IIMT UNIVERSITY
MEERUT (U.P.)
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UGC Approved
Section 2f & 12B

School of Agricultural Sciences

ACADEMIC HAND BOOK

NEW SYLLABUS AND EVALUATION SCHEME AS PER NEP 2020-21 UNDER GRADUATE CURRICULA & SYLLABUS B.Sc. (Hons.) Agriculture 2020-21 [Semester System as per ICAR 5th Deans Committee Report] (Academic Session 2024-25)

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1. PREAMBLE:

This syllabus has been designed to portray Agricultural Science as an applied science with emphasis on the acquisition of knowledge and skills associated with the content. A general review of the Junior Secondary School Agricultural Science syllabus is presumed. Candidates will be expected to answer questions on all the topics set out in the column headed syllabus. The notes therein are intended to indicate the scope of the questions which will be set, but they are not to be considered as an exhaustive list of limitations and illustration. Every school offering Agricultural Science must:

(i) Establish a farm where crops are grown;
(ii) Keep at least one species of ruminant and one non ruminant;
(iii) Establish a fish pond where feasible.

Candidates should have practical notebooks which should contain records of individual activities based on laboratory and individual observations carried out on the school farms, field trips and also records of specimens collected. In order to enhance effective teaching/learning process and better performance of candidates, continuous assessment of candidates is recommended.

2. DEFINITIONS AND NOMENCLATURE:

In these Regulations, unless the context otherwise requires:

1. "Programme" means Degree Programme like B.Sc.(Hons.) Agriculture/Computer Science / AIML / Civil / Electrical / Mechanical / Aerospace / Electronics & Communications / Electrical / Electronics & Instruments / IT / Bio-Tech branch of B.Tech. Degree Programme.
2. "Course" means a theory or practical subject that is normally studied in a semester.
3. "Vice – Chancellor of IIMT-University" means the Head of the University.
4. "Registrar" is the Head of all academic and General Administration of the University.
5. "Dean" means the authority of the school that is responsible for all academic activities of various programmes and implementation of relevant rules of these Regulations pertaining to the Academic Programmes.
6. "Controller of Examinations" means the authority of the University who is responsible for all activities related to the University Examinations, publication of results, award of grade sheets and degrees.
7. "Dean – Student Welfare" is responsible for all student related activities including student discipline, extra and co – curricular activities, attendance and meetings with class representatives, Student Council, and parent – teacher meet.
8. "HOD" means the Head of the Department concerned.
9. "University" means IIMT-University, Meerut.
10. "TCH" means Total Contact Hours – refers to the teaching – learning periods.
11. "DEC" means Department Exam Committee.
12. "BoS" means Board of Studies.
13. "ACM" means Academic Council meeting the highest authoritative body for approval of all Academic Policies.
14. "Class Co-ordinator" is a faculty of the class who takes care of the attendance, academic performance, and the general conduct of the students of that class.

15. "IA" is Internal Assessment which is assessed for every student for every course during the semester.
16. "ESE" is End Semester Examination conducted by the University at the End of the Semester for all the courses of that semester.
17. "UGC" means University Grants Commission.
18. "MHRD" means Ministry of Human Resource Development, Govt. of India.
19. "AICTE" means All India Council of Technical Education.
20. "HEI" means Higher Education Institutions.

3. Vision and Mission:

Vision:

To produce agricultural graduates with high knowledge and competence by imparting practical technical education through innovative and analytical approach with an objective to create valuable manpower for sustainable agriculture, Argo- Industry and contribution to the society.

Mission:

To accomplish the mission, B.Sc.(Hons) Agriculture faculty, with advice from stakeholders, endorses the following objectives with an aim to produce the Graduate Agriculture who:

- To provide the best possible infrastructure, facilities for innovative teaching and learning agricultural and horticultural subjects.
- To establish a centre of excellence to promote academia – Agro-Industry interface and partnerships for enthusing competence of students as per needs of the Industry.
- To empower students with latest agricultural/horticultural techniques and skills to promote their employability and encourage them to become agro-entrepreneurs with emphasis on practical-oriented teaching to develop skills and analytical capability of students.

4. Programme Educational Objectives (PEOs):

PEO-1: To provide the sound knowledge in the Agriculture and allied science subjects required to solve common problems in management of crop cultivation, improvement, livestock rearing and their marketing.

PEO-2: To develop a good teaching-learning environment for higher studies and help in selection of professional careers in government and private organization, agro- based industries, educational/ research/extension, institutes *etc.*

PEO-3: To develop the skills for leadership, ethical integrity, professional engagement in agriculture and allied science.

PEO-4: To provide adequate information about natural and other resources through a course curriculum for the betterment of life.

PEO-5: To produce highly skilled professionals in field of various branches of agriculture to meet the need of various scientific agriculture institutions as well as farmers demand for agriculture professionals.

5. Programme Outcomes (POs):

P.O.1. Understand the basic knowledge of agriculture and related subjects in the current scenario of Indian and world Agriculture.

P.O.2. Develop an understanding of communication methods, resources utilization, cultivation of crops, management of crops, and value addition of agricultural produces.

P.O.3. Develop the skills to manage agricultural farms, enhance quality of farm- produces and their commercial utilization.
P.O.4. Demonstrate the methods used in collection, presentation of data and analysis of results of experiments in laboratories and fields and their validation.
P.O.5. Understand all related methods in agriculture to increase the profit from crop fields and livestock.
P.O.6. Learn to make optimum decision at various levels that enhances the success as an agricultural enterprise.
P.O.7. Extension activities in agriculture and allied sectors around the local villages through Rural Agricultural Work Experience and Agro-industrial Attachment (RAWE & AIA).
P.O.8. Harmonize the relation with Agriculture Research Institutions, State Agriculture Universities, Krishi Vigyan Kendra (KVK) *etc.*
P.O.9. Motivate for entrepreneurship, start-up through project planning and execution, research and training during field visits *etc.*

6. Programmes Specific Outcomes (PSOs):

P.S.O.1. Develop the knowledge based resources and technologies for the enhancement of decision-making ability in students for selection of higher studies in Agriculture.
P.S.O.2. Demonstrate the thoughts of the legal and ethical issues of the environment impacting agriculture and food security of the local and global population.
P.S.O.3. Establish a self-motivated system of agriculture education to attain the local and global demands of agriculture professionals in agriculture and allied sectors.
P.S.O.4. Develop operational resources for the efficient and cost effective implementation of agriculture education.

7. Admission to the Course:

Admission to the above course shall be made on the terms & conditions as prescribed in Ordinance of IIMT University, Meerut as amended from time to time.

1. The admission policy and procedure shall be decided from time to time by the Board of Studies (BoS) of the University based on the guidelines issued by the UGC/NEP/AICTE and Ministry of Education (MoE), Government of India. Seats are also made for Non-Resident Indians and foreign nationals, who satisfy the admission eligibility norms of the University. The number of seats in each of the B.Sc.(Hons.) Agriculture degree program will be decided by the University as per the directives of AICTE/UGC/MoE, Government of India, considering the market demands.
2. The University can take 10% additional admission, in view of the short fall expected in 2nd year due to failure of students or students leaving the University.

8. Eligibility in all year as NEP (entry & exit) as per NEHQF and NSQF (if applicable)

The Candidate should have qualified in 10+2 of the State Board/CBSE board /Indian School Certificate Examination Board (ICSE)/Board of School Education, or an examination recognized equivalent there to with at least 45 % (As per UGC/GOI/Sate Govt. norms are applicable in case of candidate belonging to reserved category) in the qualifying examination. Candidate must have passed in the subjects of Physics, Chemistry, Biology/Math and English individually in the qualifying examination or Agriculture stream.

9. Curriculum

The curriculum for Bachelor of Science Honors in Agriculture Programme is designed to have minimum and maximum credits as per the evaluation scheme. Credits that are distributed

across eight semesters of study for the award of degree.

10. Medium of Instruction:

The medium of instruction is English for all courses, examinations, seminar, presentations and project reports.

11. Choice based Credit system (CBCS)/LOCF/OBE):

Structure of the Bachelor of Science Honours in Agriculture Degree Programme

Bachelor of Science Honours in Agriculture Degree Programmes will have the 4 years curriculum and syllabus as approved by the respective Board of Studies and Academic Council of the University.

The curriculum for Bachelor of Science Honours in Agriculture degree programme is designed to have minimum and maximum credits as per the scheme of 200 credits that are distributed across eight semesters of study for the award of degree.

Under CBCS, the degree programme will consist of the following categories of courses:

1. Core Course-CC
2. Discipline Specific Elective-DSE
3. Generic Elective-GE
4. Ability Enhancement Compulsory Courses-AECC
5. Skill Enhancement Courses-SEC
6. RAWE/ Research Project (RP)/Internship (Industrial/Research)

Table 1. Distribution of Credits (Evaluation Scheme)

S.No.	Category	
1.	Core Course (Theory)-CC	As per Format 1 & 2 of CBCS
2.	Discipline Specific Elective (Theory)- DSE	
3.	Generic Elective (Theory)-GE	
4.	Ability Enhancement Compulsory Courses-AECC	
5.	Skill Enhancement Courses-SEC	
6.	RAWE/Research Project (RP)/ Internship (Industrial/Research)	

12. Registration for course in a semester: Student has to pay semester fees online as per online payment facility and submit the registration form in the department.

13. Attendance:

13.1 Condonation of medical cases: For medical cases, submission of complete medical history and records with prior information from the parent / guardian to Dean Students Welfare (D.S.W.) is mandatory and put-up recommendation to the Vice–Chancellor. Such condonation is permitted only twice for a student in the entire duration of the programme.

13.2 Additional Condonation: Additional Condonation may be considered in rare and genuine cases which includes, approved leave for attending select N.C.C. / Sports Camps, cases requiring prolonged medical treatment and critical illness involving hospitalization. For such select N.C.C. / Sports Camps prior permission for leave shall

be obtained by the respective Dean / Director of sports from the designated authority, before deputing the students.

The Vice-Chancellor, based on the recommendation of Dean may then give condonation of attendance, only if the Vice-Chancellor deems it fit and deserving. But in any case, the condonation cannot exceed 10%.

13.2.1. Exemption from Attendance

The shortage of lectures to the maximum limit, to be condoned by the competent authority is as under:

S. No.	Exemptible Number of Lectures	Ground of Exemption	Competent Authority
1	All periods of the days of blood donation	Voluntarily blood donation to the Blood Bank.	Dean of the Faculty
2	Maximum 10 days attendance during a semester	For participation in Intra-University or Inter-Faculty/College Sports Tournaments/ Youth Festivals, N.C.C./ N.S.S. Camps/ University Educational Excursions/ Mountaineering Courses *etc.*	-do-
3	Maximum 15 days attendance during a semester	For participation in Inter-University Sports Tournaments/ Youth Festivals *etc.*	-do-

13.2.3. Attendance Requirements/Eligibility to Appear in Examination:

The student shall fulfill the following criteria to be eligible for appearing in the end term examinations:

(i) He/ she should bear a good moral character.

(ii) He/she should be on the rolls of the University during the Semester.

(iii) He/she should have not less than 75% of the attendance during the respective semester. The Dean of the Faculty on his own or on the recommendation of the HOD (Subjects) will have the power to give relaxation up to 5% on genuine grounds over the minimum 75% attendance requirement.

(iv) Further, the Vice Chancellor on his own or on the recommendation of the Dean will have the power to give further relaxation up to 5% on genuine grounds over the above relaxation given by the Dean.

(v) He/she should not be a defaulter in payment of tuition fees or any other dues of the University and no disciplinary action is pending against him/her.

14. Assessment procedure:

External theory (50%)

- Internal Theory + Practical (50%)
  Theory and Practical: EM 50% +Mid-term (30%) + Practical (15%) + Assignment (5%)
- Courses with only Theory
  Ext. Theory + Internal + Assignment: EM 50% +Mid-term (40%) + Assignment (10%)
- Courses with only Practical:
  (100%) Internal +Assignment (0%)

a. Internal Assessment Marks "IA": This assessment will be carried out throughout the semester as per the Academic Schedule.

b. End Semester Examination Marks "ES": This assessment will be carried out at the end of the Semester as per the Academic Schedule.

14.1. University Examinations:

(i) End Term Examinations:

The examinations of the 1st, 3rd, 5th and 7th semesters shall ordinarily be held in the month of December and those of 2nd, 4th, 6th and 8th semesters in the month of May or on such dates as fixed by the Controller of Examinations with the approval of the Vice-Chancellor.

(ii) Supplementary/ Re-appear Examinations:

Supplementary examinations of the 1st, 3rd, 5th and 7th semesters will be held along with the regular semester examinations of 1st, 3rd, 5th and 7th semesters in December and those of 2nd, 4th, 6th and 8th semesters will be held along with regular semester examinations of 2nd, 4th, 6th and 8th semesters in May or on such dates as fixed by the Controller of Examinations with the approval of the Vice-Chancellor. However, the supplementary examinations of 7thsemester may be held in the month of May along with that of even semester examinations and that of 8th semester may be held in the month December along with that of odd semester examinations. A student on the rolls of Faculty or an ex-student shall submit his/her application for admission to an examination on the prescribed form with the requisite certificate duly countersigned by the Dean of the Faculty and examination fee.

(iii.) Distribution of Marks:

The distribution of marks in various papers shall be as given in the Scheme of Examinations approved by the Board of Studies/the Academic Council.

Declaration of Results:

(i) After the semester examinations are over, the Controller of Examinations shall declare the results of those students who had appeared in the examinations.

(ii) Each successful student/ the student placed in re-appear shall be provided a copy of the Detailed Marks Card of each semester examination.

(iii) The student, whose result is declared late due to some reasons, can provisionally attend classes of the next higher semester at his /her own risk and responsibility, subject to his /her passing the concerned semester examination. In case, the student fails to pass the concerned semester examination, his/her attendance/internal assessment in the next higher semester in which he / she was provisionally allowed to attend class, shall stand cancelled.

Criteria for Promotion to Higher Semester:

All the students will be automatically promoted to 2nd, 4th, 6th and 8th semester without any condition of passing minimum number of papers. For promotion from 2nd to 3rd semester, the student shall have to clear at least 50% papers of 1st semester; for promotion from 4th to 5th semester, the student shall have to clear at least 50% papers of 1st, 2nd and 3rd semesters taken together. For promotion from 6th to 7th semester, the student shall have to clear at least 50% papers of 1st, 2nd, 3rd, 4th and 5th semesters taken together.

1. Pass Percentage:

The pass percentage for Internal (Theory and Practical) will be 40% to be eligible to appear in End Term Examination (External Theory), whereas overall pass percentage will be 50% including external theory and internal (theory and practical). Minimum CGPA for award of degree will be 5.5.

2. Improvement Examination:

The student shall be permitted to improve his/her result subject to the following conditions:

i) The student will be permitted to appear in improvement examinations as a previous batch-student, with the regular batch for the purpose of improvement.

ii) The student will be permitted to improve his/her grade only in those papers in which he/she has obtained less than 1st division (60%).

iii) Only one chance for each semester will be given. The chance must be availed within a period of two years after passing of the final examination.

iv) The student shall be allowed to appear in the improvement examination(s) along with the students of regular batch as and when the concerned course is offered. No separate examination will be held for improvement of the result. In case of any change in the syllabi, the student shall have to appear for improvement in accordance with the changed syllabi of the concerned course applicable to the regular students.

v) If the status/nature of the student's result does not change, his/her "improvement Result" will be declared "PRS" (Previous Result Stands).

3. Other Provisions:

i) Provisions in Chapter 5 (Conduct of Examinations) of 1st Ordinance of the University will be applicable in the matters that are not covered by the Subject Ordinance.

ii) Each student has to pass the course "Environmental Science". It will be registered by the student in the semester as prescribed in the Scheme of Examinations. It will be a qualifying compulsory paper. Paper for this course will be set and evaluated by the internal examiner to be appointed by the Controller of Examination with the approval of the Vice-Chancellor. Its score will not be taken into account while computing the Division/Grade.

iii) Nothing in the Ordinance shall debar the University from amending the Ordinance, if required and the same shall be applicable to all the students whether old or new.

iv) Any other provisions not contained in the Ordinance shall be governed by the rules and regulations framed by the University from time to time.

v) In case of any dispute, the Vice-Chancellor will be the competent authority to interpret the rules and his interpretation shall be final and binding.

4. Setting of Question Papers and Examination:

4.1. Paper to be set by external: Dean/HoD shall ensure the coverage of syllabus. If needed moderation can be done Evaluation to be done internally by the faculty other than the Course Instructor. Syllabus of the concerned course shall be sent to the external examiner, who shall prepare the question papers. For practical, it is recommended that examination shall be conducted by course instructor(s) and one teacher nominated by Dean Agriculture.The duration of final external theory examination will be 03 hours and practical 02 hours.

i) The Head of the Department/Dean of the Faculty shall supply the panel of internal and external examiners well in time duly approved by the Board of Studies to the Controller

of Examinations. The paper(s) will be set by the examiner(s) nominated by the Vice-Chancellor from the panel of examiners.

ii) An examiner shall be allowed to set not more than two papers in a semester examination.

4.2. Evaluation Process – Theory, Practical and Viva Voce:

(A) Evaluation of Answer Books:

The answer books may be evaluated either by paper setter or by any other **internal or external examiner** to be nominated by the Controller of Examinations. In case, such examiner does not evaluate the answer books in the given schedule, the Controller of Examinations may get the answer book(s) evaluated from any other expert in the subject with the approval of the Vice-Chancellor.

(B) Re-evaluation of Answer Books:

i) Re-evaluation will be permitted only for the theory papers.

ii) No re-evaluation will be allowed for examinations in practical/Viva-Voce/ Training Report/ Project Report/ Sessional / Thesis / Dissertation, *etc.* or in any other paper where there is a joint evaluation by two examiners.

iii) The candidate may apply for re-evaluation in theory paper only on the prescribed form in an examination taken by him/her within ten (10) days of the declaration of the result along with a copy of Detail-Mark Certificate or the downloaded result and prescribed fee. No re-evaluation form will be accepted thereafter under any circumstances.

iv) The University will not be responsible for any postal delay in the receipt of the evaluation request from the student, if sent by post.

v) Award of Re-Evaluation Marks/Score:

a)	When increase/decrease is up to 15% of the maximum marks obtained in the paper concerned, the higher marks will be awarded to the student.
b)	When increase/decrease is more than 15% of the maximum marks in the paper concerned the answer book will be got evaluated by the second Re-Evaluator and the average of two highest scores will be awarded.

vi) Final result of re-evaluation favorable or against will be binding on the student and it will supersede the original score/result.

(C) Practical Examinations:

(i) Practical examinations shall be conducted by course instructor(s) and one teacher nominated by Dean/HOD.

(ii) The student who fails to obtain the pass marks in practical examination can be allowed to re-appear as laid down under (i) of above as per schedule specified for the Supplementary Examinations.

Internal Examination:

As given in 16 (B) above, the internal theory and practical will be of 50% marks.

Courses with Theory + Practical, the Mid-term Exam (30%) + Assignment (5%) in practical oriented courses + Practical (15%); Courses with only Theory Mid-term Exam (40%) + Assignment (10%) and Courses with only Practical: (100%) Internal, Internal theory examination/assessment will include attendance, mid-term test, quiz/seminar *etc.*

- Internal practical examination/assessment will include attendance, lab. Work, practical report, written examination and viva-voce.

Distribution of marks for attendance	05 marks (Less than 75%= 0; 76-80%= 1 mark; 81-85%=2 marks; 86-90%=3 marks; 91-95%=4 marks; 96-100%=5 marks)/if marks less or more than 5, the distribution will be in the ratio mentioned

The dates of internal examinations will be decided by the Dean/ HOD. The answer books for the same will be supplied by the Examination Branch.

(i) In case of those ex-students who will be appearing for re-appear / improvement examination in any semester, their previous internal examination marks awarded, will be counted for the purpose. The concerned teacher shall preserve the records on the basis of which the internal examination marks have been awarded, and shall make the same available to the Controller of Examinations whenever required.

(ii) The Head of the Department/ Dean shall ensure:

(a) That the internal examination marks are displayed on the Notice Board for information of the students at least seven (07) days before the commencement of the end term examinations of the semester.

(b) That the internal examination marks are submitted to the Controller of Examinations at least seven (07) days before the commencement of the examinations of each semester.

15. Research Project/Semester Project / RAWE / ELP Assessment Criteria:
The general guidelines for assessment of Project are given in Table 2.

Table 2: Assessment pattern

S. No.	Parameters	Max. Marks
1	Project Planning and Writing	10
2	Presentation	10
3	Regularity	10
4	Monthly Assessment	10
5	Output delivery	10
6	Technical Skill Development	10
7	Entrepreneurship Skills	10
8	Business networking skills	10
9	Report Writing Skills	10
10	Final Presentation	10
	Total	**100**

16. Internship – Research / Industrial Internship-In agriculture, hands-on experience is a must, and an agriculture internship is the best way to get your hands dirty. As an agriculture intern, you'll learn about agronomy, profitability, yield, storage, and procurement.

17. For non – credit courses / audit courses: The Assessment will be done based on the respective assessment as per rubrics approved by Board of Studies (BOS).A student securing less than the minimum specified internal assessment marks in any course will not be permitted

to appear for the end-semester examination in that course and will be graded under "CO (Carry Over)" category for that course. This will be denoted in the grade sheet as "CO (Carry Over)", till the course is successfully completed in the subsequent semester(s).

18. Credit weightage: Credits are the weightage, assigned to the courses based on the following general pattern:

One Hour	1 credit
Two Hour Practical	1 credit

19. Maximum duration of programme/promotion policy

The duration of B. Sc. (Hons.) Agriculture course shall be of four academic years. Each year shall be divided into two semesters. Thus, the course shall comprise of eight semesters will spread over four years. On completion of all the eight semesters, the student will be awarded B.Sc. (Hons.) Agriculture degree. The student shall complete all the eight semesters within a maximum period of 6 (six) years from the date of admission to the first semester. However, he/she may be given one more year by the Academic Council under special circumstances which will be duly recorded in the Council's resolution

20. Maximum gaps between semester/year

As per UGC Norms.

21. CREDIT SYSTEM & GRADING CGPA/SGPA

21.1 Credit system IIMT-University implemented the UGC guidelines for implementation of the choice-based credit system with a view to offer student's choice of courses within a programme with a flexibility to complete the programme by earning credits at a pace decided by the students themselves. The system allowed students to choose inter-disciplinary, intra-disciplinary courses according to their learning needs, interest and aptitude. It was considered as a cafeteria approach and was expected to provide mobility to students.

As per the Current credit system practiced in institutions needs comprehensive reforms as they offer very little flexibility, choice and are less learner centric. Degrees offered today are more self-contained focusing on a specialization area and depend a lot on knowledge available with the faculty from the department only. Though the most requisite credit system does exist, wherein students are given a wide choice and flexibility, these exist as small islands in the vast ocean of thousands of educational institutes in India. In such institutions, the curriculum is frequently designed which is learner centric and offering a wide specialization area for students to pick and choose courses from.

The institutions shall make attempts wherein the design of the credit system and the teaching and evaluation modes shall be the responsibility of individual course teachers. The students should have the freedom to opt for courses from other specializations and not just from their core specialization. For this there has to be stronger collaborations between departments of the University and outside.

21.2 GRADING SYSTEM

The school follows the absolute grading system which is a simple procedure wherein the marks obtained by students correspond to a specific grade and grade point. It reflects the individual

performance in a particular subject without any reference to the group/class. The absolute grading system has limitations and may be susceptible to some inconsistencies.

The relative grading system on the other hand provides relative performance of a student to a group/class wherein the student is ranked in a group/class on basis of relative level of achievement. In this system decisions are made in advance by the faculty members as to what proportion of students would be awarded a particular grade on the basis of their relative performance and which is done by assigning grades on basis of a normal curve. This facilitates comparative performance and eliminates negative effect of pass or fail.

A grading system as shown in Table 3 will be followed.

Table 3: Grading system

Letter Grade	Range
A+	TM>M+1.75SD
A	M+1.25 SD ≤TM<M+1.75SD
B+	M+0.75 SD ≤TM<M+1.25SD
B	M+0.25 SD ≤ TM < M+0.75 SD
C+	M-0.25 SD ≤ TM < M-0.25 SD
C	M-0.75 SD ≤ TM < M-0.25 SD
D+	M-1.25 SD ≤ TM < M-0.75 SD
D	M-1.75 SD ≤ TM < M-1.25 SD
E+	M-2.0 SD ≤ TM < M-1.75 SD
E	M-2.25 SD ≤ TM < M-2.0 SD
F	M-2.25 SD > TM
CO	Carry Over (Summer / Winter) due to Attendance deficiency (between 40% and 75%)and/orI. Lack of minimum IA marks as specified in clause 10.0 Table 3.
RA	Repeat the course due to (i) Lack of minimum attendance (below 40%) in regular course.
--	DETAINED "RC" or "RA" or both in all registered theory courses of a semester. The student is detained and has to repeat the entire semester.

Letter grades may be improved based on the following scheme: Use the table above to determine grade boundaries. Look for natural gaps in the neighborhood of grade boundaries. Choose the largest gap in the neighborhood and make this as the grade boundary.

An 'E', 'E+' and 'F' grade may not be a purely relative grade. These may be assigned on the following basis:

- A minimum, say 30/100, may be set as pass marks for the course. A fail grade may then be awarded only if the Total Marks for the course are less than 30. Otherwise, the students may be awarded the Just Pass Grade D.
- A fail grade may be awarded to students whose marks are below the prescribed minimum even if the table above leads to a pass grade.

Similarly, a lower limit may be set for the A grade also, for instance greater than or equal to 86. Students not achieving the prescribed minimum may be awarded a lower letter grade even

if the table above indicates otherwise. A pass grade may be made mandatory for both internal as well as external examinations in the case of a separate internal and external assessment,

a. Internal and External marks may be summed up with appropriate weightages to compute a total out of 100 marks. The letter grade may be assigned on this computed total.
b. Internal and external marks may be graded separately and then the assigned grade points may be used, with appropriate weightages, to compute a final grade point and letter grade.

Grading in the case of Re-evaluations, Retests and Remedial Examinations may be based on the following guidelines:

a. The ranges of marks once computed for awarding letter grades the first time, called the First Distribution (FD), will not be modified.
b. If a re-evaluation leads to a change in marks, then FD will be used to award an appropriate letter grade.
c. A retest may be permitted if
    i. A student gets a letter grade of E+ or E. In this case, irrespective of the marks obtained, at most D grade may be awarded.
    ii. A student is unable to complete course requirements because of certified illness or tragedy. In this case FD will be used to award an appropriate letter grade.

The use of relative grading system may be recommended in autonomous institutions, institutes of national importance and institutions with high ranking. The results of the relative grading system may be shared by such institutions later with other interested institutions to implement the same.

21.2 GPA and CGPA

GPA is the ratio of the sum of the product of the number of credits Ci of course "i" and the grade points Pi earned for that course taken over all courses "i" registered and successfully completed by the student to the sum of Ci for all "i". That is,

$$GPA = \frac{\sum_i C_i P_i}{\sum_i C_i}$$

CGPA will be calculated in a similar manner, in any semester, considering all the courses enrolled from the first semester onwards.

The Grade card will not include the computation of GPA and CGPA for courses with letter grade CO, RC and U until those grades are converted to the regular grades.
A course successfully completed cannot be repeated

22. CLASS/DIVISION

Classification is based on CGPA and is as follows:
CGPA ≥ 8.0: First Class with distinction
6.5 ≤ CGPA <8.0: First Class
5.0 ≤ CGPA <6.5: Second Class.

Further, the award of 'First class with distinction' is subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses in his/her first appearance with effect from II semester, within the minimum duration of the programme.

(The award of 'First Class' is further subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses within 4 years for Bachelor of Sciences Honours in Agriculture.

23. Transfer of credit /Academic Credit Bank

University Grants Commission initiated the concept of National Academic Credit Bank (NAC-Bank) which will be a digital / virtual / online entity to be established and managed by UGC. The main objective of the NAC-Bank would be to facilitate student mobility across the education system wherein the credits can be accumulated and be used at alter point of time for the requirements of partial fulfillment of a degree program.

a. The Academic Bank of Credits (ABC) has been envisaged to facilitate the academic mobility of students with the freedom to study across the Higher Education Institutions in the country with an appropriate "credit transfer" mechanism from one programme to another, leading to attain a Degree/ Diploma/PG-diploma, *etc.*

b. The Academic Council may also approve admission of students who have completed a portion of course work in another approved Institute of repute under Multiple entry & Exit system, based on the recommendation of the credit transfer committee on a case-to-case basis.

c. Students who have completed coursework, at least first year, at some university other than the university to which transfer is sought (may request for transfer of admission to this university. A student may be granted admission only through an admission process that will follow the same policy as for fresh admissions. However, a uniform credit system must be followed by all universities to effect transfer of credits.

24. Change of discipline

"Academic Flexibility" is the provision for innovative and interchangeable curricular structures to enable creative combinations of Courses/Programmes in Disciplines of study leading to Degree/Diploma/PG Diploma/Certificate of Study offering multiple entry and multiple exit facilities in tune with National Education Policy-2020, while removing the rigid curricular boundaries and creating new possibilities of life-long learning.

25. USE OF TECHNOLOGICAL INTERVENTION

The use of educational technology and information communication technologies (ICTs) in education is the need of the hour. With the proliferation of different types of access devices, especially mobile access devices, technology has the potential to augment traditional classroom practices and revolutionize learning and evaluation methods. Technology, in fact can be an important driver to enable lifelong learning. Learning and engagement of students is facilitated by use of technology through several modes such as synchronous learning, semi-synchronous learning, blended learning, collaborative learning, flipped classroom *etc.* MOOC's, especially provided through SWAYAM, are a window of opportunity for lifelong learning and are offered through technology-based platforms. Learning Management systems (LMS) may be used by institutions to integrate the entire teaching, learning and evaluation process. Open-source learning systems may be used for posting content in the form of videos, audios, e-learning modules, live class sessions *etc.* Use of plagiarism detection software will be highly recommended to check originality of content.

26. STUDENTDISCIPLINE:

Every student is required to observe utmost discipline and decorum both inside and outside the campus and not to indulge in any activity which may affect adversely the prestige reputation of the university.

27. STUDENT WELFARE:

Any act of indiscipline of a student reported to the Dean (Students Welfare) and Head of the Department will be referred to a Discipline Committee constituted for the purpose. The Committee will enquire into the charges and decide on a suitable punishment if the charges are sub-stantiated. The committee will also authorize the Dean (Students Welfare) to recommend to the Vice-Chancellor for the implementation of the decision. The student concerned may appeal to the Vice-Chancellor, whose decision will be the final.

28. RAGGING:

Ragging in any form is a criminal and non-boilable offence in our country. The current State and Central legislations provide stringent punishments including imprisonment. Once the involvement of a student(s) is established in ragging, offending fellow students/staff, harassment of any nature to the fellow students/staff *etc.* the student(s) will be liable to be dismissed from the University, as per the laid down procedures of the UGC / Govt. /Institute. Every senior student at the University, along with their parent, shall give an undertaking every year in this regard and the same should be submitted at the time of Registration

29. Power of modify- School of Agricultural Sciences conduct various types of workshop/seminar/ faculty development programme/quiz *etc.*

30. Exit point- As per NEP

1. UG-Certificate in Agriculture (exit after first year and completion of 10 weeks' internship)
2. UG-Diploma in Agriculture (exit after second year and completion of 10 weeks' internship)
3. B. Sc (Hons) Agriculture (on successful completion of four-year degree requirements)

31. NC/Credit Course- For non-credit courses 'Satisfactory' or "Unsatisfactory' shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

32. Any other heading as per your program: NA

EVALUATION SCHEME

SEMESTER-I

S. No	Course Code	Course Name	Credit Hours			Evaluation Scheme				
			L	P	Total Credit	Ext. Theory + Internal + Assignment			Practical	Total Marks
						EM	IM	AM		
Core Course										
1	AG-101N	Fundamentals of Agronomy	2	1	3	50	30	5	15	100
2	AG-102N	Fundamentals of Genetics	2	1	3	50	30	5	15	100
3	AG-103N	Fundamentals of Soil Science	2	1	3	50	30	5	15	100
4	AG-104N	Fundamentals of Horticulture	1	1	2	50	30	5	15	100
5	AG-105N	Rural Sociology & Educational Psychology	1	1	2	50	30	5	15	100
6	AG-106N	Introduction to Forestry	1	1	2	50	30	5	15	100
7	AG-107N	Introductory Animal Husbandry	2	1	3	50	30	5	15	100
8	AG-108N	Comprehension & Communication Skills in English	1	1	2	50	30	5	15	100
***R- Remedial Courses**										
9	AG-109N	Agricultural Heritage*	1	0	1	50	40	10	-	100
10	AG-110N	Introductory Biology*	1	1	2	50	30	5	15	100
11	AG-111N	Elementary Mathematics*	2	0	2	50	40	10	-	100
****NC: Non-gradial courses**										
12	AG-112C	Physical Education & Yoga Practices**	0	2	2	-	-	-	100	100
Total- R*: Remedial Course NC: Non-Gradial Course**			**12**	**8**	**20+5*+2****					**1200**
Note: 1. Agriculture & Bio based students will study: Elementary Mathematics **2. Math based students will study:** Introductory Biology										

Note: EM-External Marks**, IM-** Internal Marks, **AM-** Assignment Marks**, PM-** Practical Marks

SEMESTER-II

S. No	Course Code	Course Name	Credit Hours			Evaluation Scheme				
			L	P	Total Credit	Ext. Theory + Internal + Assignment			Practical	Total Marks
						EM	IM	AM		
Core Course										
1	AG-201N	Fundamentals of Crop Physiology	2	1	3	50	30	5	15	100
2	AG-202N	Fundamentals of Plant Biochemistry	2	1	3	50	30	5	15	100
3	AG-203N	Fundamentals of Entomology-I	2	1	3	50	30	5	15	100
4	AG-204N	Fundamentals of Agricultural Economics	2	0	2	50	40	10	-	100
5	AG-205N	Principles of Organic Fanning	1	1	2	50	30	5	15	100
6	AG-206N	Fundamentals of Plant Pathology	3	1	4	50	30	5	15	100
7	AG-207N	Production Technology for Vegetables and Spices	1	1	2	50	30	5	15	100
8	AG-208N	Fundamentals of Agricultural Extension Education	2	1	3	50	30	5	15	100
9	AG-209N	Food Processing & Safety Issue	2	1	3	50	30	5	15	100
****NC: Non-gradial courses**										
10	AG-210N	**Human Values & Ethics	1	0	1	50	40	10	-	100
Total Credits - NC: Non- Gradial Course**			**17**	**8**	**25+1****					**1000**

SEMESTER-III

S. No	Course Code	Course Name	Credit Hours			Evaluation Scheme				
			L	P	Total Credit	Ext. Theory + Internal + Assignment			Practical	Total Marks
						EM	IM	AM		
Core Course										
1	AG-301N	Crop Production Technology -1 (Kharif crops)	1	1	2	50	30	5	15	100
2	AG-302N	Practical Crop Production-I (Kharif Crops)	0	2	2	-	-	-	100	100
3	AG-303N	Fundamentals of Plant Breeding	2	1	3	50	30	5	15	100
4	AG-304N	Agricultural Microbiology	1	1	2	50	30	5	15	100
5	AG-305N	Agricultural Finance and Co-Operation	2	1	3	50	30	5	15	100
6	AG-306N	Farm Machinery and Power	2	1	3	50	30	5	15	100
7	AG-307N	Principles of Integrated Disease Management	2	1	3	50	30	5	15	100
8	AG-308N	Environmental Studies & Disaster Management	1	1	2	50	30	5	15	100
9	AG-309N	Statistical Methods	1	1	2	50	30	5	15	100
10	AG-310N	Fundamental of Soil and Water Conservation	1	1	2	50	30	5	15	100
11	AG-311N	Dairy Science	2	1	3	50	30	5	15	100
12	AG-312N	Fundamentals of Entomology-II	1	1	2	50	30	5	15	100
Total Credits			**16**	**13**	**29**					**1200**

SEMESTER-IV

S. No	Course Code	Course Name	Credit Hours			Evaluation Scheme				
			L	P	Total Credit	Ext. Theory + Internal + Assignment			Practical	Total Marks
						EM	IM	AM		
Core Course										
1.	AG-401N	Crop Production Technology - II (Rabi crops)	1	1	2	50	30	5	15	100
2.	AG-402N	Practical Crop Production-II (Rabi Crops)	0	2	2	-	-	-	100	100
3.	AG-403N	Principles of Seed Technology	2	1	3	50	30	5	15	100
4.	AG-404N	Problematic soils and their Management	1	1	2	50	30	5	15	100
5..	AG 405N	Fundamentals of Biotechnology	2	1	3	50	30	5	15	100
6.	AG-406N	Renewable Energy and Green Technology	1	1	2	50	30	5	15	100
7.	AG-407N	Production Technology for Ornamental Crops, MAP and Landscaping	1	1	2	50	30	5	15	100
8.	AG-408N	Entrepreneurship Development and Business Communication	1	1	2	50	30	5	15	100
9.	AG-409N	Introductory Agro-meteorology & Climate Change	1	1	2	50	30	5	15	100
10.	AG-410N	Agri- Informatics	1	1	2	50	30	5	15	100
11.	AG-411N	Poultry Production & Management	2	1	3	50	30	5	15	100
Total Credits			**13**	**12**	**25**					**1100**

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SEMESTER-V

S. No.	Course Code	Course Name	Credit Hours			Evaluation Scheme				
			L	P	Total Credit	Ext. Theory + Internal + Assignment			Practical	Total Marks
						EM	IM	AM		
Core Course										
1.	AG-501N	Rainfed and dry land Agriculture	1	1	2	50	30	5	15	100
2.	AG-502N	Crop Improvement-1 (Kharif crops)	1	1	2	50	30	5	15	100
3.	AG-503N	Pests of field crops & Stored Grain and their Management	2	1	3	50	30	5	15	100
4.	AG-504N	Agricultural Marketing Trade & Prices	2	1	3	50	30	5	15	100
5..	AG-505N	Protected Cultivation and Secondary Agriculture	2	1	3	50	30	5	15	100
6.	AG-506N	Diseases of Field and Horticultural Crops and their Management-I	2	1	3	50	30	5	15	100
7.	AG-507N	Production Technology for Fruit and Plantation Crops	1	1	2	50	30	5	15	100
8.	AG-508N	Communication Skills and Personality Development	1	1	2	50	30	5	15	100
9.	AG-509N	Intellectual Property Rights	1	0	1	50	40	10	-	100
10.	AG-510N	Principles of Food Science & Nutrition	2	1	3	50	30	5	15	100
11.	AG-511N	Geo-informatics and Nanotechnology	1	1	2	50	30	5	15	100
Elective Course (Student will opt any one of the three)										
12.	AGE-51N	Agribusiness Management	2	1	3	50	30	5	15	100
	AGE-52N	Agrochemicals								
	AGE-53N	Commercial Plant Breeding								
	AGE-54N	Landscaping								
	AGE-55N	Food Safety and Standards								
	AGE-56N	Bio pesticides & Bio fertilizer								
Total Credits			**18**	**11**	**29**					**1200**

SEMESTER-VI

S. No.	Course Code	Course Name	Credit Hours			Evaluation Scheme				
			L	P	Total Credit	Ext. Theory + Internal + Assignment			Practical	Total Marks
						EM	IM	AM		
Core Course										
1	AG-601N	Farming System, Precision Farming & Sustainable Agriculture	1	1	2	50	30	5	15	100
2	AG-602N	Crop Improvement-11 (Rabi crops)	1	1	2	50	30	5	15	100
3	AG-603N	Manures Fertilizers and Soil Fertility Management	2	1	3	50	30	5	15	100
4	AG-604N	Farm Management, Production & Resource Economics	1	1	2	50	30	5	15	100
5	AG-605N	Diseases of Field and Horticultural Crops and their Management-II	2	1	3	50	30	5	15	100
6	AG-606N	Post-harvest Management and Value Addition of Fruits and Vegetables	1	1	2	50	30	5	15	100
7	AG-607N	Watershed and Wasteland Management	1	1	2	50	30	5	15	100
8	AG-608N	Beneficial insects and Pest of Horticultural Crops and their Management	2	1	3	50	30	5	15	100
9	AGT	**Educational Tour	0	2	2	-	-	-	100	100
Elective Course (Student will opt any one of the three)										
10	AGE-61N	Protected Cultivation	2	1	3	50	30	5	15	100
	AGE-62N	Hi-tech. Horticulture								
	AGE-63N	Weed Management								
	AGE-64N	System Simulation and Agro-advisory								
	AGE-65N	Agricultural Journalism								
	AGE-66N	Composition cum Duck/(and) Quail/(and) Rabbit culture								
Total Credits – NC: Non- Gradial Course**			**13**	**2**	**22+2****					**1000**

SEMESTER-VII

Rural Agricultural Work Experience and Agro-Industrial Attachment (RAWE & AIA)								
Subjects Code	**Activities**	**Lectures Weekly**			**Total Credit**	**Internal**	**External**	**Total**
		L	**T**	**P**				
Component-I								
RAWE-411	**Rural Agricultural Work Experience**	**0**	**0**	**14**	**14**	**240**	**60**	**300**
1	General orientation & On campus training by different faculties	0	0	1	1	80	20	100
2	Village attachment	0	0	8	8	80	20	100
3	Unit attachment in Univ./ College. KVK/ Research Station Attachment	0	0	5	5	80	20	100
Component-II								
AIA-412	**Agro-Industrial Attachment**	**0**	**0**	**3**	**3**	**240**	**60**	**300**
• Students shall be placed in Agro-and Cottage industries and Commodities Boards for 03 weeks. • Industries include Seed/Sapling production, Pesticides-insecticides. Post-harvest-processing- value addition, Agri-finance institutions. etc.		0	0	3	3	80	20	100
Plant clinic Seed/Sampling production, Pesticide/insecticide, post-harvest industries, processing-value addition, Agri –finance institutions etc.		0	0	2	2	80	20	100
Project Report Preparation, Presentation and Evaluation		0	0	1	1	80	20	100
Total weeks for RAWE & AIA					**20**	**480**	**120**	**600**

RAWE Component -II Agro Industrial Attachment

- Students shall be placed in Agro-and Cottage industries and Commodities Boards for 03 weeks.
- Industries include Seed/Sapling production, Pesticides-insecticides. Post-harvest-processing- value addition, Agri-finance institutions. etc.

Activities and Tasks during Agro-Industrial Attachment Programme

- Acquaintance with industry and staff
- Study of structure, functioning, objective and mandates of the industry

- Study of various processing units and hands-on trainings under supervision of industry staff
- Ethics of industry
- Employment generated by the industry
- Contribution of the industry promoting environment
- Learning business network including outlets of the industry
- Skill development in all crucial tasks of the industry
- Documentation of the activities and task performed by the students
- Performance evaluation appraisal and ranking of students

SEMESTER-VIII

READY- Component –III (Experiential Learning Programme)
Modules for Skill Development and Entrepreneurship
A student has to register 20 credits opting for two modules of (0+10) credits each (total 20 credits) from the package of modules in the VIII Semester

Course Code	Title of the module	Credit Hours		Total Credit	Internal	External	Total
		T	P				
ELP-421	Production Technology for Bioagents and Biofertilizer	0	10	10	80	20	100
ELP-422	Seed Production and Technology	0	10	10	80	20	100
ELP-423	Mushroom Cultivation Technology	0	10	10	80	20	100
ELP-424	Soil, Plant, Water and Seed Testing	0	10	10	80	20	100
ELP-425	Commercial Beekeeping	0	10	10	80	20	100
ELP-426	Poultry Production Technology	0	10	10	80	20	100
ELP-427	Commercial Horticulture	0	10	10	80	20	100
ELP-428	Floriculture and Landscaping	0	10	10	80	20	100
ELP-429	Food Processing	0	10	10	80	20	100
ELP-430	Agriculture Waste Management	0	10	10	80	20	100
ELP-431	Organic Production Technology	0	10	10	80	20	100
ELP-432	Commercial Sericulture	0	10	10	80	20	100

Evaluation of Experiential Learning Programme

S. No.	Parameters	Max. Marks
1	Project Planning and Writing	10
2	Presentation	10
3	Regularity	10
4	Monthly Assessment	10
5	Output delivery	10
6	Technical Skill Development	10
7	Entrepreneurship Skills	10
8	Business networking skills	10
9	Report Writing Skills	10
10	Final Presentation	10
	Total	**100**

FORMAT – 1

NEP-2020 IMPLEMENTATION 3 STEPS PLAN (FORMAT-1, 2 & 3)
CBCS: Statement of Credits Distribution

Format -1

College/School: School of Agricultural Sciences Programme: B. Sc (Hons) Agriculture Duration: UG (6 Sem.), UG (Hons./Research) 8 Sem., PG (4 Sem.)	Credit range:Minimum 120 for UG 160 for UG (Hons.), 80 for PG (Suggested by CBCS-NEP Committee)

COURSE	CREDIT	SEMESTER	CORE (Th 4+P 2) Major	DSE (Th 4+P 2) Minor	AECC (Th 3)	SEC **	GE (Th 4) Interdisciplinary	General Elective (2)	Value Added Course (VAC) (2)	Industrial Training/ Survey / Research Project (4)	Prerequisite/ Remedial courses	Total Credits
Certificate Course in B. Sc Agriculture	54	1st	C1 C2 C1: Fundamentals of Agronomy 3(2+1) C2: Fundamentals of Genetics 3(2+1) C3: Fundamentals of Soil Science 3(2+1) C4: Fundamentals of Horticulture 2(1+1) C5: Rural Sociology & Educational Psychology 2(1+1) C6: Introduction to Forestry 2(1+1) C7: Introductory Animal Husbandry 3(2+1)	DSE-1A/B	AECC-1 Comprehension & Communication Skills in English 2(1+1)/Environment Science AECC-1 Comprehension & Communication Skills in English 2(1+1)/Environment Science				VAC-1 Physical Education/Yoga Practices 2(0+2)		AG-109N Agricultural Heritage 1(1+0) AG-110N Introductory Biology 2(1+1) AG-111N Elementary Mathematics 2(2+0) **Note**: Students who have Biology in XII std Study Math and Students who have Math in XII std to Study Biology course.	27

		2nd	C8: Fundamentals of Crop Physiology 3(2+1) C9: Fundamentals of Plant Biochemistry 3(2+1) C10: Fundamentals of Entomology-I 3(2+1) C11: Fundamentals of Agricultural Economics 2(2+0) C12: Fundamentals of Plant Pathology 4(3+1) C13: Production Technology for Vegetables and Spices 2(1+1) C14: Fundamentals of Agricultural Extension Education 3(2+1) C15 3(2+1) Food Processing & Safety Issue		AECC-2 :**Human Values & Ethics 1(1+0)	SEC 1 – MOOCs/NPTEL			VAC-2 Principles of Organic Farming			27
	Entry and Exit point (Post-II semester- student has to complete 10 weeks internship)											

Diploma in B. Sc. Agriculture	1 0 7	3rd	C16: Crop Production Technology-1 (Kharif crops2(1+1) C17 Practical Crop Production -1 (Kharif crops) 2 (0+2) C18: Fundamentals of Plant Breeding 3(2+1) C19: Agricultural Microbiology 2(1+1) C20: Agricultural Finance and Co-Operation 3(2+1) C21Farm Machinery and Power 3 (2+1) C22Principles of Integrated Disease Management 3(2+1) C23: Statistical Methods 2(1+1) C24: Fundamental of Soil and Water Conservation 2(1+1) C25Dairy Science C26: Fundamentals of Entomology-II 2(1+1)		AECC-3Environmental Studies & Disaster Management 2(1+1)/Comprehension & Communication Skills in English						28

		4th	C27: Crop Production Technology-II (Rabi crops) 2(1+1) C28 Practical Crop Production - II (Rabi crops) 2(0+2) C29: Principles of Seed Technology 3(2+1) C30: Problematic soils and their Management 2(1+1) C31: Fundamentals of Bio-Technology 3(2+1) C32: Renewable Energy and Green Technology 2(1+1) C33: Production Technology for Ornamental Crops, MAP and Landscaping 2(1+1) C34: Introductory Agro-meteorology & Climate Change 2(1+1) C35Poultry Production & Management 3(2+1) C36Agri-Informatics 2(1+1)		AECC-4 Communication Skills and Personality Development 2(1+1)	SEC 2-Entrepreneurship Development and Business Communication 2(1+1)					25
	Entry and Exit point (Post-IV semester- student has to complete 10 weeks internship)										

		5th	C37: Rainfed and Dryland Agriculture 2(1+1) C38: Crop Improvement-1 (Kharif crops) 2(1+1) C39: Pests of Crops and Stored Grain	DSE-1Agrochemicals 3(2+1) DSE-2 Commercial Plant Breeding 3(2+1) DSE-3 Landscaping 3(2+1) DSE-4 Bio pesticides & Bio fertilizer 3(2+1)	AECC-7 Intellectual Property Rights 1(1+0) AECC-8 Geo-informatics and Nano Technology 2(1+1)		GE1: Agribusiness Management 3(2+1) GE2: Foo Safety ar Standards 3(2+1)				29
			and their Management 3(2+1) C40: Agricultural Marketing Trade & Prices 3(2+1) C41 Protected Cultivation and Secondary Agriculture 3(2+1) C42: Diseases of Field and Horticultural Crops and their Management-I 3(2+1) C43: Production Technology for Fruit and Plantation Crops 2(1+1) C44: Principles of Food Science & Nutrition 3(2+1)								

		6th	C45: Farming System, Precision Farming & Sustainable Agriculture 2(1+1) C46: Crop Improvement-II (Rabi crops) 2(1+1) C47: Manures. Fertilizers and Soil Fertility Management 3(2+1) C48: Farm Management, Production & Resource Economics 2(1+1) C49: Diseases of Field and Horticultural Crops and their Management-II 3(2+1) C50: Watershed and Wasteland Management 2(1+1) C51Beneficial insects and Pest of Horticultural Crops and their Management 3(2+1) C52AGT-Educational Tour 2(0+2) C53: Post-harvest Management and Value Addition of Fruits and Vegetables 2(1+1)	DSE-5 Protected Cultivation 3(2+1) DSE-6 Hi-tech. Horticulture 3(2+1) DSE-7 Weed Management 3(2+1) 3(2+1) DSE-8 Composition cum Duck/(and)Quail/(and) Rabbit culture 3(2+1)		SEC 3-MOOCs/NPTEL	**GE-3**System Simulation and Agro-advisory 3(2+1) GE4: DSE-11 Agricultural Journalism		**VAC-3** AI in Agriculture		24
Degree in B.Sc. (Hons) Agriculture	200	7th	Rural Agricultural Work Experience (RAWE) and Agro-industrial Attachment(AIA)-20(16+4)							RP-1 Agro-Industrial Attachment, Project Report preparation	20
		8th								Skill Development and Entrepreneurship – 20	20

Note: For 04 years undergraduate programmes, research projects will be of 6 credits each in last 02 semesters.

*General Elective: Certificate will be provided to the students opted for NCC apart from degree.
** One SEC must be E&I and IPR (Can be through NPTEL or IPR can be from TIFAC, DST)

Total Credit Hours =160+20+20=200

Exit options

1. UG-Certificate in Agriculture (exit after first year and completion of 10 weeks' internship)
2. UG-Diploma in Agriculture (exit after second year and completion of 10 weeks' internship)
3. B. Sc (Hons) Agriculture (on successful completion of four-year degree requirements)

FORMAT – 2

Format-2

Program	Year	Semester (15 weeks)	Paper	Credit	Periods per Week	Periods (Hours) per Semester	Paper Title	Unit (Periods per semester)	Prerequisite	Elective (For other faculty)
CERTIFICATE COURSE	FIRST YEAR	SEMESTER-I	AG-101N	3	3	45	Fundamentals of Agronomy	45	AG-109N: Agricultural Heritage AG-110N: Introductory Biology AG-111N: Elementary Mathematics	AG-112C: Physical Education & Yoga Practiced
			AG-102N	3	3	45	Fundamentals of Genetics	45		
			AG-103N	3	3	45	Fundamentals of Soil Science	45		
			AG-104N	2	2	30	Fundamentals of Horticulture	30		
			AG-105N	2	2	30	Rural Sociology & Educational Psychology	30		
			AG-106N	2	2	30	Introduction to Forestry	30		
			AG-107N	3	3	45	Introductory Animal Husbandry	45		
			AG-108N	2	2	30	Comprehension & Communication Skills in English	30		
			AG-109N	1	1	15	Agricultural Heritage	15		
			AG-110N	2	2	30	Introductory Biology	30		
			AG-111N	2	2	30	Elementary Mathematics	30		
		SEMESTER-II	AG-201N	3	3	45	Fundamentals of Crop Physiology	45		
			AG-202N	3	3	45	Fundamentals of Plant Biochemistry	45		
			AG-203N	3	3	45	Fundamentals of Entomology-I	45		
			AG-204N	2	2	30	Fundamentals of Agricultural Economics	30		
			AG-205N	2	2	30	Principles of Organic Farming	30		
			AG-206N	4	4	60	Fundamentals of Plant Pathology	60		
			AG-207N	2	2	30	Production Technology for Vegetables and Spices	30		
			AG-208N	3	3	45	Fundamentals of Agricultural Extension Education	45		
			AG-209N	3	3	45	Food Processing and Safety Issue	45		
			AG-210N	1	1	15	**Human Values & Ethics	15		

SEMESTER-I			
PO1	Student can adopt the methods for increase the field crop production	PSO1	Acquire knowledge on potential yield and high net returns
PO2	To learn and apply concepts of modern transmission and molecular genetics.	PSO2	Acquire the scientific knowledge on fundamental structural and functional units of living organisms.
PO3.	Students will gain knowledge on concepts and principles of Soil Science	PSO3	Understanding the behavior of soils in crop production and management
PO4	Student can apply horticultural principles to the successful growth and production of horticultural plants.	PSO4	Familiarize with horticultural skills and knowledge
PO5	Student can understand the behavior patterns and socio-economic conditions of the rural people.	PSO5	Can portrait the scientific picture of rural life
PO6	Scientific supervision of forests and the exploitation of their resources.	PSO6	Understand the ecosystem which includes many plants and animals and conservations.
PO7	Acquainted with veterinary health care and diagnostic facilities.	PSO7	Proper management of animals by providing proper food, shelter and protection against diseases to domestic animals.
PO8	Communication skills	PSO8	Acquaintance with the expression, feelings and thoughts.
PO9	Student can learn more about agriculture, rural livelihood, agricultural system and conserve our biodiversity.	PSO9	Promote and sensitize the people about sustainable agriculture.
SEMESTER-II			
PO1	Student can learn on various aspects of metabolism, growth and development of crops.	PSO1	Familiar with crop improvement or technology.
PO2	Basic knowledge of the chemistry and the biochemical mechanisms of the plant which needed in agriculture.	PSO2	Comprehend on plant nutrition and metabolisms.
PO3	Student can identify, link and report common pests to the crop and type of damage.	PSO3	Identify and discuss interrelations between host crop, pest insect & beneficial insects.
PO4	Basic knowledge on economic theory and how to analyze productivity, investment, and trends in agricultural markets	PSO4	Familiar with economics principles to understand the conduct and performance of the agricultural.
PO5	Selection of crops and varieties for organic produce, and Certification of organic produce.	PSO5	Understand about the risks of human, animal, and environmental exposure to toxic materials and promotion of organic farming.
PO6	Learn about plant diseases and their obliteration techniques	PSO6	Familiar with the mechanisms of plant disease development by pathogens and their mitigation.
PO7	Become a skilled in the basic commercial vegetable cultivation techniques.		Acclimatize with the commercial cultivation of high value crops.
PO8	Student can demarcate how to use new knowledge, skills and attitudes in solving their problems	PSO8	Well-versed with rural extension work.
PO9	Understand the various issues of food safety and potential hazardous contaminants	PSO9	Understand the food safety management.
PO10	Understand the value of harmonious relationship based on trust and respect in their life and profession.	PSO10	Understand the role of a human being in ensuring harmony in society and nature.

Program	Year	Semester (15 weeks)	Paper	Credit	Periods per Week	Periods (Hours) per Semester	Paper Title	Unit (Periods per semester)	Prerequisite	Elective (For other faculty)
CERTIFICATE COURSE	SECOND YEAR	SEMESTER-III	AG-301N	2	2	30	Crop Production Technology-1 (Kharif crops)	30	Nil	
			AG-302N	2	2	30	Practical Crop Production -1 (Kharif crops)	30	Nil	
			AG-303N	3	3	45	Fundamentals of Plant Breeding	45	Nil	
			AG-304N	2	2	30	Agricultural Microbiology	30	Nil	
			AG-305N	3	3	45	Agricultural Finance and Co-Operation	45	Nil	
			AG-306N	3	3	45	Farm Machinery and Power	45	Nil	
			AG-307N	3	3	45	Principles of Integrated Disease Management	45	Nil	
			AG-308N	2	2	30	Environmental Studies & Disaster Management	30	Nil	
			AG-309N	2	2	30	Statistical Methods	30	Nil	
			AG-310N	2	2	30	Fundamental of Soil and Water Conservation	30	Nil	
			AG-311N	3	3	45	IssuesDairy Science	45	Nil	
			AG-312N	2	2	30	Fundamentals of Entomology-II	30	Nil	
		SEMESTER-IV	AG-401N	2	2	30	Crop Production Technology-II (Rabi crops)	30	Nil	
			AG-402N	2	2	30	Practical Crop Production - II (Rabi crops)	30	Nil	
			AG-403N	3	3	45	Principles of Seed Technology	45	Nil	
			AG-404N	2	2	30	Problematic soils and their Management	30	Nil	
			AG-405 N	3	3	45	Fundamentals of Bio-Technology	45	Nil	
			AG-406N	2	2	30	Renewable Energy and Green Technology	30	Nil	
			AG-407N	2	2	30	Production Technology for Ornamental Crops, MAP and Landscaping	30	Nil	
			AG-408N	2	2	30	Entrepreneurship Development and Business Communication	30	Nil	
			AG-409N	2	2	30	Introductory Agro-meteorology & Climate Change	30	Nil	
			AG-410N	2	2	30	Agri- Informatics	30	Nil	
			AG-411N	3	3	45	Poultry Production & Management	45	Nil	

SEMESTER-III			
PO1:	Students will have a comprehensive knowledge about origin, geographical distribution, and economic importance of Kharif crops.	PSO1:	Knowledge gain on production technology of Kharif crops for human consumption and cattle.
PO2:	Take up the diversified farming system according to available farming situation with special reference to Kharif crops.	PSO2:	Acquainted with the knowledge of profitable crop (Kharif) production technology.
PO3:	Learn to develop the biotic & abiotic stress resistant varieties by commercial breeding techniques.	PSO3:	Help to increase the farm yield to get higher income by developing high yielding varieties.
PO4:	Systematic knowledge gain of structure, properties and advantages of micro-organisms.	PSO4:	Impart knowledge about the beneficial micro-organism.
PO5:	Understand the financial institutions and its impact in agricultural economy.	PSO5:	Acquainted with the broad feature of Indian financial institutions and functions.
PO6:	Knowledge on various implements used in agriculture farm for various purposes	PSO6:	Understanding of various farm power and their uses.
PO7:	Understands about different classes of insecticides, herbicides, pesticides and their formulation, toxicity,poisoning, and antidotes and their effect on plants, animals and environment.	PSO7:	Understand the appropriate use of insecticides and their moral, social, legal, economic, and environmental issues.
PO8	Understanding the concepts and methods from ecological and physical sciences and theirapplication in environmental problem solving.	PSO8	Comprehensive knowledge of interdisciplinary branches of environment andtheir scopes.
PO9	Making familiar with some elementary statistical methods of analysis of data viz.Measures of Central Tendency, Dispersion, Moments, Skewness, and Kurtosis and to interpret them.	PSO9	Acquaintance with some basic concepts in statistics.
PO10	Students will be able to understand the types of soil erosion and conservation techniques.	PSO10	Understand the soil loss factors and conservation management practices.
SEMESTER-IV			
PO1	Knowledge on agronomic package and practices of rabi crops.	PSO1	Systematic understanding of origin, geographical distribution, economic importance, soil and climaticrequirements, varieties, cultural practices and yield of rabi crops
PO2	Acquainted with the knowledge of profitable rabicropproduction technology.	PSO2	Profitable based (Rabi crops) farming system can we adopted with the help of course content
PO3	Knowledge on production of hybrid seed of different crops to increase the farm income	PSO3	Knowledge on increase the farm income by producing high yielding disease free quality.
PO4	Knowledge gain about waste land and problematic soils in India and management.	PSO4	Understand different factors responsible for saline,sodic and acidic soils and their reclamation practices.
PO5	Understand the bio fuel, wind energy, solar energy production and their applications in agriculture sector.	PSO5	Understand the roleof renewable sources in agriculture.

PO6	Understand the sustainable production, processing and marketing of ornamental crops and MAP.	PSO6	Knowledge gain on natural herbal products from an economic perspective.
PO7	Analyze and identify the various elements of successes of entrepreneurial venture.	POS7	Comprehensive knowledge on preparation of detailed business plan for own enterprise.
PO8	Understand about meteorological and hydrologicalfactors influences to agriculture	PSO8	Impart knowledge to develop weather based agro advisories to sustain crop production.

Program	Year	Semester (15 weeks)	Paper	Credit	Periods per Week	Periods (Hours) per Semester	Paper Title	Unit (Periods per semester)	Prerequisite	Elective (For other faculty)
CERTIFICATE COURSE	THIRD YEAR	SEMESTER-V	AG-501N	2	2	30	Rainfed and Dryland Agriculture	30	Nil	
			AG-502N	2	2	30	Crop Improvement-1 (Kharif crops)	30	Nil	
			AG-503N	3	3	45	Pests of Crops and Stored Grain and their Management	45	Nil	
			AG-504N	3	3	45	Agricultural Marketing Trade & Prices	45	Nil	
			AG-505N	3	3	45	Protected Cultivation and Secondary Agriculture	45	Nil	
			AG-506N	3	3	45	Diseases of Field and Horticultural Crops and their Management-I	45	Nil	
			AG-507N	2	2	30	Production Technology for Fruit and Plantation Crops	30	Nil	
			AG-508N	2	2	30	Communication Skills and Personality Development	30	Nil	
			AG-509N	1	1	15	Intellectual Property Rights	15	Nil	
			AG-510N	3	3	45	Principles of Food Science & Nutrition	45	Nil	
			AG-511N	2	2	30	Geo-informatics and Nano Technology	30	Nil	
			AGE-51 AGE-52 AGE-53 AGE-54 AGE-55 AGE-56	3	3	45	**Elective-1 (student can choose any one course)** 1.Agribusiness Management 2. Agrochemicals 3. Commercial Plant Breeding 4. Landscaping 2. Food Safety and Standards 3. Bio pesticides & Bio fertilizer	45	Nil	
		SEMESTER-VI	AG-601N	2	2	30	Farming System, Precision Farming & Sustainable Agriculture	30	Nil	
			AG-602N	2	2	30	Crop Improvement-II (Rabi crops)	30	Nil	
			AG-603N	3	3	45	Manures. Fertilizers and Soil Fertility Management	45	Nil	
			AG-604N	2	2	30	Farm Management, Production & Resource Economics	30	Nil	
			AG-605N	3	3	45	Diseases of Field and Horticultural Crops and their Management-II	45	Nil	
			AG-606N	2	2	30	Post-harvest Management and Value Addition of Fruits and Vegetables	30	Nil	

			AG-607N	2	2	30	Watershed and Wasteland Management	30	Nil	
			AG-608N	3	3	45	Beneficial insects and Pest of Horticultural Crops and their Management	45	Nil	
			AGE-61 AGE-62 AGE-63 AGE-64 AGE-65 AGE-66	3	3	45	**Elective-2 (student can choose any one course)** 1. Protected Cultivation 2. Hi-tech. Horticulture 3. Weed Management 4. System Simulation and Agro-advisory 5. Agricultural Journalism 6. Composition cum Duck/(and)Quail/(and) Rabbit culture	45	Nil	
			AGT	2	2	30	Educational Tour		Nil	

SEMESTER-V			
PO1:	Students will be highlighted about the crop production under dry land situation and given idea about rainfall pattern, importance of rain water harvesting and runoff water storage etc.	PSO1:	Understanding on comprehensive assessment of water management in agriculture.
PO2	In this course Students learn importance of wild relative to produce new varieties of Kharif crop	PSO2	Acquaintance with new genetic approaches to achieve a definite Ideotype of Kharif crop.
PO3.	Familiar with identification of different insect pest of field, horticulture, ornamentals, vegetables and stored grains at the field level.	PSO3	Understanding the recognition of nature of damage and symptoms caused by the pest and suitable technique of pest management.
PO4	Understanding on structure of Agriculture marketing in India, agriculture cooperatives, future trading, critical appraisal of agriculture marketing.	PSO4	Overview on instruments of agriculture price policy, buffer stock,appraisal of agriculture pricing policy.
PO5	Basic knowledge on greenhouse construction, green house cooling, drying systems, heating, micro irrigation, properties of biological materials, seed processing, drying, driers, grain storage.	PSO5	Familiarize with Green house equipment's, materials of construction fortraditional and low cost green houses.
PO6	Help the learners for identify the diseases through symptoms in field, their proper management as well as identification of causal agents by microscopic study.	PSO6	Student acquire the knowledge about etiology, and symptoms of these diseases which helps in diagnosis of the diseases of field and horticultural crops.
PO7	Understand the importance of different fruit crops, plantation crops and high density planting in different fruit crops.	PSO7	Understand the package of practices of high value horticultural crops.
PO8	Students will able to analyze basic communication, intercultural and interpersonal communication skills and public- speaking skills.	PSO8	Encourage critical and innovative thinking. Also in written and visual communication.
SEMESTER-VI			
PO1	Understand the profitable cultivation of rabi crops production technology.	PSO1	Profitable based (Rabi crops) farming system can be adopted with the help of course

			content
PO2	Application of different manure and fertilizers used in different crops according to soil condition.	PSO2	Familiar with the site specific, crop specific application of manure and fertilizers.
PO3	Comprehensive knowledge of the traditional agricultural production economics employing both detailed graphics and mathematical order.	PSO3	Comprehensive understanding in determining the best use of resources, and also helps to policy makers in drafting the consequences like output, profit and resource use in farms.
PO4	Learn to recognize the plant diseases through symptoms in field, their proper management as well as identification of causal agents by microscopic study.	PSO4	Advanced knowledge about etiology, and symptoms of thesediseaseswhichhelps in diagnosis of the diseases of field and horticultural crops.
PO5	Understand the post-harvest technology of horticultural crops	PSO5	Understand the value addition of horticulture crops and familiarize with various certification and accreditation i.e. FPO, ISO and other leveling.
PO6	Understand the watershed management and waste land.	PSO6	Basic understanding of characterization and delineation of watershed model and waste land management.

Program	Year	Semester (15 weeks)	Paper	Credit	Periods per Week	Periods (Hours) per Semester	Paper Title	Unit (Periods per semester)	Prerequisite	Elective (For other faculty)
CERTIFICATE COURSE	FOURTH YEAR	**SEMESTER-VII**		20	20		Rural Agricultural Work Experience and Agro-industrial Attachment (RAWE & AIA)	20	Nil	
		SEMESTER-VIII		20	20		Modules for Skill Development and Entrepreneurship: [A student has to register 20 credits opting for two modules of (0+10) credits each (total 20 credits)]	20	Nil	

SEMESTER-VII			
PO1	Helps the students primarily to understand the rural situations, status of agricultural technologies adopted by the farmers to prioritize the farmers' problems and to develop skills & attitude of working with farm families for overall development in rural area.	PSO1	Provide an opportunity to the students to understand the rural setting in relation toagriculture and allied activities.
SEMESTER-VIII			
PO1	Agri. preneurs program have the potential to employment generation, income generation, poverty reduction and improvements in nutrition, health and overall food security in the national economy as a whole.	PSO1	Learn how to start an agri. preneur and design business plans.

FORMAT – 3

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: I

Programme: Certificate / Diploma/ Degree/ UG/PG/PhD **Class: B. Sc. (Hons) Agriculture**	**Year : I** **Semester: I**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-101N	**Title: Fundamentals of Agronomy**

Course Objectives:

- Knowledge and concept of different techniques of crop production
- Basics of crop growth in relation to environment and sustainability
- Knowledge of tillage (zero and minimum tillage)
- Basic concepts of crop modelling for maximizing crop yield
- Study of Cropping and farming systems for sustainable agriculture

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 00
P: 01 (In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Agronomy, its scope and role of Agronomist. Tillage, its objectives, types, implements and factors affecting of tillage. Tilth: its characteristics and ideal tilth for crop growth. Modern concepts of tillage, minimum and zero tillage puddling and its importance.	**6**
II	Seed: Methods of seed sowing, seed treatment and its objectives. Crop density and geometry, crop nutrition, manures, fertilizers and green manuring. Nutrient use efficiency, meaning, factors affecting of nutrient use efficiency.	**6**
III	Water resources, Soil plant water relationship, Crop water requirement (CWR), Water Use Efficiency (WUE), Irrigation-scheduling criteria and methods, Irrigation-scheduling, criteria and methods, quality of irrigation water, logging soil-plant-water relationship, crop water requirement.	**6**
IV	Weeds-, characteristics, importance, classification, crop weed competition, concepts of weed management principles and methods, Herbicides: classification, selectivity and resistance, Allelopathic effect of weed.	**6**
V	Growth and development, its factors affecting, Plant ideotype: its types. Crop rotation, principles and advantages. Study of crop adaptation and its distribution. Crop management technologies for sustainable agriculture, harvesting and threshing of crops.	**6**

Suggested Readings:

1. Chhidda Singh, Modern techniques of raising field crops. Oxford and IBH Publishing Co. Ltd., Bangalore.
2. Gopal Chandra De. 1980., Fundamentals of Agronomy. Oxford and IBH Publishing Co. Ltd., Bangalore, Hand book of Agriculture, ICAR Publication.
3. Palaniappan, S.P., Cropping Systems in the tropics – Principles and Practices. Willey Eastern Ltd., New Delhi.Panda, S.C., 2006.Agronomy Agribios Publication, New Delhi.

If the course is available as Generic Elective then the students of following departments may opt it.NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	**100**

Course Learning Outcomes:

CO1: To know the basics of the agriculture, tillage and evolution of agriculture from different periods from veda to modern agriculture**.**

CO2: In modern terminology however the word has come to mean and denote a branch of Science dealing with all aspects of crop cultivation and production.

CO3: A study of agronomy often involves a summoning of resources from related disciplines such as Botany, Soil Science, Irrigation, plant protection, Plant Genetics and Breeding, Agrometeorology etc.

CO4: Cropping seasons of India. Soil formation, classification, physical, chemical properties. Identification of important crops and crop seeds.

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: I

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B. Sc. (Hons)Agriculture**	**Year : I** **Semester I**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-102N	**Title: Fundamentals of Genetics**

Course Objectives:
1. To promote professional skills and knowledge through meaningful hands on experience.
2. To build confidence and to work in project mode.
3. To acquire enterprise management capabilities.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 00
P: 02(In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 2 Hrs.= Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	Pre and Post Mendelian concepts of heredity, Mendelian principles of heredity. Architecture of chromosome; special types of chromosomes. Chromosomal theory of inheritance; cell cycle and cell division - mitosis and meiosis.	6
II	Dominance relationships, epistatic interactions; Multiple alleles, pleiotropism and pseudoalleles. Sex determination and sex linkage, sex limited and sex influenced traits, Blood group genetics. Linkage and its estimation. crossing over mechanisms, chromosome mapping	6
III	Structural and numerical variations in chromosome and their implications, use of haploids, diploids and doubled haploids in Genetics. Mutation, classification, Methods of inducing mutations & CLB technique. mutagenic agents(Mutagens)	6
IV	Qualitative & Quantitative traits. Multiple factor hypothesis. Cytoplasmic inheritance. Genetic disorders. Nature, structure & replication of genetic material (DNA).	6
V	Protein synthesis. Transcription and translational mechanism of genetic material. Gene concept: Gene structure, function and regulation.	6

Reference / Text Books:
1. Principles of Plant Genetics and Breeding by George Acquaah.
2. Principles of Plant Breeding by Robert W. Allard.
3. Introgression Breeding in Cultivated Plants by Jaime Prohens, Pietro Gramazio, Mariola Plazas, Laura Toppino Frontiers Media SA.

4. Genetics by B. D Singh. 5. Plant breeding by B.D. Singh
If the course is available as Generic Elective then the students of following departments may opt it. NA
Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:
Course Learning Outcomes:
CO1 To know about the historical development aspect to genetics. CO2 Understanding the role of genetic technologies in industries related to biotechnology, pharmaceuticals, energy, and other fields CO3 The knowledge required to design, execute, and analyze the results of genetic experimentation in plant systems CO4 To expose the students on basic concepts of genetics. CO5 To impart knowledge on genetic engineering and technologies like tissue-culture, GMO etc.

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: I

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: I** **Semester: I**
Credits : 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-103N	**Title: Fundamentals of Soil Science**

Course Objectives:

1. To promote professional skills and knowledge through meaningful hands on experience.
2. To build confidence and to work in project mode.
3. To acquire enterprise management capabilities.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 00
P: 02(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Soil as a natural body, Pedological and edaphological concepts of soil, overview of soil functions in ecosystems and agricultural settings.; Soil genesis: soil forming rocks and minerals; weathering, processes and factors of soil formation; Soil Profile, components of soil; Soil physical properties: soil-texture, structure, density and porosity, soil colour, consistence and plasticity	6
II	Basic principles of soil taxonomy and introduction to soil orders and classes. Soil types from different regions of India including their formation, characteristic and agricultural suitability. Examine the composition of soil air, factors affecting soil aerations and the impact of soil compaction on air movement. Soil air, composition, gaseous exchange problem and plant growth. Soil temperature; source, amount and flow of heat in soil: effect on plant growth	6
III	Soil reaction-pH, EC, soil acidity and alkalinity, buffering, effect of pH on nutrient availability; soil colloids - inorganic and organic; silicate clays: constitution and properties; sources of charge; ion exchange, cation exchange capacity. base saturation	6
IV	Expand on the bio chemical processes involved in the decomposition and transformation of organic matter including the role of enzymes and microbial activity, composition, properties and its influence on soil properties; humic substances-nature and properties. Factors affecting decomposition of organic matter, fractions of soil organic matter. Carbon	6

	sequestration, nutrient cycling, soil health and microbial activity and soil physical properties.	
V	Emerging pollutants, pollution pathways and impact analysis with inorganic contaminants. Advanced pesticide chemistry, bio degradation processes, transport mechanisms and risk assessment	6

Reference / Text Books:

1. The Nature and Properties of Soils" by Brady N C.
2. Introductory Soil Science" by Dilip Kumar Das.
3. A Text Book of Soil Science" by Daji A J.
4. Text Book of Soil Science" by Biswas T D and Mukherjee S K.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1. Class tasks/ Sessional Examination	30
2. Presentations /Seminar/Assignments/internal	05
3. Practical/Research Project Report Seminar On Research Project Report	15
4. ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

CO1. Students will gain knowledge on concepts and principles of Soil Science
CO2. Enable the student to understand the soil, their role, their properties soil forming mineral and development of soil profile.
CO3. Knowledge on advanced instruments in soil analysis was gained
CO4. To provide a better appreciation of the distribution and variability of soils and their properties across the landscape.
CO5. Thorough knowledge on recent advances in Soil Science, Geoinformatics and geospatial techniques in Land Resource Inventory.

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: I

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class:B.Sc (Hons) Agriculture**	**Year : I** **Semester: I**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-104N	**Title: Fundamentals of Horticulture**

Course Objectives:
1. To promote professional skills and knowledge through meaningful hands on experience.
2. To build confidence and to work in project mode.
3. To acquire enterprise management capabilities.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 1
T: 0
P: 2 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Horticulture-Its definition and branches, importance and scope; horticultural and botanical classification, recent trends in horticulture.	3
II	Climate and soil for horticultural crops. Plant propagation-methods and propagating structures .Influence of climatic factors on the growth of plants.	3
III	Principles and methods of training and pruning, juvenility and flower bud differentiation. Seed dormancy, Seed germination, principles of orchard establishment; Principles and methods of training and pruning juvenility and flower bud differentiation and flower bud differentiation and bearing habits.	3
IV	Unfruitfulness; pollination, pollinizers and pollinators; fertilization and parthenocarpy; importance of plant bio-regulators in horticulture.	3
V	Irrigation: principles and methods of irrigation Macro and Micro Irrigation Systems and their application and fertilizers applications-method and quality.	3

Reference / Text Books:
1. Instant Horticulture by S. N. Guptha.
2. Basic Horticulture by Jitendra Singh.
3. Glaustas Horticulture by P. Muthu Kumar & Selva Kumar

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

Max. Marks

1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report Seminar On Research Project Report 4) ESE	30 05 15 50
Total:	100
Prerequisites for the course:	
Course Learning Outcomes:	
CO1 The student will be able to understand different branches of horticulture CO2 Can demonstrate advanced technologies like training, pruning, etc in horticulture. CO3 To enable the students to apply various horticultural skills and knowledge in their career. CO4 To identify and prescribe sustainable options in horticulture which benefit the environment while maintaining productivity and economic viability	

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: I

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: I** **Semester: I**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-105N	**Title: Rural Sociology & Educational Psychology**

Course Objectives:

1. To promote professional skills and knowledge through meaningful hands on experience.
2. To build confidence and to work in project mode.
3. To acquire enterprise management capabilities.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L:1
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	**Sociology:** definition, concept and different branches. Rural sociology: Definition and scope. Its importance and significance in agriculture extension. Difference between community and society. Differences and Relationship between Rural and Urban societies	3
II	Social Ecology, Rural society, Social Groups, Meaning, Definition, Classification, Factors considered in formation and organization of groups, Motivation in group formation and Role of Social groups in Agricultural Extension, Social Stratification, Culture: concept, definition characteristics, Social Institution, Social Change & Development, Social Interaction.	3
III	**Rural Leadership:** Concept and definition, types of leaders in rural context. Importance of rural leadership. Identification of rural leadership, Women Empowerment and child development	3
IV	**Educational psychology**: Definition, Branches of psychology, Meaning & its importance in agriculture extension. Attitude, Attention, Frustration & adjustment and thinking & reasoning.	3
V	**Behavior:** Concept and definition. Cognitive, affective. psychomotor domain, Personality: Meaning, Definition, Types, Factors influencing the Personality and Role of personality in Agricultural Extension. Learning, Motivation, Theories of Motivation, Intelligence.	3

Reference / Text Books:

1. Ray, G. L. -Extension Communication and Management
2. Dahama O. P. and Bhatnagar, O. P. - Education and Communication for Development

3. Sandhu A. S. -Textbook on Agricultural Communication
4. Chitambar, J. B.- Introductory rural sociology
5. A. R. Desai -Rural Sociology

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

1. Understand basics concepts related to rural sociology and Basics concepts related Apply important sociological and psychological concepts Understand fundamentals of extension education and Programme planning
2. Gain Knowledge on Educational psychology. Identify various rural development programmes.

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: I

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: I** **Semester: I**
Credits:2 **Theory:1** **Practical:1**	**Subject: Agriculture**
Course Code:AG-106N	**Title: Introduction to Forestry**

Course Objectives:

1. To promote professional skills and knowledge through meaningful hands on experience.
2. To build confidence and to work in project mode.
3. To acquire enterprise management capabilities.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L:1
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction - definitions of basic terms related to forestry, objectives of silviculture, scope and potential of agroforestry, components of agro forestry, Importance of agroforestry, components of social agroforestry system, objectives of social forestry	3
II	Forest classification, salient features of Indian Forest Policies. Forest regeneration, Natural regeneration - natural regeneration from seed and vegetative parts, coppicing, root suckers	3
III	Artificial regeneration - objectives. Choice between natural and artificial regeneration. Essential preliminary considerations. Crown classification. Tending operations - weeding, cleaning, thinning - mechanical, ordinary, crown and advance thinning.	3
IV	Forest mensuration - objectives, diameter measurement, instruments used in diameter measurement; measurement of volume of felled and standing trees, age determination of trees. Home gardens, Cultivation practices of two important fast growing tree species of the region	3
V	**Agroforestry -** definitions. importance, criteria of selection of trees in agroforestry, different agroforestry systems prevalent in the country, shifting cultivation, taungya, alley cropping, wind breaks and shelter belts,	3

Reference / Text Books:

1. Introduction to Forestry & Agroforestry by K.T. Parthiban
2. Forestry in India by Dr. Jayasree Laha, Dr. Parthapratim Chakraborty, Debjani Mukherjee

If the course is available as Generic Elective then the students of following departments may opt it. NA	
Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report Seminar On Research Project Report 4) ESE	30 05 15 50
Total:	100
Prerequisites for the course:	

Course Learning Outcomes:

CO1 Demonstrate an integrated approach to silviculture practices in relationship to the policies related to harvesting, conservation, and management of forests and other renewable resources.

CO2 Demonstrate the ability to establish forest inventory plots according to given protocols.

CO3 Demonstrate the ability to manage data both in the field and using computer programme.

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: I

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B. Sc. (Hons) Agriculture**	**Year: I** **Semester: I**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-107N	**Title: Introductory Animal Husbandry**

Course Objectives:

1. Creation of thousands of Self-employment opportunities throughout the year by adopting, animal husbandry on large scale for sustainable income of the rural masses of the state.
2. To educate people by imparting training on modern and scientific methods of livestock farming and extension activities.
3. To make available the high quality and productive livestock and poultry breeds for multiplication and supply to the needy farmers of the state by providing advanced breeding services for up gradation of indigenous cattle and buffaloes.

Nature of Paper: Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 0
P: 01 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	**GENERAL:** Common terms used in Animal Husbandry role of livestock in Agriculture and National Economy. Classification of animals. Dairying under specialized and mixed farming. Livestock and milk production statistics.	6
II	**DAIRY CATTLE AND BUFFALOES MANAGEMENT:** Important Indian and exotic breeds of cattle and buffalo. Breeding methods & systems, Symptoms of heat in dairy animals, Care and Management of pregnant and milch cow, Raising of calves, Management of heifers and bulls. Maintenance of livestock records, Milking methods, Digestive system of ruminants, Feeds and feeding, Conservation of fodder, Housing for dairy animals	6
III	**PIG MANAGEMENT:** Importance of swine farming, Important Indian and exotic breeds of swine. Raising of piglets up to age of slaughter, General Aspects of breeding, Care and management of sow and boar.	6
IV	**SHEEP AND GOAT MANAGEMENT:** Importance of sheep and goat farming, Management of sheep and goat, Important Indian and exotic breeds of sheep and goat, Raising of kids and lambs, feeds and feeding system of goats and sheep. Methods and basis of selection.	6

V	**HEALTH MANAGEMENT:** Classification of disease. Symptoms, Causal organism and prevention of common diseases of cattle, buffalo, goat, sheep and swine viz. FMD, LSD, Sheep Pox, Goat Pox, Swine pox, Swine Fever, Swine Influenza Anthrax. HS, Brucellosis, Mastitis, Milk fever. Bloat. Swine fever and Enterotoxaemia, Vaccination schedule in ruminants, non-ruminants animals.	6

Reference / Text Books:

1. Livestock Production Management by N. S. R Shastri.
2. Livestock Production Management by Nilotpal Ghosh.
3. Animal Husbandry & Dairy Science by Jagdish Prasad.

If the course is available as Generic Elective then the students of following departments may opt it.
NA.

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

CO1 Students will able to apply concepts of breeding, physiology, nutrition, herd-health, Economics and management into practical and profitable animal production programs.
CO2 Students will understand the role of nutrition in animal production.
CO3 Students will be able develop feeding systems for farm animal production and companion animals.
CO4 Students will be able to demonstrate critical thinking and problem solving skills as they apply scientific principles to a variety of animal production systems.
CO5 Students will understand how the application of modern animal production technologies and management practices impact their production facilities, their communities and the World.

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: I

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: I** **Semester: I**
Credits: 2 **Theory:1** **Practical:1**	**Subject: Agriculture**
Course Code: AG-108N	**Title: Comprehension & Communication Skills in English**

Course Objectives:

1. The course is intended to familiarize students with the basics of English language and help them to learn to identify language structures for correct English usage.
2. Study cultural influences on communication more thoroughly, identify key cultural influences in their own experience and compare their culture with a different one to identify ways to improve communication and decrease misunderstanding.
3. Develop email accuracy and style and engage in email correspondence with potential employers, clients or investors to set up interviews and/or meetings.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 01
T: 00
P: 01 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	War minus Shooting- The sporting Spirit. A Dilemma- A layman looks at science Raymond B. Fosdick. You and Your English - Spoken English and broken English G.B. Shaw. Reading Comprehension	3
II	Vocabulary- Antonym, Synonym, Homophones, Homonyms. Often confused words. Functional grammar: Articles, Prepositions, Verb, Subject verb Agreement, Transformation	3
III	Exercises to help the students in the enrichment of vocabulary based on TOEFL and other competitive examinations	3
IV	Synthesis. Direct and Indirect Narration. Written Skills: Paragraph writing, Precise writing, Report writing and Proposal writing	3
V	The Style: Importance of professional writing. Preparation of Curriculum Vitae and Job applications. Synopsis Writing. Interviews: kinds. Importance and process.	3

Reference / Text Books:

1. Comprehension & Communication Skills in English, Raj Varinder Kumar

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	30 05 15 50
Total:	100
Prerequisites for the course:	
Course Learning Outcomes: 1. Express their interests and opinions, engage in debates and make presentations in English. 2. Use every day social expressions correctly and the natural pauses of English spontaneously; 3. Develop strategies to make their conversation more fluent and natural, while gaining confidence when speaking and writing in English. 4. Improve their pronunciation and intonation and communicate in English with confidence; 5. Develop new effective communicative skills	

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: I

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: I** **Semester: I**
Credits: 1 **Theory: 1** **Practical: 0**	**Subject: Agriculture**
Course Code: AG-109N	**Title: Agricultural Heritage**

Course Objectives:

1. Agricultural Heritage is to promote student understanding, awareness about sustainable agriculture and to safeguard the social, cultural, economic and environmental goods and services these provide to family farmers, smallholders, indigenous peoples and local communities

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / 1 Credits

L: 01
T: 00
P: 00 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (1Hrs./Week=1Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction of Indian agricultural heritage. Chronology of agriculture development in India. Ancient agricultural practices. Relevance of heritage to present day agriculture, Past and present status of agriculture and farmers in society;	3
II	Status of farmers in society during different periods. Journey of Indian agriculture and its development from past to modern era;	3
III	Plant production and protection through indigenous traditional knowledge; such as agro forestry, crop rotation, mixed-inter cropping etc. Crop voyage in India and world;	3
IV	Agriculture scope; Importance of agriculture and agricultural resources available in India; Crop significance and classifications	3
V	National agriculture setup in India; Current scenario of Indian agriculture; Indian agricultural concerns and future prospects, role of women in agriculture.	3

Reference / Text Books:

1. S.R. Reddy, Agricultural Heritage, Kalyani Publisher
2. A. Zaman and Sagar Maitra, Agricultural Heritage, Palmview publishers
3. UtpalGiri and Md. Hedayutulla, Text Book of Agricultural Heritage, Scientific Publishers

If the course is available as Generic Elective then the students of following departments may opt it.
NA.

Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	40 10 0 50
Total:	100
Prerequisites for the course:	
Course Learning Outcomes: 1. This course enables the students to pursue higher studies and employment 2. Basic concepts of crop modelling for maximizing crop yield 3. Study of Cropping and farming systems for sustainable agriculture	

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: I

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: I** **Semester: I**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-110N	**Title: Introductory Biology**

Course Objectives:

1. A clear understanding of the key concept and principles for living and nonliving world and the biodiversity.
2. To provide a basic understanding of the nomenclature, cell theory, and cell division.
3. To encourage students to think morphology of flower, Characteristics, and modification of roots and stem.
4. Understand the process of seed germination, seed structure, and plant system.
5. Know the role of animals in agriculture, beneficial insect viz. (silkworm, honey bees, lac insects.)

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 01
T: 00
P: 01 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction to the living world: Attributes of living organisms. Diversity and characteristics of life: Variations and its types, concept of bio-diversity,	3
II	Origin of life, evidence of organic evolution. Evolution and Eugenics. Binomial nomenclature and classification: Introduction of cell & cell organelles, Structure and functions of cell organelles, cell theory, Prokaryotic and eukaryotic cells. Cell and cell division.	3
III	Morphology of flowing plants: Parts of flowering plant. Root: types of roots, modification of roots. Stem its characteristics and modification Bud, Leaf, fruit, Seed.	3
IV	Seed and Classification of seeds. Structure of some common seeds. **seed germination.** Plant systematic- viz; Brassicaccac, Fabaccac and Poaceae. Seed Germination	3
V	Role of animals in agriculture. Economic importance of insects. Beneficial insects. Productive insects (silkworm, honey bees lac insects)	3

Reference / Text Books:
1. Introductory biology – P.K. Sehgal

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	30 05 15 50
Total:	100
Prerequisites for the course:	
Course Learning Outcomes: Upon successful completion of this course/paper, students should be able to: 1. Understand the basic concept of the living world, diversity, and characteristics of life. 2. Clarify the influential origin of life, cell theory, and cell division. 3. This course may help the students understand the importance of life, plant life of organisms and development of own occupation (honey bee, silkworm etc.)	

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: I

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: I** **Semester: I**
Credits: 2 **Theory: 2** **Practical: 0**	**Subject: Agriculture**
Course Code: AG-111N	**Title: Elementary Mathematics**

Course Objectives:

1. The student should state clearly what the student should know/be able to do, and at what level.
2. The student must be able to conceive of how their attainment might be assessed
3. Could be seen as similar to attainability, but refers to their appropriateness to the overall task. "Valid" in assessment-speak

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / 2 Credits

L: 02
T: 00
P: 00 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (2Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Straight lines: Distance formula, section formula (internal and external division), Change of axes (only origin changed). Equation of co-ordinate axes, Equation of lines parallel to axes, Slope-intercept form of equation of line, Slope-point form of equation of line. Two point form of equation of line, Intercept form of equation of line, Normal form of equation of line, General form of equation of line, Point of intersection of two st. lines, Angles between two st. lines, Parallel lines, Perpendicular lines, Angle of bisectors between two lines. Area of triangle and quadrilateral	6
II	Circle: Equation of circle whose centre and radius is known, General equation of a circle, Equation of circle passing through three given points, Equation of circle whose diameters is line joining two points (xj. yj) & (x2.y2)> Tangent and Normal to a given circle at given point (Simple problems), Condition of tangency of a line y = nix + c to the given circle x2 + y2 = a	6
III	Differential Calculus: Definition of function, limit and continuity, Simple problems on limit, Simple problems on continuity, Differentiation of xn, en, sin x &cos x from first principle, Derivatives of sum, difference, product and quotient of two functions	6
IV	Differentiation of functions of functions (Simple problem based on it), Logarithmic differentiation (Simple problem based on it), Differentiation by substitution method and simple problems based on it. Differentiation of	6

	Inverse Trigonometric functions	
V	Maxima and Minima of the functions of the form y=f (x) (Simple problems based on it). Integral Calculus : Integration of simple functions, Integration of Product of two functions, Integration by substitution method, Definite Integral (simple problems based on it), Area under simple well-known curves (simple problems based on it). Matrices and Determinants: Definition of Matrices, Addition. Subtraction, Multiplication. Transpose and Inverse up to 3rd order. Properties of determinants up to 3rd order and their evaluation.	6

Reference / Text Books:

1. Elementary Mathematics, Rajender Singh

If the course is available as Generic Elective then the students of following departments may opt it.

NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	40
2) Presentations /Seminar/Assignments/internal	10
3) Practical/Research Project Report/Seminar On Research Project Report	0
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

1. Apply various problem-solving strategies to create mathematical models that will help analyze real world scenarios.
2. Use appropriate mathematical vocabulary to strengthen skills needed for communicating while teaching elementary math.
3. Explain and apply basic concepts of probability, and Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: II

Programme:Certificate/Diploma/Degree/ UG/PG/PhD **Class: B.Sc (Hons.) Agriculture**	**Year: I** **Semester: II**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Fundamentals of Crop Physiology**
Course Code: AG-201N	**Title: B .Sc. (Hons.) Agriculture**

Course Objectives:

1. To confer information to the understudies on various plant metabolic procedures and their functions in plants with special reference to agricultural and horticultural crops.
2. Get fundamental ideas on various basic plant metabolic functions such as Diffusion and Osmosis, Plant Water Relations, Mineral Nutrition, Photosynthesis, Respiration, Fat Metabolism, Plant Growth and Development

Nature of Paper: Core
Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction to crop physiology and its importance in Agriculture; Plant cell: an Overview: Diffusion and osmosis; Absorption of water, transpiration and Stomata Physiology	6
II	Mineral nutrition of Plants: Functions and deficiency symptoms of nutrients, nutrient uptake mechanisms;	6
III	Photosynthesis: Light and Dark reactions, C3. C4 and CAM plants; Respiration: Glycolysis. TCA cycle and electron transport chain;	6
IV	Fat Metabolism: Fatty acid synthesis and Breakdown; Plant growth regulators: Physiological roles and agricultural uses. Physiological aspects of growth and development of major crops:	6
V	Growth analysis, Role of Physiological growth parameters in crop productivity.	6

Reference / Text Books:

1. Plant Physiology by SN Pandey and BK Sinha
2. Fundamentals of Plant Physiology by V.K. Jain
3. Plant Physiology and Development by Eduardo Zeiger and Lincoln Taiz

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination (Presentations /Seminar/Assignments/internal) 2) Practical/Research 3) Project Report/Seminar On Research Project Report 4) ESE	30 05 15 50
Total:	100
Prerequisites for the course:	

Course Learning Outcomes:

1. Know the importance of Physiology in Agriculture and Horticulture
2. Have pinpoint information on Plant cell, Plant Growth Regulators, Growth analysis, use of growth parameters on Crop productivity
3. Distinguish key physiological processes underlying the formation of seedlings from seed embryos;
4. Identify the physiological factors that regulate growth and developmental processes of crop plants, and clearly define their roles;
5. Evaluate the different strategies used by plants to acquire and utilize resources, and formulate a logical argument of their impact on crop productivity;
6. Recognize the significance of assimilate translocation and patterns of its partitioning in determining crop yield;
7. Demonstrate clear understanding of crop-environment interaction and its implication on crop growth and yield;

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: II

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class:B.Sc (Hons) Agriculture**	**Year: I** **Semester: II**
Credits: 3 **Theory:2** **Practical:1**	**Subject: Agriculture**
Course Code: AG-202N	**Title: Fundamentals of Plant Biochemistry**

Course Objectives:

1. To promote professional skills and knowledge through meaningful hands on experience.
2. To build confidence and to work in project mode.
3. To acquire enterprise management capabilities.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L:2
T:0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	**Biochemistry**-Introduction and definition of biochemistry, Scope and Importance of biochemistry in agriculture. **Carbohydrate:** Definition, Importance and classification of carbohydrates. Chemistry of Monosaccharide's-sources, structure and properties of Glucose and Fructose, Oligosaccharides- Chemistry of Disaccharides-source, structure and properties of Sucrose. Polysaccharides-sources, structure and properties of Starch and Cellulose.	6
II	**Lipid:** Importance Sources and Classification; Chemistry of Simple lipids-Fats, Oils and Waxes, Chemistry of Compound Lipids-Lecithin, Cephalin and Sphingomyelins. Structure of Glycolipids. Chemistry of Derived lipids-Sterols, Structures and properties of fatty acids; rancidity.	6
III	**Proteins:** Importance, sources and classification of proteins; Structures and properties of proteins, Amino acid-definition, calcification, amphoteric nature and important function of Amino acids	6
IV	**Enzymes**: General properties; Specificity and Classification; Mechanism of enzymic action; factors affecting enzymic action. **Vitamins:** Classification, sources, structure, role and its deficiency symptoms. Introduction to allosteric enzymes	6
V	**Nucleic acids**: Types, structure and Function of nucleic acids, Synthesis of DNA and RNA, Metabolism of carbohydrates: Glycolysis and Krebs's cycle.	6

Reference / Text Books:

1. Fundamentals of Biochemistry by J.L Jain

2. Principles of biochemistry by Lehninjer
If the course is available as Generic Elective then the students of following departments may opt. it. NA

Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination (Presentations /Seminar/Assignments/internal)	30
2) Practical/Research	05
3) Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

1. Describe the chemistry of carbohydrates, fat, proteins and enzymes.
2. Describe the metabolism of carbohydrates, lipids and proteins
3. Describe the metabolism of amino acids, nucleic acids and its regulation
4. Describe the mechanism of enzyme action and identify the classes of enzymes and factors affecting action

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: II

Programme: Certificate/Diploma/Degree/UG/ PG/PhD. **Class: B.Sc (Hons) Agriculture**	**Year: I** **Semester: II**
Credits: 3 **Theory: 2** **Practical:1**	**Subject: Agriculture**
Course Code: AG-203N	**Title: Fundamentals of Entomology-I**

Course Objectives:
1. To impart knowledge to the students on morphology and physiology of Insects.
2. To impart knowledge on classification and identification of insects based on their morphology
3. To impart the knowledge of students about the taxonomic classification and evolution of insects.

Nature of Paper: Core
Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction and history of Entomology including contribution of scientist in brief (Aristotal, Carolous Linnaeous, Fabricious, Lefroy, Pradhan, Pruthi and Ananth Krishnan), Theory Classification of phylum Arthropoda up to classes. Relationship of class Insecta with other classes of Arthropoda. Structure and functions of insect cuticle and process of moulting-different layers, Function of cuticular appendages and its process.	6
II	Body segmentation. Structure of Head, thorax and abdomen. Components of typical antennae, leg, Structure and modifications of insect antennae, mouth parts, legs, wing and wing coupling apparatus. Structure of male and female genital organs. Metamorphosis and diapauses in insects.	6
III	Types of larvae and pupae-differences between nymph, Pupa and larva. Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretary (Endocrine).	6
IV	Types of reproduction in insects. Major sensory organs like simple and compound eyes and Mechanoreceptors chemorcceptors, photoreceptors, auditory organs, tactile receptors, gustatory receptors.	6
V	Systematics: Taxonomy- -importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insectaupto Orders, basic groups of presentday insects with special emphasis to orders and families of Agricultural importance like Orthoptera: Acrididae. Dictyoptera: Mantidae, Odonata; Isoptera: Termitidae; Thysanoptera: Thripidae; Hemiptera:	6

	Pentatomidae, Coreidae, Cimicidae, Pyrrhocoridae. Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Lophophidac, Alcurodidac, Pseudococcidae; Neuroptera: Chrysopidae; Lepidoptera: Pieridae, Papiloinidae, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Saturnidae, Bombycidae; Coleoptera: Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidac, Bruchidae, Scarabaeidae; Hymenoptera: Tenthridinidae, Apidae. Trichogrammatidae, ichneumonidae, Braconidae, Chalcididae; Diptera: Cecidomyiidae, Tachinidae, Agromyziidae, Culicidae, Muscidae, Tephritidae.	

Reference / Text Books:

- Handbook of Entomology
- Insecta: An introduction

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

CO1 Attain a solid foundation in insect biology, including general entomology.
CO2 Attain basic knowledge on systematics, morphology, physiology, and biodiversity.
CO3 Develop the ability to perform a scientific study on insects, and to analyze results.
CO4 Explain evolution and biodiversity through macro and micro evolutionary processes.
CO5 Explains how to classify the insects in different orders.

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: II

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc. (Hons) Agriculture**	**Year: I** **Semester: II**
Credits:2 **Theory: 2** **Practical: 0**	**Subject: Agriculture**
Course Code: AG-204N	**Title: Fundamentals of Agricultural Economies**

Course Objectives:

1. To know the way forward for an efficient production.
2. To determine the combinations of most profitable amount of inputs.
3. To estimate how the production will respond to a change in the price of output

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / 2 Credits

L:2
T:0
P: 0 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (2Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Economics Meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro and Macro Economics, positive and normative analysis, concept of equilibrium. Capital and its characteristics – classification and capital formation. Enterprises – forms of business organization – merits and demerits.	6
II	Basic concepts: Goods and services, desire, want. demand, utility, cost and price, wealth, capital, income and welfare. Agricultural economics: meaning, definition, characteristics of agriculture, importance and its role in economic, development, Agricultural planning and development in the country. Consumption – theory of consumer behaviour, laws of consumption, classification of goods	6
III	Demand meaning, law of demand, demand schedule and demand curve, determinants, utility theory: law of diminishing marginal utility, equimarginal utility principle. Consumer's equilibrium and derivation of demand curve, concept of consumer surplus. Elasticity of demand: concept and measurement of price elasticity, income elasticity and cross elasticity, Enterprises – forms of business organization – merits and demerits	6
IV	Production: process, creation of utility, factors of production. Input output relationship. Supply: Stock v/s supply, law of supply, supply schedule, supply curve, determinants of supply, elasticity of supply. Concepts of rent, wage, interest and profit, National income' Meaning and importance, circular flow, concepts of national income accounting and approaches to	6

	measurement, difficulties in measurement	
V	Population: Importance, current policies and programmes on population control. Money: Barter system of exchange and its problems, evolution. meaning and functions of money, classification of money, money supply, general price index, inflation and deflation, public revenue and public expenditure. Tax: meaning. Direct and indirect taxes, agricultural taxation, VAT. Economic systems: Concepts of economy and its functions, important features of capitalistic, socialistic and mixed economies, elements of economic planning, Market intelligence, Concept of future market	6

Reference / Text Books:

- Johl, S.S. and Kapoor, T.R. (1973), Fundamentals of Farm Business Management, Kalyani Publishers, Ludhiana.
- Sankhayan, P.L. (1988), Introduction to the Economics of Agricultural Production, Prentice Hall of India Private Limited, New Delhi-110 001
- Raju, V.T. and Rao, D.V.S. (1990), Economics of Farm Production and Management, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi-110 001.
- Dhondyal, S.P. (1984), Farm Management, Friends Publication Meerut (India).
- Kahlon, A.S. and Karam Singh (190), Economics of Farm Management, Allied Publishers, New Delhi.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	40
2) Presentations /Seminar/Assignments/internal	10
3) Practical/Research Project Report/Seminar On Research Project Report	00
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

1. Expresses agricultural business, farmer, agricultural activities and the relationship between agricultural economy with other disciplines
2. Emphasizes the importance of agricultural economy.
3. Assist farm managers in determining the best use of resources, given the changing needs, values and goals of the society.
4. Assist policy makers in determining the consequences of alternative public policies on output, profits and resource use on farms.

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: II

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: I** **Semester: II**
Credits:2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-205N	**Title: Principles of Organic Farming**

Course Objectives:

1. To produce food of high nutritional quality in sufficient quantity.
2. To work with natural system rather than seeking to dominate them.
3. To encourage and enhance biological cycles within farming system-involving microorganisms, soil flora and fauna, plants and animals.
4. To maintain and increase long term fertility of soil.
5. To use, as far as possible, the renewable resources.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L:1
T:0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Principles and its scope in India; Initiatives taken by Government (central/state), NGOs and other organizations for promotion of organic agriculture. Problem and constraints in organic farming	3
II	Organic ecosystem and their concepts; Organic nutrient resources and its fortification; Restrictions to nutrient use in organic farming, Choice of crops and varieties in organic farming; Bio-fertilizers and it's types, difference between organic fertilizers and chemical fertilizers.	3
III	Fundamentals of insect, pest, disease and weed management under organic mode of production; Operational structure of NPOP; products and nutrients for plant pest and disease control	3
IV	Certification process and standards of organic farming; Processing, leveling, economic considerations and viability	3
V	Marketing and export potential of organic products. Present Status and Future Prospects of Organic Farming in India, Exploring the Potential of India's Organic Food Market	3

Reference / Text Books:

- Principles of Organic Farming, S R Reddy

If the course is available as Generic Elective then the students of following departments may opt it.

NA	
Evaluation/Assessment Methodology	
	Max. Marks
1) Class takes/ Sessional Examination 2) Presentations/ Seminar/ Assignments/ Internal 3) Practical/ Research Project Report/ Seminar on Research Project Report 4) ESE	30 05 15 50
Total:	100
Prerequisite for the course	
Course Learning Outcomes: Upon successful completion of this course/paper, students should be able to: 1. Understanding and knowledge of organic farming and its products 2. To understand the procedure followed for organic certification as per NPOP guidelines namely pr oduction standards, labelling and accreditation 3. To gain the information about the impact of organic farming and indigenous practices on Environ ment. 4. To equip students with geostatistical techniques and variables of crop yield mapping.	

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: II

Program: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B. Sc. (Hons) Agriculture**	**Year: I** **Semester: II**
Credits: 4 **Theory: 3** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-206N	**Title: Fundamentals of Plant Pathology**

Course Objectives:

1. The student knows about the early development & role of different micro-organism in development of plant disease.
2. The students gain knowledge on general concepts and classification of plant diseases
3. The students have knowledge with general characteristics of fungi, bacteria, virus and mycoplasma like organisms causing plant diseases.
4. To acquaint the students with reproduction in fungi and fungal like organisms causing plant diseases.
5. The students gain knowledge on management of plant diseases

Nature of Paper: Core
Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 3, Practical 1 = 4 Credits

L: 3
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1Credit (5Hrs./Week = 4Credits)

Unit	Contents	No. of Lectures Allotted
I	**Introduction:** Importance of plant diseases, scope and objective of Plant Pathology. History of Plant Pathology with special reference to Indian work.	8
II	Terms and concept in Plant Pathology. Pathogenesis, diseases triangle and tetrahedron, Epidemiology: Factors affecting disease development and classification of plant diseases.	8
III	Important Plant pathogenic organism fungi, Bacteria, fastidious vesicular bacteria, Phytoplasmas, Spiroplasmas, viruses, viroids, algae, protozoa, phanerogamic parasite and nematodes with example of diseases caused by them. Diseases due to abiotic causes	8
IV	**Fungi**: general character, definition of fungus, somatic structures, type of fungus thalli, fungal tissues. Modifications of thallus, reproduction (Asexual and Sexual). Nomenclature, Binomial system of nomenclature. Rules of nomenclature, classification of fungi, key to divisions, sub-divisions. Orders and classes.	8
V	**Bacteria and mollicutes:** general morphological characters, basic methods reproduction. Viruses: nature of properties, structure and transmission.	8

Reference / Text Books:

- Fundamentals of Plant Pathology by B.D Singh
- Principals of Plant Pathology by R.S Singh.
- Plant Bacteriology by Kalyan K. Mondal

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class takes/ Sessional Examination	30
2) Presentations/ Seminar/ Assignments/ Internal	05
3) Practical/Research Project Report/Seminar on Research Project Report	15
4) ESE	50
Total:	100

Prerequisite for the course

Course Learning Outcomes:

Upon successful completion of this course/paper, students should be able to:

1. Understanding and knowledge of plant disease.
2. On successful completion of this course and basing on the diversified course outcomes this course offers a good scope for students in employment sector.
3. Acquired knowledge may help the students for predicting crop loss and disease management through various approaches

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: II

Programme:Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc. (Hons) Agriculture**	**Year:I** **Semester: II**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-207N	**Title: Production Technology for Vegetable and Spices**

Course Objectives:

1. To acquaint students about the Importance of vegetables & spices in human nutrition and national economy.
2. To impart a comprehensive knowledge on Physiological disorders, disease and seed production of important vegetable
3. To prevent illnesses by transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting storage.

Nature of Paper: Core
Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 1
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3 Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Importance of vegetables & spices in human nutrition and national economy. Vegetables and Spices: Nutritional value and Toxic compounds.	3
II	Types of vegetable gardening: Kitchen garden Market garden, Truck garden *etc.,* brief about origin, area, production improved varieties and cultivation practices such as time of sowing,	3
III	Vegetables and Spices: Transplanting techniques, planting distance, time of planting, fertilizer requirements, irrigation methods, weed management, harvesting, and yield.	3
IV	Physiological disorders, disease and insects-pest of important vegetable (potato, tomato, brinjal, chilli, cauliflower, cabbage, onion, okra, bottle guard and bitter guard)	3
V	Spices: Scientific cultivation and nutritional importance of spices in human life: condiments. Ginger, turmeric, coriander, cumin, funnel, black pepper, ilaichi	3

Reference / Text Books:

- Fundamentals of Vegetables
- Instant ant Horticulture
- Vegetables & spices

• Glautus Horticulture • Horticulture
If the course is available as Generic Elective then the students of following departments may opt it. NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

CO1 Explain the Importance of vegetables & spices in human nutrition and national economy
CO2 Discuss Types of vegetable gardening brief about origin, area, production improved varieties.
CO3 Transplanting techniques, planting distance, fertilizer requirements, irrigation.
CO4 Explains the importance Physiological disorders, disease and seed production
CO5 Explains the Spices i.e. condiments. Ginger. Turmeric, coriander, cumin, funnels.

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: II

Programme:Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: I** **Semester: II**
Credits:3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-208N	**Title: Fundamentals of Agricultural Extension Education**

Course Objectives:

1. To acquaint students about the Education: Meaning, definition & Types: objectives and principles of Extension Education
2. To impart a comprehensive knowledge on New trends in agriculture extension: privatization extension, cyber extension/ extension, market-led extension, farmer-led extension
3. To prevent illnesses by Extension Program me planning- Meaning, Process, Principles and Steps in Programme Development.

Nature of Paper: Core
Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Education: Meaning, definition, importance & Types: Extension Education-meaning, definition, scope and process; objectives and principles of Extension Education, extension teaching methods: meaning, classification, individual, group and mass contact methods	6
II	Extension Programme planning- Meaning, Process, Principles and Steps in Programme Development. Extension systems in India: extension efforts in. pre-independence era (Sriniketan, Martbandam, Firka Development Scheme, Gurgaon Experiment, etc.) and post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.);	6
III	Various extension/ agriculture development programmes launched by ICAR/ Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND, NATP, NAIP, etc.).	6
IV	New trends in agriculture extension: Rural Development: concept, meaning, definition: various rural development programmes launched by Govt. of India. Rural Leadership: concept and definition, types of leaders in rural context; extension administration: meaning and concept, principles and functions.	6
V	Community Development-meaning: Definition, concept & principles, Philosophy of C.D. extension administration: meaning and concept,	6

	principles and functions. Monitoring and evaluation: concept and definition, transfer of technology: concept and models, capacity building of extension personnel; extension teaching methods: meaning, classification, individual, group and mass contact methods, ICT Applications in TOT, Agriculture journalism; diffusion and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories.	

Reference / Text Books:

- Fundamentals of rural extension
- Rural Development

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

CO1 Explain the Extension Education- meaning, definition, scope and process; objectives and principles of Extension Education.

CO2 Discuss about Extension Programme planning- Meaning, Process, Principles and Steps in Programme Development.

CO3 Explain the New trends in agriculture extension: privatization extension, cyber extension/ extension.

CO4 Explains the Community Dev-meaning. Definition, concept & principles, Philosophy of C.D.

CO5 Explains the objectives and principles of Extension Education.

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: II

Programme:Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: I** **Semester: II**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-209N	**Title: Food Processing and Safety Issues**

Course Objectives:

1. To acquaint students about the processes involved in the processing of raw milk with constructional details, operation and maintenance of dairy equipment's.
2. To impart a comprehensive knowledge on chemical and microbiological quality of milk for production of health beneficial foods.
3. To prevent illnesses by focusing food-manufacturing attention and activities on preventing or minimizing exposure of the consumer to pathogens.

Nature of Paper: Core
Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	**GENERAL:** Common terms used in processing and food safety**,** Definition, concept, importance and functions of food, Constituents of foods: Water, Carbohydrate, Fat, Protein, Vitamins and Minerals with reference to milk	6
II	MILK AND COLOSTRUM: Detailed composition of milk and colostrum. Definition, importance, Physio-chemical properties of milk and colostrum, Milk standards, clean milk production and factors affecting clean milk production, milk adulteration	6
III	FOOD PROCESSING: Pasteurization, Sterilization, Bactofugation, Uperization, Stassanization, U.H.T. of milk. Homogenization of milk, Neutralization of milk, Cream, Cooling and chilling of milk.	6
IV	**UNIT IV:** DAIRY PRODUCTS: Fermented dairy products viz. Dahi, Yoghart, Shrikhand. Heat coagulated dairy products viz. Paneer, Cheese, Chhena, Cheddar cheese and. Mozzarella cheese (Pizza cheese).Heat desiccated dairy products viz. Evaporated milk, condensed milk, Khoa, WMP, SMP. Frozen dairy products viz. Ice-cream and Kulfi. Fat products viz. Cream, Butter and Ghee.	6
V	**FOOD SAFETY**: Definition, Importance, Scope, Hazards and risks. Food safety management, HACCP, ISO Series, TQM-Concept and need for quality component of TQM. Basic water tests.	6

Reference / Text Books:

- Dairy Science, Dr. S. G. Shukla
- Advance Dairy Technology
- Dairy and Food Engineering
- Fundamentals of Milk Processing
- Fermented and Coagulated Milk Products
- Concentrated and Dehydrated Milk Products
- Food and Dairy Microbiology

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report	15
4) Seminar On Research Project Report	
5) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

CO1 Explain the formation of milk and its components.
CO2 Discuss how contamination of food can occur in a food service establishment
CO3 Develop and implement food safety management plan for primary production
CO4 Explains the importance of UHT and pasteurization processes
CO5 Explains the production of cheese, milk powder, and ice cream.

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: II

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class:B.Sc (Hons.) Agriculture**	**Year: I** **Semester: II**
Credits: 1 **Theory: 1** **Practical: 0**	**Subject: Agriculture**
Course Code: AG-210N	**Title: Human Value of Ethics**

Course Objectives:

1. To create an awareness on Engineering Ethics and Human Values.
2. To instill Moral and Social Values and Loyalty
3. To appreciate the rights of others.
4. To create awareness on assessment of safety and risk

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / 1 Credits

L: 1
T: 0
P: 0 (In Hours/Week)
Theory - 1 Hr. = 1 Credit (1Hrs./Week=1 Credits)

Unit	Contents	No. of Lectures Allotted
I	Values and Ethics-An Introduction Concept, definition, significance and sources. Goal and Mission of Life. Vision of Life Fundamental values: Right conduct, peace, truth, love and non-violence.	3
II	Principles and Philosophy. Self-Exploration. Self-Awareness. Self-Satisfaction Rights and responsibilities; Road safety; Human relations and family harmony.	3
III	Decision Making. Motivation. Sensitivity. Success. Selfless Service. .Needs- Basic Human needs, types of needs and need ethics	3
IV	Case Study of Ethical Lives. Positive Spirit. Body, Mind and Soul. Attachment and Detachment. Concept of sustainability	3
V	Spirituality Quotient, positive attitude and scientific temper; Team work and volunteering, Possitive attitude and personality building	3

Reference / Text Books:

1. M. Govindarajan, S. Natarajananad, V.S. Senthil Kumar "Engineering Ethics includes Human Values" -PHI Learning Pvt. Ltd-2009
2. Harris, Pritchard and Rabins "Engineering Ethics", CENGAGE Learning, India Edition, 2009. 3. Mike W. Martin and Roland Schinzinger "Ethics in Engineering" Tata McGraw- Hill–2003.
3. Prof. A. R. Aryasri, Dharanikota Suyodhana "Professional Ethics and Morals" Maruthi Publications.
4. Alavudeen, R. Kalil Rahman and M. Jayakumaran "Professional Ethics and Human Values" – Laxmi Publications.

5. Prof. D. R. Kiran "Professional Ethics and Human Values"
6. PSR Murthy "Indian Culture, Values and Professional Ethics" BS Publication

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	40
2) Presentations /Seminar/Assignments/internal	10
3) Practical/Research Project Report/Seminar On Research Project Report	00
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

CO1 Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field
CO2 Identify the multiple ethical interests at stake in a real-world situation or practice
CO3 Articulate what makes a particular course of action ethically defensible
CO4 Assess their own ethical values and the social context of problems
CO5 Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects
CO6 Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: III

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B. Sc. (Hons) Agriculture**	**Year: II** **Semester: III**
Credits:2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-301N	**Title: Crop Production Technology-I (Kharif Crops)**

Course Objectives:

1. Knowledge and concept of major field crops (including cereals, pulses, oilseeds and fiber crops)
2. Basics of soil requirements for field crops including fertilizers, manures, Farm yard manures
3. Knowledge of seed rates, morphology phenology, varietal improvement of crops
4. Basic concepts of origin, history, distribution, adaptations of different crops according to the environment

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 01
T: 00
P: 01 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif crops. Cereals – rice, maize.	3
II	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif crops. Cereals – sorghum, pearl millet and finger millet,	3
III	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif crops., pulses-pigeon pea, Mung bean and urd bean,	3
IV	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif crops., oilseeds- groundnut, sesame and soybean	3
V	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif crops. fibre crops- cotton , Jute, Mesta and sun hemp; forage crops-sorghum, cowpea,	3

Suggested Readings:

1. Modern technique of raising field crops by Chidda Singh
2. Agronomy of field crop by S.R. Reddy
3. Hand book of Agriculture, ICAR New Delhi

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report Seminar On Research Project Report 4) ESE	30 05 15 50
Total:	100
Course Learning Outcomes: • Concept of major field crops (including cereals, pulses, oilseeds and fiber crops) • Knowledge of farm yard manures soil requirements for field crops including fertilizers, manures, • Basics if origin, history, distribution, adaptations of different crops according to the environment	

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: III

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: II** **Semester: III**
Credits:2 **Theory: 0** **Practical: 2**	**Subject: Agriculture**
Course Code: AG-302N	**Title: Practical Crop Production-I (Kharif Crops)**

Course Objectives:

1. To teach the practical growing of crop husbandry of different *Kharif* crop
2. To promote professional skills and knowledge through meaningful hands on experience.
3. To acquire enterprise management capabilities.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / 2 Credits

L: 0
T: 0
P: 2 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
	1. Crop planning, raising field crops in multiple cropping systems: 2. Field preparation, seed, treatment, nursery raising, sowing. 3. Nutrient, water and weed management and management of insect-pests diseases of crops, 4. Harvesting, threshing, drying winnowing, Principles of post-harvest management. 5. Storage and principles & strategies of marketing of produce. 6. The emphasis will be given to seed production. 7. Mechanization, resource conservation technologies and zero tillage. 8. Integrated nutrient management, integrated pest management and disease management technologies. 9. Preparation of balance sheet including cost of cultivation. 10. Net returns per student as well as per team of 8-10 students	15

Reference / Text Books:

Practical Crop Production-I (Kharif Crops), Reddy S. R.
Principle and Practices of Agronomy by S.S. Singh

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	0 0 100 0
Total:	100
Prerequisites for the course:	
Course Learning Outcomes: 1. This course offers a wide scope for students in skill development 2. Crop planning, raising field crops in multiple cropping systems: Field preparation, seed, treatment, nursery raising, sowing, nutrient, water and weed management and management of insect-pests diseases of crops, harvesting, threshing, drying winnowing, storage and marketing of produce	

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: III

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: II** **Semester: III**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-303N	**Title: Fundamentals of Plant Breeding**

Course Objectives:

1. To impart knowledge to the students on the principles and procedures of plant breeding in self and cross pollinated crops for development of the high yielding varieties / hybrids with the help of various conventional and modern molecular approaches

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks/ Theory 2, Practical 1 = 3 Credits

L:02
T:00
P: 01(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Historical development, concept. Nature and role of plant breeding, major achievements and future prospects. Genetics in relation to plant breeding, modes of reproduction and apomixes, self-incompatibility and male sterility-genetic consequences. Domestication	6
II	Acclimatization and Introduction: Centre's of origin/diversity, components of Genetic variation; Heritability and genetic advance; Genetic basis and breeding methods in self-pollinated crops -mass and pure line selection, hybridization techniques and handling of segregating population; Multiline concept.	6
III	Concepts of population genetics and Hardy- Weinberg Law; Genetic basis and methods of breeding cross pollinated crops. Modes of selection; Population improvement Schemes-Ear to row method, Modified Ear to Row	6
IV	Recurrent selection. Heterosis and inbreeding depression. Development of inbred lines and hybrids, composite and synthetic varieties; Breeding methods in asexually propagated crops. clonal selection and hybridization: Maintenance of breeding records and data collection	6
V	Wide hybridization and pre-breeding; Polyploidy in relation to plant breeding. Mutation breeding methods and uses; Breeding for important biotic and abiotic stresses; Biotechnological tools-DNA markers and marker assisted selection. Participatory plant breeding.	6

Reference / Text Books:

1. Fundamental of Plant Breeding - B. D. Singh and Payal Bansal
2. Fundamental of Plant Breeding – Phundan Singh
3. Essentials of Plant Breeding – Phundan Singh
4. Principles of Plant Breeding - R.W. Allard
5. Principles of Plant Breeding ICAR e-Course Link

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

- Learn breeding procedures in self and cross pollinated crops.
- Understand exploitation of heterosis utilizing male sterility and other method.
- Know about the various population improvement programmes.
- Study about the fundamentals of mutation, polyploidy and wide hybridization and their role in crop improvement.
- Orientation regarding modern molecular approaches like Marker Assisted Selection

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: III

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: II** **Semester: III**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code:AG-304N	**Title: Agricultural Microbiology**

Course Objectives:

1. To gain knowledge on several beneficial and harmful micro-organisms
2. To have detailed idea about their cell structure, reproduction and mechanism of action
3. To know the complex interaction between agriculture system and micro-organism.
4. To introduce micro-organism in agricultural system for building a pathway for sustainable agriculture

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 1 Credits

L: 01
T:00
P: 01 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction of Microbial World-General characteristics, importance and scope of Agricultural Microbiology. Prokaryotes and eukaryotes microorganisms. Cell structure, chemoautotrophy, photo autotrophy, growth and nutrition	3
II	Bacterial genetics: Genetic recombination- transformation, conjugation and transduction. plasmids, transposon. Role of microbes in Soil fertility and Crop production: Transformation reactions in soil microbiology- Carbon Cycle, Nitrogen cycle, Phosphorus cycle and Sulphur cycles.	3
III	Biological nitrogen fixation- symbiotic and non-symbiotic, associative and symbiosis in non-legumes. Azolla, Blue green algae and mycorrhiza. Rhizosphere and Phyllo sphere.	3
IV	Microbes in human welfare: bio fertilizers, bio pesticides, biofuel production and biodegradation. Microbial degradation of organic matter in soil	3
V	Cellulose decomposing microbes for compost preparation & vermi-composed. Soil organisms: macro and microorganisms, their beneficial and harmful effects	3

Reference / Text Books:

1. Brock Biology of Microorganisms. Madigan, M., Martinko, J.M. and Parker, J. (14 Ed.) 2015. Prentice Hall of India Pvt. Ltd., New Delhi.
2. Soil Microbiology: Subba Rao, N.S.(4thEd.) 2014. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
3. Microbiology A Laboratory Manual: James, C and Natile, S. (10th Ed.) 2014. Pearson India

Education Services Pvt. Ltd., South Asia.
4. Experiments in Microbiology, Plant Pathology and Biotechnology, Aneja, K.R.2011. New Age International (P) Ltd., Publishers, New Delhi.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

1. Learners will gain detailed idea on various micro-organisms, its harmful or beneficial effects on Agriculture, how to use them in a safer way for creating a better agriculture system like using as bio fertilizers, bio pesticide, Silage production, plant disease management etc.
2. Student will understand the basic microbial structure, function and study the comparative characteristics of prokaryotes and eukaryotes.
3. To know the various Physical and Chemical growth requirements of bacteria

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: III

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: II** **Semester: III**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-305N	**Title: Agricultural Finance and Co-Operation**

Course Objectives:

1. The Objective of this Course is to impart knowledge and expertise in the field of agricultural finance
2. It enables the student to understand the business planning and financial management of an agri-business: become aware of the international models for gauging agricultural debt and the role of the regulator in agricultural financing.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits:50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T:00
P: 01(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Agricultural Finance- meaning, scope and significance, credit needs and its role in Indian agriculture. Agricultural credit: meaning, definition, need, classification, Farm business and its management.	6
II	Credit analysis; 4 R's, and 3C's of credits. 5C's and 7 P's of credits Sources of agricultural finance: institutional and non-institutional sources, commercial banks, social control and nationalization of commercial banks. Micro financing including KCC. Lead bank scheme, RRBs, Scale of finance and unit cost	6
III	An introduction to higher financing institutions - RBI. NABARD. ADB, IMF, world bank. Insurance and Credit Guarantee Corporation of India. Cost of credit. Recent development in agricultural credit. Preparation and analysis of financial statements - Balance Sheet and Income Statement	6
IV	Basic guidelines for preparation of project reports, SWOT analysis.	6
V	Agricultural Cooperation - Meaning, brief history of cooperative development in India, objectives, principles of cooperation, significance of cooperatives in Indian agriculture. Agricultural Cooperation in India-credit, marketing, farmers' service cooperative societies, processing cooperatives, Farming cooperatives, cooperative warehousing; role of ICA, NCUI, NCDC, NAFED, Cooperative Exploitation	6

Reference / Text Books: 1. AGRICULTURE FINANCE AND CO- OPERATION, SUBBA REDDY & REDDY	
If the course is available as Generic Elective then the students of following departments may opt it. NA	
Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	30 05 15 50
Total:	100
Prerequisites for the course:	
Course Learning Outcomes: 1. To acquire Knowledge of successful cooperative systems in India and newly launched crop insurance schemes. 2. Estimation of Credit requirement of farm business. 3. Preparation and Analysis of project reports and Financial Statements 4. Analysis and performance of commercial banks, cooperative banks to acquire firsthand knowledge of their management, schemes and procedures	

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: III

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: II** **Semester: III**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-306N	**Title: Farm Machinery and Power**

Course Objectives:

1. To promote professional skills and knowledge through meaningful hands on experience.
2. To impart knowledge about farm power in India, i.e. Tillage implements, Seed drills, Paddy Transplanters, Plant protection equipment and land development and soilconservation
3. To understand guide farmers to use farm power machineries for tillage and cultural operations to grow the crops mechanically.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L:02
T:00
P: 01 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Status of Farm Power in India, Sources of Farm Power, I.C. engines, working principles of I.C. engines. Comparison of two stroke and four stroke cycle engines Study of different components of I.C. engine, I.C. engine terminology and solved problems.	6
II	Familiarization with different systems of I.C. engines: Air cleaning, cooling, lubrication, fuel supply and hydraulic control system of a tractor	6
III	Familiarization with Power transmission system: clutch, gear box, differential and final drive of a tractor, Tractor types	6
IV	Cost analysis of tractor power and attached implement, Familiarization with Primary and Secondary Tillage implement, Implement for hill agriculture, implement for intercultural operations	6
V	Familiarization with sowing and planting equipment, calibration of a seed drill and solved examples, Familiarization with Plant Protection equipment. Familiarization with harvesting and threshing equipment	6

Reference / Text Books:

1. Surendra Singh- Farm machinery –Principles and applications, ICAR, New Delhi
2. Jain, S.C. and C.R. Rai. Farm Tractor and maintenance and repair. Standard Publishers, 1705- B, Naisarak, Delhi- 110006
3. Ojha, T.P. and A.M. Michael, A.M. Principles of Agricultural Engineering. Vol. I. Jain brothers, 16/893, East Park Road, Karol Bagh, New Delhi -11000

If the course is available as Generic Elective then the students of following departments may opt it. NA	
Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	30 05 15 50
Total:	100
Prerequisites for the course:	

Course Learning Outcomes:

1. It acknowledges the students with the improved mechanization and how to increase efficiency of machineries.
2. To equip the students with technical knowledge and skills required for the operation of Tillage, Sowing and intercultural and plant protection machinery needed for agricultural farms.
3. To train the students with skills required for the operation, maintenance and evaluation of harvesting, threshing machinery needed for agricultural farms.

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: III

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: II** **Semester: III**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-307N	**Title:Principles of Integrated Disease Management**

Course Objectives:

1. Learn some benefits of disease, some characteristics of disease, some challenges associated with disease control, and how trophic interactions can contribute to disease control
2. Learn what IDM is and how to apply the economic threshold concept to interpret if a pest population has reached an economic threshold
3. Learn some transgenic disease management technologies and their impact
4. Understand how few pest control tactics can select for disease resistance while integrated disease and weed management can contribute to long-term successful weed and disease management
5. The students gain knowledge on management of plant diseases.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Categories of plant diseases. Integrated disease management: Introduction, history, importance, concepts, principles and tools of Integrated disease management	6
II	Economic importance of plant diseases. Methods of detection and diagnosis of plant diseases. Calculation of disease incidence and disease severity.	6
III	Methods of control: Cultural method, mechanical method, physical method, legislative method and host plant resistance. Definition and concept of quarantine	6
IV	Biological, host resistance and chemical control. Survey surveillance and forecasting of diseases and forecasting module. Safety issues in fungicide uses	6
V	IPM module in different crop. Political implication of Integrated disease management, social implication of Integrated disease management and legal implication of Integrated disease management	6

Reference / Text Books:

- Fundamentals of Plant Pathology by B.D Singh
- Principals of Plant Pathology by R.S Singh.
- Plant Pathology by GN Agrios
- Plant Diseases Management by RS Singh

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

Upon successful completion of this course/paper, students should be able to:

1. Explain how plant diseases are classified by symptoms displayed on plants.
2. Analyze a disease situation and determine the best cultural, mechanical, and biological control methods used to manage the plant disease.
3. Distinguish between the various integrated pest management strategies for plant disease management.
4. Compare some of the "Best Management Practices" for the production of food crops and ornamentals.
5. Understand the plant disease control through plant quarantine

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: III

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: II** **Semester: III**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-308N	**Title: Environmental Studies and Disaster Management**

Course Objectives:

1. Enable students to develop a comprehensive understanding of various facets of life forms, ecological processes and how humans have impacted them during the Anthropogenic Era
2. Capability to identify relevant environmental issues, analyzes the various underlying causes, evaluate the practices and policies, and develop framework to make informed decisions.
3. Develop empathy for various life forms and appreciate the various ecological linkages within the web of life.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 1
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Multidisciplinary nature of environmental studies Definition, scope and importance. Natural Resources: Renewable and non-renewable resources	2
II	Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation. case studies. Timber extraction, mining. Dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water. floods. drought. Conflicts over water, dam's benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture. Fertilizer pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources. Case studies. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. Ecosystems: Concept of an ecosystem	4

III	Structure and function of an ecosystem. Producers, consumers and decomposers, Energy flow in the ecosystem. Ecological succession, Food chains. food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries), Biodiversity and its conservation: - Introduction, definition, genetic, species & ecosystem diversity and biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global. National and local levels. India as a mega-diversity nation. Hot sports of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India	3
IV	Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Environmental Pollution: definition, cause, effects and control measures of: 1. Air pollution 2. Water pollution 3. Soil pollution 4. Marine pollution 5. Noise pollution 6. Thermal pollution 7. Nuclear hazards. Solid Waste Management: causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Social Issues and the Environment: Water conservation, rain water harvesting, watershed management. Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, dies, Wasteland reclamation, Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness. Human Population and the Environment: population growth, variation among nations, population explosion, Family Welfare Programme. Environment and human health: Human Rights, Value Education. HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health	3
V	**Disaster Management:** Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, ozone depletion. Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters. Building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste, water pollution. Disaster Management- Effect to migrate natural disaster at national and	3

	global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of N(it)s, community - based organizations and media. Central, state, district and local administration	

Reference / Text Books:

1. Bharucha, E. 2005. Text book of Environmental Studies for undergraduate courses. University Grants Commission, New Delhi.
2. Anjaneyalu, Y. 2004. Introduction to Environmental Science, BS Publications, Hyderabad, A.P., India.

If the course is available as Generic Elective then the students of following departments may opt it.NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

1. Understand the natural environment and its relationships with human activities.
2. Characterize and analyze human impacts on the environment.
3. Integrate facts, concepts, and methods from multiple disciplines and apply to environmental problems.
4. Capacity to integrate knowledge and to analyze, evaluate and manage the different public health aspects of disaster events at a local and global levels.
5. Capacity to obtain, analyze, and communicate information on risks, relief needs and lessons learned from earlier disasters in order to formulate strategies for mitigation in future scenarios.

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: III

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: II** **Semester: III**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code:AG-309N	**Title: Statistical Methods**

Course Objectives:

1. Demonstrate knowledge of the properties of parametric, semi-parametric and nonparametric testing procedures
2. Demonstrate understanding of how to design experiments and surveys for efficiency.
3. Demonstrate knowledge of classical and repeated measures multivariate methods and computational techniques.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 1
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction to Statistics and its Applications in Agriculture, Graphical Representation of Data., Measures of Central Tendency & Dispersion	3
II	Definition of Probability. Addition and Multiplication Theorem (without proof). Simple Problems Based on Probability	3
III	Binomial & Poisson Distributions, Definition of Correlation. Scatter Diagram. Karl Pearson's Coefficient of Correlation. Linear Regression Equations	3
IV	Introduction to Test of Significance, One sample & two sample test t for Means. Chi-Square Test of Independence of Attributes in 2×2 Contingency Table. Introduction to Analysis of Variance. Analysis of One Way Classification	3
V	Introduction to Sampling Methods. Sampling versus Complete Enumeration, Simple Random Sampling with and without replacement. Use of Random Number Tables for selection of Simple Random Sample	3

Reference / Text Books:

1. Statistical Methods, Majumdar D.N.
2. Statistical Methods by S.P. Gupta

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	30 05 15 50
Total:	100
Prerequisites for the course:	
Course Learning Outcomes: 1. Describe the formulation of stochastic models for genomic and proteomic data. 2. Apply statistical techniques to analyze microarray data and interpret the results generated. 3. Use statistical tests commonly employed in bioinformatics. 4. Recognize modern statistical methods and software to solve complex problems in bioinformatics. 5. Interpret the statistical results as reported in the bioinformatics literature	

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: III

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: II** **Semester: III**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code:AG-310N	**Title: Fundamental of Soil and Water Conservation**

Course Objectives:

1. To understanding about the degradation of productive soil and the causes of its erosion.
2. To make the students know about the measurement techniques for soil loss and wind erosion.
3. To understand the different agronomical and engineering measures adopted for its control along with its design.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 1
T: 0
P:1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction and concept of Soil and Water Conservation. Types of erosion. Soil conservation programmes in India. Types of Causes of soil erosion. Definition and agents of soil erosion.	3
II	Water erosion: Factors affecting water erosion. Runoff. Forms of water erosion. Gully classification and control measures. Soil loss estimation by universal Loss Soil Equation. Soil loss measurement techniques.	3
III	Principles of erosion control: Introduction to contouring. Strip cropping. Contour bund. Graded bund and bench terracing. Agronomical Measures for Water Erosion Control, Terraces for Water Erosion Control.	3
IV	Grassed water ways: purpose, design, size, shape, site selection, Construction Procedure and Maintenance. Water harvesting: importance and its techniques	3
V	Wind erosion: mechanics of wind erosion, types of soil movement. Principles of wind erosion control and its control measures.	3

Reference / Text Books:
Fundamental of Soil and Water Conservation, R SURESH

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	30 05 15 50
Total:	100
Prerequisites for the course:	
Course Learning Outcomes: 1. The various types of soil, water and wind erosion along with its mitigation measures. 2. The agronomic and engineering methods of conservation and the design of bunds and terraces being implemented on the field. 3. Minimize the erosion loss and conservation of soil.	

Format-3

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: III

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: II** **Semester: III**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-311N	**Title: Dairy Science**

Course Objectives:

To enable course participant to:-

1. Demonstrate knowledge of the science and composition of milk and dairy products
2. Work hygienically and safely in a dairy industry environment
3. Demonstrate within the dairy industry knowledge of quality assurance techniques commonly used within the dairy industry.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	**GENERAL:** Concept of Dairying, Dairying in India, Dairy development in different five-year plans. Market milk industry in India, Dairy production statistics.	6
II	Dairy cooperatives, functioning of dairy cooperatives societies, AMUL model, White revolution objectives and achievements of operation flood, Pricing policy of milk.,	6
III	Milk and its secretion, Composition of milk, Quality of milk, Nutritive value of milk and milk products, Transportation and milk distribution, Platform tests, Filtration, Straining and Clarification and bactofugation of milk. Standardization	6
IV	Milk adulteration and its detection, Common preservatives of milk and their detection, Micro-organisms in Milk and their functions, Legal standards of milk. Factors affecting the quality and quantity of milk.	6
V	Cleaning and sanitization of dairy equipment, Basic principles of refrigeration and cold storage of milk and milk product, Common adulterants of ghee, khoa and their detection.	6

Reference / Text Books:

- Dairy Science, Dr. S. G. Shukla
- Advance Dairy Technology

- Dairy and Food Engineering
- Fundamentals of Milk Processing
- Fermented and Coagulated Milk Products
- Concentrated and Dehydrated Milk Products
- Food and Dairy Microbiology

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:
CO1 Explain the formation of milk and its components.
CO2 Discuss how contamination of food can occur in a food service establishment
CO3 Develop and implement food safety management plan for primary production
CO4 Explains the importance of UHT and pasteurization processes
CO5 Explains the production of cheese, milk powder, and ice cream.

IIMTU-NEP IMPLEMENTATION
Years: II / Semester: III

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year :II** **Semester : III**
Credits:2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-312N	**Title: Fundamentals of Entomology-II (Insect Ecology & Concepts of IPM)**

Course Objectives:

1. To impart knowledge to the students on morphology and physiology of Insects.
2. To impart knowledge on classification and identification of insects based on their morphology.
3. To acquire enterprise management capabilities.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 1
T: 0
P: 1(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Insect Ecology: Introduction, Environment and its components. Effect of abiotic factors- temperature, moisture, humidity, rainfall, light, atmospheric pressure and air currents. Effect of biotic factors - food competition, natural and environmental resistance.	3
II	IPM- definition**:** Categories of pests- regular pest, occasional pest, seasonal pest, persistant pest, sporadic pest, epidemic pest, endemic pest. Concept of IPM, Practices, scope and limitations of IPM.	3
III	Classification of insecticides, toxicity of insecticides and formulations of insecticides- liquid, granule, dust formulations. Chemical control- importance, hazards and limitations.	3
IV	Recent methods of pest control, Pheromones, repellents, anti-feedants, hormones. Attractants, gamma radiation	3
V	Insecticides Act 1968- Important provisions. Application techniques of spray fluids. Symptoms of poisoning, first aid and antidotes. Survey, surveillance and forecasting of insect pests. Safety issues of pesticides uses	3

Reference / Text Books:

1. Principles Of Integrated Disease Management, G.S. DHALLIVAL
2. Principals of Plant Disease Management, Subhashini Sinha And Manjula Sharma

If the course is available as Generic Elective then the students of following departments may opt it. NA	
Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	30 05 15 50
Total:	100
Prerequisites for the course:	

Course Learning Outcomes:

- Thorough knowledge on insects Collection and preservation
- Developing skill to identify insects
- Knowledge on physiological systems in insect through dissections
- Be able to identify the potential impact of different insect species on agriculture, human health, and society in general; to be knowledgeable about potential control strategies
- To be able to examine insects deeply within a biological level of analysis and compare strategies used by different groups

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: IV

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: II** **Semester: IV**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code:AG-401N	**Title: Crop Production Technology-II (Rabi Crops)**

Course Objectives:
1. To study the Origin, geographical distribution, economic importance of rabi crops.
2. To study about the different practices and yield of rabi crops.

Nature of Paper: Core
Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 1
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Rabi crops; wheat and barley.	3
II	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Rabi crops; pulses – chickpea, lentil, peas.	3
III	Origin, classification, Geographical distribution, economic importance, Soil requirements, Climatic requirement and Cultural practices, soil and climatic requirements, verities and yield of Rabi crops of oil seeds –rape seed, mustard and sunflower, sugar crops: sugarcane, sugar beet	3
IV	Origin, geographical distribution, economic importance, soil and climatic requirements, verities, cultural practices soil and climatic requirements, verities and yield of Rabi crops of Medicinal and aromatic crops –mentha, lemon grass and citronella	3
V	Origin, classification, Geographical distribution, economic importance, Soil requirements, Climatic requirement and Cultural practices, soil and climatic requirements, verities and yields of Potato, Berseem, Lucerne, oat and fodder grass	3

Reference / Text Books:

1. Modern techniques of raising field crops –Chhidda Singh, Prem Singh and Rajbir Singh
2. Field crops production-Foodgrain crops Volume I- Dr. Rajendra Prasad
3. Field crops production-Commercial crops Volume II - Dr. Rajendra Prasad
4. Crops of India - N.R. Das
5. Agronomy of field crops - S.R. Reddy

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESEs	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

CO1 Student will able to understand the Origin, geographical distribution, economic importance of Rabi crops.
CO2 Student will able to recognize the Rabi crops.
CO3 Student will able to understand the cultural practices and yield of Rabi crops

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: IV

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B. Sc. (Hons) Agriculture**	**Year: : II** **Semester: IV**
Credits: 2 **Theory: 0** **Practical: 2**	**Subject: Agriculture**
Course Code: AG-402N	**Title: Practical Crop Production-II**

Course Objectives:

- To teach the crop husbandry of cereals fibers, oil seed and pulse crops.
- To give experience of crop production in the field to the students.
- Raising field crops in multiple cropping systems.
- Nursery raising, sowing, nutrient, water and weed management.
- Management of insect-pests diseases of crops, harvesting, threshing, drying winnowing, storage and marketing of produce.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50%Marks / 2 Credits

L:
T:0
P: 2 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
	1. Crop planning, raising field crops in multiple cropping systems 2. Field preparation, seed, treatment, nursery raising. 3. Sowing, nutrient, water and weed management and management of insect-pests diseases of crops, harvesting, threshing, drying winnowing, storage and marketing of produce. 4. The emphasis will be given to seed production, mechanization, resource conservation and integrated nutrient, insect-pest and disease management technologies. 5. Preparation of balance sheet including cost of cultivation. 6. Net returns per student as well as per team of 8-10 students.	15

Reference / Text Books:

1. A Textbook of Agronomy by B. Chandrasekaran
2. Reddy, S.R. 2004. Agronomy of Field Crops. Kalyani Publishers, New Delhi.
3. Reddy, T.Y. and Reddi, G.H.S. 1993. Principles of Agronomy, Kalyani Publishers, New Delhi
4. Reddy, T. Yellamanda and Reddy, G.H. Sankara. 2016. Principles of Agronomy (2nd edition), Kalyani Publishers, Ludhiana.

If the course is available as Generic Elective then the students of following departments may opt it. **NA**	
Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	0 100 0 0
Total:	100
Prerequisites for the course:	

Course Learning Outcomes:

- This course offers a wide scope for students in employment, skill development and entrepreneurial sectors.
- Students will awareness of the nature of field crop production including the knowledge, skills and abilities required for field crop production.
- Carry out field observations, including sowing-methods, depth, plant density, Nursery bed and transplanting, Crop density and geometry, Optimum plant population.
- To encourage the development of employability skills in field crop production.
- Understand about the procedure of harvesting and threshing of crops.

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: IV

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: II** **Semester: IV**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-403N	**Title: Principles of Seed Technology**

Course Objectives:

1. To teach the basic concepts of Seed production technology
2. To teach them the development and management of seed programs, maintenance of genetic purity
3. To teach about seed storage packaging and handling and seed marketing.
4. To impart knowledge about seed marketing.
5. To know the various issues like Patents & other laws related to seeds.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Seed and seed technology: introduction, definition and importance. Types of seed, class of seed, Importance of scientific seed production crops	6
II	Deterioration causes of crop varieties and their control; Maintenance of genetic purity during seed production. Seed quality; Definition and Characters of good quality seed, different classes of seed	6
III	Foundation and certified seed production of important cereals, pulses. Oilseeds, fodder and vegetables. Seed certification. Phases of certification, procedure for seed certification, field inspection. Seed Act and Seed Act enforcement. Duty and powers of seed inspector, offences and penalties	6
IV	Seeds Control Order 1983. Varietal identification through Grow out Test. Molecular and Biochemical test. Detection of genetically modified crops, Transgene contamination in non-GM crops, GM crops and organic seed production. History and development of Seed Industry in India.	6
V	Seed storage; general principles, stages and factors affecting seed longevity during storage. Measures for pest and disease control during storage. Seed marketing, Private and public sectors and their production and marketing strategies	6

Reference / Text Books:

1. R. L. Agarwal., Seed Technology.,Oxford and IBH Publishing.
2. Phundan Singh., Principles of seed Technology., Kalyani publication
3. P. K Upadhya., Principles of seed Technology., Kalyani publication
4. Dhirendra Khare., Seed Technology., Scientific Publication.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

- Learn about seed technology, National seed project
- Learn the development and management of seed programs.
- Have a basic understanding of Genetic purity, seed processing plant,
- Able to implement seed marketing, seed testing.
- Able to take legal decisions of seed management.

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: IV

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: II** **Semester: IV**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-404N	**Title: Problematic Soils and their Management**

Course Objectives:

- To know about the soil and different problem occur during cultivation. How to identify the problem and what are the reclamation method requires improving the soil health. Students learn practically about the identification of problem soil and learn different method to improve soil fertility, that necessary to improve the yield.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 1
T:0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Soil quality and health, Expand the content of saline and alkaline soils with a focus on local conditions. Their categorization based on properties. Characteristics of salt affected soils, formation of saline and alkaline/sodic soils, formation of acid soils	3
II	Problematics soil categorization based on properties. Reclamation and management of Saline and sodic soils, Acid soils. Acid Sulphate soils	3
III	Detrimental effects of soil salinity, alkalinity and acidity Eroded and Compacted soils. Introduced advanced techniques for soil remediation, specifically tailored to the problems in western U.P. Effective water management is crucial in regions facing water logging and salinity issues	3
IV	Utilization of saline water in agriculture. Remote sensing and GIS in diagnosis and management of problem soils. Crop management technologies in problematic areas	3
V	Multipurpose tree species, bio remediation through MPTs of soils. Land capability and classification, land suitability classification. Problematic soils under different Agro-ecosystems	3

Reference / Text Books:

1. Maliwal, G.L and Somani L.L. 2010. Nature Properties and Management of saline and alkali soils. Agro tech Publishing Academy, Udaipur.
2. Tyagi, N. K. and P.S.Minhas,1998. Agricultural Salinity Management in India. Published by CSRI Karnal.

3. Das, D.K. Introductory Soil Science.
4. Brady, N.C. 2016. The Nature and Properties of Soils. 15edn.
5. Management of Salt affected Soils and Waters-L.L. Somani and K.L. Totawat.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

- The students get knowledge about different kind of problem soil in India and there characteristics
- The students will understand how to control or improve the soil fertility.
- The students gain practical knowledge of laboratory to test the problem soil**.**

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: IV

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: II** **Semester: IV**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-406N	**Title: Renewable Energy and Green Technology**

Course Objectives:
1. To promote professional skills and knowledge through meaningful hands on experience.
2. To build confidence and to work in project mode.
3. To acquire enterprise management capabilities.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 1
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction, Definition, importance and role of renewable energy, classification of energy sources, Various Forms of Renewable Energy, contribution of these of sources in agricultural sector	3
II	Familiarization with biomass utilization for biofuel production and their application, Biomass-Importance of biomass, Energy plantation classification of energy production principles of combustion, pyrolysis and gasification	3
III	Familiarization with types of biogas plants and gasifiers. Biogas. Bio alcohol, biodiesel and bio oil production and their utilization as bioenergy resource	3
IV	Introduction of solar energy, collection and their application, Familiarization with solar energy gadgets: solar cooker, solar water heater, application of solar energy: solar drying, solar pond, solar distillation,	3
V	Introduction of wind energy and their application. Wind energy-advantages, disadvantages, wind mills and types. Constructional details of wind mills, applications of wind mills	3

Reference / Text Books:
1. Renewable Energy Sources and Emerging Technologies by Kothari
2. Ext book of Renewable Energy, by S.C. Bhatia, R. K. Gupta

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	30 05 15 50
Total:	100
Prerequisites for the course:	

Course Learning Outcomes:

CO1. Students will able to use laboratories and emulators of renewable energy systems to analyze relevant issues

CO2. Students have a good understanding of renewable energy systems, its components and interactions between the components. This includes all renewable energy technologies, different storage technologies, distribution grid, smart grid including sensors. Regulation and control, and both "stand alone" systems and large integrated distribution systems

CO3. Students have profound knowledge in a special field such as solar energy, storage, smart grid.

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: IV

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc.(Hons) Agriculture**	**Year : II** **Semester: IV**
Credits:2 **Theory: 1** **Practical : 1**	**Subject: Agriculture**
Course Code: AG-407N	**Title: Production Technology for Ornamental Crops, MAPS and Landscaping**

Course Objectives:
- To provide technical and scientific cultivation practices of different fruit and plantation crops.
- To provide field knowledge and acquaint the students with practical field.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L:01
T:00
P: 01 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2 Credits)

Unit	Contents	No. of Lectures Allotted
I	Definition Importance and Scope of Ornamental Crops Medicinal and Aromatic Plants in India, and landscaping, Bio-aesthetic Planning in India	6
II	Principles of landscaping. Landscape uses of trees, shrubs and climbers. Style of gardening and lawn making and maintenance. Difference between formal and informal garden	6
III	Production technology of important cut flowers like rose, Gerbera, carnation, lilium and orchids under protected conditions and gladiolus, tuberose, chrysanthemum under open conditions.	6
IV	Package of practices for loose flowers like marigold and jasmine under open conditions.	6
V	Production technology of important medicinal plants and aromatic plants like- Isabgol, Ashwagandha, Aloe, Opium Poppy, Belladona lemongrass, citronella, ocimum, Lavender, Sandalwood Processing and value edition in ornamental crop and MAPs produce	6

Reference / Text Books:

1. Chadha, K.L.2001. Hand Book of Horticulture, ICAR, New Delhi
2. Amar Singh, 1986. Fruit Physiology and Production. Kalyani Publishers, Delhi
3. Bose, T.K, Mitra, S.K. and Sanyal, D. 2002. Fruits: Tropical and Subtropical. Vol. I and II, Naya prakash Publications, Calcutta.
4. Chadha, K.L.2001. Hand Book of Horticulture, ICAR, New Delhi
5. CPCRI, 2003. Coffee Guide, Central Coffee Research Institute, Coffee Board, Chickamangalur, Karnataka.

6. Kumar.N, Abdul Khader.J.B.M. Rangaswami.P. and Irulappan., 1993. Introduction to Spices – Plantation Crops, Medicinal and Aromatic Plants, Rajalekshmi Pub, Nagercoil.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	35
Total:	**75**

Prerequisites for the course:

Course Learning Outcomes:

To know importance of different fruit crops and plantation crops.

- Understand the scientific cultivation methods of different fruit crops like Mango, Banana, Guava, Pomegranate, Lime, Lemon, Sweet Orange, Sapota, Apple, Strawberry etc.
- Understand the scientific cultivation methods of plantation crops like Coconut, Areca nut, Tea, Coffee, rubber, Cashew nut, Oil palm etc.
- To know more about origin, area, climate, soil, improved varieties and cultivation practices such as time and methods of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield.
- To know about different propagation techniques in fruit crops.
- Understanding the concept of High density plantation in different fruit crops
- To know about canopy management of different fruit crops.

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: IV

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: II** **Semester: IV**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-408N	**Title: Entrepreneurship Development and Business Communication**

Course Objectives:

1. To understand different watershed behavior
2. To be able to interpret runoff data and quantify erosion by using various modelling methods
3. To understand land use classification and impact of land use changes on hydrological cycle parameters

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 1
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs. Limitations and Demerits of entrepreneurs. Types of Entrepreneurs.	3
II	SWOT Analysis & achievement motivation, Government policy and programs and institutions for entrepreneurship development	3
III	Impact of economic reforms on Agribusiness/ Agrienterprises, Entrepreneurial Development Process: Business Leadership Skills	3
IV	Developing organizational skill (Planning, Organizing, Staffing, Leading and Controlling) Developing Managerial skills, Business Leadership Skills (Communication, direction and motivation Skills), Problem solving skill	3
V	Supply chain management and Total quality management, Project Planning Formulation and report preparation; Financing of enterprise, Opportunities for agri-entrepreneurship and rural enterprise	3

Reference / Text Books:

Required text

1. Sharda V.N., Sikka A.K. and Juyal G.P. (2006) Participatory Integrated Watershed Management: A Field Manual, Central Soil and Water Conservation Research and Training Institute, 218, Kaulagarh Road, Dehradun.
2. Tideman E.M. (1999) Watershed Management–Guidelines for Indian Conditions, Omega Scientific Publishers, New Delhi.

Suggested readings

1. Common Guidelines for Watershed Development Projects (2008) Government of India.
2. Dhruva N.V.V. (2002) Soil and Water Conservation Research in India, Indian Council of Agricultural Research, Krishi Anusandhan Bhavan, Pusa, New Delhi- 110012.
3. Dhruva N.V.V., Sastry G. and Patnaik U.S. (1990) Watershed Management, Indian Council of Agricultural Research, New Delhi.
4. Frevert R.K., Schwab G.O., Edminster T.W. and Barnes K.K. (2009) Soil and Water Conservation Engineering, 4thEd, John Wiley and Sons, New York.
5. Jain S.K. and Singh V.P. (2006) Water Resources Systems Planning and Management, Reed Elsevier India Pvt. Ltd., New Delhi.

If the course is available as Generic Elective then the students of following departments may opt it.
1. NA
2.

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

- Suggest technical measures for soil erosion control both due to water and wind
- Assess the current status of the watershed at field, by taking up accurate investigation measures and conduct survey
- Suggest drought control measures, water conservation structures, including design.

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: IV

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: II** **Semester: IV**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-409N	**Title: Introductory Agro-meteorology & Climate Change**

Course Objectives:
1. To study about different climatic factors affecting crop growth and development
2. Study about different weather aberrations
3. Study about climate change, it's cause and impacts.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 1
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Meaning and scope of agricultural meteorology; Earth atmosphere- its composition, extent and structure; Atmospheric weather variables; Atmospheric pressure, its variation with height	3
II	Wind, types of wind, daily and seasonal variation of wind speed, cyclone, anticyclone, land breeze and sea breeze; Nature and properties of solar radiation, solar constant, depletion of solar radiation, short wave, long wave and thermal radiation, net radiation, albedo: Atmospheric temperature, temperature inversion, lapse rate, daily and seasonal variations of temperature, vertical profile of temperature	3
III	Energy balance of earth; Atmospheric humidity, concept of saturation, vapor pressure, process of condensation, formation of dew, fog. mist, frost, cloud; Precipitation. Process of precipitation. types of precipitation such as rain. snow. sleet, and hail, cloud formation and classification: Artificial rainmaking	3
IV	Monsoon-mechanism and importance in Indian agriculture, Weather hazards - drought, floods, frost, tropical cyclones and extreme weather conditions such as heat-wave and cold-wave. Agriculture and weather relations	3
V	Modifications of crop microclimate, climatic normal for crop and livestock production. Weather forecasting- types of weather forecast and their uses. Climate change. climatic variability, global warming, causes of climate change and its impact on regional and national Agriculture	3

Reference / Text Books:

1. Agro meteorology G.S.I.H.V. Prasad Rao
2. Agricultural Meteorology by J. Warren smith
3. Principles and Practice of Agricultural Meteorology by S. Venkatram
4. Byers, H.R. 1959. General Meteorology. McGraw Hill, Inc., New York.
5. Ghadekar, A.E. 1991. Meteorology. Agromet Publishers, Nagpur.
6. Petterson, S. 1958. Introduction to Meteorology. McGraw Hill, Inc., New York.
7. Trewartha Glenn T. 1954. An Introduction to Climate, McGraw Hill, Inc., New York,

If the course is available as Generic Elective, then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

CO1. Students will be able to know the impact of weather and climate on agricultural production system

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: IV

Programme:Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: II** **Semester: IV**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code:AG-410N	**Title: Agri-Informatics**

Course Objectives:

1. To promote professional skills and knowledge through meaningful hands on experience.
2. Agri Informatics prepares students by imparting them with conceptual and applied knowledge in the different domains of Information Technology, Agriculture, and Management
3. Students learn about IT subjects like Data Structure, Operating Systems, Object Oriented Programming, students are also introduced to agriculture specific subjects like Plant Physiology, Post-Harvest Engineering, and Irrigation Engineering among others..

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 1
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Theory Introduction to Computers. Operating Systems. definition and types, Applications of MS-Office for document creation & Editing	3
II	Data presentation, interpretation and graph creation, statistical analysis, mathematical expressions. Database, concepts and types, uses of DBMS in Agriculture, World Wide Web (WNW): Concepts and components. Introduction to computer programming languages, concepts and standard input/output operations.	3
III	E-Agriculture, concepts and applications. Use of ICT in Agriculture. Computer Models for understanding plant processes. IT application for computation of water and nutrient requirement of crops, Computer-controlled devices (automated systems) for Agri-input management	3
IV	Smartphone Apps in Agriculture for farm advises, market price. Postharvest management etc; Geospatial technology for generating valuable agri-information	3
V	Decision support systems, concepts, components and applications in Agriculture, Agriculture Expert System, Soil Information Systems etc. for supporting Farm decisions. Preparation of contingent crop-planning using IT tools	3

Reference / Text Books:

1. Bangia, Learning Ms Office 2010
2. Prof. Satish Jain and M. Geetha, MS-Office 2010 Training Guide
3. Johnson, Microsoft Office 2010…….on Demand
4. Kate Shoup, Microsoft Office 2010
5. Melanie Gass, It's all about You! Office 2010
6. Nancy Conner and Matthew MacDonald, Office 2010: The Missing Manual

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

CO1: Understanding basic concept of computer.
CO2: Fundamentals of MS Office.
CO3: Basic concept database, Internet and WWW.
CO4: Use of IT application and different IT tools in Agriculture

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: IV

Programme:Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: II** **Semester: IV**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-411N	**Title: Poultry production and management**

Course Objectives:

1. To see and practice the paths that lead to the success of any entrepreneurship on live animals and birds.
2. To develop the knowledge of poultry in an operational farm for more profit management, feed requirements, etc.
3. To make the participants/ professionals well versed in their practical skills starting from hatching of chicks to the egg production stage

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	**GENERAL:** Importance of poultry industry in India, Poultry production and marketing statistics of eggs and chicken. Historical development in poultry birds potential	6
II	**BREEDING:** Male and female reproductive system of chicken, Breeds and strains of broilers and layers of chicken. Duck and quails, General aspects of breeding for better egg production and body weight gain. Selection and culling, Artificial insemination	6
III	**GENERAL MANAGEMENT:** Location of poultry house, Types of poultry houses. Different types of rearing - advantages and disadvantages. Environmentally controlled housing. Incubation and hatching of eggs, Broiler and layer management. **FEEDS AND FEEDING:** Digestive system of chicken. Feed ingredients, Availability of CP and ME in ingredients. Feed processing. Formulation of feed viz. Starter. Grower, Layer, Finisher and Breeder ration, FCR, CP ratio, Nutritional deficiency conditions	6
IV	**HEALTH MANAGEMENT:** Common poultry diseases: bacterial, viral, fungal, parasitic and nutritional deficiencies. Vaccination schedule for commercial layers and broilers, Medication: Types of administration-general principles and precautions with emphasis on administering medication through	6

	water and feed. Control of internal and external parasites **BIOSECURITY-** Proactive measures to minimize entry of infections in farm premises farm fencing, disinfectant pits, personnel management restriction of movement etc. Poultry welfare and behavior	
V	**POULTRY PRODUCTS:** Preservation and storage of eggs, Grading of eggs, AGMARK standard of egg. Egg powder, Projects reports layer and broiler in different systems of rearing. Export/import of poultry and poultry products.	6

Reference / Text Books:

1. Livestock Production Management by N. S. R Shastri.
2. Livestock Production Management by Nilotpal Ghosh
3. Animal Husbandry & Dairy Science by Jagdish Prasad

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

CO1 Students will able to apply concepts of breeding, physiology, nutrition, herd-health, economics and management into practical and profitable animal production programs.
CO2 Students will understand the role of nutrition for poultry production.
CO3 Students will be able develop feeding systems for farm animal production and companion animals.
CO4 Students will be able to demonstrate critical thinking and problem solving skills as they apply scientific principles to a variety of poultry production systems.
CO5 Students will understand how the application of modern poultry production technologies and management practices impact their production facilities, their communities and the world.

IIMTU-NEP IMPLEMENTATION
Year: III / Semester: V

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B. Sc (Hons) Agriculture**	**Year: II** **Semester: V**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code:AG-501N	**Title: Rainfed and Dryland Agriculture**

Course Objectives:

1. Familiarize the student about rain fed agriculture and watershed management.
2. Students learn basic knowledge of rain fed agriculture and water shed management.
3. Study the crop adaptation and mitigation strategies, crop planning and crop management techniques.
4. Main objective is to increase / stabilize production of crops & forage crops.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 1
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2 Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction, concept, types and history of rain fed and dryland agriculture. Present Status of rain fed and dry land agriculture, Problems & future prospects for rain fed farming in India.	3
II	Soil and climatic conditions prevalent in rain fed areas. Drought: types, effect of water deficit on physic-morphological characteristics of the plants. Eco systems under arid and semi-arid conditions in India	3
III	Mechanism of crop adoption under moisture deficit conditions, Crop adaptation and mitigation to drought. Efficient utilization of water through soil and crop management practices, management of crops in rain fed areas.	3
IV	Contingent crop planning for aberrant weather conditions. Watershed Management-principles, objective, factors affecting, steps. Characteristics and components of watershed management programme	3
V	Precision agriculture; concepts and techniques: their issues and concerns for Indian agriculture	3

Reference / Text Books:

1. Rainfed Agriculture - 1st Edition - **R.K. Nanwal - G.A. Rajanna - Rou**
2. Textbook of Rainfed Agriculture and Watershed Management- P. L. Maliwal
3. Field crops production-Foodgrain crops Volume I- Dr. Rajendra Prasad
4. Crops of India - N.R. Das
5. Agronomy of field crops - S.R. Reddy

If the course is available as Generic Elective then the students of following departments may opt it. NA	
Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	30 05 15 50
Total:	100
Prerequisites for the course:	

Course Learning Outcomes:

- Importance of drylands and their contribution to food basket of India.
- Soil and water conservation practices for dryands.
- Appropriate crop and soil management techniques.
- Watershed concepts for application to drylands.
- Implements and post-harvest applications in drylands.
- Extension methodologies in reaching technologies to farmers.

IIMTU-NEP IMPLEMENTATION
Year: III / Semester: V

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: III** **Semester: V**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code:AG-502N	**Title: Crop Improvement - I (Kharif & Rabi)**

Course Objectives:

1. To promote professional skills and knowledge through meaningful hands on experience.
2. To build confidence and to work in project mode.
3. To acquire enterprise management capabilities.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 1
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Centers of origin. distribution of species. wild relatives in different cereals (Rice, Maize, Sorghum and Pearmillet); pulses (Pigeonpea, Urdbean and Mungbean); oilseeds (Groundnut); fibre (Cotton)	3
II	Plant genetic resources, its utilization and conservation. Important concepts of breeding self-pollinated cross pollinated and vegetative propagated crops. Study of genetics of qualitative and quantitative characters	3
III	Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties of Major Kharif crops for yield, adaptability, stability.	3
IV	Abiotic and biotic stress tolerance and quality (physical, chemical, nutritional), Seed production technology in self-pollinated, cross pollinated and vegetative propagated crops	3
V	Hybrid seed production technology in Maize, Rice, Sorghum, Pearl millet and Pigeon pea, etc. Ideotype Breeding	3

Reference / Text Books:

1. Crop Breeding: Dr. Manoj Kumar Sarma, Dr. Jayanta Bhuyan, Dr. Shazmira Zaman
2. Essentials of Plant Breeding, Kalyani publication New Dellhi, Dr. Phundan Singh
3. Plant Breeding(Principal & Methods), Kalyani publication New Dellhi B.D. Singh
4. Crop Improvement-II (Rabi crop), AkiNik Publications, New Dellhi, Dr. D.G. Ingole, Dr. S.S. Vitnor, Dr. V.R. Bharade

If the course is available as Generic Elective then the students of following departments may opt it. NA	
Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	30 05 15 50
Total:	100
Prerequisites for the course:	

Course Learning Outcomes:

CO1. Understand the basic concept of the Center of origin and wild relatives of different crops.

CO2. This course may help the students to understand the PGR & its conservation and utilization and study of qualitative and quantitative characters.

CO3. Students will know about the important concepts of breeding in self-pollinated, cross pollinated and vegetative propagated crops.

CO4. Students will know about the major breeding objectives & procedures including conventional & modern approaches for development of hybrids & varieties for yield, adaptability, stability, abiotic and biotic stress tolerance and quality.

CO5. End in this course student will know about the hybrid seed production technology in different crops, ideotype concept.

IIMTU-NEP IMPLEMENTATION
Year: III / Semester: V

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: III** **Semester: V**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code: AG-503N	**Title: Pests of field crops, stored grains and their Management**

Course Objectives:

1. This course is offered to the students as this is the most important course which has significant field relevance along with storage conditions.
2. The farmers' major problem is the insect pests of crops and their control.
3. The students will be taught in such a way that they will be able to identify the insect pest, diagnose the symptom and advocate the necessary remedial measures.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	General account on nature and type of damage by following insect pests of field crops and stored products arthropods pests	6
II	Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests (mites) of various field crops	6
III	Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain. Insect pests, mites, rodents, birds and microorganisms associated with stored grain and their management. Storage structure and methods of grain storage and fundamental principles of grain store management.	6
IV	**Paddy:** *Leptocorisavaricroms, Hieroglyphus Spp., Nilaparvatalugens, Nephotetix, spp..Mythimnaseparata.* **Jowar Maize:** *Chilo partel1us. Atherigonavariasoccata, Scirpophagaexcerpatalis. Chiloinfuscatelles* **Sugarcane:** *Top borer, Pyrilla, Early Shoot borer and white fly.* **Cotton:** *Pectinaphoragossypiella. Earias Spp, Syleptaderogata, Dysdercus Spp Bemisiatabacz. Amrascabzgutulla*	6
V	**Oilseeds:** *Lipaphiserysimi, Athaliaproxima Ragrada Cruciferarun, Dasyneura.*	6

	Pluses: *HelicoverpaarmigeraAgrotisSpp..Etiellazinckenella.* **Pests of Stored Grains:** *Sitophilusoryzae, Trogodermagranarium, Sitotrogacerealella, Callosobruchuschinensis.* **Polyphagous pests:** *Odontotermesobesus, Holotrichiaconsanguinea, Spilosomaobliqua, Spodopteralitura, Amsacta Spp*	

Reference / Text Books:

1. Atwal, A.S. 1976. Agricultural Pests of India and South East Asia. Kalyani Publishers, Ludhiana.
2. Butani, D.K. and Jotwani, M.G. 1984. Insects in Vegetables. Periodical Export Book Agency, New Delhi.
3. Butani, D. K. 1984. Insects and Fruits. Periodical Export Book Agency, New Delhi.
4. Dennis S Hill 1987 Agricultural Insect Pests of tropics and their control, Cambridge University Press , New York
5. Khare, S.P. 1993. Stored Grain Pests and Their Management. Kalyani Publishers, Ludhiana
6. Kumar, R., (2017). Insect Pests of Stored Grains. Tylor and Francis Groups, Florida USA. 978-1-77188.
7. David, B. B and Ramamurthy, V. V., (2016). Elements of Economic Entomology. Brillion Publishing House, New Delhi.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

CO1 The student will feel confident to address the insect pest problems of farmers both under field and storage conditions so that immediate steps can be taken up by the stakeholders to keep the pest population under check and to avoid significant crop damage.
CO2 This course lays the foundation for higher studies in the field of entomology.
CO3 The students will be able to determine various pests of field as well as stored grain.
CO4 Through this course, the students will also get to know the control measures of the pest.

IIMTU-NEP IMPLEMENTATION
Year: III / Semester: V

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc. (Hons) Agriculture**	**Year: III** **Semester: V**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code:AG-504N	**Title: Agricultural Marketing, Trade and Prices**

Course Objectives:

- Enable students to gain knowledge on agricultural marketing, challenges and prospects for improving agricultural marketing system.
- Provides an incisive analysis on agricultural input and output marketing with particular emphasis on marketing functions
- Gain skills to analyze Marketing Functions, Market Information and Intelligence
- Imparting knowledge of the marketing efficiency and agricultural prices
- Learn the Markets and Market Structure
- Provide the platform to the students of Marketing of Agricultural Inputs

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L:02
T:00
P: 01 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Agricultural Marketing: Concepts and definitions of market. marketing. Agricultural marketing, market structure, marketing mix and market segmentation.	6
II	Classification and characteristics of agricultural markets; demand, supply and producer's surplus of agri-commodities: nature and determinants of demand and supply of farm products. producer's surplus - meaning and its types, marketable and marketed surplus, factors affecting marketable surplus of agri-commodities; Product life cycle (PLC), Characteristics of PLC, Pricing considerations and approaches, cost based and competition based pricing	6
III	Market promotion - advertising, personal selling, sales promotion and publicity - their meaning and merits & demerits; marketing process and functions: Marketing process-concentration, dispersion and equalization; exchange functions - buying and selling; physical functions -storage. Transport and processing; facilitating functions - packaging, branding. grading. quality control and labeling (Agmark)	6
IV	Market functionaries and marketing channels: Types and importance of	6

	agencies involved in agricultural marketing; meaning and definition of marketing channel; number of channel levels; marketing channels for different farm products; Integration, efficiency, costs and price spread: Meaning, definition and types of market integration; marketing efficiency; marketing costs, margins and price spread; factors affecting cost of marketing: reasons for higher marketing costs of farm commodities; ways of reducing marketing costs: Role of Govt. in agricultural marketing: Public sector institutions- CWC, SWC, FCI, CACP & DMI - their objectives and functions; cooperative marketing in India	
V	Risk in marketing: Types of risk in marketing; speculation & hedging; an overview of futures trading; Agricultural prices and policy: Meaning and functions of price; administered prices; need for agricultural price policy; Trade: Concept of International Trade and its need, theories of absolute and comparative advantage. Present status and prospects of international trade in agri-commodities; GATT and WTO; Agreement on Agriculture (AoA) and its implications on Indian agriculture; IPR GST.	6

Reference / Text Books:

1. Acharya, S.S., Agarwal, N.L.1987. Agricultural Marketing in India. Oxford and IBH, New Delhi.
2. Acharya, S.S., Agarwal, N.L.1994. Agricultural Prices and Policy. Oxford and IBH, New Delhi
3. Philip, K. 2004. Principles of Marketing. Prentice Hall, New Delhi.

Online Sources:

1. http://egyankosh.ac.in/bitstream/123456789/8984/1/Unit-3.pdf
2. http://cacp.dacnet.nic.in/content.aspx?pid=32#
3. http://dmi.gov.in/About.aspx
4. https://opentextbc.ca/principlesofeconomics/chapter/33-1-absolute-and-comparative-advantage/
5. http://www.fao.org/docrep/014/i2043e/i2043e02d.pdf

If the course is available as Generic Elective then the students of following departments may opt it. NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

- Understand and appreciate the structure and working of the agricultural marketing system in
- Learn how agriculture marketing system affects the farmers, consumers and intermediaries.
- Develop strategies through which the dynamic marketing system will respond to create a win-win situation for all the
- Appreciate the possible changes in the agriculture input, output and food market because of pandemic Covid 19 and need for the appropriate

IIMTU-NEP IMPLEMENTATION
Year : III / Semester: V

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class:B.Sc (Hons) Agriculture**	**Year: III** **Semester: V**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code:AG-505N	**Title: Protected Cultivation and Secondary Agriculture**

Course Objectives:

1. To impart knowledge on agro-technique and management of different horticultural crops under protected environmental conditions.
2. Student will be made aware of the technological changes that are occurring in this field along with pre and post-harvest technology
3. Student will be made aware of the technological changes that are occurring in this field along with pre and post-harvest technology

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L:
T:92
P: 103 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Green house technology: Introduction, Types of Green Houses: Plant response to Green-house environment, Planning and design of greenhouses	6
II	Design criteria of green house for cooling and heating purposes. Green house equipment's, materials of construction for traditional and low cost green houses. Irrigation systems used in greenhouses, typical applications, passive solar green house, hot air green-house heating systems, green house drying	6
III	Important Engineering properties such as physical, thermal and aero & hydrodynamic properties of cereals. pulses and oilseed, their application in PHT equipment design and operation	6
IV	Drying and dehydration; moisture measurement, EMC, drying theory, various drying method	6
V	Commercial grain dryer (deep bed dryer, flat bed dryer, tray dryer, fluidized bed dryer. Re-circulatory dryer and solar dryer). Material handling equipment: conveyer and elevators, their principle, working and selection.	6

Reference / Text Books:

1. Radha Manohar, K. and Igathinathene. C. Greenhouse Technology and Management, 2nd edition, BS Publications.
2. Tiwary G.N. Greenhouse Technology for Controlled Environment. Narosa Publishing House. Pvt Ltd.

3. Singh Brrahma and Balraj Singh. 2014. Advances in Protected Cultivation, New India Publishing Company.
4. Sahay, K.M. and Singh, K.K. 1994. Unit Operation of Agricultural Processing. Vikas Publishing House Pvt. Ltd., New Delhi.
5. Chakravarthy, A. Post-Harvest Technology of cereals, pulses and Oil seeds. Oxford and IBH Publishing Co. Ltd., New Delhi.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

1. Students will gain knowledge about post-harvest technology which enables storage of agricultural products during the whole year in full quality, identification and elimination of negative processes which may be occur during processes and storage.
2. Explain the importance of pre-harvest physiology for fruit and vegetables on the long term storage of horticultural crops.

IIMTU-NEP IMPLEMENTATION
Year: III / Semester: V

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: III** **Semester: V**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code:AG-506N	**Title: Diseases of Field and Horticultural Crops & their Management–I**

Course Objectives:

1. To study the symptomology, etiology, disease cycle and management
2. To study the identification of diseases.
3. To study the diseases of field and horticulture crop
4. To study the biotic and a biotic disease.
5. To study about the management of plant diseases.
6. To study the identification of different plant pathogen.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Symptoms, etiology, disease cycle and management of major diseases of following crops: Field Crops: Rice: Blast, Brown spot, Bacterial Blight. Sheath blight, false smut, Khaira and tungro	6
II	Maize: stalk rots, downy mildew; Sorghum: smuts; Bajra: downy mildew and ergot; Groundnut: early and leaf spots; Pigeonpea: Phytophthora blight, wilt and sterility mosaic; Green gram: Cercospora leaf spot, web blight and yellow mosaic	6
III	Tobacco: Mosaic. Horticultural Crops: Guava: wilt and anthracnose; Banana: Panama wilt, sigatoka and bunchy top; Papaya: foot rot and leaf curl	6
IV	Cruciferous vegetable: Alternaria leaf spot and black rot; Brinjal: phomopsis blight, sclerotinia and little leaf; Tomato: early and late blight, leaf curl and mosaic	6
V	Okra: Yellow Vein Mosaic; Beans: Anthracnose and bacterial blight: ginger: soft rot; Colocasia: Phytophthora blight.	6

Reference / Text Books:

1. Diseases of crop plants in India writing by Rangaswami, G & Mahadevan.

2. Diseases of Field and Horticultural Crops & their Management–I by Dr. M. N. Khan and Ramesh Singh.
3. Fundamentals of Plant Pathology by R.S Singh.
4. Plant Pathology by PD Sharma.
5. Plant Pathology by G.N Agrios.
6. Crop Diseases by D.P Tripathi Plant Pathology by GN Agrios.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

Upon successful completion of this course/paper, students should be able to:

- Students will be able to apply concepts of disease of field and horticulture crop.
- Able to be a pathogen and identification of disease in different field and horticulture crop.
- Able to develop the management of field and horticulture crop..
- Student able to know the disease pathogen morphology under the microscope.
- Able to develop the how to preservation the disease.
- Analyze a disease situation and determine the best cultural, mechanical, and biological control methods used to manage the plant disease.

IIMTU-NEP IMPLEMENTATION
Year: III / Semester: V

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: III** **Semester: V**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code:AG-507N	**Title:Production Technology for Fruit and Plantation Crops**

Course Objectives:
1. To provide technical and scientific cultivation practices of different fruit and plantation crops.
2. To provide field knowledge and acquaint the students with practical field.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L:
T:92
P: 103(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Importance and scope of fruit and plantation crop industry in India	3
II	High density planting; Use of rootstocks	3
III	Production technologies for the cultivation of major fruits-mango, banana, citrcus, grape, guava, Litchi	3
IV	Papaya, apple, pear, peach and; minor fruits-pineapple, pomegranate, jackfruit, strawberry. nut crops	3
V	Plantation crops-coconut, arecanut, cashew, tea, coffee & rubber	3

Reference / Text Books:
NA

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

1. Students swill know more about origin, area, climate, soil, improved varieties and cultivation practices such as time and methods of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield of different fruits and plantation crops.
2. To learn about the Physiological disorders of important fruits and plantation crops.
3. To learn technical cultivation practices of major fruit crops - mango, banana, citrus, grape, guava, litchi, papaya, apple, pear and peach.
4. To learn technical cultivation practices of minor fruit crops-pineapple, pomegranate, jackfruit, strawberry.
5. To learn technical cultivation practices of plantation crops-coconut, arecanut, cashew, tea, coffee & rubber

IIMTU-NEP IMPLEMENTATION
Year: III / Semester: V

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: III** **Semester: V**
Credits: 2 **Theory: 1** **Practical:1**	**Subject: Agriculture**
Course Code:AG-508N	**Title: Communication Skills and Personality Development**

Course Objectives:

- To develop communication skills as well as positive personality traits
- To acquire a language suitable for technical communication
- To inculcate the habit of regular reading and writing.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 1
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Communication: meaning and definition: Principles and process of communication. Models and barriers to communication	3
II	Verbal and nonverbal communication. Communication Skills: Listening and note taking, writing skills, oral presentation skills. comprehension skill: reading and comprehension of general articles	3
III	Field diary and lab record; indexing, foot note and bibliographic procedures. Reading and comprehension of general and technical articles, precise writing, summarizing, abstracting	3
IV	Individual and group presentations, impromptu presentation, public speaking; Group discussion, Spoken English: Conversations of different situations in everyday life, the concept of stress, silent letters in words and pronunciation of words with silent letters, the basic intonation patterns	3
V	Organizing seminars and conferences. Diffusion and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories	3

Reference / Text Books:

1. Communication Skills and Personality Development by J.R. Kadam, V.G. Patil, S.A. Dhenge, A.M. Murai
2. Personality Development, A Work Book on Attitudinal Transformation by Dr. Ritu Porna Raj

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	30 05 15 50
Total:	100
Prerequisites for the course:	
Course Learning Outcomes: 1. Students will understand the basic concept of communication, its need in current scenario & how communication is important for a doctor or a medical person. 2. Students will be able to write simple and correct sentences. 3. Students will able to write papers, proposals, reports etc 4. They will be able to appreciate any piece of writing and comprehend it.	

IIMTU-NEP IMPLEMENTATION
Year: III / Semester: V

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: III** **Semester: V**
Credits:1 **Theory: 1** **Practical: 0**	**Subject: Agriculture**
Course Code:AG-509N	**Title: Intellectual Property Rights**

Course Objectives:

- To provide knowledge of intellectual property, GATT, WTO, TRIPs, and the Budapest treaty.
- The student knows about patents, copyrights, trademarks, Geographical indications, and Trade secrets.
- To provide the information about patents act 1970, infringement, compulsory licensing, and patent database.
- To provide information about the UPOV for protection of plant varieties, PPV&FR Act 2001, breeders, researchers, and farmer's rights.
- The student gains the information ITPGRFA, biological diversity act 2002 access, and benefit sharing.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / 1 Credits

L: 1
T: 0
P: 0 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 0 Hrs.=0 Credit (1Hrs./Week=1Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction and meaning of intellectual property, Types of Intellectual Property and legislations covering IPR in India: - Patents, Copyrights, Trademark, Industrial design, Geographical indications, Integrated circuits, Trade secrets.	3
II	Treaties for IPR protection; brief introduction to GATT, WTO. TRIPS and WIPO, Application of Information communication Technologies (ICT) tools in agriculture sector	3
III	Patents Act 1970 and Patent system in India, patentability. process and product patent, filing of patent, patent specification, patent claims, Patent opposition and revocation, infringement, Compulsory licensing	3
IV	Patent Cooperation Treaty, Patent search and patent database. Origin and history including a brief introduction to UPOV for protection of plant varieties, Protection of plant varieties under UPOV and PPV & FR Act of India	3
V	Plant breeder's rights, Registration of plant varieties under PPV & FR Act	3

	2001, breeders, researcher and farmers rights. International treaty on plant genetic resources for food and agriculture (ITPGRFA). Indian Biological Diversity Act, 2002 and its salient features, access and benefit sharing	

Reference / Text Books:

1. Dr. Jay Prakash., Intellectual Property Right. Central law Publication
2. Phundan Singh., IPR & Plant Breeders Rights. New Vishal Publication.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	40
2) Presentations /Seminar/Assignments/internal	10
3) Practical/Research Project Report/Seminar On Research Project Report	0
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

1. Understand the basic concept of Intellectual property rights.
2. End of this course student will know about the Treaties for Intellectual property rights (WIPO, WTO, Berne convention, etc.).
3. This course may help the students understand the importance of ITPGRFA, the bio-diversity act, and PPV & FR 2001.

IIMTU-NEP IMPLEMENTATION
Year: III / Semester: V

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class:B.Sc (Hons) Agriculture**	**Year: III** **Semester: V**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code:AG-510N	**Title: Principles of Food Science and Nutrition**

Course Objectives:

1. To promote professional skills and knowledge through meaningful hands on experience.
2. Student will learn about aspects of food and nutrition.
3. To know the principles involving various food preservation methods.
4. Students gain knowledge of the role of nutrition in sustaining health and preventing diseases

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	**GENERAL**: Common terms used in food science and nutrition Definition, concept and functions of food and food science. Composition of food, Foods of animal origin.	6
II	Chemistry and Function of Carbohydrate, Fat, Protein, Minerals and vitamins and their dietary requirements and bio-availability	6
III	Nutritional deficiency diseases and their symptoms, prevention. Causes of common diseases prevalent in the society and Nutrition	6
IV	Definition, use and sources of probiotic, prebiotics. Definition and sources of symbiotics. Definition, importance and functions of feed additives. Definition and role of enzymes and hormones	6
V	Livestock Products: The eggs and its chemical composition and egg products. Meat products and their processing. Common milk products, composition and their processing. National Program and Policies for improving Dietary Nutrition	6

Reference / Text Books:

1. Sumati R. Mudambi, Shalini M.Rao and M.V. Rajagopal. 2006. Food Science, 2nd Ed. New Age International(P) Limited, New Delhi.
2. Martin Eastwood. 2003. Principles of Human Nutrition. Blackwell Science Ltd., Oxford.
3. Dairy and Food Engineering
4. Food and Dairy Microbiology

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	30 05 15 50
Total:	100
Prerequisites for the course:	
Course Learning Outcomes: CO1 Understand both fundamental and applied aspects of food science. CO2 Provides for fundamental understanding of food chemistry, and food microbiology. CO3 Students gain insights about role of specific nutrients in maintaining health and identifying nutrient specific foods**.**	

IIMTU-NEP IMPLEMENTATION
Year III / Semester: V

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class:B.Sc (Hons) Agriculture**		**Year: III** **Semester: V**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**	
Course Code:AG-511N	**Title: Geo-informatics and Nano-Technology**	

Course Objectives:

1. To promote professional skills and knowledge through meaningful hands on experience.
2. Student will learn about aspects of food and nutrition.
3. To know the principles involving various food preservation methods.
4. Students gain knowledge of the role of nutrition in sustaining health and preventing diseases

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 1
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Precision agriculture: concepts and concerns for Indian agriculture, Geo-informatics- definition concepts, tool and techniques; their use in Precision Agriculture. Remote Sensing & GIS concept and application in agriculture	3
II	Application of Geo informatics, Crop discrimination or crop identification, yield monitoring and mapping potential applications of yield mapping, soil mapping	3
III	Fertilizer recommendation using geospatial technologies: Spatial data and their management in GIS: Spatial database concept, spatial data base design, Remote sensing concepts and application in agriculture; Image processing and interpretation;.	3
IV	Global positioning system (GPS), components and its functions; Nanotechnology, definition, concepts and techniques, Application of Remote Sensing in agriculture	3
V	Brief introduction about nanoscale effects, nano-particles, nano-pesticides, nano-fertilizers, nano-sensors. Use of nanotechnology in seed, water, fertilizer, plant protection for scaling-up farm productivity	3

Reference / Text Books:

1. Geo-informatics and Nano Technology for Precision Farming by SR Reddy
2. Text book on Geo-informatics, Nanotechnology and Precision Farming by Tarun Kumar Upadhyay and Sushil Kumar Sharma
3. Geo-Informatics by A.M. Chandra

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

CO1 The concept of "doing the right thing in the right place at the right time" has a strong intuitive appeal which gives farmers the ability to use all operations and crop inputs more effectively

CO2 Precision agriculture can address both economic and environmental issues that surround Production agriculture today.

CO3 Creating awareness amongst farmers about consequences of applying imbalanced doses of farm inputs like irrigation, fertilizers, insecticides and pesticides.

CO4 Encourage the farmers to study of spatial and temporal variability of the input parameters using primary data at field level.

IIMTU-NEP IMPLEMENTATION
Year III / Semester: V

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: III** **Semester : V**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code:AGE-51N	**Title: Agribusiness Management (ELECTIVE COURSE)**

Course Objectives:

- Understand history and Importance of agribusiness in the Indian economy and new agricultural policy.
- Learn about Agri. value chain, Pest & SWOT Management function: roles & activities.
- Understand about the Components of a business plan, steps in in planning and implementation.
- Analyze about Capital management and financial management of agribusiness.
- Acquire knowledge of Project cycle, identification, formulation, appraisal implementation, monitoring and evaluation. Project appraisal and evaluation techniques.
- Provides knowledge about the Staffing, Directing and Control.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Transformation of agriculture into agribusiness, various stakeholders and components of agribusiness systems. Importance of agribusiness in the Indian economy and New Agricultural Policy. Distinctive features of Agribusiness Management: Importance and needs of agro-based industries, Classification of industries and types of agro based industries..	6
II	Institutional arrangement. Procedures to set up agro based industries. Constraints in establishing agro-based industries Agri-value chain: Understanding primary and support activities and their linkages. Business environment: PEST & SWOT analysis. Management functions: Roles & activities, Organization culture	6
III	Planning, meaning, definition, types of plans. Purpose or mission, goals or objectives, Strategies, polices procedures, rules, programs and budget. Components of a business plan. Steps in planning and implementation. Organization staffing, directing and motivation. Ordering, leading, supervision, communications. Control	6
IV	Capital Management and Financial management of Agribusiness.	6

	Financial statements and their importance. Marketing Management: Segmentation, targeting &positioning. Marketing mix and marketing strategies. Consumer behavior analysis, Product Life Cycle (PLC).	
V	Sales & Distribution Management. Pricing policy, various pricing methods. Project Management definition, project cycle, identification, formulation, appraisal, implementation, monitoring and evaluation. Project Appraisal and evaluation techniques	6

Reference / Text Books:

Teaching Methods:- Lecture (L), Hand Out (H), Slides (S), Quiz (Q), Assignment (A), Seminar (SM), Classroom Discussion (CD).

Text Books:

- T-1: Agribusiness Management by Dr. Shivaji Nagpure & Dr. R.G. Deshmukh, M/s. AGROMET Publishers, Nagpur.
- T-2:Indian Agriculture & Agri-Business Management by Dr. Smita Diwase, M/s. Scientific Publishers, Jodhpur, Rajasthan.
- T-3:Agricultural Finance & Management by S. Subha Reddy, & P. Raghu Ram, M/s. Oxford IBH Publishing Co. Pvt. Ltd., New Delhi.
- T-4:The Agribusiness Book by Mukesh Pandey, Deepali Tewari, M/s. ibdc Publishers, Lukhnow (U.P.), Pin-226 001.

Reference Books:

- R-1: Agri Business Management by Dr. J.S. Amarnath & Dr. A.P.V. Samvel, M/s. Satish Serial Publishing House, Delhi-110033.
- R-2: Economics analysis of Agricultural Projects by J. Price Gittinger, M/s. The Economics Development Institute/World Bank, Washington D.C.-20433, U.S.A.
- R-3: Subba Reddy, S. and P.Raghuram., Agricultural Finance and Management, Oxford & IBH Publishing Company Private Ltd., New Delhi, 2005.
- R-4: Subba Reddy, S., P.Raghuram., P. Sastry, T.V.N. and Bhavani Devi I. Agricultural Economics., Oxford & IBH Publishing Company Private Ltd., New Delhi, 2010.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

- Understand about different aspects and importance of agribusiness management.
- Remember about different aspects and activities related to agribusiness management.
- Analyze about different components plus planning and management.
- Evaluate financial aspects of agribusiness.
- Create various projects and evaluation techniques.
- Apply this knowledge in real life situations.

Format-3

IIMTU-NEP IMPLEMENTATION
Year III / Semester: V

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B. Sc (Hons) Agriculture**	**Year: III** **Semester : V**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code:AGE-52N	**Title: Agrochemicals (ELECTIVE COURSE)**

Course Objectives:

1. To provide a comprehensive understanding of agrochemicals, including their types and roles in agriculture.
2. Study is to comprehensively explore the characteristics and uses of systemic fungicides, specifically Benomyl, Carboxin, Oxycarboxin, Metalaxyl, and Carbendazim.
3. To examine the Insecticide Act and rules, including insecticides that are banned, withdrawn, or restricted in use.
4. To understand the various types of fertilizers, their importance, and the processes involved in their manufacturing like N P K, mixed and Complex fertilizer.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	An introduction to agrochemicals, their type and role in agriculture, effect on environment, soil, human and animal health. merits and demerits of their uses in agriculture management of agrochemicals for sustainable agriculture. Herbicides-Major classes, properties and important herbicides. Fate of herbicides.	6
II	Fungicides-Classification Inorganic fungicides characteristics, preparation and use of sulfur and copper, Mode of action-Bordeaux mixture and copper oxychloride. Organic fungicides- Mode of action-Dithio carbamates characteristics, preparation and use of Zineb and maneb. Systemic fungicides-Benomyl. carbox in, oxycarboxin, Metalaxyl, Carbendazim.characteristics and use.	6
III	Introduction and classification of insecticides: inorganic and organic insecticides Organo chlorine, Organophosphates, Carbamates, Synthetic pyrethroids Neonicotinoids. Hiorationals. Insecticide Act and rules, Insecticides banned, withdrawn and restricted use, Fate of insecticides in soil & plant. IGRs Biopesticides, Reduced risk insecticides, Botanicals, plant and	6

	animal systemic insecticides their characteristics and uses. Fertilizers and their importance.	
IV	Nitrogenous fertilizers: Feed stocks and Manufacturing of ammonium sulphate. ammonium nitrate, ammonium chloride, urea. Slow release N-fertilizers. Phosphatic fertilizers: feedstock and manufacturing of single superphosphate. Preparation ofbone meal and basic slag. Potassic fertilizers: Natural sources of potash, manufacturing of potassium chloride, potassium sulphate and potassium nitrate.	6
V	Mixed and complex fertilizers: Sources and compatibility-preparation of major, secondary and micronutrient mixtures. Complex fertilizers: Manufacturing of ammonium phosphates, nitrophosphates and NPK complexes. Fertilizer control order. Fertilizer logistics and marketing. Plant bio-pesticides forecological agriculture, Bio-insect repellent.	6

Reference / Text Books:

- Basics of Agrochemical Formulations by Anupma Singh et al.
- Fundamentals of Agrochemicals by GLORIA N
- Agrochemicals And Sustainable Agriculture by N K Roy

If the course is available as Generic Elective, then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

- Understanding the different types of agrochemicals, including herbicides, fungicides, insecticides, and fertilizers, and their roles in modern agriculture.
- Assess the effects of agrochemicals on the environment, soil health, and the well-being of humans and animals.
- Describe the major classes and properties of herbicides, including the fate of herbicides in the environment.
- Distinguish between inorganic and organic fungicides, understanding their characteristics, modes of action.
- Understand the sources, preparation, and compatibility of mixed and complex fertilizers

Format-3

IIMTU-NEP IMPLEMENTATION
Year III / Semester: V

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: III** **Semester : V**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code:AGE-53N	**Title: Commercial Plant Breeding (ELECTIVE COURSE)**

Course Objectives:

- To increase the crop yield.
- To raise plants with desired characteristics.
- To develop a disease-resistant crop.
- To develop plants that can tolerate extreme environmental stress.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 1
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Types of crops and modes of plant reproduction. Line development and maintenance breeding in self and cross pollinated crops (A/B/R and two line system) for development of hybrids and seed production.	6
II	Genetic purity test of commercial hybrids. Advances in hybrid seed production of maize, rice, sorghum, pearl millet, sunflower, cotton, pigeon peaand Brassica etc. Quality seed production of vegetable crops under open and protected environment	6
III	Alternative strategies for the development of the line and cultivars: haploid inducer, tissue culture techniques and biotechnological tools. IPR issues in commercial plant breeding	6
IV	DUS testing and registration of varieties under PPV & FR Act. Variety testing, release and notification systems in India, Participatory plant breeding.	6
V	Principles and techniques of seed production, types of seeds, quality testing in self and cross pollinated crops	6

Reference / Text Books:

1. Crop Breeding: Dr. Manoj Kumar Sarma, Dr. Jayanta Bhuyan, Dr. Shazmira Zaman.
2. Essentials of Plant Breeding, Kalyani publication New Delhi, Dr. Phundan Sing.
3. Plant Breeding (Principal & Methods), Kalyani publication New Delhi B.D. Singh.
4. Crop Improvement-II (Rabi crop), Aki Nik Publications, New Delhi, Dr. D.G. Ingole, Dr. S.S. Vitnor, Dr. V.R. Bharade

If the course is available as Generic Elective then the students of following departments may opt it. NA	
Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	30 05 15 50
Total:	100
Prerequisites for the course:	

Course Learning Outcomes:

- Students understand the role of commercial plant breeding.
- Students understand the significance of different plant breeding systems
- Understand the application of conventional breeding approaches and gene technology approaches in plant breeding programs
- Appreciate the issues associated with breeding plants in a commercial setting

Format-3

IIMTU-NEP IMPLEMENTATION
Year III / Semester: V

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B. Sc (Hons) Agriculture**	**Year: III** **Semester : V**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code: AGE-54N	**Title: Landscaping (ELECTIVE COURSE)**

Course Objectives:

- To impart knowledge and skill on ornamental gardening, landscape designing, lay out and maintenance.
- To develop competency in landscaping professionals who can tackle the dynamic requirements and contemporary developments in the field.
- To bridge the gap of employee dearth in the field of landscape designing, which aim to improve the living environment of people.
- To promote self-entrepreneurship in the field of floriculture and attract youth towards Horticulture.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Transformation of agriculture into agribusiness, various stakeholders and components of agribusiness systems. Importance of agribusiness in the Indian economy and New Agricultural Policy. Distinctive features of Agribusiness Management: Importance and needs of agro-based industries, Classification of industries and types of agro based industries.	6
II	Institutional arrangement. Procedures to set up agro based industries. Constraints in establishing agro-based industries Agri-value chain: Understanding primary and support activities and their linkages. Business environment: PEST & SWOT analysis. Management functions: Roles & activities, Organization culture	6

III	Planning, meaning, definition, types of plans. Purpose or mission, goals or objectives, Strategies, polices procedures, rules, programs and budget. Components of a business plan. Steps in planning and implementation. Organization staffing, directing and motivation. Ordering, leading, supervision, communications. control	6
IV	Capital Management and Financial management of Agribusiness. Financial statements and their importance. Marketing Management: Segmentation, targeting & positioning. Marketing mix and marketing strategies. Consumer behavior analysis, Product Life Cycle (PLC).	6
V	Sales & Distribution Management. Pricing policy, various pricing methods. Project Management definition, project cycle, identification, formulation, appraisal, implementation, monitoring and evaluation. Project Appraisal and evaluation techniques	6

Reference / Text Books:

- Manual of Woody Landscape Plants Michael Dirr
- pstein, E. and Bloom, A.J. (2005). Mineral Nutrition of Plants: Principles and Perspectives. (2nd ed). Sunderland: Sinauer Associates. (ISBN 978-0878931729)
- Textbook on Horticulture. Rajaneesh Singh. 4.2 out of 5 stars 13. Paperback.
- A Naturalist'S Guide To The Trees & Shrubs Of India. Pradeep Sachdeva. 4.1 out of 5 stars 189. Paperback.
- Home Gardeners' Guide Indian Garden Flowers. Amarjeet Singh Batth. 4.1 out of 5 stars 100. Paperback.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	30 05 15 50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

CO1- The student will have knowledge on fundamental gardening principles which form the basis for learning landscape architecture.
CO2- The students will be able to identify different soft and hard landscape elements..
CO3- The students will become capable of designing a garden project and prepare the cost economics.
CO4- The students prepare garden layouts to a specific scale for big commercial projects.

IIMTU-NEP IMPLEMENTATION
Year III / Semester: V

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: III** **Semester : V**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code:AGE-55N	**Title: Food Safety and Standards (ELECTIVE COURSE)**

Course Objectives:

- Understand the fundamentals of food safety, including hazard identification and management.
- Apply hygiene and sanitation practices to control contamination in food service establishments.
- Analyze food laws and standards, including regulatory frameworks and global standards, for ensuring food safety compliance.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Food Safety - Definition. Importance, Scope and Factors affecting Food Safety. Hazards and Risks, Types of hazards - Biological, Chemical, Physical hazards. Management of hazards - Need. Control of parameters. Temperature control. Food storage	6
II	Product design. Hygiene and Sanitation in Food Service Establishments- Introduction. Sources of contamination and their control. Waste Disposal. Pest and Rodent Control. Personnel Hygiene. Food Safety Measures	6
III	Food Safety Management Tools- Basic concepts. PRPs, OMPs, SSOPs etc. HACCP. ISO series. TQM - concept and need for quality. components of TOM. Kaizen. Risk Analysis. Accreditation and Auditing. Water Analysis, Surface Sanitation and Personal Hygiene.	6
IV	Food laws and Standards-Indian Food Regulatory Regime, FSSA. Global Scenario CAC. Other laws and standards related to food. Recent concerns- New and Emerging Pathogens. Packaging, Product labeling and Nutritional labelling	6
V	Genetically modified foods\ transgenics. Organic foods. Newer approaches to food safety. Recent Outbreaks. Indian and International Standards for food products.	6

Reference / Text Books:

- **Book Title:** "Food Safety Management: A Practical Guide for the Food Industry"

- **Author:** Yasmine Motarjemi and Huub Lelieveld
- **Book Title:** "Essentials of Food Safety and Sanitation"
- **Author:** David Mc Swane, Nancy R. Rue, Richard Linton, Anna Kate Hartman
- **Book Title:** "Food Safety: The Science of Keeping Food Safe"
- **Author:** Ian C. Shaw
- **Book Title:** "Principles of Food Sanitation"
- **Author:** Norman G. Marriott, Robert B. Gravani
- **Book Title:** "Food Safety: A Practical and Case Study Approach"
- **Author:** Jenny Scott, Jeffrey T. Barach, Angela M. Fraser

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

CO1: Students will understand the definition, importance, scope, and factors influencing food safety.
CO2: Students will identify and categorize biological, chemical, and physical hazards in food.
CO3: Students will able the management strategies for food hazards, emphasizing the need for control parameters and temperature management.
CO4: Students will evaluate hygiene and sanitation practices in food service establishments, including contamination sources, waste disposal, pest control, and personnel hygiene.
CO5: Students will analyze food safety management tools such as PRPs, OMPs, SSOPs, HACCP, ISO series, and TQM, highlighting their roles in ensuring quality and safety.

IIMTU-NEP IMPLEMENTATION
Year III / Semester: V

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B. Sc (Hons) Agriculture**	**Year: III** **Semester : V**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code:AGE-56N	**Title: Biopesticides & Biofertilizers (ELECTIVE COURSE)**

Course Objectives:

- To provide a comprehensive understanding of biopesticides, including their historical development, fundamental concepts, and practical applications.
- To provide a comprehensive understanding of biofertilizers, including their introduction, current status, and scope in sustainable agriculture.
- To explore the structure and characteristic features of various bacterial biofertilizers such as Azospirillum, Azotobacter, Bacillus, Pseudomonas, Rhizobium, and Frankia, as well as cyanobacterial biofertilizers like Anabaena, Nostoc, and Hapalosiphon.
- A comprehensive understanding of the mechanisms underlying phosphate solubilization and mobilization, as well as potassium solubilization.
- **The course will gain the knowledge and skills necessary to effectively utilize biofertilizers in sustainable agricultural practices.**

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	History and concept of bio-pesticides. Importance. scope and potential of bio-pesticide. Definitions, concepts and classification of bio-pesticides viz. pathogen, botanical pesticides, and bio-rationales. Botanicals and their uses. Mass production technology of bio-pesticides. Virulence, pathogenicity and symptoms of entomopathogenic pathogens and nematodes.	6
II	Methods of application of bio-pesticides Methods of quality control and Techniques of bio-pesticides. Impediments and limitation in production and use of bio-pesticide. Bio-fertilizers - Introduction. Status and scope.	6
III	Structure and characteristic features of bacterial biofertilizers- Azospirillum, Azotobacier, Pseudomonas. Rhizobium and FranIcia; Cyanobacterial bio-fertilizers- Anabaena. Nostoc, Hapalosiphonandfungal bio-fertilizers- AM mycorrhiza and ectomycorhizal.	6
IV	Nitrogen fixation -Free living and symbiotic nitrogen fixation. Mechanism of	6

	phosphate soluhilization and phosphate mobilization, K solubilization. Production technology: Strain selection, sterilization, growth and fermentation, mass production of carrier based and liquid bio-fertiizers.	
V	FCC) specifications and quality control of bio-fertilizers. Application technology for seeds', seedlings, tubers, sets etc. Bio-fertilizers -Storage, shelf life, quality control and marketing. Factors influencing the efficacy of bio-fertilizers.	6

Reference / Text Books:

1. Bio-fertilizers and Bio-pesticides by Krishnendu Acharya
2. Bio-fertilizers and Bio-pesticides by H. C. Lakshman

If the course is available as Generic Elective, then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

- To understand the historical development and foundational concepts of bio-pesticides, including their importance, scope, and potential in sustainable agriculture.
- To define bio-pesticides and classify them into various categories such as pathogen-derived, botanical pesticides, and bio-rationals.
- To understand the technology and processes involved in the mass production of bio-pesticides, including strain selection, growth conditions, fermentation, and quality control.
- To identify the virulence, pathogenicity, and symptoms of entomopathogenic pathogens and nematodes, and understand their role in pest control.
- To provide knowledge on the techniques of quality control for bio-pesticides, ensuring they meet regulatory standards for safe use.

IIMTU-NEP IMPLEMENTATION
Year III / Semester: VI

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: III** **Semester: VI**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code:AG-601N	**Title: Farming System, Precision Farming and Sustainable Agriculture**

Course Objectives:

1. To educate the students on the relevance of farming systems and organic farming in present context and imparting training about biological intensive nutrient management, vermin composting, green manuring and integrated framing systems etc.
2. To throw a light on students regarding the organic certification.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 1
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Farming System-scope, importance, and concept	3
II	Types and systems of farming system and factors affecting types of farming	3
III	Farming system components and their maintenance, Cropping system and pattern, multiple cropping system	3
IV	Efficient cropping system and their evaluation, Sustainable agriculture-problems and its impact on agriculture. Conservation agriculture strategies. HEIA, LELA and LEISA and its techniques for sustainability	3
V	Integrated farming system components of IFS and its advantages, farming system and environment	3

Reference / Text Books:

1. Farming System and Sustainable Agriculture by S.S. Walia, U.S. Walia
2. Farming System and Sustainable Agriculture pdf book

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50

Total:	100
Prerequisites for the course:	
Course Learning Outcomes: 1. Students will learn about primary objectives/goals and concept of sustainable agriculture. 2. Students will understanding farming systems and components thereof and integrated farming system. 3. To learn about concepts of Polyculture, inter-cropping, and crop rotation. 4. To learn about concepts of Hydroponics and Aquaponics and their significance. 5. Benefits of encouraging combined agricultural and forest production system in the name of "Agroforestry". 6. Significance and advantages of Organic farming.	

IIMTU-NEP IMPLEMENTATION
Year III / Semester: VI

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: III** **Semester: VI**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code:AG-602	**Title:Crop Improvement - II (Rabi)**

Course Objectives:
1. To promote professional skills and knowledge through meaningful hands on experience.
2. To build confidence and to work in project mode.
3. To acquire enterprise management capabilities.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 1
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Centers of origin, distribution of species, wild relatives in different cereals (Rice, Maize, Sorghum, Pearl millet & Ragi); pulses (Pigeonpea, Urdbean & Mungbean); oilseeds (Soybean, Groundnut, Seasame & Caster); fibres (Jute & Cotton); fodders (cowpea) and cash crops (tobacco); vegetable (Brinjal, Okra and cucurbitaceous crops) and horticultural crops (Guava); Plant genetic resources, its utilization and conservation, study of genetics of qualitative and quantitative characters; Important concepts of breeding self-pollinated, cross pollinated and vegetatively propagated crops; Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, Adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional); Hybrid seed production technology in Maize, Rice, Sorghum, Pearl millet and Pigeonpea, etc. Ideotype concept and climate resilient crop varieties for future. Cereals –Wheat, oat and barley - Centers of origin, Distribution of species, wild relatives, Floral biology, Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional)	3
II	Pulses –Chickpea- Centers of origin, Distribution of species, wild relatives, Floral biology, Major breeding objectives and procedures including conventional and modern innovative approaches for development of	3

	hybrids and varieties for yield, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional)	
III	Oilseeds –Sunflower and Safflower- Centers of origin, Distribution of species, Wild relatives, Floral biology, Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional)	3
IV	Cash -Sugarcane - Centers of origin, Distribution of species, wild relatives, Floral biology, Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional)	3
V	Vegetable-Potato- Centers of origin, Distribution of species, wild relatives, Floral biology, Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, abiotic and biotic 5 stress tolerance and quality (physical, chemical, nutritional)	3

Reference / Text Books:

1. Crop Breeding: Dr. Manoj Kumar Sarma, Dr. Jayanta Bhuyan, Dr. Shazmira Zaman
2. Essentials of Plant Breeding, Kalyani publication New Delhi, Dr. Phundan Singh
3. Plant Breeding(Principal & Methods), Kalyani publication New Delhi B.D. Singh
4. Crop Improvement-II (Rabi crop), Aki Nik Publications, New Delhi, Dr. D.G. Ingole, Dr. S.S. Vitnor, Dr. V.R. Bharade

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

CO1. Understand the basic concept of the Center of origin and wild relatives of different crops.

CO2. This course may help the students to understand the PGR & its conservation and utilization and study of qualitative and quantitative characters.

CO3. Students will know about the important concepts of breeding in self-pollinated, cross pollinated and vegetative propagated crops.

CO4. Students will know about the major breeding objectives & procedures including conventional & modern approaches for development of hybrids & varieties for yield, adaptability, stability, abiotic and biotic stress tolerance and quality.

CO5. End in this course student will know about the hybrid seed production technology in different crops, ideotype concept

IIMTU-NEP IMPLEMENTATION
Year III / Semester: VI

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class:B.Sc (Hons) Agriculture**	**Year: III** **Semester : VI**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code:AG-603N	**Title: Manures, Fertilizers and Soil Fertility Management**

Course Objectives:

1. To know about different manures, fertilizers
2. To manage the soil quality
3. To improve soil health
4. The relationship between soil fertility and plant health
5. Goals of a sustainable fertility/soil management program

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction and importance of organic manures, properties and methods of preparation of bulky and concentrated manures. Green/leaf manuring	6
II	Fertilizer recommendation approaches. Integrated nutrient management. Chemical fertilizers: classification, composition and properties of major nitrogenous, phosphatic. potassic fertilizers, secondary & micronutrient fertilizers, Complex fertilizers, nano fertilizers Soil amendments	6
III	Fertilizer Storage, Fertilizer Control Order. History of soil fertility and plant nutrition, criteria of essentiality, role. deficiency and toxicity symptoms of essential plant nutrients	6
IV	Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants. Chemistry of soil nitrogen. phosphorus, potassium, calcium, magnesium, sulphur and micronutrients. Soil fertility evaluation	6
V	Soil testing. Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis. rapid plant tissue tests. Indicator plants. Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions	6

Reference / Text Books:

1. Manures and Fertilizes (190), Seventh Edition by K. S. Yawalkar, J. P.Agarwal and S. Bokde
2. Soil Fertility, theory and practice (1976) by J. S. Kanwar

3. Soil Fertility and Fertilizers (1984) by S.L. Tisdale, W.L. Nelson and J. D.Beaton
4. Fundamentals of Soil (1999) by V. N. Sahai
5. Introductory Soil Science (1999) by D. K. Das.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

- The students get knowledge about different kind of manures, fertilizers
- The students will learn how to maintain the soil health.
- The students acquire practical knowledge of nutrient analysis soil.

IIMTU-NEP IMPLEMENTATION
Year III / Semester: VI

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class:B.Sc (Hons) Agriculture**	**Year: III** **Semester: VI**
Credits:2 **Theory:1** **Practical:1**	**Subject: Agriculture**
Course Code:AG-604N	**Title: Farm Management, Production and Resource Economics**

Course Objectives:

1. To know the way forward for an efficient production.
2. To determine the the combinations of most profitable amount of inputs.
3. To estimate how the production will respond to a change in the price of output

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 1
T:0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Meaning and concept of farm management, objectives and relationship with other sciences. Meaning and definition of farms, its types and characteristics, factor determining types and size of farms	3
II	Principles of farm management: concept of production function and its type. Use of production function in decision-making on a farm, factor-product. factor-factor and product- product relationship, law of equi-marginal/or principles of opportunity cost and law of comparative advantage	3
III	Meaning and concept of cost, types of costs and their interrelationship, importance of cost in managing farm business and estimation of gross farm income. net farm income, family labor income and farm business income	3
IV	Farm business analysis: meaning and concept of farm income and profitability, technical and economic efficiency measures in crop and livestock enterprises. Importance of farm records and accounts in managing a farm. various types of farm records needed to maintain on farm, farm inventory, balance sheet, profit and loss accounts. Meaning and importance of farm planning and budgeting, partial and complete budgeting, steps in farm planning and budgeting-linear programming, appraisal of farm resources, selection of crops and livestock's enterprises. Concept of risk and uncertainty occurs in agriculture production, nature and sources of risks and its management strategies. Crop/livestock/machinery insurance - weather based crop insurance, features, determinants of compensation	3

V	Concepts of resource economics, differences between NRE and agricultural economics, unique properties of natural resources. Positive and negative externalities in agriculture, Inefficiency and welfare loss. solutions, Important issues in economics and management of common property resources of land, water, pasture and forest resources etc.	3

Reference / Text Books:

1. Johl, S.S. and Kapoor, T.R. (1973), Fundamentals of Farm Business Management,
2. Sankhayan, P.L. (1988), Introduction to the Economics of Agricultural Production,
3. Raju, V.T. and Rao, D.V.S. (1990), Economics of Farm Production and Management,
4. Dhondyal, S.P. (1984), Farm Management, Friends Publication Meerut (India)

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

1. The students will be able to understand the principles of farm management and production economics dealing with the analysis of farm resources having alternative uses
2. Evaluate the uses of theory of firm for improving farm management and understanding the behavior of the farm as a profit maximizing entity.
3. Evaluate the effects of technical and institutional changes on agricultural production and resource use.
4. Determine individual farm and aggregated regional farm adjustments in output supply and resource use to changes in economic variables in the economy. Subject

IIMTU-NEP IMPLEMENTATION
Year III / Semester: VI

Pogramme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: III** **Semester: VI**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code: **AG-605N**	**Title: Diseases of Field and Horticultural Crops & their Management-II**

Course Objectives:

1. To study the symptomology, etiology, disease cycle and management
2. To study the identification of diseases.
3. To study the diseases of field and horticulture crop
4. To study the biotic and abiotic disease.
5. To study about the management of plant diseases.
6. To study the identification of different plant pathogen.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Symptoms, etiology, disease cycle and management of major diseases of following crops: Field Crops: Wheat: Rusts, loose smut, karnal bunt, powdery mildew, Alternaria blight and ear cockle	8
II	Sugarcane: red rot, smut, wilt and grassy shoot Sunflower: Sclerotinia stem rot and Alternaria blight: Mustard: Alternaria blight, white rust, downy mildew; Gram: wilt and Ascochyta blight; Lentil: Rust and wilt	8
III	Cotton: Vascular wilt and black arm; Pea: Downy mildew, powdery mildew and rust. Horticultural Crops: Mango: Anthracnose, malformation, powdery mildew; Citrus: canker and gummosis; Grape vine: Downy mildew powdery mildew; Apple: scab and Fire blight; Peach: leaf curl; Cucurbits: downy mildew, powdery mildew and wilt	8
IV	Onion and garlic: purple blotch and stemphylium blight; Chilli: anthracnose and leaf curl: Turmeric: leaf spot; Coriander; stem gall: Marigold: Botrytis blight	8

Reference / Text Books:

1. Diseases of Field Crops Diagnosis and Management by J. N. Srivastava, A. K. Singh.
2. Diseases of Field and Horticultural Crops & their Management–I by Dr. M. N. Khan and Ramesh Singh

3. Fundamentals of Plant Pathology by R.S Singh
4. Plant Pathology by PD Sharma.
5. Plant Pathology by G.N Agrios
6. Crop Diseases by D.P Tripathi Plant Pathology by GN Agrios

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

Upon successful completion of this course/paper, students should be able to:

- Students will be able to apply concepts of disease of field and horticulture crop.
- Able to be a pathogen and identification of disease in different field and horticulture crop.
- Able to develop the management of field and horticulture crop..
- Student able to know the disease pathogen morphology under the microscope.
- Able to develop the how to preservation the disease.
- Analyze a disease situation and determine the best cultural, mechanical, and biological control methods used to manage the plant disease.

IIMTU-NEP IMPLEMENTATION
Year III / Semester: VI

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class:B.Sc (Hons) Agriculture**	**Year: III** **Semester: VI**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code:AG-606N	**Title: Post-harvest Management and Value Addition of Fruits and Vegetables**

Course Objectives:
1. To promote professional skills and knowledge through meaningful hands on experience.
2. To build confidence and to work in project mode.
3. To acquire enterprise management capabilities.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L:01
T:00
P: 01 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Importance of post-harvest technology of fruits, vegetables and ornamental crops	3
II	Extent and possible causes of post-harvest losses; Pre- harvest factors affecting postharvest quality, maturity and self-life of fruits, vegetables and ornamental crops. Ripening and changes occurring during ripening; Respiration and factors affecting respiration rate; role of ethylene	3
III	Post-harvest disease and disorders; heat, chilling and freezing injury; harvesting and field handling; Storage (ZECC, cold storage, CA. MA, and hypobaric); Value addition concept	3
IV	Principles and methods of preservation; Intermediate moisture food- Jam, jelly, marmalade, preserve. candy - Concepts and Standards; Fermented and non-fermented beverages. Tomato products- Concepts and Standards	3
V	Drying/ Dehydration of fruits and vegetables - Concept and methods, osmotic drying. Canning - Concepts and Standards, packaging of products	3

Reference / Text Books:
1. Wills, R. B. H. 1998. Postharvest, UNSW Press
2. Shewfelt, R. L. and Stanley, P. E. 1992. Post-Harvest Handling: A Systems Approach, Academic Press Inc.
3. Prusky, D. and Gullino, M. L. 2010. Postharvest Pathology, Springer.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	30 05 15 50
Total:	100
Prerequisites for the course:	
Course Learning Outcomes: ▪ To enable the students for application of postharvest technologies in their career through practical knowledge. ▪ To identify and provide inputs to mitigate postharvest losses during cool chain management. ▪ To provide skill on postharvest loss reduction through processing of fruits and vegetables. ▪ To facilitate the students with knowledge and activities of food processing industries and also drive towards entrepreneurship.	

IIMTU-NEP IMPLEMENTATION
Year III / Semester: VI

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class:B.Sc (Hons) Agriculture**	**Year: III** **Semester: VI**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Agriculture**
Course Code:AG-607N	**Title: Watershed and wasteland Management**

Course Objectives:

1. To understand different watershed behaviour
2. To be able to interpret runoff data and quantify erosion by using various modelling methods
3. To understand land use classification and impact of land use changes on hydrological cyclepara meters

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 1 = 2 Credits

L: 1
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Watershed management - Concept need, principles & components of watershed management integrated watershed management	3
II	Factors effecting watershed management runoff& soil loss management in a watershed socio-economic concept of watershed. Peoples participation in watershed management	3
III	Policy approaches & management plan, problems of watershed management	3
IV	Wasteland management - Definition, concept & types of degraded & wasteland. Distribution & extent of watershed in India & Uttar Pradesh. factors responsible for land degradation, characteristics of different types of degradation & wasteland	3
V	Problems of degraded land in Uttar Pradesh. Appropriate techniques for management of different types of degraded & wasteland	3

Reference / Text Books:

1. Sharda V.N., Sikka A.K. and Juyal G.P. (2006) Participatory Integrated Watershed Management: A Field Manual, Central Soil and Water Conservation Research and Training Institute, 218, Kaulagarh Road, Dehradun.
2. Tideman E.M. (1999) Watershed Management–Guidelines for Indian Conditions, Omega Scientific Publishers, New Delhi. Suggested readings
3. Common Guidelines for Watershed Development Projects (2008) Government of India.

4. Dhruva N.V.V. (2002) Soil and Water Conservation Research in India, Indian Council of Agricultural Research, Krishi Anusandhan Bhavan, Pusa, New Delhi- 110012.
5. Dhruva N.V.V., Sastry G. and Patnaik U.S. (1990) Watershed Management, Indian Council of Agricultural Research, New Delhi.
6. Frevert R.K., Schwab G.O., Edminster T.W. and Barnes K.K. (2009) Soil and Water Conservation Engineering, 4th Ed, John Wiley and Sons, New York.
7. Jain S.K. and Singh V.P. (2006) Water Resources Systems Planning and Management, Reed Elsevier India Pvt. Ltd., New Delhi.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

- Suggest technical measures for soil erosion control both due to water and wind
- Assess the current status of the watershed at field, by taking up accurate investigation measures and conduct survey
- Suggest drought control measures, water conservation structures, including design

IIMTU-NEP IMPLEMENTATION
Year III / Semester: VI

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class:B.Sc (Hons) Agriculture**	**Year: III** **Semester: VI**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code:AG-608N	**Title: Beneficial insects and pests of horticultural crops and their management**

Course Objectives:

1. Learn key concepts and background knowledge that will help you make enriched decisions in your career as a horticulturalist, entomologist, or other field.
2. Understand the principles of Integrated Pest Management and how they relate to horticultural crop settings.
3. Analyze given situations and provide a plan to solve complex pest management problems using critical and creative thinking.
4. Identify and employ all facets of modern pest management programs, including sampling, interpretation of available thresholds, and multiple management strategies

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Types of silkworm, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties, methods of harvesting and preservation of leaves	6
II	Rearing of mulberry silkworm, rearing appliances, mounting and harvesting of cocoons. Pests and diseases of silkworm, management, and methods of disinfection	6
III	Importance of beneficial insects. bee keeping, pollinating plants and their cycle, bee biology, commercial methods of rearing, equipment used and seasonal management	6
IV	Bee pasturage. Bee foraging and communication. Insect pests and diseases of honey bee. Species of lac insect, morphology, biology. host plant and lac production - Processing of lac - seed lac, button lac. shellac and lac- products	6
V	Identification of major parasitoids and predators commonly used in biological control	6

Reference / Text Books:

1. A text book of integrated pest management- G.S. Dhaliwal, Ram Singh
2. Hand book of Entomology- T. V. Prasad

References:

1. Atwal, A.S. 1976. Agricultural Pests of India and South East Asia. Kalyani Publishers, Ludhiana.
2. Butani, D.K. and Jotwani, M.G. 1984. Insects in Vegetables. Periodical Export Book Agency, New Delhi.
3. Butani, D. K. 1984. Insects and Fruits. Periodical Export Book Agency, New Delhi.
4. Dennis S Hill 1987 Agricultural Insect Pests of tropics and their control, Cambridge Universtiy Press , New York
5. Khare, S.P. 1993. Stored Grain Pests and Their Management. Kalyani Publishers, Ludhiana.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

1. The students will learn about the types of insects attacking different horticultural crops and their appropriate management. For example, for vegetable crops, the students will recommend botanical pesticides or green label chemical pesticides to avoid residue problems in vegetables.
2. Similarly, the students will learn the sense of beautification of the environment through ornamental horticulture.
3. This course also lays the foundation for higher studies in the field of entomology.
4. The students will also develop skills in apiculture, sericulture, and lac culture which leads to the entrepreneurship opportunities.

Format-3

IIMTU-NEP IMPLEMENTATION
Year III / Semester: V

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B. Sc (Hons) Agriculture**	**Year: III** **Semester : V**
Credits: 3 **Theory:2** **Practical:1**	**Subject: Agriculture**
Course Code: **AGE-61N**	**Title: Protected Cultivation (ELECTIVE COURSE)**

Course Objectives:

1. To understand the global context of greenhouse technology and its relevance in India.
2. To investigate how factors like light, temperature, humidity, CO2, and water influence plant growth within greenhouses.
3. To explore different types of greenhouse structures, including glasshouses, shade nets, and poly tunnels.
4. To explore the interplay between light, temperature, humidity, CO2, and water in regulating crop growth.
5. To explore fertigation (combining irrigation and fertilization) techniques and Learn strategies to prevent and control pests and diseases in greenhouses.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Protected cultivation- importance and scope, Status of protected cultivation in India and World types of protected structure based on site and climate. Cladding material involved in greenhouse/ poly house	6
II	Greenhouse design, environment control, artificial lights, Automation. Soil preparation and management. Substrate management. Types of benches and containers	6
III	Irrigation and fertigation management. Propagation and production of quality planting material of horticultural crops.	6

IV	Greenhouse cultivation of important horticultural crops - rose, carnation,chrysanthemum, gerbera, orchid, anthurium, lilium, tulip, tomato, bell pepper, cucumber, strawberry, pot plants, etc	6
V	Cultivation of economically important medicinal and aromatic plants. Offseason production of flowers and vegetables. Insect pest and disease management	6

Reference / Text Books:

1. Aldrich RA & Bartok JW. 1994. Green House Engineering. NRAES, Riley, Robb 23 Hall, Cornell University, Ithaca, New York.
2. Balraj Singh. 2006. Protected cultivation of vegetable crops. Kalyani Publishers, Ludhiana.
3. Reddy, P. Parvatha. 2011. Sustainable crop protection under Protected Cultivation. Springer Publications. USA.
4. Jitendra Singh, 2015. Precision Farming in Horticulture. New Publishing Agency. New Delhi.
5. Brahma Singh, 2014. Advances in Protected Cultivation. New India Publishing Agency. New Delhi.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	30 05 15 50
Total:	100

Prerequisites for the course: NA

Course Learning Outcomes:

1. Students will study different agro-climatic zones within India and their relevance to greenhouse operations.
2. Students will investigate how environmental factors (light, temperature, humidity, CO2, water) impact plant growth in greenhouses.
3. Students will explore cost-effective greenhouse structures suitable for Indian conditions.
4. Students will learn about micro irrigation and fertigation practices.
5. Students will learn strategies for pest and disease control in greenhouses.

IIMTU-NEP IMPLEMENTATION
Year III / Semester: V

Programme: Certificate/Diploma/Degree /UG(R)/PG/Ph.D. **Class: B. Sc (Hons) Agriculture**	**Year: III** **Semester : V**
Credits: 3 **Theory:2** **Practical:1**	**Subject: Agriculture**
Course Code: **AGE-62N**	**Title: Hi-tech. Horticulture (ELECTIVE COURSE)**

Course Objectives:

1. To understand the significance, scope, and advancements in hi-tech horticulture, and its impact on the Indian horticultural industry.
2. To learn the principles and techniques of micro-propagation for the production of high-quality horticultural crops.
3. To provide the advanced methods of field preparation and planting techniques for optimal growth and yield.
4. To understand the components and benefits of micro irrigation systems.
5. To learn the application of DGPS for precise positioning and management in horticulture
6. To learn the application of DGPS for precise positioning and management in horticulture.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction & importance; Nursery management and mechanization; micro propagation of horticultural crops; Modern field preparation and planting methods	6
II	Protected cultivation: advantages, controlled conditions, method and techniques, Micro irrigation systems and its components; EC. pH based fertilizer scheduling, canopy management, high density orchard.	6
III	Components of precision fanning: Remote sensing. Geographical Information System (GIS), Differential Geo-positioning System (DGPS), Variable Rate applicator (VRA), application of precision farming in	6

	horticultural crops (fruits, vegetables and ornamental crops)	
IV	mechanized harvesting of produce. Practical Types of polyhouses and shade net houses, Intercultural operations, tools and equipments identification and application, Micro propagation	6
V	Nursery-portrays, micro-irrigation. EC, pH based fertilizer scheduling, canopy management, visit to hi-tech orchard/nursery.	6

Reference / Text Books:

1. Hi-tech Horticulture- T.A. More, MPKV, Rahuri Balraj Singh,2005: Protected cultivation of vegetable crops. Kalyani publication
2. Patil M.T. & Patil,P.V., 2004 Commercial Protected Floriculture. MPKV, Rahuri
3. Commercial floriculture- Prasad & kumar
4. Green house operation & Management: Paul V. Nelson

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

1. Students will explore the scope and potential impact of hi-tech practices on crop productivity and quality.
2. Students will learn efficient nursery management techniques.
3. Students will explore applications of micro-propagation in horticulture.
4. Explore the benefits and limitations of protected cultivation (greenhouses, shade nets, etc.).
5. They will understand the role of machinery in reducing labor-intensive tasks.
6. They will Study temperature, light, CO2, relative humidity, and ventilation management within greenhouses.

IIMTU-NEP IMPLEMENTATION
Year III / Semester: V

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: III** **Semester : V**
Credits : 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code:AGE-63N	**Title: Weed Management (ELECTIVE COURSE)**

Course Objectives:

1. Different types weeds and its impact on crop production
2. Herbicides and its application in weed control
3. To transfer weed management technologies on farmers' fields through on-Farm Research and FLDs, their impact assessment and training.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction to weeds, characteristics of weeds their harmful and beneficial effects on ecosystem. Classification, reproduction and dissemination of weeds	6
II	Herbicide classification. concept of adjuvant, surfactant, herbicide formulation and their use. Introduction to mode of action of herbicides and selectivity	6
III	Allelopathy and its application for weed management. Bio-herbicides and their application in agriculture	6
IV	Concept of herbicide mixture and utility in agriculture. Herbicide compatibility with agro-chemicals and their application	6
V	Integration of herbicides with non-chemical methods of weed management. Herbicide Resistance and its management.	6

Reference / Text Books:

- S R Reddy , 2020 Weed Management, Kalyani publishing
- Jaganathan, R., and R. Jayakumar. 2003. Weed Science Principles, Kalyani Publishers, New Delhi.
- Subramanian, S. A. Mohammed Ali and R. Jayakumar. 1991. All about Weed Control. Kalyani Publishers, New Delhi.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30

2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	05 15 50
Total:	100
Prerequisites for the course:	
Course Learning Outcomes: • Identify different types of weeds and their ecosystem • Understand the weeds survival mechanisms • Recommend herbicides understanding their effects on the crops • Students will understand classification of weeds, different methods of weed control, • Apply integrated weed management practices • Workout the economics of weed control in horticultural crops	

IIMTU-NEP IMPLEMENTATION
Year III / Semester: V

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: III** **Semester : V**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code:AGE-64N	**Title: System Simulation and Agro advisory (ELECTIVE COURSE)**

Course Objectives:

- To introduce the students about the system simulation and agro advisory which helps the farmer about the early warning about the disease and climate and let the farmer ready reduces the losses.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3 Credits)

Unit	Contents	No. of Lectures Allotted
I	System Approach for representing soil-plant-atmospheric continuum, system boundaries, Crop models, concepts & techniques, types of crop models, data requirements, relational diagrams.	6
II	Evaluation of crop responses to weather elements; Elementary crop growth models; calibration, validation, verification and sensitivity analysis. Potential and achievable crop production- concept and modelling techniques for their estimation	6
III	Crop production in moisture and nutrients limited conditions; components of soil water and nutrients balance	6
IV	Weather forecasting, types, methods, tools & techniques, forecast verification: Value added weather forecast, ITK for weather forecast and its validity; Crop-Weather Calendars;	6
V	Preparation of agro-advisory bulletin based on weather forecast. Use of crop simulation model for preparation of Agro-advisory and its effective dissemination	6

Reference / Text Books:

- Fundamentals of Agro metrology and Climate Change, Mahi, G.S. and Kingra, P. K. Kalyani Publisher.
- Climate Change and Agriculture G. S. L. H. V. Prasada Rao, G. G. S. N. Rao and V. U. M. Rao.
- A text book on Agricultural Meteorology, Ram Nivas, Surender Singh, Diwan Singh, Khichar Ml and Raj Singh.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	30 05 15 50
Total:	100
Prerequisites for the course:	
Course Learning Outcomes: • Students will able to understand the system approach for representing soil-plant-atmospheric continuum, system. • Students will understand crop models, concepts &techniques, types of crop models, data requirements, relational diagrams • Students will able to understand the weather forecasting, types, methods, tools & techniques	

IIMTU-NEP IMPLEMENTATION
Year III / Semester: V

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class: B.Sc (Hons) Agriculture**	**Year: III** **Semester : V**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code:AGE-65N	**Title: Agricultural Journalism (ELECTIVE COURSE)**

Course Objectives:

- Define the given concepts of agricultural journalism.
- Develop news, news stories, and articles.
- Criticize various news stories and articles.
- Creating awareness and keep students up to date with latest information.
- Debates and Discussions to analyze the role of agricultural journalism in the dissemination of agricultural information among the farmers

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Agricultural Journalism: The nature and scope of agricultural journalism characteristics and training of the agricultural journalist, how agricultural journalism is similar to and different from other types of journalism	6
II	Newspapers and magazines as communication media: Characteristics; kinds and functions of newspapers and magazines, characteristics of newspaper and magazine readers. Form and content of newspapers and magazines: Style and language of newspapers and magazines	6
III	Parts of newspapers and magazines. The agricultural story: Types of agricultural stories, subject matter of the agricultural story. Structure of the agricultural story. Gathering agricultural information	6
IV	Sources of agricultural information, interviews, coverage of events, abstracting from research and scientific materials, wire services, other agricultural news sources. Writing the story: Organizing the material, treatment of the story.	6
V	writing the news lead and the body, readability measures. Illustrating agricultural stories: Use of photographs, use of artwork (graphs. charts, maps, etc.), writing the captions. Editorial mechanics: Copy reading, headline and title writing, proofreading, lay outing.	6

Reference / Text Books:

- Ricky, T. and Anne, T. (2012). Agricultural Communications in Action: a Hands-on Approach. Clifton Park, NY: Delmar.
- Graves and Russell A. (2005). Communicating in the Agricultural Industry / Russell A. Graves. Clifton Park, N.Y: Thomson/ Delmar Learning.
- Shri, K.et.al.(1999), Local Radio, making an impact. Agricultural Information Development Bulletin.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

- Students will be able to write better insights by knowing the agricultural sector in detail.
- Students may create social media campaigns for audience awareness.
- Students can write a review on agricultural developmental work.
- Students will do case studies in diffusion of agricultural technologies among the farming communities.
- Students will contribute in radio and TV broadcasting.

Format-3

IIMTU-NEP IMPLEMENTATION
Year III / Semester: VI

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. **Class:B.Sc (Hons) Agriculture**	**Year: III** **Semester: VI**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agriculture**
Course Code:AGE-66N	**Title: Composition cum Duck/ (and) Quail/ (and) Rabbit culture**

Course Objectives:

1. Learn key concepts and background knowledge about poultry and duck culture.
2. Students will learn about biotechnological methods for breeding.
3. To learn the identification of breeds of rabbit and duck.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Definition, common characteristics and position of fish in Animal Kingdom, fishery stastics preparation and management of fish pond, physical and chemical condition of water for fishery	6
II	Feeds and feeding of fishes, breeding of fish, diseases and enemies of fishes, use of Duck/quality beats on fish feeds	6
III	Definition, common features and advantages, breeds, incubation and hatching feeding of ducks, care and managements of ducking, grower, layer/broiler ducks. Characteristics of duck eggs, common diseases and vaccination schedule, duckry statistics	6
IV	Quail: Definition, common features of quail farming, advantages, breeds, incubation and hatching, feeding of quails. Care and managements of quail chick, grower/layer/broilers. Quail product technology, common diseases and vaccination schedule	6
V	Introduction, scope and advantages of rabbit farming, breeds, breeding, housing, care and management of young and adult rabbit. Feeds and feeding for rabbits, common problems of rabbitry including vaccination schedule, fur and meat production technology.	6

Reference / Text Books:

1. Livestock Production Management by N. S. R Shastri.
2. Livestock Production Management by Nilotpal Ghosh
3. Animal Husbandry & Dairy Science by Jagdish Prasad

4. A Text Book of Animal Husbandry by G. C. Benergy
5. Handbook of Animal Husbandry by ICAR

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal	05
3) Practical/Research Project Report/Seminar On Research Project Report	15
4) ESE	50
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

CO1 Students will able to apply concepts of breeding, physiology, nutrition, herd-health, economics and management into practical and profitable animal production programs.

CO2 Students will understand the role of nutrition in animal production.

CO3 Students will be able develop feeding systems for farm animal production and companion animals.

CO4 Students will be able to demonstrate critical thinking and problem solving skills as they apply scientific principles to a variety of animal production systems.

CO5 Students will understand how the application of modern animal production technologies and management practices impact their production facilities, their communities and the world.

IIMT UNIVERSITY
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Transforming Education System, Transforming Lives

UGC Approved
Section 2f & 12B

School of Agricultural Sciences

ACADEMIC HAND BOOK

Post Graduate Programme Agronomy
(New Restricted Syllabus as per ICAR 5th Dean's committee w.e.f. 2022-23)

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1. PREAMBLE:

In the M.Sc. Agronomy program, students delve into the principles and practices that govern crop production, plant physiology, soil science, pest and disease management, and crop improvement techniques. The curriculum is designed to provide a comprehensive understanding of the interactions between plants, soils, climate, and agricultural management practices, with a strong emphasis on sustainable and environmentally-friendly approaches.

The program's primary objective is to develop competent agronomists who can apply scientific research and innovation to optimize crop yields, enhance agricultural productivity, and promote resource-efficient farming methods. Through a combination of theoretical knowledge and practical experience, students are encouraged to explore the latest advancements in agronomy and develop critical thinking skills to address real-world agricultural challenges. M.Sc. in Agronomy prepares graduates for diverse career paths in agricultural research, crop consulting, sustainable agriculture development, academia, and policymaking. By equipping students with a strong scientific foundation and practical skills, the program empowers them to contribute positively to the global agricultural landscape and address the growing demand for food production in a sustainable and responsible manner.

2. DEFINITIONS AND NOMENCLATURE:

In these Regulations, unless the context otherwise requires:

1. "Programme" means Degree Programme like B.Sc. (Hons) Agriculture/ M. Sc. Agriculture /Computer Science / AIML / Civil / Electrical/Mechanical / Aerospace / Electronics & Communications / Electrical / Electronics & Instruments/IT/bio-Tech branch of B.Tech. Degree Programme.
2. "Course" means a theory or practical subject that is normally studied in a semester.
3. "Vice – Chancellor of IIMT-University" means the Head of the University.
4. "Registrar" is the Head of all academic and General Administration of the University.
5. "Dean" means the authority of the school that is responsible for all academic activities of various programmes and implementation of relevant rules of these Regulations pertaining to the Academic Programmes.
6. "Controller of Examinations" means the authority of the University who is responsible for all activities related to the University Examinations, publication of results, award of grade sheets and degrees.
7. "Dean – Student Welfare" is responsible for all student related activities including student discipline, extra and co – curricular activities, attendance and meetings with class representatives, Student Council, and parent – teacher meet.
8. "HoD" means the Head of the Department concerned.
9. "University" means IIMT-University, Meerut.
10. "TCH" means Total Contact Hours – refers to the teaching – learning periods.
11. "DEC" means Department Exam Committee.
12. "BoS" means Board of Studies.
13. "ACM" means Academic Council meeting the highest authoritative body for approval for all Academic Policies.
14. "Class Co-coordinator" is a faculty of the class who takes care of the attendance, academic performance, and the general conduct of the students of that class.
15. "IA" is Internal Assessment which is assessed for every student for every course during the semester.
16. "ESE" is End Semester Examination conducted by the University at the End of the

Semester for all the courses of that semester.

17. "UGC" means University Grants Commission.

18. "MHRD" means Ministry of Human Resource Development, Govt. of India.

19. "AICTE" means All India Council of Technical Education.

20. "HEI" means Higher Education Institutions.

3. VISION AND MISSION:

VISION:

To produce agricultural graduates with high knowledge and competence by imparting practical technical education through innovative and analytical approach with an objective to create valuable manpower for sustainable agriculture, Argo- Industry and contribution to the society.

MISSION:

(i) To provide the best possible infrastructure and facilities for innovative teaching and learning agricultural and horticultural subjects.

(ii) To establish a centre of excellence to promote academia – Agro-Industry interface and partnerships for enthusing competence of students as per needs of the Industry.

(iii) To empower students with latest agricultural and Agronomic techniques and skills to promote their employability and encourage them to become agro-entrepreneurs, with emphasis on practical-oriented teaching to develop skills and analytical capability of students.

4. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO-1: To provide the sound knowledge in the Agriculture and allied science subjects required to solve common problems in management of crop cultivation, improvement, livestock rearing and their marketing.

PEO-2: To develop a good teaching-learning environment for higher studies and help in selection of professional careers in government and private organization, agro- based industries, educational/ research/extension, institutes *etc.*

PEO-3: To develop the skills for leadership, ethical integrity, and professional engagement in agriculture and allied science.

PEO-4: To provide adequate information about natural and other resources through a course curriculum for the betterment of life.

PEO-5: To produce highly skilled professionals in field of various branches of agriculture to meet the need of various scientific agriculture institutions as well as farmers demand for agriculture professionals.

5. PROGRAMME OUTCOMES (POs):

P.O.1. Understand the basic knowledge of agriculture and related subjects in the current scenario of Indian and world Agriculture.

P.O.2. Develop an understanding of communication methods, resources utilization, cultivation of crops, management of crops, and value addition of agricultural produces.

P.O.3. Develop the skills to manage agricultural farms, enhance quality of farm- produces and their commercial utilization.

P.O.4. Demonstrate the methods used in collection, presentation of data and analysis of results of experiments in laboratories and fields and their validation.

P.O.5. Understand all related methods in agriculture to increase the profit from crop fields and livestock.

P.O.6. Learn to make optimum decision at various levels that enhances the success as an agricultural enterprise.

P.O.7. Extension activities in agriculture and allied sectors around the local villages through Rural Agricultural Work Experience and Agro-industrial Attachment (RAWE & AIA).

P.O.8. Harmonize the relation with Agriculture Research Institutions, State Agriculture Universities, KrishiVigyan Kendra (KVK), *etc.*

P.O.9. Motivate for entrepreneurship, start-up through project planning and execution, research and training during field visits *etc.*

6. PROGRAMMES SPECIFIC OUTCOMES (PSOs):

P.S.O.1. Develop the knowledge based resources and technologies for the enhancement of decision-making ability in students for selection of higher studies in Agriculture.

P.S.O.2. Demonstrate the thoughts of the legal and ethical issues of the environment impacting agriculture and food security of the local and global population.

P.S.O.3. Establish a self-motivated system of agriculture education to attain the local and global demands of agriculture professionals in agriculture and allied sectors.

P.S.O.4. Develop operational resources for the efficient and cost effective implementation of agriculture education.

7. ADMISSION TO THE COURSE:

1. Admission to the above course shall be made on the terms & conditions as prescribed in Ordinance of IIMT University, Meerut as amended from time to time.
2. The admission policy and procedure shall be decided from time to time by the Board of Studies (BoS)of the University based on the guidelines issued by the UGC/NEP/AICTE and Ministry of Education (MoE), Government of India. Seats are also made for Non-Resident Indians and foreign nationals, who satisfy the admission eligibility norms of the University. The number of seats in each of the M. Sc. Agriculture degree program will be decided by the University as per the directives of AICTE/ UGC / MOE, Government of India, considering the market demands.

7.1 Selection of candidates for admission:

The candidates shall be selected for admission to the above course on the basis of their academic merit to be determined on the basis of marks obtained either in Entrance Examination conducted by IIMT University, or in the qualifying examination as decided by the University from time to time.

8. ELIGIBILITY IN ALL YEAR AS NEP (ENTRY & EXIT) AS PER NEHQF AND NSQF (IF APPLICABLE)

The candidate seeking admission to M.Sc. (Ag.) Agronomy course must have passed B.Sc.(Hons) in Agriculture/ Zoology, Biology and Chemistry (ZBC) groups and should have obtained at least 50% marks (As per UGC/GOI/Sate govt. Normsare applicable in case of candidate belonging to reserved category) in the qualifying examination.

Note: The age of the candidate shall be determined as per entry in the Matriculation/Secondary School Examination certificate or any other examination recognized equivalent thereto.

9. CURRICULUM:

The curriculum for Master of Science in Agronomy Degree Programme is designed to have minimum and maximum credits as per the evaluation scheme. Credits that are distributed across four semesters of study for the award of degree.

10. MEDIUM OF INSTRUCTION

The medium of instruction is English for all courses, examinations, seminar, presentations and project reports.

11. CHOICE BASE CREDIT SYSTEM (CBCS)/LOCF/OBE):

Structure of the M.Sc. (Ag.) in Agronomy master Degree Programme: Master of Science in Agronomy Degree Programmes will have the 2 years curriculum and syllabus as approved by the respective Board of Studies and Academic Council of the University. The curriculum for Master of Sciences in Agronomy degree programmeis designed to have minimum and maximum credits as per the scheme of 100 credits that are distributed across four semesters of study for the award of degree.

Under CBCS, the degree programme will consist of the following categories of courses:

1. Core Course-CC
2. Discipline Specific Elective-DSE
3. Generic Elective-GE
4. Ability Enhancement Compulsory Courses-AECC
5. Skill Enhancement Courses-SEC
6. Research Enhancement (Thesis)
7. Research Seminar for personality Enhancement

12. REGISTRATION FOR COURSE IN A SEMESTER:

- A student will be eligible for registration of courses only if he/she satisfies the regulation and has cleared all dues to the University, Hostel and Library up to the end of the previous semester if student is not debarred from enrolment on disciplinary grounds.
- The university follows a flexible Choice Based Credit System. Accordingly, the students shall be given the option for selecting their courses, credits, teachers, slots and create their timetable. The student is given the option of selecting the number of credits to undergo in a semester, subject to the curriculum requirements of minimum and maximum.
- Except for the first-year courses, registration for a semester will be done during a specified week before the start of the semester as per the Academic Calendar.
- Late registration /enrolment will be permitted by the Dean of the School for genuine cases, on recommendation by the Head of the respective department, with a late fee as decided from time to time.
- The student shall make the choice of course in consultation with the Class Coordinator and as stipulated from time to time.
- Students shall have to pay additional fee as prescribed, for registering in certain elective courses under Generic Electives courses offered by certain specific Departments and for higher level Foreign Languages, as decided from time to time.

13. ATTENDANCE

13.1 Condonation of medical cases: For medical cases, submission of complete medical history and records with prior information from the parent / guardian to Dean (Students Welfare) DSW is mandatory and put-up recommendations to the Vice – Chancellor. Such condonation is permitted only twice for a student in the entire duration of the programme.

13.2 Additional Condonation: Additional Condonation may be considered in rare and genuine cases which includes, approved leave for attending select NCC / Sports Camps, cases requiring prolonged medical treatment and critical illness involving hospitalization. For such select NCC /Sports Camps prior permission for leave shall be obtained by the respective Dean /Director of sports from the designated authority, before deputing the students. The Vice-Chancellor, based on the recommendation of Dean may then give condonation of attendance, only if the Vice-Chancellor deems it fit and deserving. But in any case, the condonation cannot exceed 10%.

13.3 Attendance Shortage Warning: Attendance shortage warning will be displayed on the Faculty's Notice Board and University Website by 10th day of every month.

13.4 Attendance Requirements/Eligibility to Appear in Examination:

a) The student shall fulfil the following criteria to be eligible for appearing in the end term examinations:
b) He/ she should bear a good moral character.
c) He/she should be on the rolls of the University during the Semester.
d) He/she should have not less than 75% of the attendance during the respective semester. The Dean of the Faculty on his own or on the recommendation of the HOD will have the power to give relaxation up to 5% on genuine grounds over the minimum 75% attendance requirement.
e) Further, the Vice Chancellor on his own or on the recommendation of the Dean will have the power to give further relaxation up to 5% on genuine grounds over the above relaxation given by the Dean.
f) He/she should not be a defaulter in payment of tuition fees or any other dues of the University and no disciplinary action is pending against him/her

13.5 Detained Students:

A student, who does not fulfil the criteria prescribed in Clauses 11, subject to clause 12, will not be eligible for appearing in the End Term Semester Examination in that particular paper and will be deemed as "Detained" in the paper. Such student will repeat the course/paper along with the regular students of the subsequent batch after fulfilling the prescribed conditions to appear in the "End Term" examination of the course/ paper.

14. ASSESSMENT PROCEDURE

The Committee recommends Uniform Grading system to be followed with uniform OGPA requirements for award of degrees at all levels and uniform conversion formulae to be followed for declaration of I, II and III divisions, distinctions *etc.* Declaration of division in the degree certificate to be made compulsory by all universities.

14.1 **Examination marks distributions:** External theory (40%) and Internal Theory (30%) + Practical (30%).

14.2 **Courses with Theory and Practical:** Mid-term Exam (30%) + [Assignment (10%) in practical oriented courses + Practical (20%).

14.3 **Courses with only Theory:** Mid-term Exam (40%) + Assignment (10%).

14.4 **Courses with only Practical:** 100% Internal.

15. **Research Thesis/Semester Thesis Assessment Criteria**- 60 % mark given by Thesis Writing + 40 % mark given by Viva –Voce.

16. **Internship – Research / Industrial Internship.**

17. **For non – credit courses / audit courses** – The Assessment will be done based on the respective assessment as per rubrics approved by Board of Studies (BOS). A student securing less than the minimum specified internal assessment marks in any course will not be permitted to appear for the end-semester examination in that course and will be graded under "CO (Carry Over)" category for that course. This will be denoted in the grade sheet as "CO (Carry Over)", till the course is successfully completed in the subsequent semester(s).

18. **Credit weightage**: Credits are the weightage, assigned to the courses based on the following general pattern:

One Hour	1 credit
Two Hour Practical	1 credit

19. **MAXIMUM DURATION OF PROGRAMME/PROMOTION POLICY**

The duration of M.Sc.(Ag.) Agronomy course shall be of two academic years. Each year shall be divided into two semesters. Thus, the course shall comprise of four semesters will spread over two years. On completion of all the four semesters, the student will be awarded M.Sc.(Ag.) Agronomy degree. The student shall complete all the Four (4) semesters within a maximum period of 2 (Two) years from the date of admission to the first semester. However, he/she may be given one more year by the Academic Council under special circumstances which will be duly recorded in the Council's resolution.

20. **Maximum gaps between semester/year**

As per UGC norms

21. **Credit system & grading CGPA/SGPA:**

IIMT-University implemented the UGC guidelines for implementation of the choice-based credit system with a view to offer student's choice of courses within a programme with a flexibility to complete the programme by earning credits at a pace decided by the students themselves. The system allowed students to choose inter-disciplinary, intra-disciplinary courses according to their learning needs, interest and aptitude. It was considered as a cafeteria approach and was expected to provide mobility to students.

As per the Current credit system practiced in institutions needs comprehensive reforms as they offer very little flexibility, choice and are less learner centric. Degrees offered today are more

self-contained focusing on a specialization area and depend a lot on knowledge available with the faculty from the department only. Though the most requisite credit system does exist, wherein students are given a wide choice and flexibility, these exist as small islands in the vast ocean of thousands of educational institutes in India. In such institutions, the curriculum is frequently designed which is learner centric and offering a wide specialization area for students to pick and choose courses from.

The institutions shall make attempts wherein the design of the credit system and the teaching and evaluation modes shall be the responsibility of individual course teachers. The students should have the freedom to opt for courses from other specializations and not just from their core specialization. For this there has to be stronger collaborations between departments of the University and outside.

21.2 GRADING SYSTEM: The school follows the absolute grading system which is a simple procedure wherein the marks obtained by students correspond to a specific grade and grade point. It reflects the individual performance in a particular subject without any reference to the group/class. The absolute grading system has limitations and may be susceptible to some inconsistencies.

The relative grading system on the other hand provides relative performance of a student to a group/class wherein the student is ranked in a group/class on basis of relative level of achievement. In this system decisions are made in advance by the faculty members as to what proportion of students would be awarded a particular grade on the basis of their relative performance and which is done by assigning grades on basis of a normal curve. This facilitates comparative performance and eliminates negative effect of pass or fail.

Table 3: Grading system

Letter Grade	Range
A+	TM>M+1.75SD
A	M+1.25 SD ≤TM<M+1.75SD
B+	M+0.75 SD ≤TM<M+1.25SD
B	M+0.25 SD ≤ TM < M+0.75 SD
C+	M-0.25 SD ≤ TM < M-0.25 SD
C	M-0.75 SD ≤ TM < M-0.25 SD
D+	M-1.25 SD ≤ TM < M-0.75 SD
D	M-1.75 SD ≤ TM < M-1.25 SD
E+	M-2.0 SD ≤ TM < M-1.75 SD
E	M-2.25 SD ≤ TM < M-2.0 SD
F	M-2.25 SD > TM
CO	Carry Over (Summer / Winter) due to Attendance deficiency (between 40% and 75%) and/or I. Lack of minimum IA marks as specified in clause 10.0 Table 3.
RA	Repeat the course due to (i) Lack of minimum attendance (below 40%) in regular course.
--	DETAINED "RC" or "RA" or both in all registered theory courses of a semester. The student is detained and has to repeat the entire semester.

Letter grades may be improved based on the following scheme: Use the table above to determine grade boundaries. Look for natural gaps in the neighbourhood of grade boundaries. Choose the largest gap in the neighbourhood and make this as the grade boundary.
An 'E', 'E+' and 'F' grade may not be a purely relative grade. These may be assigned on the following basis:

- A minimum, say 30/100, may be set as pass marks for the course. A fail grade may then be awarded only if the Total Marks for the course are less than 30. Otherwise, the students may be awarded the Just Pass Grade D.
- A fail grade may be awarded to students whose marks are below the prescribed minimum even if the table above leads to a pass grade.
  Similarly, a lower limit may be set for the A grade also, for instance greater than or equal to 86. Students not achieving the prescribed minimum may be awarded a lower letter grade even if the table above indicates otherwise. A pass grade may be made mandatory for both internal as well as external examinations in the case of a separate internal and external assessment,

a. Internal and External marks may be summed up with appropriate weightages to compute a total out of 100 marks. The letter grade may be assigned on this computed total.
b. Internal and external marks may be graded separately and then the assigned grade points may be used, with appropriate weightages, to compute a final grade point and letter grade.

Grading in the case of Re-evaluations, Retests and Remedial Examinations may be based on the following guidelines:

a. The ranges of marks once computed for awarding letter grades the first time, called the First Distribution (FD), will not be modified.
b. If a re-evaluation leads to a change in marks, then FD will be used to award an appropriate letter grade.
c. A retest may be permitted if
   i. A student gets a letter grade of E+ or E. In this case, irrespective of the marks obtained, at most D grade may be awarded.
   ii. A student is unable to complete course requirements because of certified illness or tragedy. In this case FD will be used to award an appropriate letter grade.

The use of relative grading system may be recommended in autonomous institutions, institutes of national importance and institutions with high ranking. The results of the relative grading system may be shared by such institutions later with other interested institutions to implement the same.

21.3 GPA and CGPA

GPA is the ratio of the sum of the product of the number of credits Ci of course "i" and the grade points Pi earned for that course taken over all courses "i" registered and successfully completed by the student to the sum of Ci for all "i". That is,

$$GPA = \frac{\sum_i C_i P_i}{\sum_i C_i}$$

CGPA will be calculated in a similar manner, in any semester, considering all the courses enrolled from the first semester onwards.

The Grade card will not include the computation of GPA and CGPA for courses with letter grade CO, RC and U until those grades are converted to the regular grades.
A course successfully completed cannot be repeated

22. CLASS/DIVISION

Classification is based on CGPA and is as follows:

CGPA (with equivalent % marks)	Classification of Performance
CGPA of 9.0 (90 and above) or more in first attempt	Outstanding
CGPA of 8.0 (80 and above but less than 90) or more but less than 9.0	Excellent
CGPA of 7.0 (70 and above but less than 80) or more but less than 8.0	1st Div. with Distinction
CGPA of 6.0 (60 and above but less than 70) or more but less than 7.0	1st Division
CGPA above 5.0 Pass Grade (Above 50 but less than 60) but less than 6.0	2nd Division
CGPA equal to 5.0 Pass Grade (50% marks)	Pass
CGPA less than Pass Grade (less than 50% marks)	Fail

i. Further, the award of 'First class with distinction' is subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses in his/her first appearance with effect from II semester, within the minimum duration of the programme.

ii. The award of 'First Class' is further subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses within 2 years for M.Sc. Agronomy.

23. TRANSFER OF CREDITS/ACADEMIC CREDIT BANK: University Grants Commission initiated the concept of National Academic Credit Bank (NAC-Bank) which will be a digital / virtual / online entity to be established and managed by UGC. The main objective of the NAC-Bank would be to facilitate student mobility across the education system wherein the credits can be accumulated and be used at alter point of time for the requirements of partial fulfilment of a degree program.

a. University Grants Commission initiated the concept of National Academic Credit Bank (NAC-Bank) which will be a digital / virtual / online entity to be established and managed by UGC. The main objective of the NAC-Bank would be to facilitate student mobility across the education system wherein the credits can be accumulated and be used at alter point of time for the requirements of partial fulfilment of a degree program.

b. The Academic Bank of Credits (ABC) has been envisaged to facilitate the academic mobility of students with the freedom to study across the Higher Education Institutions in the country with an appropriate "credit transfer" mechanism from one programme to another, leading to attain a Degree/ Diploma/PG-diploma, etc.

c. The Academic Council may also approve admission of students who have completed a portion of course work in another approved Institute of repute under Multiple entry & Exit system, based on the recommendation of the credit transfer committee on a case-to-case basis.

e. Students who have completed coursework, at least first year, at some university other than the university to which transfer is sought (may request for transfer of admission to

this university. A student may be granted admission only through an admission process that will follow the same policy as for fresh admissions. However, a uniform credit system must be followed by all universities to effect transfer of credits.

Credit Transfer request can be submitted only after the student has been admitted in the concerned program and the following conditions are met:

i. The course work has been completed at a UGC approved and accredited University through fulltime formal learning mode.
ii. The university accreditation grade/ ranking is not lower than that of the university to which the transfer is sought.
iii. The courses prescribe to the common minimum syllabus under UGC CBCS system.
iv. The letter grade obtained in the courses is "B" or better.
v. The number of credits to be transferred does not exceed the prescribed limit.
vi. The program in question must have a similar credit system, in particular, modular or semester and the same numeric and letter grading system along with common meaning of the term "credit" in numerical terms.

The aspect of shelf life of courses needs to be considered while accepting credits as obsolescence of knowledge of certain field in terms of its current relevance needs to be investigated. The time elapsed between successful completion of certain courses of the program and the admission to which program transfer is sought needs to be considered. The maximum number of credit points that may be considered under a credit transfer needs to be specified. Contextual variables such as teaching-learning approach adopted, learning facilities offered, use of evaluation modes may also be considered while preparing the credit transfer policy.

23.1 Moderation

Moderation of assessment is an organized procedure which ensures use of valid assessment material and consistent application of criteria, to provide fair academic judgment and reliable outcome in the form of marks or grades. It assures appropriate designing and implementation of assessment activities along with generation of valid and reliable results. Integration of moderation process with assessment system is imperative for the development of academic quality in higher educational institutions as:

- It addresses any difference in individual judgments of different evaluators.
- It ensures that all achievements in the form of marks and grades across courses reflect achievement of same level of standard.
- It is also carried out to develop a common understanding of the standards and criteria and to recognize performance which demonstrates that standard or fulfils those criteria. Moderation may be conducted in case there are large number of fail grades or high grades, or when large numbers of students who have received the same grade or clustering of students on letter grades, or when there are discrepancies between grades allocated to individual students in different courses, or to find out the difficulty level of the question paper or whether the assessments modes used cover the entire syllabus or not. Applicability - Moderation will be made applicable to both external and internal modes of assessment. All programs and courses will indicate, as part of their statements on assessment, arrangements for the moderation of assessed work. This can be done through formulation of a moderation policy and implemented across all programs and courses of instruction and delivery. The time frame for the moderation will be linked with the time frame for assessment. In the event moderation is triggered, an evaluation will begin with a discussion on the following (though not exhaustive) lines:

a. What are the rubrics used for each of the different types of assessment in the course? Is a standardized/ prescribed rubric used or has the instructor developed his/ her own rubric. If the instructor is using a personally framed rubric, or if there is no identified rubric, then how does the assessment map to learning outcomes?

b. The difficulty level of the questions included in the assessments, i.e., is the difficulty level on the extremes, very easy or very hard.

c. The manner of awarding marks, i.e., has the correction been at the extremes, liberal or tough. Each department will establish a committee and designate roles and responsibilities at different levels for smooth working of the moderation process. In order to maintain neutrality, it will be ensured that moderator should not be the assessor. Staff members will be trained professionally in assessment techniques and moderation procedures. All assessment material produced by learner including examination sheets, assignments, project reports, research reports etc. will be examined. Institutions will be encouraged to make the moderation process online. In this system, assessment plans, moderation plans, assessment tools, samples of which may be submitted online. Moderation reports will be generated online so that progress can be tracked and submitted to the COE after the approval of dean by Head of the department. The moderation will not be restricted to just assessment but also include moderation of content and assessment design.

24. CHANGE OF DISCIPLINE

Every student is required to observe utmost discipline and decorum both inside and outside the campus and not to indulge in any activity which may affect adversely the prestige reputation of the university.

25. USE OF TECHNOLOGICAL INTERVENTION

The use of educational technology and information communication technologies (ICTs) in education is the need of the hour. With the proliferation of different types of access devices, especially mobile access devices, technology has the potential to augment traditional classroom practices and revolutionize learning and evaluation methods. Technology, in fact can be an important driver to enable lifelong learning. Learning and engagement of students is facilitated by use of technology through several modes such as synchronous learning, semi-synchronous learning, blended learning, collaborative learning, flipped classroom *etc.* MOOC's, especially provided through SWAYAM, are a window of opportunity for lifelong learning and are offered through technology-based platforms. Learning Management systems (LMS) may be used by institutions to integrate the entire teaching, learning and evaluation process. Open-source learning systems may be used for posting content in the form of videos, audios, e-learning modules, live class sessions *etc.* Use of plagiarism detection software will be highly recommended to check originality of content.

26. STUDENT DISCIPLINE

Every student is required to observe utmost discipline and decorum both inside and outside the campus and not to indulge in any activity against any law which may affect adversely the prestige/reputation of the University

27. STUDENT WELFARE

Any act of indiscipline of a student reported to the Dean (Students Welfare) and Head of the Department will be referred to a Discipline Committee constituted for the purpose. The

Committee will enquire into the charges and decide on a suitable punishment if the charges are substantiated. The committee will also authorize the Dean (Students Welfare) to recommend to the Vice-Chancellor for the implementation of the decision. The student concerned may appeal to the Vice-Chancellor, whose decision will be the final.

28. RAGGING

Ragging in any form is a criminal and non-boilable offence in our country. The current State and Central legislations provide stringent punishments including imprisonment. Once the involvement of a student(s) is established in ragging, offending fellow students/staff, harassment of any nature to the fellow students/staff *etc.* the student(s) will be liable to be dismissed from the University, as per the laid down procedures of the UGC / Govt. /Institute. Every senior student at the University, along with their parent, shall give an undertaking every year in this regard and the same should be submitted at the time of Registration.

29. POWER TO MODIFY

Notwithstanding all that has been stated above, the Academic Council is vested with powers to modify any or all the above regulations from time to time, if required, subject to the approval by the Board of Studies and Final approval by Vice-Chancellor.

30. Exit Point: As per NEP

31. NC/Credit Course: For non-credit courses 'Satisfactory' or "Unsatisfactory' shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

32. ANY OTHER HEADING AS PER YOUR PROGRAM

- Common Academic Regulations for PG
- Credit requirements
- Framework of the courses:
- Course Title with Credit Load M.Sc. in Agronomy
- Evaluation Scheme- **Annexure-A**
- Course Contents of M.Sc. in Agronomy

Common Academic Regulations for PG

Mandatory requirement of seminars

- It has been agreed to have mandatory seminars one in Masters (One Credit) and two in Doctoral programmes (two Credits).
- The students should be encouraged to make presentations on the latest developments and literature in the area of research topic. This will provide training to the students on preparation for seminar, organizing the work, critical analysis of data and presentation skills.

Residential requirements:

- The minimum and maximum duration of residential requirement for Masters'

P.G. Degree Programmes	Duration of Minimum	Residential Requirement Maximum
Masters' Degree	2 Academic Years (4 Semesters)	5 Academic Years (10 Semesters)
*Student may be allowed to discontinue temporarily only after completion of course work		

In case a student fails to complete the degree programme within the maximum duration of residential requirement, his/ her admission shall stand cancelled. The requirement shall be treated as satisfactory in the cases in which a student submits his/ her thesis any time during the 4thand 6thsemester of his/ her resident ship at the University for Masters' and Ph.D. programme, respectively.

Evaluation of course work and comprehensive examination:

- For M.Sc., multiple levels of evaluation (First Test, Midterm and Final semester) is desirable. However, it has been felt that the comprehensive examination is redundant for M.Sc. students.

Advisory System:

Advisory Committee

- There shall be an Advisory Committee for every student consisting of not fewer than three members in the case of a candidate for Masters' degree with the Advisor as Chairperson. The Advisory Committee should have representatives from the major and minor fields amongst the members of the Post-graduate faculty accredited for appropriate P.G. level research. However, in those departments where qualified staff exists but due to unavoidable reasons Post-graduate degree programmes are not existing, the staff having Post-graduate teaching experience of two years or more may be included in the Advisory Committee as member representing the minor.
- At any given time, a P.G. teacher shall not be a Chairperson, Advisory Committee (including Master's programmes) for more than five students.
- The Advisor should convene a meeting of the Advisory Committee at least once in a Semester. The summary record should be communicated to the Head of Department, Dean of the College of concerned, Director (Education)/ Dean PGS and Registrar for information.

Advisor/ Co-guide/ Member, Advisory Committee from other collaborating University/ Institute/ Organization:

- In order to promote quality Post-graduate research and training in cutting edge areas, the University may enter into Memorandum of Understanding (MOU) with other Universities/ Institutions for conducting research. While constituting an Advisory Committee of a student, if the Chairperson, Advisory Committee feels the requirement of involving of a faculty member/ scientist of such partnering university/ Institute/ Organization, he/ she may send a proposal to this effect to Director (Education)/ Dean PGS along with the proposal for consideration of Student's Advisory Committee (SAC).
- The proposed faculty member from the partnering institution can be allowed to act as Chairperson/ Co-guide/ Member, SAC, by mutual consent, primarily on the basis of intellectual input and time devoted for carrying out the research work at the particular institution. The faculty member/ scientist of partnering institutions in the SAC shall become a temporary faculty member of the University by following the procedure approved by the Academic Council.

Allotment of students to the retiring persons:

Normally, retiring person may not be allotted M. Sc. Student if he/ she is left with less than 2 years of service student if left with less than 3 years of service. However, in special circumstances, permission may be obtained from the Director (Education)/ Dean PGS, after due recommendation by the concerned Dean Agriculture/Head of the Department.

Changes in the Advisory Committee:

(i) Change of the Chairperson or any member of the Advisory Committee is not ordinarily permissible. However, in exceptional cases, the change may be effected with due approval of the Dean Agriculture/Dean PGS/Director Education.

(ii) Normally, staff members of the university on extra ordinary leave or on study leave or who leave the University service will cease to continue to serve as advisors of the Post-graduate students of the University. However, the Director (Education)/ Dean PGS may permit them to continue to serve as advisor subject to the following conditions:

a) The concerned staff member must be resident in India and if he/ she agrees to guide research and must be available for occasional consultations;

b) An application is made by the student concerned duly supported by the Advisory Committee;

c) The Head of the Department and the Dean of the College concerned agree to the proposal;

d) The staff member, after leaving the University service is granted the status of honorary faculty's membership by the Vice-Chancellor on the recommendation of the Director (Education)/Dean Agriculture/Dean PGS for guiding as Chairperson or Member, Advisory Committee the thesis/theses of the student(s) concerned only.

(iii) In case the Chairperson/member of a Student's Advisory Committee retires, he/ she shall be allowed to continue provided that the student has completed his course work and minimum of 10 research credits and the retiring Chairperson/ member stays at the Headquarters of the College, till the thesis is submitted.

(iv) If the Chairperson/ member proceeds on deputation to another organization, he/ she may be permitted to guide the student provided his/ her new organization is at the Headquarters of the College and his/ her organization is willing for the same.

(v) The change shall be communicated to all concerned by the Head of Department.

Prevention of plagiarism

- An institutional mechanism should be in place to check the plagiarism. The students must be made aware that manipulation of the data/ plagiarism is punishable with serious consequences.

Credit requirements

The following nomenclature and Credit Hrs need to be followed while providing the Syllabus for all the disciplines:

Name of the Courses	Masters' Programme
Major courses	30
Minor courses	08
Supporting courses	06
Common courses	05

Seminar	01
Thesis Research	30
Total	**80**

- **Major courses:** From the Discipline in which a student takes admission. Among the listed courses, the core courses compulsorily to be taken may be given mark
- **Minor courses:** From the subjects closely related to a student's major subject
- **Supporting courses:** The subject not related to the major subject. It could be any subject considered relevant for student's research work (such as Statistical Methods, Design of Experiments, etc.) or necessary for building his/her overall competence.
- **Common Courses:** The following courses (one credit each) will be offered to all students undergoing Master's degree programme:
    1. Library and Information Services
    2. Technical Writing and Communications Skills
    3. Intellectual Property and it management in Agriculture
    4. Basic Concepts in Laboratory Techniques
    5. Agricultural Research, Research Ethics and Rural Development Programmes

Some of these courses are already in the form of e-courses/ MOOCs. The students may be allowed to register the courses /similar courses on these aspects, if available online on SWAYAM or any other platform. If a student has already completed any of these courses during UG, he/she may be permitted to register for other related courses with the prior approval of the Head of Department (HoD)/Board of Studies (BoS).

Major Courses

Course Code	Course Title	Credit Hours
AGRON 501	Modern Concepts in Crop Production	3+0
AGRON 502	Principles and practices of soil fertility and Nutrient management	2+1
AGRON 503	Principles and Practices of Weed Management	2+1
AGRON 504	Principles and Practices of Water Management	2+1
AGRON 505	Agro Meteorology and Crop Weather Forecasting	1+1
AGRON 506	Agronomy of major Cereals and Pulses	2+1
AGRON507	Agronomy of oilseed, fibre and sugar crops	2+1
AGRON 508	Conservation Agriculture	2+1
AGRON 509	Agronomy of fodder and forage crops	2+1
AGRON 510	Agrostology and Agroforestry	2+1
AGRON 511	Cropping System and Sustainable Agriculture	2+0
AGRON 512	Dryland Farming and Watershed Management	2+1
AGRON 513	Principles and practices of organic farming	2+1
AGRON 550	Master's Seminar	1+0
AGRON 560	Master's research	30

Minor Courses

Course Code	Course Title	Credit Hours
SOILS 502	Soil Fertility and Fertilizer Use	2+1
SOILS 509	Remote Sensing and GIS Technique for Soil and Crop Studies	2+1
SOILS 510	Analytical Techniques and Instrumental Methods in Soil and Plant Analysis	0+2
SOILS 511	Management of Problematic Soils and Waters	2+1
SOILS 513	Soil Survey and Land Use Planning	2+0
SOILS 514	Introduction to Nano Technology	1+0

Supporting Courses: The following courses are being offered by various disciplines (The list is only indicative). Based on the requirement, any of the following courses may be opted under the supporting courses. The syllabi of these courses are available in the respective disciplines. If required, the contents may be modified to suit the individual discipline with approval of the concerned BoS:

Code	Course Title	Credit Hours
STAT-501	Mathematics for Applied Sciences	2+0
STAT-502	Statistical Methods for Applied Sciences	3+1
STAT-511	Experimental Designs	2+1
STAT-512	Basic Sampling Techniques	2+1
STAT-521	Applied Regression Analysis	2+1
STAT-522	Data Analysis Using Statistical Packages	2+1
MCA-501	Computers Fundamentals and Programming	2+1
MCA-502	Computer Organization and Architecture	2+0
MCA-511	Introduction to Communication Technologies, Computer Networking and Internet	1+1
MCA-512	Information Technology in Agriculture	2+1
AGM-508	Principles Of Remote Sensing And Its Applications In Agriculture	2+1

Common Courses: The following courses (one credit each) will be offered to all students undergoing Master's degree programme:

Code	Course Title	Credit Hours
PGS 501	Library and Information Services	0+1
PGS 502	Technical Writing and Communications Skills	0+1
PGS 503	Intellectual Property and its management in Agriculture	1+0
PGS 504	Basic Concepts in Laboratory Techniques	0+1
PGS 505	Agricultural Research, Research Ethics and Rural Development Programmes	1+0
PGS 506	(e course) Disaster Management	1+0

EVALUATION SCHEME

M. Sc. (Ag.) Agronomy
SEMESTER-I

S.No.	Sub. Code	Subject	Credit	Theory	Lab	External Theory Marks	Practical Marks	Internal Marks	Passing Marks	Total Marks
1	AGRON 501	Modern Concepts in Crop Production	3	3	0	70	-	30	60	100
2	AGRON 506	Agronomy of major Cereals and Pulses	3	2	1	50	20	30	60	100
3	AGRON 512N	Dryland Farming and Watershed Management	3	2	1	50	20	30	60	100
4	AGRON 513	Principles and practices of organic farming	3	2	1	50	20	30	60	100
5	SOILS 511	Management of Problematic Soils and Waters	3	2	1	50	20	30	60	100
6	MCA512N	Information Technology in Agriculture	3	2	1	50	20	30	60	100
7	PGS 506	(e-course) Disaster Management	1	1	0	70	-	30	60	100
Total			**19**	**14**	**05**					**700**

SEMESTER-II

S.No.	Sub. Code	Subject	Credit	Theory	Lab	External Theory Marks	Practical Marks	Internal Marks	Passing Marks	Total Marks
1	AGRON 502	Principles and practices of soil fertility and Nutrient management	3	2	1	50	20	30	60	100
2	AGRON 503	Principles and Practices of Weed Management	3	2	1	50	20	30	60	100
3	AGRON 504	Principles and Practices of Water Management	3	2	1	50	20	30	60	100

4	AGRON507	Agronomy of oilseed, fibre and sugar crops	3	2	1	50	20	30	60	100
5	SOILS 502	Soil Fertility and Fertilizer Use	3	2	1	50	20	30	60	100
6	STAT 511	Experimental Designs	3	2	1	50	20	30	60	100
7	PGS 503	Intellectual Property and its management in Agriculture	1	1	0	70	-	30	60	100
8	PGS 505	Agricultural Research, Research Ethics and Rural Development Programmes	1	1	0	70	-	30	60	100
9	AGRON 550	Master's Seminar	1	0	1	-	-	100	60	100
Total			**21**	**14**	**07**					**900**

SEMESTER-III

S.No.	Sub. Code	Subject	Credit	Theory	Lab	External Theory Marks	Practical Marks	Internal Marks	Passing Marks	Total Marks
1	AGRON 508	Conservation Agriculture	3	2	1	70	-	30	60	100
2	AGRON 509	Agronomy of fodder and forage crops	3	2	1	50	20	30	60	100
3	SOILS 509	Remote Sensing and GIS Technique for Soil and Crop Studies	3	2	1	50	20	30	60	100
4	PGS 501	Library and Information Services	1	0	1	-	100	-	60	100
5	PGS 502	Technical Writing and Communications Skills	1	0	1	-	100	-	60	100
Total			**11**	**06**	**05**	**500**				

SEMESTER-IV

S.No.	Sub. Code	Subject	Credit	Theory	Lab	External Marks	Practical Marks	Internal Marks	Passing Marks	Total Marks
1	AGRON 560	Master's research	30	-	-	100	-	-	60	100
Total			**30**							

Total Credit- Major-30+ Minor- 09+ Supporting-06+ Common Courses -5+ Seminar-1+Master's Thesis- 30= 81

FORMAT-1

NEP-2020 IMPLEMENTATION 3 STEPS PLAN (FORMAT-1, 2& 3)
CBCS: Statement of Credits distribution

Format -1

College/School: School of Agricultural Sciences Programme:M. Sc (Ag.) Agronomy Duration: UG (6 Sem.), UG (Hons./Research) 8 Sem., PG (4 Sem.)	Credit range: Minimum 120 for UG 160 for UG (Hons.), 80 for PG (Suggested by CBCS-NEP Committee)

COURSE	CREDIT	SEMESTER	CORE (Th 4+P 2) Major	DSE (Th 4+P 2) Minor	AECC (Th 3)	SEC **	GE (Th 4) Interdisciplinary	General Elective (2)	Value Added Course (VAC) (2)	Industrial Training/ Survey / Research Project (4)	Total Credits
M.Sc. (Ag.) Agronomy		1st	C1-Modern Concepts in Crop Production 3(3+0) C2- Agronomy of Major Cereals and Pulses 3(2+1) C3-Dryland Farming and Watershed Management 3(2+1)	DSE1-Management of Problematic Soils and Waters	AECC 1-Information Technology in Agriculture	SEC-1 (e-course) Disaster Management			VAC-1-Principles and practices of organic farming 3(2+1)		**19**

		2nd	C5-Principles and practices of soil fertility and Nutrient management C6-Principles and Practices of Weed Management C7-Principles and Practices of Water Management C8-Agronomy of oilseed, fibre and sugar crops C9-Experimental Designs	DSE 3-Soil Fertility and Fertilizer Use	AECC 2- Agricultural Research, Research Ethics and Rural Development Programmes	SEC2-Intellectual Property and its management in Agriculture			VAC -2	Master's Seminar	21
		3rd	C10- Agronomy of fodder and forage crops C11-Conservation Agriculture	DSE 2-Remote Sensing and GIS Technique for Soil and Crop Studies	AECC 3-Technical Writing and Communications Skills	SEC 3- Library and Information Services			VAC -3	*Master's Research	**11**
		4th				SEC 4- MOOCs/NPTEL				*Master's Research	30

* Master's research credits can be distributed as per need of advisor

FORMAT-2

Format-2

Program	Year	Semester (15 weeks)	Paper	Credit	Periods per Week	Periods (Hours) per Semester	Paper Title	Unit (Periods per semester)	Prerequisite	Elective (For other faculty)
M. Sc(Ag.) Agronomy	FIRST YEAR	SEMESTER-I	AGRON 501	3	3	45	Modern Concepts in Crop Production	45		
			AGRON 506	3	3	45	Agronomy of major Cereals and Pulses	45		
			AGRON 512	3	3	45	Dryland Farming and Watershed Management	45		
			AGRON 513	3	3	45	Principles and practices of organic farming	45		
			SOILS 511	3	3	45	Management of Problematic Soils and Waters	45		
			MCA512	3	3	45	Information Technology in Agriculture	45		
			PGS 506	1	1	15	(e-course) Disaster Management	15		
		SEMESTER-II	AGRON 502	3	3	45	Principles and practices of soil fertility and Nutrient management	45		
			AGRON 503	3	3	45	Principles and Practices of Weed Management	45		
			AGRON 504	3	3	45	Principles and Practices of Water Management	45		
			AGRON507	3	3	45	Agronomy of oilseed, fibre and sugar crops	45		
			SOILS 502	3	3	45	Soil Fertility and Fertilizer Use	45		
			STAT 511	3	3	45	Experimental Designs	45		
			PGS 503	1	1	15	Intellectual Property and its management in Agriculture	15		
			PGS 505	1	1	15	Agricultural Research, Research Ethics and Rural Development Programmes	15		
			AGRON 550	1	1	-	Master's Seminar	-		

PO1:	Understand the basic knowledge of agriculture and related subjects in the current scenario of Indian and world Agriculture	PSO1:	Develop the knowledge based resources and technologies for the enhancement of decision-making ability in students for selection of higher studies in Agriculture
PO2	Develop an understanding of communication methods, resources utilization, cultivation of crops, management of crops, and value addition of agricultural produces	PSO2	Demonstrate the thoughts of the legal and ethical issues of the environment impacting agriculture and food security of the local and global population.
PO3.	Develop the skills to manage agricultural farms, enhance quality of farm- produces and their commercial utilization.	PSO3	Understanding the behavior of soils in crop production and management
PO4	Demonstrate the methods used in collection, presentation of data and analysis of results of experiments in laboratories and fields and their validation.	PSO4	Promote and sensitize the people about sustainable agriculture
PO5	Understand all related methods in agriculture to increase the profit from crop fields and livestock	PSO5	Proper management of animals by providing proper food, shelter and protection against diseases to domestic animals
PO6	Scientific supervision of forests and the exploitation of their resources.	PSO6	Understand the ecosystem which includes many plants and animals and conservations.

Program	Year	Semester (15 weeks)	Paper	Credit	Periods per Week	Periods (Hours) per Semester	Paper Title	Unit (Periods per semester)	Prerequisite	Elective (For other faculty)
M. Sc(Ag.) Agronomy	SECOND YEAR	SEMESTER-III	AGRON 508	3	3	45	Conservation Agriculture	45		
			AGRON 509	3	3	45	Agronomy of fodder and forage crops	45		
			SOILS 509	3	3	45	Remote Sensing and GIS Technique for Soil and Crop Studies	45		
			PGS 501	1	1	15	Library and Information Services	15		
			PGS 502	1	1	15	Technical Writing and Communications Skills	15		
		SEMESTER-IV	AGRON 560	30	-	-	Master's research	-		

PO1	Students will have a comprehensive knowledge about origin, geographical distribution, and economic importance of Kharif crops.	PSO1:	Establish a self-motivated system of agriculture education to attain the local and global demands of agriculture professionals in agriculture and allied sectors.
PO2	Learn to make optimum decision at various levels that enhances the success as an agricultural enterprise	PSO2	Develop operational resources for the efficient and cost effective implementation of agriculture education.
PO3	Harmonize the relation with Agriculture Research Institutions, State Agriculture Universities, Krishi Vigyan Kendra (KVK), etc.	PSO3	Able to examine insects deeply within a biological level of analysis and make strategies for successful pest management strategy.
PO4	Systematic knowledge gain of structure, properties and advantages of micro-organisms.	PSO4	Skill developed on use of decision support systems, agriculture expert system and soil information systems in agriculture.
PO5	Motivate for entrepreneurship, start-up through project planning and execution, research and training during field visits etc.	PSO5	Systematic understanding of origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi crops

FORMAT-3

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: I

Programme: **Certificate/Diploma/Degree/UG/PG/Ph.D.** **Class: M. Sc. (Ag) Agronomy**	**Year: I** **Semester: I**
Credits: 3 **Theory: 3** **Practical: 0**	**Subject: Agronomy**
Course Code: AGRON-501*	**Title: MODERN CONCEPTS IN CROP PRODUCTION**

Course Objectives:

- Disseminate contemporary agricultural production concepts, such as tillage, population optimization for plant development, planting geometry, etc.
- Talk about the use of growth regulators in agriculture, plant nutrition, and field crop disease tolerance.
- Use the optimal plant type concept in organic farming.
- Examine crop modelling and crop growth in agronomic systems.

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks / 3 Credits

L: 03
T: 00
P: 00(In Hours/Week)
Theory - 3 Hr. = 3 Credit
Practical- 0 Hrs.=0 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Crop growth analysis in relation to environment; geo-ecological zones of India.Quantitative agro-biological principles and inverse yield nitrogen law; Mitscherlich yield equation, its interpretation and applicability; Baule unit.	6
II	Effect of lodging in cereals; physiology of grain yield in cereals; optimization of plant population and planting geometry in relation to different resources, concept of ideal plant type and crop modeling for desired crop yield	6
III	Scientific principles of crop production; crop response production functions; concept of soil plant relations; yield and environmental stress, use of growth hormones and regulators for better adaptation in stressed condition	6
IV	Integrated farming systems, organic farming, and resource conservation technology including modern concept of tillage; dry farming; determining the nutrient needs for yield potentiality of crop plants, concept of balance nutrition and integrated nutrient management; precision agriculture	6
V	Modern crop production concepts: soil less cultivation, Aeroponics, Hydroponic, Robotic and terrace farming. use of GIS, GPS and remote sensing in modern agriculture, precision farming and protected agriculture	6

Suggested Readings:

1. Balasubramanian P and Palaniappan SP. 2001. *Principles and Practices of Agronomy*. Agrobios.
2. Paroda R.S. 2003. *Sustaining our Food Security*. Konark Publ.
3. Reddy SR. 2000. *Principles of Crop Production*. Kalyani Publ.
4. Sankaran S and Mudaliar TVS. 1997. *Principles of Agronomy*. The Bangalore Printing & Publ.
5. Singh SS. 2006. *Principles and Practices of Agronomy*. Kalyani.
6. Lal R. 1989. *Conservation tillage for sustainable agriculture: Tropics versus Temperate Environments. Advances in Agronomy* 42: 85-197

If the course is available as Generic Elective then the students of following departments may opt it.NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination 2) ESE	30 70
Total:	**100**

Course Learning Outcomes:

- Students will get basic idea about crop growth analysis, principles and modern concepts of crop production.
- Precision agriculture and Precision farming, their concepts and application.
- Basics and application crop production under protective agriculture.
- Students understand the zero and minimum tillage: their basics and application

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: I

Programme: Certificate/Diploma/Degree/UG/PG/Ph.D. **Class: M. Sc. (Ag) Agronomy**	**Year: I** **Semester: I**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agronomy**
Course Code: AGRON-506	**Title: AGRONOMY OF MAJOR CEREALS AND PULSES**

Course Objectives:

- Be familiar with the phonological research, yield, nutritional benefits, physiology, cultivation, harvesting, and seed production of the Kharif and Rabi crops.
- Gain knowledge of the cropping plans, cultivation techniques, growth indices, etc. for the Kharif and Rabi seasons.
- Develop your ability to recognise problems and manage them when growing the Kharif and Rabi crops in India.
- Able to cultivate Kharif and Rabi crops using a systematic approach.

Nature of Paper: Core

Minimum Passing Marks/Credits:50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 00
P: 01In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 1 Hrs.=1 Credit (3Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Origin and history, area and production, classification, improved varieties, adaptability, climate, soil, water and cultural requirements, nutrition, quality components, handling and processing of the produce for maximum production of: *Rabi* cereals.	8
II	Origin and history, area and production, classification, improved varieties, adaptability, climate, soil, water and cultural requirements, nutrition, quality components, handling and processing of the produce for maximum production of: *Kharif*cereals.	8
III	Origin and history, area and production, classification, improved varieties, adaptability, climate, soil, water and cultural requirements, nutrition, quality components, handling and processing of the produce for maximum production of: *Rabi* pulses.	8
IV	Origin and history, area and production, classification, improved varieties, adaptability, climate, soil, water and cultural requirements, nutrition, quality components, handling and processing of the produce for maximum production of: *Kharif*pulses.	8

Suggested Readings:

1. Das NR. 2007. Introduction to Crops of India. Scientific Publ.
2. Hunsigi G and Krishna KR. 1998. Science of Field Crop Production. Oxford & IBH.
3. Jeswani LM and Baldev B. 1997. Advances in Pulse Production Technology.ICAR.
4. Khare D and Bhale MS. 2000. Seed Technology. Scientific Publ.
5. Kumar Ranjeet and Singh NP. 2003. Maize Production in India: Golden Grain in Transition. IARI, New Delhi.
6. Pal M, Deka J and Rai RK. 1996. Fundamentals of Cereal Crop Production. Tata Mc Graw Hill.
7. Prasad Rajendra. 2002. Text Book of Field Crop Production. ICAR.
8. Singh C, Singh P and Singh R. 2003. Modern Techniques of Raising Field Crops. Oxford & IBH.
9. Singh SS. 1998. Crop Management. Kalyani.

If the course is available as Generic Elective then the students of following departments may opt it.NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3) ESE	50
Total:	**100**

Course Learning Outcomes:

- Students will get basic idea about crop husbandry of cereals.
- Concept of major field crops (including cereals, pulses, oilseeds and fiber crops)
- Knowledge of farm yard manures soil requirements for field crops including fertilizers, manures,
- Basics of origin, history, distribution, adaptations of different crops according to the environment
- In-depth knowledge of sustainable agriculture and cropping and farming systems

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: I

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M. Sc. (Ag) Agronomy**	**Year: I** **Semester: I**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agronomy**
Course Code: AGRON-512N	**Title: DRYLAND FARMING AND WATER SHED MANAGEMENT**

Course Objectives:

- Spread knowledge of the fundamental principles and traits of dry-land and rain-fed farming.
- Gain knowledge of the importance and dimensions of dry land farming in the context of India.
- Improve your ability to manage watershed resources and drought conditions.
- Capable of analyzing the physiology of crop stress and choosing the appropriate tillage, irrigation, planting, fertilizers, and other practices

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 00
P: 01(In Hours/Week)
Theory - 3 Hr. = 3 Credit
Practical- 0 Hrs.=0 Credit (3Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Definition, concept and characteristics of dry land farming; dry land versus rainfed farming; significance and dimensions of dry land farming in Indian agriculture.	6
II	Soil and climatic parameters with special emphasis on rainfall characteristics; constraints limiting crop production in dry land areas; types of drought, characterization of environment for water availability; crop planning for erratic and aberrant weather conditions.	6
III	Stress physiology and resistance to drought, adaptation of crop plants to drought, Physical Sciences: Agronomy drought management strategies; preparation of appropriate crop plans for dry land areas; mid contingent plan for aberrant weather conditions.	6
IV	Tillage, tilth, frequency and depth of cultivation, compaction in soil tillage; concept of conservation tillage; tillage in relation to weed control and moisture conservation; techniques and practices of soil moisture conservation (use of mulches, kinds, effectiveness and economics); antitranspirants; soil and crop management techniques, seeding and efficient fertilizer use.	6
V	Concept of watershed resource management, problems, approach and components.	6

Suggested Readings:

1. Reddy TY. 2018. Dryland Agriculture Principles and Practices, Kalyani publishers
2. Das NR. 2007. Tillage and Crop Production. Scientific Publ.
3. Dhopte AM. 2002. Agrotechnology for Dryland Farming. Scientific Publ.
4. Dhruv Narayan VV. 2002. Soil and Water Conservation Research in India. ICAR.
5. Gupta US. (Ed.). 1995. Production and Improvements of Crops for Drylands. Oxford & IBH.
6. Katyal JC and Farrington J. 1995. Research for Rainfed Farming. CRIDA.
7. Rao SC and Ryan J. 2007. Challenges and Strategies of Dryland Agriculture. Scientific Publ.
8. Singh P and Maliwal PL. 2005. Technologies for Food Security and Sustainable Agriculture.
9. Singh RP. 1988. Improved Agronomic Practices for Dryland Crops. CRIDA.
10. Singh RP. 2005. Sustainable Development of Dryland Agriculture in India. Scientific Publ.
11. Singh SD. 1998. Arid Land Irrigation and Ecological Management. Scientific Publ.
12. Venkateshwarlu J. 2004. Rainfed Agriculture in India. Research and Development Scenario. ICAR.

If the course is available as Generic Elective then the students of following departments may opt it.NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3) ESE	50
Total:	**100**

Course Learning Outcomes:

- Understand about rainfed agriculture and watershed management in India.
- Recognize soil, water and climatic conditions dominant in rainfed areas.
- Understand about soil and water conservation techniques, watershed management inrainfed areas.
- Comprehend integrated watershed management and its factors

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: I

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M. Sc. (Ag) Agronomy**	**Year: I** **Semester: I**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agronomy**
Course Code: **AGRON-513**	**Title: PRINCIPLES AND PRACTICES OF ORGANIC FARMING**

Course Objectives:

- Raise awareness of organic farming and its importance to India's, the world's, and future agriculture
- Gain knowledge about soil fertility, nutrient cycling, organic residues, organic manures, composting, soil biota, and organic residue breakdown.
- Learn how to use soil microflora, earthworms, vermicompost, green manures, and bio fertilisers for farming without using chemicals.
- Being able to choose the best agricultural methods, weed control measures, biological agents, pheromone traps, manures, bio fertilisers, and bio insecticides for organic farming.

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 00
P: 01(In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 02 Hrs.=01 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Organic farming - concept and definition, its relevance to India and global agriculture and future prospects; principles of organic agriculture; organics and farming standards; organic farming and sustainable agriculture; selection and conversion of land, soil and water management - land use, conservation tillage; shelter zones, hedges, pasture management, agro-forestry.	**6**
II	Organic farming and water use efficiency; soil fertility, nutrient recycling, organic residues, organic manures, composting, soil biota and decomposition of organic residues, earthworms and vermicompost, green manures, bio-fertilizers and biogas technology.	**6**
III	Farming systems, selection of crops andcrop rotations, multiple and relay cropping systems, intercropping in relation to maintenance of soil productivity.	**6**
IV	Control of weeds, diseases and insect pest management, biological agents and pheromones, bio-pesticides.	**6**
V	Socio-economic impacts; marketing and export potential: inspection, certification, labeling and accreditation procedures; organic farming and national economy.	**6**

Suggested Readings:

1. Ananthakrishnan TN. (Ed.). 1992. Emerging Trends in Biological Control of Phytophagous Insects. Oxford & IBH.
2. Gaur AC. 1982. A Manual of Rural Composting, FAO/UNDP Regional Project Document, FAO.
3. Joshi M. 2016. New Vistas of Organic Farming. Scientific Publishers
4. Lampin N. 1990. Organic Farming. Press Books, lpswitch, UK.
5. Palaniappan SP and Anandurai K. 1999. Organic Farming – Theory and Practice. Scientific Publ.
6. Rao BV Venkata. 1995. Small Farmer Focused Integrated Rural Development: Socio-economicEnvironment and Legal Perspective: Publ.3, Parisaraprajna Parishtana, and Bangalore.
7. Reddy MV. (Ed.). 1995. Soil Organisms and Litter Decomposition in the Tropics. Oxford & IBH.
8. Sharma A. 2002. Hand Book of Organic Farming. Agrobios.
9. Singh SP. (Ed.). 1994. Technology for Production of Natural Enemies. PDBC, Bangalore.
10. SubbaRao NS. 2002. Soil Microbiology. Oxford & IBH.
11. Trivedi RN. 1993. A Text Book of Environmental Sciences, Anmol Publ.
12. Veeresh GK, Shivashankar K and Suiglachar MA. 1997. Organic Farming and Sustainable Agriculture. Association for Promotion of Organic Farming, Bangalore.
13. WHO. 1990. Public Health Impact of Pesticides Used in Agriculture. WHO.
14. Woolmer PL and Swift MJ. 1994. The Biological Management of Tropical Soil Fertility. TSBF & Wiley.

If the course is available as Generic Elective then the students of following departments may opt it.NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3) ESE	50
Total:	**100**

Course Learning Outcomes:

- Students understand about the organic farming its varioustypes, biodynamic farming, vedic farming.
- Students will be aware about soil fertility, nutrient recycling,organic residues, organic manures and composting.
- Students will understand control of weeds, diseases and insect pest management, biological agents and pheromones, bio pesticides.

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: I

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M. Sc. (Ag) Agronomy**	**Year: I** **Semester: I**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agronomy**
Course Code: SOILS-511	**Title: MANAGEMENT OF PROBLEMATIC SOILS AND WATERS**

Course Objectives:

- Foundational ideas for managing brackish water and problem soils.
- The management of problematic soils and the responsible use of brackish water in connection to agricultural production will be emphasised.
- Learn the ideas and concepts behind troublesome soils and waterways.
- Learn about irrigation water quality and standards, as well as reclamation and management of soil physical and chemical restrictions.

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 00
P: 01(In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 1 Hrs.=0 Credit (3Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Area and distribution of problem soils – acidic, saline, sodic and physically degraded soils; origin and basic concept of problematic soils, and factors responsible.	5
II	Morphological features of saline, sodic and saline-sodic soils; characterization of salt-affected soils - soluble salts, ESP, pH; physical, chemical and microbiological properties.	5
III	Management of salt-affected soils; salt tolerance of crops - mechanism and ratings; monitoring of soil salinity in the field; management principles for sandy, clayey, red lateritic and dry land soils.	5
IV	Acid soils - nature of soil acidity, sources of soil acidity; effect on plant growth, lime requirement of acid soils; management of acid soils; biological sickness of soils and its management.	5
V	Quality of irrigation water; management of brackish water for irrigation; salt balance under irrigation; characterization of brackish waters, area and extent; relationship in water use and quality.	5
VI	Agronomic practices in relation to problematic soils; cropping pattern for utilizing poor quality ground waters	5

Suggested Readings:

1. Bear FE. 1964. Chemistry of the Soil. Oxford & IBH.
2. Jurinak JJ. 1978. Salt-affected Soils. Department of Soil Science &Biometeorology.Utah State Univ.
3. USDA Handbook No. 60. 1954. Diagnosis and improvement of Saline and Alkali Soils. Oxford & IBH.

If the course is available as Generic Elective then the students of following departments may opt it.NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3) ESE	50
Total:	**100**

Course Learning Outcomes:

- To learn the fundamentals of the factors that contributes to poor soils.
- To educate people on the classification and characterization of India's salt-affected soils.
- To disseminate information about soil reclamation and control of physical and chemical restrictions
- To survey and map the problematic soils of India To research crop management techniques in irrigation waters and problematic soils

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: I

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M. Sc. (Ag) Agronomy**	**Year: I** **Semester: I**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agronomy**
Course Code: MCA 512	**Title: Information Technology in Agriculture**

Course Objectives:

- This is a course on Introduction to Networking and Internet Applications that aims at exposing the students to understand analogy of computer, basic knowledge of MS Office. Also to understand Internet and WWW, use of IT application and different IT tools in Agriculture

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L:02
T:00
P: 01 (In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 2 Hrs.=1 Credit (3Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction to Computers, Anatomy of computer, Operating Systems, definition and types, Applications of MS Office for document creation & Editing, Data presentation, interpretation and graph creation, statistical analysis, mathematical expressions	8
II	Database, concepts and types, uses of DBMS in Agriculture, World Wide Web (WWW): Concepts and components, Introduction to computer programming languages, concepts and standard input/output operations. e-Agriculture, concepts and applications.	8
III	Use of ICT in Agriculture, Computer Models for understanding plant processes. IT application for computation of water and nutrient requirement of crops, Computer controlled devices (automated systems) for Agri-input management, Smartphone Apps in Agriculture for farm advises, market price, postharvest management *etc.*.	8
IV	Geospatial technology for generating valuable agri-information. Decision support systems, concepts, components and applications in Agriculture, Agriculture Expert System, Soil Information Systems *etc.* for supporting Farm decisions, Preparation of contingent crop-planning using IT tools.	8

Reference / Text Books:

- Internet: The Complete Reference
- Sub Edition by Margaret Levine Young.
- Office 2013 All-In-One For Dummies by Peter Weverka.
- Computer Fundamentals (With CD) 6th Edition 6th Edition by Pradeep Sinha and Priti Sinha.

- Principles of Programming Languages by Er. Anil Panghal.
- E-Agriculture and Rural Development by Charalampos Patrikakis, Blessing Maumbe.
- Vanitha G. 2011. *Agro-informatics*
- http://www.*agrimoon*.com
- http://www.agriinfo.in
- http://www.eagri.org
- http://www.agriglance.com

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1. Class tasks/ Sessional Examination	30
2. Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3. ESE	50
Total:	**100**

Prerequisites for the course:

Course Learning Outcomes:

- Increased employability of agricultural graduates
- Trained and skilled manpower
- High level of interface with the industry
- Knowledge platform with the domestic and international intelligentsia
- Producing managers & social entrepreneurs
- Improved crop productivity & farm profitability

Format-3

IIMTU-NEP IMPLEMENTATION
Year: I / Semester:I

Programme: Certificate / Diploma/ Degree/ UG/PG/PhD **Class: M. Sc. (Agriculture) Agronomy**	**Year : I** **Semester: I**
Credits: 1 **Theory: 1** **Practical: 0**	**Subject: Agronomy**
Course Code: PGS-506	**Title: (e-course) DISASTER MANAGEMENT**

Course Objectives:

- To provide basic conceptual understanding of disasters.
- To understand approaches of Disaster Management.
- To build skills to respond to disaster.

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 0 = 1 Credits

L: 01
T: 00
P: 00 (In Hours/Week)
Theory - 1Hr. = 01 Credit
Practical- 0 Hrs.=0 Credit

Unit	UNIT	No. of Lectures Allotted
I	Natural Disasters Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves. Climatic change, Global warming, Sea level rise, Ozone depletion.	**4**
II	Man Made Disasters-Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, Industrial wastewater pollution, road accidents, rail accidents, air accidents, sea accidents	**4**
III	Disasters Management- Efforts to mitigate natural disasters at national and global levels. Concept of disaster management, International strategy for disasters reduction.	**4**
IV	National disaster management framework, financial arrangement, role of NGOs, Community-based organizations and media. Central, state, district and local administration, Armed forces in disaster response, Disaster response: Police and other organizations.	**4**

Suggested Readings:

1. Disaster Management Guidelines, GOI-UND Disaster Risk Program (2009-2012)
2. Damon, P. Copola, (2006) Introduction to International Disaster Management, Butterworth Heineman.
3. Gupta A.K., Niar S.S and Chatterjee S. (2013) Disaster management and Risk Reduction, Role of Environmental Knowledge, Narosa Publishing House, Delhi.
4. Murthy D.B.N. (2012) Disaster Management, Deep and Deep Publication PVT. Ltd. New Delhi.
5. Modh S. (2010) Managing Natural Disasters, Mac Millan publishers India LTD.

If the course is available as Generic Elective then the students of following departments may opt it.NA	
Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/Sessional Examination 2) ESE	30 70
Total:	**100**

Course Learning Outcomes:

- Students can learn the basic concepts of disasters and disaster management.
- Students can learn to evaluate disaster risk reduction and management principles and practices,
- Students can learn about the phenomenon of disaster, its different dimensions, strategies for disaster reduction.
- Students can learn about various types of disasters, their causes and impacts on communities.

Format-3

IMTU-NEP IMPLEMENTATION
Year: I / Semester: II

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M. Sc. (Ag) Agronomy**	**Year: I** **Semester: II**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agronomy**
Course Code: AGRON-502	**Title: Principles And Practices Of Soil Fertility And Nutrient Management**

Course Objectives:

- Become familiar with the fundamental concepts of soil fertility, plant nutrition management, and soil resource sustainability.
- Be familiar with the holistic approach to plant nutrition.
- Gain experience conducting laboratory experiments for physical, chemical, and biological qualities on plants and soil.
- Capable of resolving issues with soil nutrient deficiencies

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 00
P: 01In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Soil fertility and productivity - factors affecting; features of good soil management; problems of supply and availability of nutrients; relation between nutrient supply and crop growth; organic farming - basic concepts and definitions.	6
II	Criteria of essentiality of nutrients; Essential plant nutrients – their functions, nutrient deficiency symptoms; transformation and dynamics of major plant nutrients.	6
III	Preparation and use of farmyard manure, compost, green manures, vermicompost, bio-fertilizers and other organic concentrates their composition, availability and crop responses; recycling of organic wastes and residue management. Soil less cultivation.	6
IV	Commercial fertilizers; composition, relative fertilizer value and cost; crop response to different nutrients, residual effects and fertilizer use efficiency; agronomic, chemical and physiological, fertilizer mixtures and grades; methods of increasing fertilizer use efficiency; nutrient interactions.	6

V	Time and methods of manures and fertilizers application; foliar application and its concept; relative performance of organic and inorganic nutrients; economics of fertilizer use; integrated nutrient management; use of vermicompost and residue wastes in crops. • Determination of soil pH and soil EC • Determination of soil organic C • Determination of available N, P, K and S of soil • Determination of total N, P, K and S of soil • Determination of total N, P, K, S in plant • Computation of optimum and economic yield.	6

Suggested Readings:

1. Brady NC and Weil RR. 2002. The Nature and Properties of Soils. 13thEd. Pearson Edu.
2. Fageria NK, Baligar VC and Jones CA. 1991. Growth and Mineral Nutrition of Field Crops.Marcel Dekker.
3. Havlin JL, Beaton JD, Tisdale SL and Nelson WL. 2006. Soil Fertility and Fertilizers. 7th Ed. Prentice Hall.
4. Prasad R and Power JF. 1997. Soil Fertility Management for Sustainable Agriculture. CRC Press.

If the course is available as Generic Elective then the students of following departments may opt it.NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations/Seminar/Assignments/internalPractical/Research Project Report/Seminar On Research Project Report	20
3) ESE	50
Total:	**100**

Course Learning Outcomes:

CO-1 The students have knowledge with basic principle of soil fertility management.
CO-2 The students with general concepts and classification of manures and fertilizer.
CO-3 The students have knowledge about methods of fertilizer recommendation to crops.

Format-3

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: II

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M. Sc. (Ag) Agronomy**	**Year: I** **Semester: II**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agronomy**
Course Code: AGRON-503	**Title: PRINCIPLES AND PRACTICES OF WEED MANAGEMENT**

Course Objectives:

- Become familiar with the biology and ecology of weeds, herbicides, the advantages of managing weeds, and the ways in which herbicides are broken down in soil and plant systems.
- Increase your understanding of weed management principles and techniques.
- Improve your ability to recognise weeds and manage them effectively.
- Capable of preparing herbicide solutions in a variety of formations and applying them correctly in fields.

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 00
P: 01(In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Weed biology, and ecology and classification, crop-weed competition including allelopathy; principles and methods of weed control and classification management; weed indices, weed shift in different eco-systems	**6**
II	Herbicides introduction and history of their development; classification based on chemical, physiological application and selectivity; mode and mechanism of action of herbicides.	**6**
III	Herbicide structure - activity relationship; factors affecting the efficiency of herbicides; herbicide formulations, herbicide mixtures, sequential application of herbicides, rotation; weed control through use ofNano-herbicides and bio-herbicides, myco-herbicidesbio-agents, and allele chemicals; movement of herbicides in soil and plant, Degradation of herbicides in soil and plants; herbicide resistance, residue, persistence and management; development of herbicide resistance in weeds and crops and their management, herbicide combination and rotation.	**6**
IV	Weed management in major crops and cropping systems; alien, invasive and parasitic weeds and their management; weed shifts in cropping systems; aquatic and perennial weed control; weed control in non-crop area.	**6**

V	Integrated weed management; recent development in weed management-robotics, use of drones and aeroplanes, organic *etc.*, cost: benefit analysis of weed management.	**6**

Suggested Readings:

1. Böger, Peter, Wakabayashi, Ko, Hirai, Kenji (Eds.). 2002. Herbicide Classes in Development. Mode of Action, Targets, Genetic Engineering, Chemistry. Springer.
2. Chauhan B and Mahajan G. 2014. Recent Advances in Weed Management. Springer.
3. Das TK. 2008. Weed Science: Basics and Applications, Jain Brothers (New Delhi).
4. Fennimore, Steven A and Bell, Carl. 2014. Principles of Weed Control, 4thEd, California Weed Sci. Soc.
5. Gupta OP. 2007. Weed Management: Principles and Practices, 2ndEd.
6. Jugulan, Mithila (ed). 2017. Biology, Physiology and Molecular Biology of Weeds. CRC Press
7. Monaco TJ, Weller SC and Ashton FM. 2014. Weed Science Principles and Practices, Wiley
8. Powles SB and Shaner DL. 2001. Herbicide Resistance and World Grains, CRC Press.
9. Walia US. 2006. Weed Management, Kalyani.
10. Zimdahl RL. (ed). 2018. Integrated Weed Management for Sustainable Agriculture, B. D. Sci. Pub.

If the course is available as Generic Elective then the students of following departments may opt it.NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3) ESE	50
Total:	**100**

Course Learning Outcomes:

- The students have knowledge with basic principle of soil fertility management.
- The students with general concepts and classification of manures and fertilizer.
- The students have knowledge about methods of fertilizer recommendation to crops.

IMTU-NEP IMPLEMENTATION
Year: I / Semester: II

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M. Sc. (Ag) Agronomy**	**Year: I** **Semester: II**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agronomy**
Course Code: AGRON-504	**Title: PRINCIPLES AND PRACTICES OF WATER MANAGEMNT**

Course Objectives:

- Explain the physical characteristics of water, its significance in agriculture, and the resources accessible in India.
- Recognize how water moves through soils and plants, how water is absorbed and lost by plants, how plants respond to water stress and how it affects their ability to thrive, etc.
- Gain knowledge on how to plan irrigation according to weather conditions, crop types, and cropping systems.
- Evaluate the irrigation water's quality and improve your capacity to fix drainage and irrigation issues.

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 00
P: 01(In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Water and its role in plants; Irrigation: Definition and objectives, water resources and irrigation development in of India and concerned state, major irrigation projects, extent of area and crops irrigated in India and in different states.	5
II	Field water cycle, water movement in soil and plants; transpiration; soil-water- plant relationships; water absorption by plants; plant response to water stress, crop plant adaptation to moisture stress condition. Water availability and its relationship with nutrient availability and loses.	5
III	Soil, plant and meteorological factors determining water needs of crops, scheduling, depth and methods of irrigation; micro irrigation systems; deficit irrigation; fertigation; management of water in controlled environments and polyhouses. Irrigation efficiency and water use efficiency.	5
IV	Water management of crop and cropping system, Quality of irrigation water and management of saline water for irrigation, water use efficiency, Crop water requirement- estimation of ET and effective rainfall; Water management of the major crops and cropping systems. Automated irrigation system.	5

V	Excess of soil water and plant growth; water management in problem soils, drainage requirement of crops and methods of field drainage, their layout and spacing; rain water management and its utilization for crop production.	5
VI	Quality of irrigation water and management of saline water for irrigation, water management in problem soils, Soil moisture conservation, water harvesting, rain water management and its utilization for crop production. Hydroponics, Water management of crops under climate change scenario.	5

Suggested Readings:

1. Majumdar DK. 2014. Irrigation Water Management: Principles and Practice. PHL Learning private publishers
2. Mukund Joshi. 2013. A Text Book of Irrigation and Water Management Hardcover, Kalyani publishers
3. Lenka D. 1999. Irrigation and Drainage. Kalyani.
4. Michael AM. 1978. Irrigation: Theory and Practice. Vikas Publ.
5. Paliwal KV. 1972. Irrigation with Saline Water. IARI Monograph, New Delhi.
6. Panda SC. 2003. Principles and Practices of Water Management. Agrobios.
7. Prihar SS and Sandhu BS. 1987. Irrigation of Food Crops - Principles and Practices. ICAR.
8. Reddy SR. 2000. Principles of Crop Production. Kalyani.
9. Singh Pratap and Maliwal PL. 2005. Technologies for Food Security and Sustainable Agriculture. Agrotech Publ.

If the course is available as Generic Elective then the students of following departments may opt it.NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internalPractical/Research Project Report/Seminar On Research Project Report	20
3) ESE	50
Total:	**100**

Course Learning Outcomes:

- Students will get basic idea about Principle and Practices of water management
- To impart the physical properties of water, its importance in agriculture andavailable resources in India.
- To understand water movement in plant and soils, Absorption and transpiration of water in plants, water deficit stress in plants and its effect on growth.
- Develop skills to schedule the irrigation, their methods with respect to crops and cropping systems and meteorological factors.
- Analyze the quality of irrigation water and develop ability to resolve irrigation and drainage problems.
- To understand about the Soil moisture conservation, water harvesting, rain water management and its utilization for crop production.

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: II

Programme: Certificate/Diploma/Degree/UG/PG/Ph.D. **Class: M. Sc. (Ag) Agronomy**	**Year: I** **Semester: II**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agronomy**
Course Code: AGRON-507	**Title: AGRONOMY OF OILSEED, FIBRE ANDSUGAR CROPS**

Course Objectives:

- Become familiar with the distribution of commercial crops throughout various agro-ecosystems in India and the rest of the world.
- Gain knowledge of the production methods, economic significance, geographic origins, soil requirements, and climatic requirements of oilseed, fibre, and sugar crops.
- Gain knowledge about the techniques for growing sugar, fibre, and oilseed crops.
- Capable of growing crops such as sugar, fibre, and oilseeds using a scientific method.

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 00
P: 01(In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 1 Hrs.=1 Credit (3Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Origin and history, area and production, classification, improved varieties, Physical Sciences: Agronomy adaptability, climate, soil, water and cultural requirements, nutrition, quality component, handling and processing of the produce for maximum production of: *Rabi* oilseeds – Rapeseed and mustard, Linseed and Niger	8
II	Origin and history, area and production, classification, improved varieties, Physical Sciences: Agronomy adaptability, climate, soil, water and cultural requirements, nutrition, quality component, handling and processing of the produce for maximum production of *Kharif*oilseeds - Groundnut, Sesame, Castor, Sunflower, Soybean and Safflower	8
III	Origin and history, area and production, classification, improved varieties, Physical Sciences: Agronomy adaptability, climate, soil, water and cultural requirements, nutrition, quality component, handling and processing of the produce for maximum production of Fiber crops - Cotton, Jute, Ramie and Mesta.	8
IV	Origin and history, area and production, classification, improved varieties, Physical Sciences: Agronomy adaptability, climate, soil, water and cultural requirements, nutrition, quality component, handling and processing of the produce for maximum production of Sugar crops – Sugar-beet and Sugarcane.	8

Suggested Readings:

1. Das NR. 2007. Introduction to Crops of India. Scientific Publ.
2. Das PC. 1997. Oilseed Crops of India. Kalyani.
3. Lakshmikantam N. 1983. Technology in Sugarcane Growing. 2nd Ed. Oxford & IBH.
4. Prasad Rajendra. 2002. Text Book of Field Crop Production. ICAR.
5. Singh SS. 1998. Crop Management. Kalyani.

If the course is available as Generic Elective then the students of following departments may opt it.NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3) ESE	50
Total:	**100**

Course Learning Outcomes:

- Students will get basic idea about crop production of oilseed fibre and pulses
- To understand recent crop management practices on crop productivity and resource use efficiency.
- To formulate different cropping system and production technologies for various fibre crops.
- To analyze the importance of sugar crops and its cultivation practice.
- To create awareness about fibre and sugar crops and its production technologies

Format-3

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: II

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M. Sc. (Ag) Agronomy**	**Year: I** **Semester: II**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agronomy**
Course Code: SOILS-502	**Title: SOIL FERTILITY AND FERTILIZERS USE**

Course Objectives:

- Understanding of the fundamental principles of managing soil fertility.
- Definitions and categories for manures and fertilisers.
- Information about how to advise crops on fertiliser applications.
- Understanding of micronutrients, fertiliser application effectiveness, fertiliser quality, and recommendations
- Information about how to advise crops on fertiliser applications.

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 00
P: 01(In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	Soil fertility and soil productivity; nutrient sources – fertilizers and manures; essential plant nutrients - functions and deficiency symptoms.	
II	Soil and fertilizer nitrogen, phosphorus, Potassium – sources, forms, immobilization and mineralization, nitrification, denitrification; biological nitrogen fixation - types, mechanism, microorganisms and factors affecting; nitrogenous fertilizers and their fate in soils; management of fertilizer inLowland and upland conditions for high fertilizer use efficiency.	6
III	Sulphur - source, forms, fertilizers and their behaviour in soils; calcium and magnesium– factors affecting their availability in soils; management of sulphur, calcium and magnesium fertilizers.	6
IV	Micronutrients – critical limits in soils and plants; factors affecting their availability and correction of their deficiencies in plants; role of chelates in nutrient availability.Common soil test methods for fertilizer recommendations; quantity– intensity relationships; soil test crop response correlations and response functions.	6
V	Fertilizer use efficiency; blanket fertilizer recommendations – usefulness and limitations; site-specific nutrient management; plant need based nutrient management; integrated nutrient management.Soil fertility evaluation - biological methods, soil, plant and tissue tests; soil quality in relation to sustainable agriculture..	6

Suggested Readings:

1. Brady NC & Weil RR. 2002. The Nature and Properties of Soils. 13thEd. Pearson Edu.
2. Kabata-Pendias A & Pendias H. 1992.Trace Elements in Soils and Plants.CRC Press.
3. Kannaiyan S, Kumar K & Govindarajan K. 2004.Biofertilizers Technology. Scientific Publc.
4. Leigh JG. 2002. Nitrogen Fixation at the Millennium. Elsevier.
5. Mengel K &Kirkby EA. 1982.Principles of Plant Nutrition. International Potash Institute, Switzerland.
6. Mortvedt JJ, Shuman LM, Cox FR & Welch RM. 1991. Micronutrients in Agriculture. 2nd Ed. SSSA, Madison.
7. Pierzinsky GM, Sims TJ & Vance JF. 2002. Soils and Environmental Quality. 2nd Ed. CRC Press.
8. Stevenson FJ & Cole MA. 1999. Cycles of Soil: Carbon, Nitrogen,Phosphorus, Sulphur, Micronutrients. John Wiley & Sons.
9. Tisdale SL, Nelson SL, Beaton JD &Havlin JL. 1999. Soil Fertility andFertilizers. 5thEd. Prentice Hall of India.

If the course is available as Generic Elective then the students of following departments may opt it.NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3) ESE	50
Total:	**100**

- Students will acquire knowledge on soil fertility and fertilizer use.
- To remember the knowledge of soil fertility and nutrient status of major soils of India.
- To understand the various fertilizer sources and their management
- To apply the knowledge for maintaining the soil fertility status and reduce the harmful effects of chemical fertilizers.
- To Analysis the soil nutrient status and various elements required in plant growth.
- To evaluate the soil fertility using biological methods, plant and tissue tests

Format-3

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: II

Programme: Certificate/Diploma/Degree/ UG/PG/Ph.D. **Class: M. Sc. (Ag) Agronomy**	**Year: I** **Semester: II**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Experimental Designs**
Course Code: STAT 511	**Title:Experimental Designs**

Course Objectives:

- Basic concepts of Experiments, designs and analysis of covariance
- Comparative experiments, need for designing of experiments
- In depth knowledge of principles of design of experiment: randomization, replication and local control
- Knowledge of completely randomized design, Randomized Block Design and Latin square design and their analysis of variance
- Balanced Incomplete Block Design (BIBD) and its parameters
- Analysis of missing plot design (Fisher's Rule),analysis of Randomized Block Design with one missing observation

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L:02
T:00
P: 01 (In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Need for designing of experiments, characteristics of a good design. Basic principles of designs- randomization, replication and local control	8
II	Uniformity trials, size and shape of plots and blocks, Analysis of variance, completely randomized design, randomized block design and Latin square design.	8
III	Factorial experiments, (symmetrical as well as asymmetrical). Orthogonally and partitioning of degrees of freedom. Concept of confounding.	8
IV	Split plot and strip plot designs, analysis of covariance and missing plot techniques in randomized block and Latin square designs; Transformations, Balanced Incomplete Block Design, resolvable designs and their applications, Lattice design, alpha design - concepts, randomization procedure, analysis and interpretation of results. Response surfaces. Combined analysis.	8

Reference / Text Books:

- Cochran WG and Cox GM. 1957. *Experimental Designs*. 2nd Ed. John Wiley.
- Dean AM and Voss D. 1999. *Design and Analysis of Experiments*. Springer.

- Montgomery DC. 2012. *Design and Analysis of Experiments*, 8th Ed. John Wiley.
- Federer WT. 1985. *Experimental Designs*. MacMillan.
- Fisher RA. 1953. *Design and Analysis of Experiments*. Oliver & Boyd.
- Nigam AK and Gupta VK. 1979. *Handbook on Analysis of Agricultural Experiments*. IASRI Publ.
- Pearce SC. 1983. *The Agricultural Field Experiment: A Statistical Examination of Theory and Practice*. John Wiley.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1. Class tasks/ Sessional Examination	30
2. Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3. ESE	50
Total:	**100**

Prerequisites for the course:

Course Learning Outcomes:

- Students will have basic knowledge of Experiments, designs and analysis of covariance
- Students will have knowledge of Comparative experiments.
- The students will be able to prepare their experimental fields on the basis of designs.
- Students can have the knowledge of completely Randomized Design, Randomized Block Design and Latin square design and their analysis of variance.
- Students can analyze their results according to the designs.

Format-3

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: II

Programme: Certificate/Diploma/Degree/ UG/PG/Ph.D. **Class: M. Sc. (Ag) Agronomy**	**Year: I** **Semester: II**
Credits:1 **Theory:1** **Practical:0**	**Subject: Agronomy**
Course Code: PGS 503	**Title:Intellectual Property and its Management In Agriculture**

Course Objectives:

- Knowledge, concept and introduction of Intellectual Property Right regime; TRIPs and various provisions in TRIPS Agreement
- Basics of Legislations for the protection of various types of Intellectual Properties
- Fundamentals of patents, copyrights, geographical indications, designs and layout
- Basic concepts of Protection of plant varieties and farmers' rights and bio-diversity protection, Convention on Biological Diversity; International Treaty on Plant Genetic Resources for Food and Agriculture
- Study of Licensing of technologies, Material transfer agreements, Research collaboration Agreement, License Agreement

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks/ 1 Credits

L:01
T:00
P: 00 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 0 Hrs.=0 Credit (1Hr./Week=1Credits)

Unit	Contents	No. of Lectures Allotted
I	Historical perspectives and need for the introduction of Intellectual Property Right regime; TRIPs and various provisions in TRIPS Agreement; Intellectual Property and Intellectual Property Rights (IPR), benefits of securing IPRs;	4
II	Indian Legislations for the protection of various types of Intellectual Properties; Fundamentals of patents, copyrights, geographical indications, designs and layout, trade secrets and traditional knowledge, trademarks, protection of plant varieties and farmers' rights and biodiversity protection.	4
III	Protectable subject matters, protection in biotechnology, protection of other biological materials, ownership and period of protection; National Biodiversity protection initiatives; Convention on Biological Diversity.	4
IV	International Treaty on Plant Genetic Resources for Food and Agriculture; Licensing of technologies, Material transfer agreements, Research collaboration Agreement, License Agreement.	4

Reference / Text Books:

- Erbisch FH and Maredia K.1998. Intellectual Property Rights in Agricultural Biotechnology.

CABI.
- Ganguli P. 2001. Intellectual Property Rights: Unleashing Knowledge Economy. McGraw-Hill.
- Intellectual Property Rights: Key to New Wealth Generation. 2001. NRDC and Aesthetic Technologies.
- Ministry of Agriculture, Government of India. 2004. State of Indian Farmer. Vol. V. Technology Generation and IPR Issues. Academic Foundation.
- Rothschild M and Scott N. (Ed.). 2003. Intellectual Property Rights in Animal Breeding and Genetics. CABI.
- Saha R. (Ed.). 2006. Intellectual Property Rights in NAM and Other Developing Countries: A Compendium on Law and Policies. Daya Publ. House.
- The Indian Acts - Patents Act, 1970 and amendments; Design Act, 2000; Trademarks Act, 1999; The Copyright Act, 1957 and amendments; Layout Design Act, 2000; PPV and FR Act 2001, and Rules 2003; The Biological Diversity Act, 2002.

If the course is available as Generic Elective then the students of following departments may opt it.NA

Evaluation/Assessment Methodology

	Max. Marks
1. Class tasks/ Sessional Examination	30
2. ESE	70
Total:	100

Prerequisites for the course:

Course Learning Outcomes:

1. Concept of Intellectual Property Right regime; TRIPs and various provisions in TRIPS Agreement.
2. Knowledge of Legislations for the protection of various types of Intellectual Properties.
3. Concepts of Protection of plant varieties and farmers' rights and bio-diversity protection, Convention on Biological Diversity; International Treaty on Plant Genetic Resources for Food and Agriculture.
4. Knowledge of Convention on Biological Diversity; International Treaty on Plant Genetic Resources for Food and Agriculture.
5. Knowledge of Socio-economic impact, Research collaboration Agreement, License Agreement.

Format-3

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: II

Programme: Certificate/Diploma/Degree/UG/PG/Ph.D. **Class: M. Sc. (Ag) Agronomy**	**Year: I** **Semester: II**
Credits: 1 **Theory: 1** **Practical: 0**	**Subject: Agronomy**
Course Code: PGS 505	**Title:Agricultural Research, Research Ethics and Rural Development Programmes**

Course Objectives:

1. Appreciate the objective and principle of extension education
2. Obtain idea on various development programmes in agriculture and allied area to help farmers.
3. To enlighten the students about the organization and functioning of agricultural research systems at national and international levels, research ethics, and rural development programmes and policies of Government.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks/ 1 Credits

L:01
T:00
P: 00 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 0 Hrs.=0 Credit (1Hr./Week=1Credits)

Unit	Contents	No. of Lectures Allotted
I	History of agriculture in brief; Global agricultural research system: need, scope, opportunities; Role in promoting food security, reducing poverty and protecting the environment; National Agricultural Research Systems (NARS) and Regional Agricultural Research Institutions; Consultative Group on International Agricultural Research (CGIAR):	3
II	International Agricultural Research Centres (IARC), partnership with NARS, role as a partner in the global agricultural research system, strengthening capacities at national and regional levels; International fellowships for scientific mobility.	3
III	Research ethics: research integrity, research safety in laboratories, welfare of animals used in research, computer ethics, standards and problems in research ethics.	3
IV	Concept and connotations of rural development, rural development policies and strategies. Rural development programmes: Community Development Programme, Intensive Agricultural District Programme, Special group – Area Specific Programme,	3
V	Integrated Rural Development Programme (IRDP) Panchayati Raj Institutions, Co-operatives, Voluntary Agencies/ Non-Governmental Organisations. Critical evaluation of rural development policies and programmes. Constraints in	3

	implementation of rural policies and programmes.	

Reference / Text Books:

- Bhalla GS and Singh G. 2001. *Indian Agriculture - Four Decades of Development*. Sage Publ.
- Punia MS. *Manual on International Research and Research Ethics.* CCS Haryana Agricultural University, Hisar.
- Rao BSV. 2007. *Rural Development Strategies and Role of Institutions - Issues, Innovations and Initiatives*. Mittal Publ.
- Singh K. 1998. *Rural Development - Principles, Policies and Management*. Sage Publ.

If the course is available as Generic Elective, then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1. Class tasks/ Sessional Examination	30
2. ESE	70
Total:	**100**

Prerequisites for the course:

Course Learning Outcomes:

1. Students capable, efficient and self-reliant in character.
2. They gain knowledge to help rural families in better appreciation of SWOT in the village.
3. They know about to open new opportunities for developing talents and leadership of rural people.
4. To provide knowledge and help for better management of farms and increase incomes.
5. To promote better social, natural recreational intellectual and spiritual file among the people.

Format-3

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: III

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. Class: M. Sc. (Ag) Agronomy	**Year: II** **Semester: III**
Credits:3 **Theory: 2** **Practical: 1**	**Subject: Agronomy**
Course Code: AGRON-508	**Title: CONSERVATION AGRICULTURE**

Course Objectives:

- Knowledge and concept of different techniques of crop production
- Basics of crop growth in relation to environment and sustainability
- Knowledge of tillage (zero and minimum tillage)
- Basic concepts of crop modelling for maximizing crop yield
- Study of Cropping and farming systems for sustainable agriculture

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 00
P: 01(In Hours/Week)
Theory - 2 Hr. = 2Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Conventional and conservation agriculture systems, sustainability concerns, conservation agriculture: Historical background and present concept, global experiences, present status in India.	**8**
II	Nutrient management in CA, water management, weed management, energy use, insect-pest and disease management, farm machinery, crop residue management, cover crop management.	**8**
III	Climate change mitigation and CA, C-sequestration, soil health management, soil microbes and CA. CA in agroforestry systems, rainfed / dryland regions	**8**
IV	Economic considerations in CA, adoption and constraints, CA: The future of agriculture	**8**

Suggested Readings:

1. Chhidda Singh, Modern techniques of raising field crops. Oxford and IBH Publishing Co. Ltd., Bangalore.
2. Gopal Chandra De. 1980., Fundamentals of Agronomy. Oxford and IBH Publishing Co. Ltd., Bangalore, Hand book of Agriculture, ICAR Publication.
3. Palaniappan, S.P., Cropping Systems in the tropics – Principles and Practices. Willey Eastern Ltd., New Delhi. Panda, S.C., 2006.Agronomy Agribios Publication, New Delhi.

If the course is available as Generic Elective then the students of following departments may opt it.NA

Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) ESE	30 70
Total:	**100**
Course Learning Outcomes: • Knowledge and concept of different techniques of crop production • Basics of crop growth in relation to environment and sustainability • Knowledge of tillage (zero and minimum tillage) • Basic concepts of crop modelling for maximizing crop yield • Study of Cropping and farming systems for sustainable agriculture	

Format-3

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: III

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M. Sc. (Ag) Agronomy**	**Year: II** **Semester: III**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agronomy**
Course Code: AGRON-509	**Title: AGRONOMY OF FODDER AND FORAGE CROPS**

Course Objectives:

- Become familiar with the important fodder and forage crops' adaptation, distribution, varietal improvement, agro techniques, quality characteristics, and anti-quality factors.
- Increase your understanding of the ideas and processes involved in producing fodder and forage crops.
- Improve your ability to recognize forage and fodder crops.
- Capable of implementing novel techniques for enhancing the nutritional value of fodder and forage crops.

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 00
P: 01 (In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Adaptation, distribution, varietal improvement, agro-techniques and quality aspects including anti-quality factors of important fodder crops like sorghum, maize, *bajra*, *guar*, cowpea, oats, barley, berseem, *senji*, lucerne, *etc.*	**6**
II	Adaptation, distribution, varietal improvement, agro-techniques and quality aspects including anti-quality factors of important forage crops/grasses lime, Napier grass, *Panicum, Lasiuras, Cenchrus, etc.*	**6**
III	Year-round fodder production and management, preservation and utilization of forage and pasture crops.	**6**
IV	Principles and methods of hay and silage making; chemical and biochemical changes, nutrient losses and factors affecting quality of hay and silage; use of physical and chemical enrichments and biological methods for improving nutrition; value addition of poorquality fodder. Fodder production through hydroponics. Azolla cultivation.	**6**
V	Economics of forage cultivation uses and seed production techniques of important fodder crops.	**6**

Suggested Readings:

1. Chatterjee BN. 1989. Forage Crop Production - Principles and Practices. Oxford & IBH.
2. Das NR. 2007. Introduction to Crops of India. Scientific Publ.
3. Narayanan TR and Dabadghao PM. 1972. Forage Crops of India. ICAR.
4. Singh P and Srivastava AK. 1990. Forage Production Technology. IGFRI, Jhansi.
5. Singh C, Singh P and Singh R. 2003. Modern Techniques of Raising Field Crops. Oxford & IBH.
6. Tejwani KG. 1994. Agroforestry in India. Oxford & IBH.

If the course is available as Generic Elective then the students of following departments may opt it.NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3) ESE	50
Total:	**100**

Course Learning Outcomes:

- This program will provide students the theoretical and researchbackgrounds necessary to design, implement, and managedifferent cropping system.
- Students will able to conduct field trials.
- Students able to collect, summarize and interpret data.

Format-3

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: III

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M. Sc. (Ag) Agronomy**	**Year: II** **Semester: III**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Agronomy**
Course Code: SOILS-509	**Title: Remote sensing and GIS technique for soil and crop studies**

Course Objectives:

- Understanding and application of remote sensing
- The fundamentals of processing and interpreting images from aerial pictures
- Understanding of drought and watershed management
- Foundational ideas about the significance of and sources for the temporal and geographical variability in soils
- Researching GIS and its use for properties of soil and land that are both spatial and not.

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 00
P: 01(In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction and history of remote sensing; sources, propagation of radiations in atmosphere; interactions with matter.	**6**
II	Sensor systems - camera, microwave radiometers and scanners; fundamentals of aerial photographs and image processing and interpretations.	**6**
III	Application of remote sensing techniques - land use soil surveys, crop stress and yield forecasting, prioritization in watershed and drought management, wasteland identification and management.	**6**
IV	Significance and sources of the spatial and temporal variability in soils; variability in relation to size of sampling; classical and geo-statistical techniques of evolution of soil variability.	**6**
V	Introduction to GIS and its application for spatial and non-spatial soil and land attributes.	**6**

Suggested Readings:

1. Brady NC & Weil RR. 2002. The Nature and Properties of Soils. 13th Ed. Pearson Edu.
2. Elangovan K. 2006. GIS Fundamentals, Applications and Implementations. New India Publ. Agency.
3. Lillesand TM & Kiefer RW. 1994. Remote Sensing and Image Interpretation. 3rd Ed. Wiley.
4. Nielsen DR & Wendroth O. 2003.Spatial and Temporal Statistics. Catena Verloggmbh.
5. Star J &Esles J. 1990. Geographic Information System: An Introduction.Prentice Hall.

If the course is available as Generic Elective then the students of following departments may opt it.NA	
Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report 3) ESE	30 20 50
Total:	**100**

Course Learning Outcomes:

- Fully equipped with concepts, methodologies and applications of Remote SensingTechnology used in agriculture.
- Prepare the candidates for National and Global Employability in the field of agriculture
- Acquire skills in handling instruments, tools, techniques and modeling while using Remote Sensing Technology
- It empowers the candidate with confidence and leadership qualities.

Format-3

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: III

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M. Sc. (Ag) Agronomy**	**Year: II** **Semester: III**
Credits: 1 **Theory : 0** **Practical : 1**	**Subject: AGRONOMY**
Course Code: PGS-501	**Title: LIBRARY AND INFORMATION SERVICES**

Course Objectives:

- Knowledge and concept of different techniques of crop production
- Basics of crop growth in relation to environment and sustainability
- Knowledge of tillage (zero and minimum tillage)
- Basic concepts of crop modelling for maximizing crop yield
- Study of Cropping and farming systems for sustainable agriculture

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks / 1 Credits

L: 0
T: 0
P: 01(In Hours/Week)
Theory - 0 Hr. = 0 Credit
Practical- 02 Hrs.=01 Credit (2Hrs./Week=1Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction to library and its services; Role of libraries in education, research and technology transfer.Classification systems and organization of library; Sources of information- Primary Sources, Secondary Sources and Tertiary Sources. Intricacies of abstracting and indexing services (Science Citation Index, Biological Abstracts, Chemical Abstracts, CABI Abstracts, etc.)Tracing information from reference sources; Literature survey; Citation techniques/Preparation of bibliography, Use of CD-ROM Databases, Online Public Access Catalogue and other computerized library services; Use of Internet including search engines and its resources; e- resources access methods	**15**

Suggested Readings:

1. Chhidda Singh, Modern techniques of raising field crops. Oxford and IBH Publishing Co. Ltd., Bangalore.
2. Gopal Chandra De. 1980., Fundamentals of Agronomy. Oxford and IBH Publishing Co. Ltd., Bangalore, Hand book of Agriculture, ICAR Publication.
3. Palaniappan, S.P., Cropping Systems in the tropics – Principles and Practices. Willey Eastern Ltd., New Delhi. Panda, S.C., 2006.Agronomy Agribios Publication, New Delhi.

If the course is available as Generic Elective then the students of following departments may opt it.NA

Evaluation/Assessment Methodology	
	Max. Marks
1) Practical/Research Project Report/Seminar On Research Project Report	100
Total:	**100**

Course Learning Outcomes:

- To acquaint students with the basic concepts of information and information science.
- To understand the concept communication of information, models of communication and role of libraries in information communication in society.
- To make students understand and appreciate the concept of information society and information policies formulated for societal development.
- To get familiarize with the concepts of economics and management of information and knowledge

Format-3

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: III

Programme: Certificate/Diploma/Degree/ UG/PG/Ph.D. **Class: M. Sc. (Ag) Agronomy**	**Year: II** **Semester: III**
Credits: 1 **Theory: 0** **Practical: 1**	**Subject: Agronomy**
Course Code: PGS-502	**Title: TECHNICAL WRITING AND COMMUNICATIONS SKILLS**

Course Objectives:

- Knowledge and concept of different techniques of crop production
- Basics of crop growth in relation to environment and sustainability
- Knowledge of tillage (zero and minimum tillage)
- Basic concepts of crop modelling for maximizing crop yield
- Study of Cropping and farming systems for sustainable agriculture

Nature of Paper: Common course

Minimum Passing Marks/Credits: 50% Marks / 1 Credits

L: 0
T: 0
P: 01(In Hours/Week)
Theory - 1 Hr. = 1Credit
Practical- 2 Hrs.=1 Credit (2Hrs./Week=1Credits)

Unit	Contents	No. of Lectures Allotted
I	Technical Writing - Various forms of scientific writings- theses, technical papers, reviews, manuals, etc; Various parts of thesis and researchcommunications (title page, authorship contents page, preface, introduction, review of literature, material and methods, experimental results and discussion); Writing of abstracts,summaries,précis,citationsetc.; commonly used abbreviations in the theses and research communications; illustrations, photographs and drawings with suitable captions; pagination, numbering of tables and illustrations; Writing of numbers and dates in scientific write-ups; Editing and proof-reading; Writing of a review article. Communication Skills-Grammar (Tenses, parts of speech, clauses, punctuation marks); Erroranalysis (Common errors)Concord; Collocation; Phonetic symbols and transcription; Accentual pattern: Weak forms in connected speech: Participation in group discussion: Facing an interview; presentation of scientific papers	**06**

Suggested Readings:

1. Chicago Manual of Style. 14th Ed. 1996. Prentice Hall of India.
2. Collins' Co-build English Dictionary. 1995. Harper Collins.
3. Gordon HM & Walter JA. 1970. Technical Writing. 3rd Ed. Holt, Rinehart & Winston.
4. Hornby AS. 2000. Comp. Oxford Advanced Learner's Dictionary of Current English. 6th Ed. Oxford University Press.
5. James HS. 1994. Handbook for Technical Writing. NTC Business Books. Joseph G. 2000. MLA Handbook for Writers of Research Papers. 5th Ed.

If the course is available as Generic Elective then the students of following departments may opt it.NA

Evaluation/Assessment Methodology

	Max. Marks
1) Presentations / Seminar / Assignments / Internal Practical / Practical / Research Project Report / Seminar On Research Project Report	100
Total:	**100**

Course Learning Outcomes:

- Learn in-demand skills from university and industry experts
- Master a subject or tool with hands-on projects
- Develop a deep understanding of key concepts
- Earn a career certificate from University of Colorado Boulder

IIMT UNIVERSITY
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Section 2f & 12B

School of Agricultural Sciences

ACADEMIC HAND BOOK

Post Graduate Programme
M.Sc. (Hort.) Fruit Science
(New Restricted Syllabus as per ICAR 5th Dean's committee w.e.f. 2022-23)

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1. PREAMBLE:

Horticulture is the branch of agriculture that deals with the art, science, technology, and business of plant cultivation. It includes the cultivation of fruits, vegetables, nuts, seeds, herbs, sprouts, mushrooms, flowers, seaweeds and non-food crops such as grass and ornamental trees and plants. It also includes plant conservation, landscape restoration, landscape and garden design, construction, and maintenance, and arboriculture, ornamental trees and lawns. Horticulture, from Latin hortus meaning garden and colere meaning to cultivate,focuses on the use of small plots in contrast to agronomy which involves intensive crop farming and large-scale field crop production of grains and forages or forestry involving forest trees and products derived form them. It deals with garden crops such as ornamental plants grown for their appearance, fruits and vegetable and spices grown for their food value, and medicinal plants. India's horticulture production is estimated to rise 2.1 percent to 341.63 million tonnes in 2021-22 mainly on higher output of fruits, vegetables, and honey, according to government data. Horticulture production stood at 334.60 million tonnes in 2020-21. It has also been a strong proponent of sustainable organic farming, receiving significant government backing.Hence, it is very much essential to revise the course curriculum of Horticulture so that students' even teachers may be well acquainted with the present concept of development of the discipline. This will help bringing competency in students along with confidence so as to develop himself/ herself for being tackling field problems and management of land. The existing M.Sc. (Ag) courses of Horticulture have been modified taking into account of present day need by incorporating the necessary and important topics in the respective courses. Minor changes have been made in most of the existing courses. As a part of course curriculum, M.Sc.(Ag) Horticulture was restructured to equip students to tackle emerging issues by inclusion of one new course on "Conservation agriculture".

2. DEFINITIONS AND NOMENCLATURE:

In these Regulations, unless the context otherwise requires:

1. "**Programme**" means Degree Programme like B.Sc.(Hons) Agriculture/ M.Sc. Agriculture/ComputerScience/AIML/Civil/Electrical/Machinal/Aerospace/Electronics &Communications/Electrical/Electronics & Instruments/IT/Bio-Tech branch of B.Tech Degree Programme.
2. "**Course"** means a theory or practical subject that is normally studied in a semester.
3. **"Vice Chancellor of IIMT-University"** means the Head of the University.
4. "**Registrar"** is the Head of all Academic and General Administration of the University.
5. **"Dean"** means the authority of the school who is responsible for all academic activities of various programmes and implementation of relevant rules of these Regulations pertaining to the Academic Programmes.
6. **"Controller of Examinations**" means the authority of the University who is responsible for all activities related to the University Examinations, publication of results, award of grade sheets and degrees.
7. **"Dean Student Welfare"** is responsible for all student related activities including student discipline, extra and co curricular activities, attendance and meetings with class representatives, Student Council, and parent teacher meet.
8. **"HoD"** means the Head of the Department concerned.
9. **"University"** means IIMT University, Meerut.
10. **"TCH"** means Total Contact Hours refers to the teaching learning periods.
11. **"DEC**" means Department Exam Committee.
12. **"BoS"** means Board of Studies.

13. **"ACM"** means Academic Council meeting the highest authoritative body for approval for all Academic Policies.
14. **"Class Co-ordinator"** is a faculty of the class who takes care of the attendance, academic performance, and the general conduct of the students of that class.
15. **"IA"** is Internal Assessment which is assessed for every student for every course during the semester.
16. **"ESE"** is End Semester Examination conducted by the University at the End of the Semester for all the courses of that semester.
17. **"UGC"** means University Grants Commission.
18. **"MHRD"** means Ministry of Human Resource Development, Govt. of India.
19. **"AICTE"** means All India Council of Technical Education.
20. **"HEI"** means Higher Education Institutions.

3. Vision and Mission:

Vision:

To produce Horticulture post graduate with high knowledge and competence by imparting practical technical education through innovative and analytical approach with an objective to create valuable manpower for sustainable agriculture, Argo- Industry and contribution to the society.

Mission:

To accomplish the mission, Post Graduate Horticulture faculty, with advise from stake holders, endorses the following objectives with an aim to produce the Post Graduate Agriculture who:

- To provide the best possible infrastructure and facilities for innovative teaching and learning agricultural and horticultural subjects.
- To establish a centre of excellence to promote academia – Agro-Industry interface and partnerships for enthusing competence of students as per needs of the Industry.
- To empower students with latest agricultural and horticultural techniques and skills to promote their employability and encourage them to become agro-entrepreneurs, with emphasis on practical-oriented teaching to develop skills and analytical capability of students.

4. Programme Educational Objectives (PEOs) :

PEO-1: To provide the sound knowledge in the Horticulture subjects required to solve common problems in management of crop cultivation, improvement, livestock rearing and their marketing.

PEO-2: To develop a good teaching-learning environment for higher studies and help in selection of professional careers in government and private organization, agro- based industries, educational/ research/extension, institutes *etc.*

PEO-3: To develop the skills for leadership, ethical integrity, and professional engagement in Horticulture and allied science.

PEO-4: To provide adequate information about natural and other resources through a course curriculum for the betterment of life.

PEO-5: To produce highly skilled professionals in field of various branches of Horticulture to meet the need of various scientific agriculture institutions as well as farmers demand for agriculture professionals.

5. Programme Outcomes (POs):

P.O.1. Understand the basic knowledge of Horticulture and related subjects in the current scenario of Indian and world Agriculture.

P.O.2. Develop an understanding of communication methods, resources utilization, cultivation of crops, management of crops, and value addition of Horticultural produces.

P.O.3. Develop the skills to manage agricultural farms, enhance quality of farm- produces and their commercial utilization.

P.O.4. Demonstrate the methods used in collection, presentation of data and analysis of results of experiments in laboratories and fields and their validation.

P.O.5. Understand all related methods in agriculture to increase the profit from crop fields and livestock.

P.O.6. Learn to make optimum decision at various levels that enhances the success as an agricultural enterprise.

P.O.7. Harmonize the relation with Agriculture Research Institutions, State Agriculture/ Horticulture Universities, Krishi Vigyan Kendra (KVK), *etc.* .

P.O.8. Motivate for entrepreneurship, start-up through project planning and execution, research and training during field visits *etc*

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6. Programmes Specific Outcomes (PSOs):

P.S.O.1. Develop the knowledge based resources and technologies for the enhancement of decision-making ability in students for selection of higher studies in Horticulture

P.S.O.2. Demonstrate the thoughts of the legal and ethical issues of the environment impacting agriculture and food security of the local and global population.

P.S.O.3. Establish a self-motivated system of horticulture education to attain the local and global demands of agriculture professionals in agriculture and allied sectors.

P.S.O.4. Develop operational resources for the efficient and cost effective implementation of agriculture education.

7. Admission to the Course:

Admission to the above course shall be made on the terms & conditions as prescribed in Ordinance of IIMT University, Meerut as amended from time to time.

1. The admission policy and procedure shall be decided from time to time by the Board of Studies (BoS) of the University based on the guidelines issued by the UGC/NEP/AICTE and Ministry of Education (MoE), Government of India. Seats are also made for Non-Resident Indians and foreign nationals, who satisfy the admission eligibility norms of the University. The number of seats in each of the M.Sc. Agriculture degree program will be decided by the University as per the directives of AICTE/ UGC / MOE, Government of India, considering the market demands.
2. The University can take 10% additional admission, in view of the short fall expected in 2nd year due to failure of students or students leaving the University.
3. The admission schedule along with last date for the receipt of admission forms and fees structure shall be fixed by the fees fixation for every academic year. The candidates will be required to submit their application for admission as per the schedule announced in the Newspaper(s)/ University Website.
4. Selection of candidates for admission: The candidates shall be selected for admission to the above course on the basis of their academic merit to be determined on the basis of marks obtained either in Entrance Examination conducted by IIMT University, or in the qualifying examination as decided by the University from time to time.

8. Eligibility in all year as NEP (entry & exit) as per NEHQF and NSQF (if applicable)

The candidate seeking admission to M.Sc. (Hort.) Fruit Science course must have passed

B.Sc.(Hons) in Agriculture / ZBC/PCM groups or an examination recognized equivalent there to with at least 45 % marks in Physics, Chemistry, Biology and Math taken together both in qualifying and/or competitive examinations and must have passed in the subjects of Physics, Chemistry, Biology/Math and English individually in the qualifying examination or Agriculture stream.

Note: The age of the candidate shall be determined as per entry in the Matriculation/Secondary School Examination certificate or any other examination recognized equivalent thereto.

9. Curriculum:

The curriculum for Master of Science in Fruit Science Degree Programme is designed to have minimum and maximum credits as per the evaluation scheme. Credits that are distributed across four semesters of study for the award of degree. **Annexure-A**

10. Medium of Instruction:

The medium of instruction and the examination shall be English.

11. Choice base Credit system (CBCS)/LOCF/OBE):

Structure of the M.Sc. (Hort.) in Fruit Science Degree Programme: Master of Science in Fruit Science Degree Programmes will have the 2 years curriculum and syllabus as approved by the respective Board of Studies and Academic Council of the University.The curriculum for Master of Sciences in Fruit Science degree programmeis designed to have minimum and maximum credits as per the scheme of 100 credits that are distributed across four semesters of study for the award of degree.

Under CBCS, the degree programme will consist of the following categories of courses:

1. Core Course-CC
2. Discipline Specific Elective-DSE
3. Generic Elective-GE
4. Ability Enhancement Compulsory Courses-AECC
5. Skill Enhancement Courses-SEC
6. Research Enhancement (Thesis)
7. Research Seminar for personality Enhancement

12. Registration for course in a semester: Student has to pay semester fees online as per online payment facility and submit the registration form in the department.

13. Attendance:

13.1. Condonation of medical cases.

For medical cases, submission of complete medical history and records with prior information from the parent / guardian to Dean (Students Welfare) DSW is mandatory and put-up recommendations to the Vice – Chancellor. Such condonation is permitted only twice for a student in the entire duration of the programme.

13.2. Additional Condonation, if applicable:

Additional Condonation may be considered in rare and genuine cases which includes,approved leave for attending select NCC / Sports Camps, cases requiring prolongedmedical treatment and critical illness involving hospitalization. For such select NCC /Sports Camps prior permission for leave shall be obtained by the respective Dean /Director of sports from the

designated authority, before deputing the students.The Vice-Chancellor, based on the recommendation of Dean may then give condonationof attendance, only if the Vice-Chancellor deems it fit and deserving. But in any case, thecondonation cannot exceed 10%.

13.3 Attendance Shortage Warning: Attendance shortage warning will be displayed on the Faculty's Notice Board and University Website by 10th day of every month.

13.4 Attendance Requirements/Eligibility to Appear in Examination:

I. The student shall fulfill the following criteria to be eligible for appearing in the end term examinations:
II. He/ she should bear a good moral character.
III. He/she should be on the rolls of the University during the Semester.
IV. He/she should have not less than 75% of the attendance during the respective semester. The Dean of the Faculty on his own or on the recommendation of the HOD will have the power to give relaxation up to 5% on genuine grounds over the minimum 75% attendance requirement.
V. Further, the Vice Chancellor on his own or on the recommendation of the Dean will have the power to give further relaxation up to 5% on genuine grounds over the above relaxation given by the Dean.
VI. He/she should not be a defaulter in payment of tuition fees or any other dues of the University and no disciplinary action is pending against him/her.

13.5 Detained Students:

A student, who does not fulfill the criteria prescribed in Clauses 11, subject to clause 12, will not be eligible for appearing in the End Term Semester Examination in that particular paper and will be deemed as "Detained" in the paper. Such student will repeat the course/paper along with the regular students of the subsequent batch after fulfilling the prescribed conditions to appear in the "End Term" examination of the course/ paper.

13.6 Exemption from Attendance / Shortage of Attendance to be condoned:

The shortage of lectures to the maximum limit, to be condoned by the competent authority is as under:

S. No.	Exemptible Number of Lectures	Ground of Exemption	Competent Authority
1	All periods of the days of blood donation	Voluntarily blood donation to the Blood Bank.	Dean of the Faculty
2	Maximum 10 days attendance during a semester	For participation in Intra-University or Inter-Faculty/College Sports Tournaments/Youth Festivals, NCC/ NSS Camps/University Educational Excursions/Mountaineering Courses *etc.*	-do-
3	Maximum 15 days attendance during a semester	For participation in Inter-University Sports Tournaments/Youth Festivals *etc.*	-do-

14. ASSESSMENT PROCEDURE

Fifth Deans" Committee deliberated on the examination and evaluation system being followed by different universities. The Committee recommends Uniform Grading system to be followed with uniform OGPA requirements for award of degrees at all levels and uniform conversion

formulae to be followed for declaration of I, II and III divisions, distinctions *etc.* Declaration of division in the degree certificate to be made compulsory by all universities:

14.1 **Examination marks distributions:** External theory (40%) and Internal Theory (30%) + Practical (30%).

14.2 **Courses with Theory and Practical:** Mid-term Exam (30%) + [Assignment (10%) in practical oriented courses + Practical (20%)].

14.3 **Courses with only Theory:** Mid-term Exam (40%) + Assignment (10%)

14.4 **Courses with only Practical:** 100% Internal

15. **Research Thesis/Semester Thesis Assessment Criteria**- 60 % mark given by Thesis Writing + 40 % mark given by Viva –Voce

16. **Internship – Research / Industrial Internship.**

17. **For non – credit courses / audit courses** – The Assessment will be done based on the respective assessment as per rubrics approved by Board of Studies (BOS). A student securing less than the minimum specified internal assessment marks in any course will not be permitted to appear for the end-semester examination in that course and will be graded under "CO (Carry Over)" category for that course. This will be denoted in the grade sheet as "CO (Carry Over)", till the course is successfully completed in the subsequent semester(s).

18. **Credit weightage**: Credits are the weightage, assigned to the courses based on the following general pattern:

One Hour	1 credit
Two Hour Practical	1 credit

19. **MAXIMUM DURATION OF PROGRAMME/PROMOTION POLICY**

The duration of M.Sc.(Hort.) Fruit Science course shall be of two academic years. Each year shall be divided into two semesters. Thus, the course shall comprise of four semesters will spread over two years. On completion of all the four semesters, the student will be awarded M.Sc.(Hort) Fruit Science degree. The student shall complete all the Four (4) semesters within a maximum period of 2 (Two) years from the date of admission to the first semester. However, he/she may be given one more year by the Academic Council under special circumstances which will be duly recorded in the Council's resolution.

20. **Maximum gaps between semester/year**

As per UGC norms

21. **Credit system & grading CGPA/SGPA:**

IIMT-University implemented the UGC guidelines for implementation of the choice-based credit system with a view to offer student's choice of courses within a programme with a flexibility to complete the programme by earning credits at a pace decided by the students themselves. The system allowed students to choose inter-disciplinary, intra-disciplinary courses according to their learning needs, interest and aptitude. It was considered as a cafeteria approach and was expected to provide mobility to students.

As per the Current credit system practiced in institutions needs comprehensive reforms as they offer very little flexibility, choice and are less learner centric. Degrees offered today are more self-contained focusing on a specialization area and depend a lot on knowledge available with the faculty from the department only. Though the most requisite credit system does exist, wherein students are given a wide choice and flexibility, these exist as small islands in the vast ocean of thousands of educational institutes in India. In such institutions, the curriculum is frequently designed which is learner centric and offering a wide specialization area for students to pick and choose courses from.

The institutions shall make attempts wherein the design of the credit system and the teaching and evaluation modes shall be the responsibility of individual course teachers. The students should have the freedom to opt for courses from other specializations and not just from their core specialization. For this there has to be stronger collaborations between departments of the University and outside.

21.2 GRADING SYSTEM: The school follows the absolute grading system which is a simple procedure wherein the marks obtained by students correspond to a specific grade and grade point. It reflects the individual performance in a particular subject without any reference to the group/class. The absolute grading system has limitations and may be susceptible to some inconsistencies.

The relative grading system on the other hand provides relative performance of a student to a group/class wherein the student is ranked in a group/class on basis of relative level of achievement. In this system decisions are made in advance by the faculty members as to what proportion of students would be awarded a particular grade on the basis of their relative performance and which is done by assigning grades on basis of a normal curve. This facilitates comparative performance and eliminates negative effect of pass or fail.

Table 3: Grading system

Letter Grade	Range
A+	TM>M+1.75SD
A	M+1.25 SD ≤TM<M+1.75SD
B+	M+0.75 SD ≤TM<M+1.25SD
B	M+0.25 SD ≤ TM < M+0.75 SD
C+	M-0.25 SD ≤ TM < M-0.25 SD
C	M-0.75 SD ≤ TM < M-0.25 SD
D+	M-1.25 SD ≤ TM < M-0.75 SD
D	M-1.75 SD ≤ TM < M-1.25 SD
E+	M-2.0 SD ≤ TM < M-1.75 SD
E	M-2.25 SD ≤ TM < M-2.0 SD
F	M-2.25 SD > TM
CO	Carry Over (Summer / Winter) due to Attendance deficiency (between 40% and 75%)and/orI. Lack of minimum IA marks as specified in clause 10.0 Table 3.
RA	Repeat the course due to (i) Lack of minimum attendance (below 40%) in regular course.
--	DETAINED “RC” or “RA” or both in all registered theory courses of a semester. The

	student is detained and has to repeat the entire semester.

Letter grades may be improved based on the following scheme: Use the table above to determine grade boundaries. Look for natural gaps in the neighborhood of grade boundaries. Choose the largest gap in the neighborhood and make this as the grade boundary.

An 'E', 'E+' and 'F' grade may not be a purely relative grade. These may be assigned on the following basis:

- A minimum, say 30/100, may be set as pass marks for the course. A fail grade may then be awarded only if the Total Marks for the course are less than 30. Otherwise, the students may be awarded the Just Pass Grade D.
- A fail grade may be awarded to students whose marks are below the prescribed minimum even if the table above leads to a pass grade.

Similarly, a lower limit may be set for the A grade also, for instance greater than or equal to 86. Students not achieving the prescribed minimum may be awarded a lower letter grade even if the table above indicates otherwise. A pass grade may be made mandatory for both internal as well as external examinations in the case of a separate internal and external assessment,

a. Internal and External marks may be summed up with appropriate weightages to compute a total out of 100 marks. The letter grade may be assigned on this computed total.
b. Internal and external marks may be graded separately and then the assigned grade points may be used, with appropriate weightages, to compute a final grade point and letter grade.

Grading in the case of Re-evaluations, Retests and Remedial Examinations may be based on the following guidelines:

a. The ranges of marks once computed for awarding letter grades the first time, called the First Distribution (FD), will not be modified.
b. If a re-evaluation leads to a change in marks, then FD will be used to award an appropriate letter grade.
c. A retest may be permitted if

i. A student gets a letter grade of E+ or E. In this case, irrespective of the marks obtained, at most D grade may be awarded.
ii. A student is unable to complete course requirements because of certified illness or tragedy. In this case FD will be used to award an appropriate letter grade.

The use of relative grading system may be recommended in autonomous institutions, institutes of national importance and institutions with high ranking. The results of the relative grading system may be shared by such institutions later with other interested institutions to implement the same.

21.3 GPA and CGPA

GPA is the ratio of the sum of the product of the number of credits Ci of course "i" and the grade points Pi earned for that course taken over all courses "i" registered and successfully completed by the student to the sum of Ci for all "i". That is,

$$GPA = \frac{\sum_i C_i P_i}{\sum_i C_i}$$

CGPA will be calculated in a similar manner, in any semester, considering all the courses enrolled from the first semester onwards.

The Grade card will not include the computation of GPA and CGPA for courses with letter grade CO, RC and U until those grades are converted to the regular grades.

A course successfully completed cannot be repeated

22. CLASS/DIVISION

Classification is based on CGPA and is as follows:

CGPA (with equivalent % marks)	Classification of Performance
CGPA of 9.0 (90 and above) or more in first attempt	Outstanding
CGPA of 8.0 (80 and above but less than 90) or more but less than 9.0	Excellent
CGPA of 7.0 (70 and above but less than 80) or more but less than 8.0	1st Div. with Distinction
CGPA of 6.0 (60 and above but less than 70) or more but less than 7.0	1st Division
CGPA above 5.0 Pass Grade (Above 50 but less than 60) but less than 6.0	2nd Division
CGPA equal to 5.0 Pass Grade (50% marks)	Pass
CGPA less than Pass Grade (less than 50% marks)	Fail

i. Further, the award of 'First class with distinction' is subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses in his/her first appearance with effect from II semester, within the minimum duration of the programme.

ii. The award of 'First Class' is further subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses within 2 years for M.Sc. Fruit Science.

23. TRANSFER OF CREDITS / ACADEMIC CREDIT BANK:

University Grants Commission initiated the concept of National Academic Credit Bank (NAC-Bank) which will be a digital / virtual / online entity to be established and managed by UGC. The main objective of the NAC-Bank would be to facilitate student mobility across the education system wherein the credits can be accumulated and be used at alter point of time for the requirements of partial fulfilment of a degree program.

a. University Grants Commission initiated the concept of National Academic Credit Bank (NAC-Bank) which will be a digital / virtual / online entity to be established and managed by UGC. The main objective of the NAC-Bank would be to facilitate student mobility across the education system wherein the credits can be accumulated and be used at alter point of time for the requirements of partial fulfilment of a degree program.

b. The Academic Bank of Credits (ABC) has been envisaged to facilitate the academic mobility of students with the freedom to study across the Higher Education Institutions in the country with an appropriate "credit transfer" mechanism from one programme to another, leading to attain a Degree/ Diploma/PG-diploma, etc.

c. The Academic Council may also approve admission of students who have completed a portion of course work in another approved Institute of repute under Multiple entry & Exit system, based on the recommendation of the credit transfer committee on a case-to-case basis.

d. Students who have completed coursework, at least first year, at some university other than the university to which transfer is sought (may request for transfer of admission to this university. A student may be granted admission only through an admission process that will follow the same policy as for fresh admissions. However, a uniform credit system must be followed by all universities to effect transfer of credits.

Credit Transfer request can be submitted only after the student has been admitted in the concerned program and the following conditions are met:

i. The course work has been completed at a UGC approved and accredited University through fulltime formal learning mode.
ii. The university accreditation grade/ ranking is not lower than that of the university to which the transfer is sought.
iii. The courses prescribe to the common minimum syllabus under UGC CBCS system.
iv. The letter grade obtained in the courses is "B" or better.
v. The number of credits to be transferred does not exceed the prescribed limit.
vi. The program in question must have a similar credit system, in particular, modular or semester and the same numeric and letter grading system along with common meaning of the term "credit" in numerical terms.

The aspect of shelf life of courses needs to be considered while accepting credits as obsolescence of knowledge of certain field in terms of its current relevance needs to be investigated. The time elapsed between successful completion of certain courses of the program and the admission to which program transfer is sought needs to be considered. The maximum number of credit points that may be considered under a credit transfer needs to be specified. Contextual variables such as teaching-learning approach adopted, learning facilities offered, use of evaluation modes may also be considered while preparing the credit transfer policy.

23.1 Moderation

Moderation of assessment is an organized procedure which ensures use of valid assessment material and consistent application of criteria, to provide fair academic judgment and reliable outcome in the form of marks or grades. It assures appropriate designing and implementation of assessment activities along with generation of valid and reliable results. Integration of moderation process with assessment system is imperative for the development of academic quality in higher educational institutions as:

- It addresses any difference in individual judgments of different evaluators.
- It ensures that all achievements in the form of marks and grades across courses reflect achievement of same level of standard.
- It is also carried out to develop a common understanding of the standards and criteria and to recognize performance which demonstrates that standard or fulfils those criteria. Moderation may be conducted in case there are large number of fail grades or high grades, or when large numbers of students who have received the same grade or clustering of students on letter grades, or when there are discrepancies between grades allocated to individual students in different courses, or to find out the difficulty level of the question paper or whether the assessments modes used cover the entire syllabus or not. Applicability - Moderation will be made applicable to both external and internal modes of assessment. All programs and courses will indicate, as part of their statements on assessment, arrangements for the moderation of assessed work. This can be done through formulation of a moderation policy and implemented across all programs and

courses of instruction and delivery. The time frame for the moderation will be linked with the time frame for assessment. In the event moderation is triggered, an evaluation will begin with a discussion on the following (though not exhaustive) lines:

a. What are the rubrics used for each of the different types of assessment in the course? Is a standardized/ prescribed rubric used or has the instructor developed his/ her own rubric. If the instructor is using a personally framed rubric, or if there is no identified rubric, then how does the assessment map to learning outcomes?
b. The difficulty level of the questions included in the assessments, i.e., is the difficulty level on the extremes, very easy or very hard.
c. The manner of awarding marks, i.e., has the correction been at the extremes, liberal or tough. Each department will establish a committee and designate roles and responsibilities at different levels for smooth working of the moderation process. In order to maintain neutrality, it will be ensured that moderator should not be the assessor. Staff members will be trained professionally in assessment techniques and moderation procedures. All assessment material produced by learner including examination sheets, assignments, project reports, research reports etc. will be examined. Institutions will be encouraged to make the moderation process online. In this system, assessment plans, moderation plans, assessment tools, samples of which may be submitted online. Moderation reports will be generated online so that progress can be tracked and submitted to the COE after the approval of dean by Head of the department. The moderation will not be restricted to just assessment but also include moderation of content and assessment design.

24. CHANGE OF DISCIPLINE

Every student is required to observe utmost discipline and decorum both inside and outside the campus and not to indulge in any activity which may affect adversely the prestige reputation of the university.

25. USE OF TECHNOLOGICAL INTERVENTION

The use of educational technology and information communication technologies (ICTs) in education is the need of the hour. With the proliferation of different types of access devices, especially mobile access devices, technology has the potential to augment traditional classroom practices and revolutionize learning and evaluation methods. Technology, in fact can be an important driver to enable lifelong learning. Learning and engagement of students is facilitated by use of technology through several modes such as synchronous learning, semi-synchronous learning, blended learning, collaborative learning, flipped classroom *etc.* MOOC's, especially provided through SWAYAM, are a window of opportunity for lifelong learning and are offered through technology-based platforms. Learning Management systems (LMS) may be used by institutions to integrate the entire teaching, learning and evaluation process. Open-source learning systems may be used for posting content in the form of videos, audios, e-learning modules, live class sessions *etc.* Use of plagiarism detection software will be highly recommended to check originality of content.

26. STUDENT DISCIPLINE

Every student is required to observe utmost discipline and decorum both inside and outside the campus and not to indulge in any activity against any law which may affect adversely the prestige/reputation of the University

27. STUDENT WELFARE

Any act of indiscipline of a student reported to the Dean (Students Welfare) and Head of the Department will be referred to a Discipline Committee constituted for the purpose. The Committee will enquire into the charges and decide on a suitable punishment if the charges are substantiated. The committee will also authorize the Dean (Students Welfare) to recommend to the Vice-Chancellor for the implementation of the decision. The student concerned may appeal to the Vice-Chancellor, whose decision will be the final.

28. RAGGING

Ragging in any form is a criminal and non-boilable offence in our country. The current State and Central legislations provide stringent punishments including imprisonment. Once the involvement of a student(s) is established in ragging, offending fellow students/staff, harassment of any nature to the fellow students/staff *etc.* the student(s) will be liable to be dismissed from the University, as per the laid down procedures of the UGC / Govt. /Institute. Every senior student at the University, along with their parent, shall give an undertaking every year in this regard and the same should be submitted at the time of Registration

29. POWER TO MODIFY

Notwithstanding all that has been stated above, the Academic Council is vested with powers to modify any or all the above regulations from time to time, if required, subject to the approval by the Board of Studies and Final approval by Vice-Chancellor.

30. Exit Point: As per NEP

31. NC/Credit Course: For non-credit courses 'Satisfactory' or "Unsatisfactory' shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

32. ANY OTHER HEADING AS PER YOUR PROGRAM

Common Academic Regulations for Programmes

33. Common Academic Regulations for Programmes

- Common Academic Regulations for PG
- Credit requirements
- Framework of the courses
- Course Title with Credit Load M.Sc. (Hort.) in Fruit Science
- Evaluation Scheme**- Annexure-A**
- Course Contents of M.Sc. (Hort.) in Fruit Science

Common Academic Regulations for PG

Mandatory requirement of seminars:

- It has been agreed to have mandatory seminars one in Masters (One Credit) and two in Doctoral programmes (two Credits).
- The students should be encouraged to make presentations on the latest developments and literature in the area of research topic. This will provide training to the students on preparation for seminar, organizing the work, critical analysis of data and presentation skills.

Residential requirements:

- The minimum and maximum duration of residential requirement for Masters'

P.G. Degree Programmes	Duration of Residential Minimum	Requirement Maximum
Masters' Degree	2 Academic Years(4 Semesters)	5 Academic Years(10 Semesters)

- Student may be allowed to discontinue temporarily only after completion of course work

In case a student fails to complete the degree programme within the maximum duration of residential requirement, his/ her admission shall stand cancelled. The requirement shall be treated as satisfactory in the cases in which a student submits his/ her thesis any time during the 4th of his/ her resident ship at the University for Masters' programme.

Evaluation of course work and comprehensive examination:

- For M.Sc., multiple levels of evaluation (First Test, Mid term and Final semester) is desirable. However, it has been felt that the comprehensive examination is redundant for M.Sc. students.

Advisory System:

Advisory Committee

- There shall be an Advisory Committee for every student consisting of not fewer than three members in the case of a candidate for Masters' degree with the Advisor as Chairperson. The Advisory Committee should have representatives from the major and minor fields amongst the members of the Post-graduate faculty accredited for appropriate P.G. level research. However, in those departments where qualified staff eXists but due to unavoidable reasons Post-graduate degree programmesare not eXisting, the staff having Post-graduate teaching eXperience of two years or more may be included in the Advisory Committee as member representing the minor.
- At any given time, a P.G. teacher shall not be a Chairperson, Advisory Committee (including Master's programmes) for more than five students.
- The Advisor should convene a meeting of the Advisory Committee at least once in a Semester. The summary record should be communicated to the Head of Department, Dean of the College of concerned, Director (Education)/ Dean and Registrar for information.

Advisor/ Co-guide/ Member, Advisory Committee from other collaborating University/ Institute/ Organization:

- In order to promote quality Post-graduate research and training in cutting edge areas, the University may enter into Memorandum of Understanding (MOU) with other Universities/ Institutions for conducting research. While constituting an Advisory Committee of a student, if the Chairperson, Advisory Committee feels the requirement of involving of a faculty member/ scientist of such partnering university/ Institute/ Organization, he/ she may send a proposal to this effect to Director (Education)/ Dean PGS along with the proposal for consideration of Student's Advisory Committee (SAC).
- The proposed faculty member from the partnering institution can be allowed to act as Chairperson/ Co-guide/ Member, SAC, by mutual consent, primarily on the basis of intellectual input and time devoted for carrying out the research work at the particular

institution. The faculty member/ scientist of partnering institutions in the SAC shall become a temporary faculty member of the University by following the procedure approved by the Academic Council.

Allotment of students to the retiring persons:

Normally, retiring person may not be allotted M. Sc. Student if he/ she is left with less than 2 years of service student if left with less than 3 years of service. However, in special circumstances, permission may be obtained from the Director (Education)/ Dean PGS, after due recommendation by the concerned Dean Agriculture/Head of the Department.

Changes in the Advisory Committee:

(i) Change of the Chairperson or any member of the Advisory Committee is not ordinarily permissible. However, in exceptional cases, the change may be effected with due approval of the Dean Agriculture.

(ii) Normally, staff members of the university on eXtra ordinary leave or on study leave or who leave the University service will cease to continue to serve as advisors of the Post-graduate students of the University. However, the Dean may permit them to continue to serve as advisor subject to the following conditions:

a) The concerned staff member must be resident in India and if he/ she agrees to guide research and must be available for occasional consultations;

b) An application is made by the student concerned duly supported by the Advisory Committee;

c) The Head of the Department and the Dean of the College concerned agree to the proposal;

d) The staff member, after leaving the University service is granted the status of honorary faculty's membership by the Vice-Chancellor on the recommendation of the Dean Agriculture for guiding as Chairperson or Member, Advisory Committee the thesis/theses of the student(s) concerned only.

(iii) In case the Chairperson/member of a Student's Advisory Committee retires, he/ she shall be allowed to continue provided that the student has completed his course work and minimum of 10 research credits and the retiring Chairperson/ member stays at the Headquarters of the College, till the thesis is submitted.

(iv) If the Chairperson/ member proceeds on deputation to another organization, he/ she may be permitted to guide the student provided his/ her new organization is at the Headquarters of the College and his/ her organization is willing for the same.

(v) The change shall be communicated to all concerned by the Head of Department.

Prevention of plagiarism

- An institutional mechanism should be in place to check the plagiarism. The students must be made aware that manipulation of the data/ plagiarism is punishable with serious consequences.

Credit requirements

The following nomenclature and Credit Hrs need to be followed while providing the Syllabus for all the disciplines:

Name of the Courses	Masters' Programme
Major courses	30
Minor courses	08

Supporting courses	06S
Common courses	05
Seminar	01
Thesis Research	30
Total	**80**

- **Major courses:** From the Discipline in which a student takes admission. Among the listed courses, the core courses compulsorily to be taken may be given mark
- **Minor courses:** From the subjects closely related to a student's major subject
- **Supporting courses:** The subject not related to the major subject. It could be any subject considered relevant for student's research work (such as Statistical Methods, Design of Experiments, etc.) or necessary for building his/her overall competence.
- **Common Courses:** The following courses (one credit each) will be offered to all students undergoing Master's degree programme:
  1. Library and Information Services
  2. Technical Writing and Communications Skills
  3. Intellectual Property and it management in Agriculture
  4. Basic Concepts in Laboratory Techniques
  5. Agricultural Research, Research Ethics and Rural Development Programmes

Some of these courses are already in the form of e-courses/ MOOCs. The students may be allowed to register the courses /similar courses on these aspects, if available online on SWAYAM or any other platform. If a student has already completed any of these courses during UG, he/she may be permitted to register for other related courses with the prior approval of the Head of Department (HoD)/Board of Studies (BoS).

M. Sc. (Horti.) in Fruit Science

Major courses: From the Discipline in which a student takes admission. Among the listed courses, the core courses compulsorily to be taken may be given *mark.

CourseCode	CourseTitle	CreditHourse
FSC501*	Tropical Fruit Production	2+1
FSC502*	Sub-Tropicaland Temperate Fruit Production	2+1
FSC503*	Propagation and Nursery Management of Fruit Crops	2+1
FSC504*	Breeding of Fruit Crops	2+1
FSC505	Systematics of Fruit Crops	2+1
FSC506	Canopy Management in Fruit Crops	1+1
FSC507	Growth and Development of Fruit Crops	2+1
FSC508	Nutrition of Fruit Crops	2+1
FSC509	Biotechnology of Fruit Crops	2+1
FSC 510	Organic Fruit Culture	2+1
FSC511	Export Oriented Fruit Production	2+1
FSC512	Climate Change and Fruit Crops	1+0
FSC513	Minor Fruit Production	2+1
FSC591	Seminar	0+1
FSC599	Research	0+30

Minor courses: From the subjects closely related to a student's major subject.

Course Code	Course Title	Credit Hourse
VSC 501	Production of Cool Season Vegetable Crops	2+1
VSC 502	Production Technology of Warm Season Vegetable Crops	2+1
VSC 503	Breeding of Vegetable Crops	2+1
VSC 504	Principles of Vegetable Breeding	3+0
VSC 505	Breeding of Self Pollinated Vegetable Crops	2+1
VSC 506	Breeding of Cross Pollinated Vegetable Crops	2+1
VSC 507	Protected Cultivation of Vegetable Crops	1+1
VSC 508	Seed Production Technology of Vegetable Crops	2+1
VSC 509	Production of Underutilized Vegetable Crops	2+1
VSC 510	Systematics of Vegetable Crops	1+1
VSC 511	Organic Vegetable Production	1+1
VSC 512	Production of Spice Crops	2+1
VSC 513	Processing of Vegetable	1+1
VSC 514	Postharvest Management of Vegetable Crops	2+1
SOILS 510	Analytical Technique and Instrumental Methods in Soil And Plant Analysis	(0+2)

Supporting courses: The following courses are being offered by various disciplines (The list is only indicative). Based on the requirement, any of the following courses may be opted under the supporting courses. The syllabi of these courses are available in the respective disciplines. If required, the contents may be modified to suit the individual discipline with approval of the concerned BoS:

Code	Course Title	Credit Hours
STAT 501	Mathematics for Applied Sciences	2+0
STAT 502	Statistical Methods for Applied Sciences	3+1
STAT 511	Experimental Designs	2+1
STAT 512	Basic Sampling Techniques	2+1
STAT 521	Applied Regression Analysis	2+1
STAT 522	Data Analysis Using Statistical Packages	2+1
MCA 501	Computers Fundamentals and Programming	2+1
MCA 502	Computer Organization and Architecture	2+0
MCA 511	Introduction to Communication Technologies, Computer Networking and Internet	1+1
MCA 512N	Information Technology in Agriculture	1+1
BIOCHEM 501	Basic Biochemistry	3+1
BIOCHEM 505	Techniques in Biochemistry	2+2

Common Courses: The following courses (one credit each) will be offered to all students undergoing Master's degree programme:

Code	Course Title	Credit Hours
PGS 501	Library and Information Services	0+1
PGS 502	Technical Writing and Communications Skills	0+1

PGS 503	(e-Course) Intellectual Property and its management in Agriculture	1+0
PGS 504	(e-Course) Basic Concepts in Laboratory Techniques	0+1
PGS 505	(e-Course) Agricultural Research, Research Ethics and Rural Development Programmes	1+0
PGS 506	(e- Course) Disaster Management	1+0

EVALUATION SCHEME

M. Sc. (Hort.) Fruit Science
SEMESTER-I

S.No.	Sub. Code	Subject	Credit	Theory	Lab	External Theory Marks	Practical Marks	Internal Marks	Passing Marks	Total Marks
1	FSC 501	Tropical Fruit Production	3	2	1	50	20	30	60	100
2	FSC 502	Subtropical and Temperate Fruit Production	3	2	1	50	20	30	60	100
3	FSC 507	Growth and Development of Horticultural Crops	3	2	1	50	20	30	60	100
4	FSC 508	Nutrition of Fruit Crops	3	2	1	50	20	30	60	100
5	VSC 501	Production of Cool Season Vegetable Crops	3	2	1	50	20	30	60	100
6	MCA512	Information Technology in Agriculture	3	2	1	50	20	30	60	100
7	PGS 506	(e-course) Disaster Management	1	1	0	70	-	30	60	100
Total			**19**	**13**	**06**					**700**

SEMESTER-II

S.No.	Sub. Code	Subject	Credit	Theory	Lab	External Theory Marks	Practical Marks	Internal Marks	Passing Marks	Total Marks
1	FSC-503	Propagation and nursery management for fruit crops	3	2	1	50	20	30	60	100
2	FSC-504	Breeding of fruit crops	3	2	1	50	20	30	60	100
3	FSC-505	SystematicofFruitCrops	3	2	1	50	20	30	60	100
4	FSC 509	Biotechnology of Fruit Crops	3	2	1	50	20	30	60	100
5	VSC 504	Principles of Vegetable Breeding	3	2	1	50	20	30	60	100
6	STAT 511	Experimental Designs	3	2	1	50	20	30	60	100
7	PGS 503	Intellectual Property and its management in Agriculture	1	1	0	70	-	30	60	100
8	PGS 505	Agricultural Research, Research Ethics and Rural Development Programmes	1	1	0	70	-	30	60	100

9	FSC-591	Master's Seminar	1	0	1	-	-	100	60	100
Total			**21**	**14**	**07**					**900**

SEMESTER-III

S.No.	Sub. Code	Subject	Credit	Theory	Lab	External Theory Marks	Practical Marks	Internal Marks	Passing Marks	Total Marks
1	FSC 510	Organic Fruit Culture	3	2	1	50	20	30	60	100
2	FSC 511	Export Oriented Fruit Production	3	2	1	50	20	30	60	100
3	VSC 512	Production Technology of Spice Crops	3	2	1	50	20	30	60	100
4	PGS 501	Library and Information Services	1	0	1	-	100	-	60	100
5	PGS 502	Technical Writing and Communications Skills	1	0	1	-	100	-	60	100
Total			**11**	**06**	**05**					**500**

SEMESTER-IV

S.No.	Sub. Code	Subject	Credit	Theory	Lab	External Marks	Practical Marks	Internal Marks	Passing Marks	Total Marks
1	FSC 599	Master's research	30	-	-	100	-	-	60	100
Total			**30**	**-**	**-**					**100**

Total Credit- Major-30+ Minor- 09+ Supporting-06+ Common Courses -5+ Seminar-1+Master's Thesis- 30= 81

FORMAT – 1

NEP-2020 IMPLEMENTATION 3 STEPS PLAN (FORMAT-1,2& 3)
CBCS: Statement of Credits distribution

Format -1

College/School: School of Agricultural Sciences Programme:M. Sc (Ag.) Horticulture Duration: UG (6 Sem.), UG (Hons./Research) 8 Sem., PG (4 Sem.)	Credit range:Minimum 120 for UG 160 for UG (Hons.), 80 for PG (Suggested by CBCS-NEP Committee)

Course	Credit	Semester	CORE (Th 4+P 2) Major	DSE (Th 4+P 2) Minor	AECC (Th 3)	SEC **	GE (Th 4) Interdisciplinary	General Elective (2)	Value Added Course (VAC) (2)	Industrial Training/ Survey / Research Project (4)	Total Credits
M.Sc. (Hort.) in Fruit Science	40	1st	C1- Tropical Fruit Production C2- Subtropical and Temperate Fruit Production C3-Growth and Development of Horticultural Crops C4- Nutrition of Fruit Crops	DSE1-Production of Cool Season Vegetable Crops	AECC 1-Information Technology in Agriculture	SEC-1 (e-course) Disaster Management					**19**
		2nd	C5-Propagation and nursery management for fruit crops C6-Biotechnology of Fruit Crops C7-Breeding of fruit crops C8-Experimental Designs	DSE 2-Principles of Vegetable Breeding	AECC 2- Agricultural Research, Research Ethics and Rural Development Programmes	SEC2-Intellectual Property and its management in Agriculture			VAC-1 Systematics of Fruit Crops	Master's Seminar	21
	41	3rd	C10-Organic Fruit Culture C11-Export Oriented Fruit Production	DSE 3- Production Technology of Spice Crops	AECC 3-Technical Writing and Communications Skills	SEC 3- Library and Information Services			VAC-2 Organic Fruit Culture	*Master's Research	**11**
		4th				SEC 4-MOOCs/NPTEL				*Master's Research	30

* **Master's research credits can be distributed as per need of advisor**

FORMAT – 2

Format-2

Program	Year	Semester (15 weeks)	Paper	Credit	Periods per Week	Periods (Hours) per Semester	Paper Title	Unit (Periods per semester)	Prerequisite	Elective (For other faculty)
M.Sc. (Hort.) in Fruit Science	FIRST YEAR	SEMESTER-I	FSC 501	3	3	45	Tropical Fruit Production	45		
			FSC 502	3	3	45	Subtropical and Temperate Fruit Production	45		
			FSC 507	3	3	45	Growth and Development of Horticultural Crops	45		
			FSC 508	3	3	45	Nutrition of Fruit Crops	45		
			VSC 501	3	3	45	Production of Cool Season Vegetable Crops	45		
			MCA512	3	3	45	Information Technology in Agriculture	45		
			PGS 506	1	1	15	(e-course) Disaster Management	15		
		SEMESTER-II	FSC-503	3	3	45	Propagation and nursery management for fruit crops	45		
			FSC 509	3	3	45	Biotechnology of Fruit Crops	45		
			FSC-504	3	3	45	Breeding of fruit crops	45		
			FSC-505	3	3	45	SystematicofFruitCrops	45		
			VSC 504	3	3	45	Principles of Vegetable Breeding	45		
			STAT 511	3	3	45	Experimental Designs	45		
			PGS 503	1	1	15	Intellectual Property and its management in Agriculture	15		
			PGS 505	1	1	15	Agricultural Research, Research Ethics and Rural Development Programmes	15		
			FSC-591	1	1	-	Master's Seminar	-		

Program	Year	Semester (15 weeks)	Paper	Credit	Periods per Week	Periods (Hours) per Semester	Paper Title	Unit (Periods per semester)	Prerequisite	Elective (For other faculty)
M.Sc. (Hort.) Fruit Science	Second Year	Semester-III	FSC 510	3	3	45	Organic Fruit Culture	45		
			FSC 511	3	3	45	Export Oriented Fruit Production	45		
			VSC 512	3	3	45	Production Technology of Spice Crops	45		
			PGS 501	1	1	15	Library and Information Services	15		
			PGS 502	1	1	15	Technical Writing and Communications Skills	15		
		Semester-IV	FSC 599	30	30	-	Master's research	-		

PO1:	Understand the basic knowledge of agriculture and related subjects in the current scenario of Indian and world Agriculture.	PSO1:	Develop the knowledge based resources and technologies for the enhancement of decision-making ability in students for selection of higher studies in Agriculture
PO2	To learn and apply concepts of modern transmission and molecular genetics.	PSO2	Demonstrate the thoughts of the legal and ethical issues of the environment impacting agriculture and food security of the local and global population
PO3.	Develop an understanding of communication methods, resources utilization, cultivation of crops, management of crops, and value addition of agricultural produces.	PSO3	Establish a self-motivated system of agriculture education to attain the local and global demands of agriculture professionals in agriculture and allied sectors
PO4	Student can apply horticultural principles to the successful growth and production of horticultural plants.	PSO4	Develop operational resources for the efficient and cost effective implementation of agriculture education
PO5	Develop the skills to manage agricultural farms, dairy farms and enhance quality of farm- produces and their commercial utilization	PSO5	Proper management of animals by providing proper food, shelter and protection against diseases to domestic animals.
PO6	Understand the various issues of food safety and potential hazardous contaminants.	PSO6	Understand the ecosystem which includes many plants and animals and conservations.

PO7	Extension activities in agriculture and allied sectors around the local villages through Rural Agricultural Work Experience and Agro-industrial Attachment (RAWE & AIA). P.O. 8. Harmonize the relation with Agriculture Research Institutions, State Agriculture Universities, KrishiVigyan Kendra (KVK), etc.	PSO7	Motivate for entrepreneurship, start-up through project planning and execution, research and training during field visits etc
PO8	Demonstrate the methods used in collection, presentation of data and analysis of results of experiments in laboratories and fields and their validation	PSO8	Analyze and identify the various elements of successes of entrepreneurial venture.

FORMAT – 3

Format-3

IIMTU-NEP IMPLEMENTATION
Year: I / Semester: I

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M.Sc. (Hort.) Fruit Science**	**Year : I** **Semester: I**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Horticulture**
Course Code: FSC 501	**Title: Tropical Fruit Production**

Course Objectives:

- To impart basic knowledge about the importance and management of Tropical and dry land fruits grown in India.
- To know the concept of IPM and recognizing the physiological disorders of fruit plants.
- To impart knowledge about inflorescence, pollination and fruit bearing in orchard.

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 00
P: 01(In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction; Importance and Background: Importance, origin and distribution, major species, rootstocks and commercial varieties of regional, national and international importance, eco-physiological requirements.	6
II	Agro-techniques; Propagation, Planting and Orchard Floor Management: Asexual and sexual methods of propagation, planting systems and planting densities, training and pruning methods, rejuvenation, intercropping, nutrient management, water management, fertigation, use of bio-fertilizers, role of bio-regulators, abiotic factors limiting fruit production.	6
III	Crop Management; Flowering, Fruit-Set and Harvesting: Physiology of flowering, pollination management, fruit set and development, physiological disorders – causes and remedies, crop regulation,	6
IV	Quality improvement by management practices; maturity indices, harvesting, grading, packing, storage and ripening techniques; insect and disease management.	6
V	Crops: Mango, Banana, Guava, Pineapple, Papaya, Avocado, Jackfruit, Annonas, Aonla, Ber, etc..	6

Suggested Readings:

1. Bose TK, Mitra SK and Sanyal D. 2002. Fruits of India – Tropical and Sub-Tropical. 3rdEdn.
2. Dhillon WS. 2013. Fruit Production in India. Narendra Publ. House, New Delhi.
3. Iyer CPA and Kurian RM. 2006. High Density Planting in Tropical Fruits: Principles and Practices. IBDC Publishers, New Delhi.
4. Morton JF. 2013. Fruits of Warm Climates. Echo Point Book Media, USA.
5. Nakasome HY and Paull RE. 1998. Tropical Fruits. CAB International.
6. Paull RE and Duarte O. 2011. Tropical Fruits (Vol. 1). CAB International.
7. Sharma KK and Singh NP. 2011. Soil and Orchard Management. Daya Publishing House, New Delhi.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3) ESE	50
Total:	**100**

Course Learning Outcomes:

- Students will learn about the importance and management of tropical fruits.
- To provide knowledge about IPM, diseases and others physiological disorders effecting fruit production.
- Provide knowledge about flowering, pollination and fruit setting in fruit crops.

Format-3

IMTU-NEP IMPLEMENTATION
Year : I / Semester: I

Programme: Certificate/Diploma/Degree/UG/PG/Ph.D. **Class: M.Sc. (Hort.) Fruit Science**	**Year : I** **Semester I**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Horticulture**
Course Code: FSC 502	**Title:Subtropical and Temperate Fruit Production**

Course Objectives:

1. To provide basic knowledge about the importance and management of sub-tropical and temperate fruits grown in India.
2. To provide knowledge about IPM, diseases and others physiological disorders effecting fruit production.
3. Provide knowledge about the propagation techniques, planting system, cropping, root zone and canopy management in fruit crops.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 00
P: 01(In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction: Importance and Background: Origin, distribution and importance, major species, rootstocks and commercial varieties of regional, national and international importance, eco-physiological requirements	6
II	Agro-Techniques: Propagation, Planting and Orchard Floor Management: Propagation, planting systems and densities, training and pruning, rejuvenation and replanting, intercropping, nutrient management, water management, fertigation, use of bio-fertilizers, role of bio-regulators, abiotic factors limiting fruit production	6
III	Crop Management: Flowering, Fruit-Set and Harvesting: Physiology of flowering, pollination management, fruit set and development, physiological disorders-causes and remedies, crop regulation,	6
IV	Quality management: Quality improvement by management practices; maturity indices, harvesting, grading, packing, storage and ripening techniques; insect and disease management.	6
V	Crops: Citrus, Grapes, Litchi, Pomegranate, Apple, Pear, Peach, Plum, Apricot, Cherries, Berries, Persimmon, Kiwifruit, Nuts- Walnut, Almond, Pecan, etc.	6

Reference / Text Books:

1. Chadha KL and Awasthi RP. 2005. The Apple. Malhotra Publishing House, New Delhi. ChadhaTR. 2011. A Text Book of Temperate Fruits. ICAR, New Delhi
2. Childers NF, Morris JR and Sibbett GS. 1995. Modern Fruit Science: Orchard and Small Fruit Culture. Horticultural Publications, USA.
3. Creasy G and Creasy L. 2018. Grapes. CAB International. Davies FS and Albrigo LG. 1994. Citrus. CAB International.
4. Dhillon WS. 2013. Fruit Production in India. Narendra Publishing House, New Delhi.
5. Jackson D, Thiele G, Looney NE and Morley-Bunker M. 2011. Temperate and Subtropical Fruit Production. CAB International.
6. Sharma RR and Krishna H. 2018. Textbook of Temperate Fruits. CBS Publishers and Distributors Pvt. Ltd., New Delhi.
7. Tromp J, Webster AS and Wertheim SJ. 2005. Fundamentals of Temperate Zone Tree Fruit Production.Backhuys Publishers, Lieden, The Netherlands.
8. Westwood MN. 2009. Temperate Zone Pomology:Physiology and Culture. Timber Press, USA.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3) ESE	50
Total:	**100**

Prerequisites for the course:

Course Learning Outcomes:

1. Students will learn about the importance and management of sub- tropical and temperate fruits.
2. To provide knowledge about IPM, diseases and others physiological disorders effecting fruit production
3. To gain knowledge about the recent trends in propagation, rootstock influence, planting system, cropping systems, root zone and canopy management.

Format-3

IIMTU-NEP IMPLEMENTATION
Year : I / Semester: I

Programme: Certificate/Diploma/Degree/UG/PG/Ph.D. **Class: M.Sc. (Hort.) Fruit Science**	**Year: I** **Semester:I**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Horticulture**
Course Code: FSC 507	**Title: Growth and Development of Fruit Crops**

Course Objectives:

1. To give students a thorough understanding of the physiological procedures, stages of development, and elements affecting the growth and development of fruit-bearing plants.

Nature of Paper: Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 0
P: 01 (In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 2 Hrs.=1 Credit(4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction General Concepts and Principles: Growth and development-definition, parameters of growth and development, growth dynamics and morphogenesis.	6
II	Climatic Factors, Hormones and Developmental Physiology: Environmental impact on growth and development-effect of light temperature, photosynthesis and photoperiodism, verbalization, heat units and thermoperiodism.	6
III	Assimilate partitioning, influence of water and mineral nutrition in growth and development; concepts of plan hormone and bioregulators, history, biosynthesis and physiological role of auxins, gibberellins, cytokinins, abscissic acid, ethylene, growth inhibitors and retardant, brasssinosteroids, other New PGRs.	6
IV	Developmental physiology and biochemistry during dormancy, bud break, juvenility, vegetative to reproductive interphase, flowering, pollination, fertilization and fruit set, fruit drop, fruit growth, ripening and seed development.	6
V	Strategies for Overcoming Stress: Growth and developmental process during stress – manipulation of growth and development, impact of pruning and training, chemical manipulations and Commercial application of PGRs in fruit crops, molecular and genetic approaches in plant growth and development.	6

Reference / Text Books

- Bhatnagar P. 2017. Physiology of Growth and Development of Horticultural Crops.

Agrobios(India).
- Roberts J, Downs S and Parker P. 2002. Plant Growth Development. In: Salisburym FB and Ross CW. (Eds.) Plant Physiology. 4th Ed.Wadsworth Publications, USA.
- Schafeer, B. and Anderson, P. 1994. Handbook of Environmental Physiology of Fruit Crops. Vol. 1 & 2. CRC Press. USA.
- Seymour GB, Taylor JE and Tucker GA. 1993. Biochemistry of Fruit Ripening. Chapman & Hall, London.

If the course is available as Generic Elective then the students of following departments may opt it.
NA.

Evaluation/Assessment Methodology

	Max. Marks
1. Class tasks/ Sessional Examination	30
2. Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3. ESE	50
Total:	**100**

Prerequisites for the course:

Course Learning Outcomes:

Consequent upon successful completion of the course, the students are expected to have

CO1: Equipped with understanding of various growth and development processes

CO2: Students will understand the biochemical, physiological, genetic and molecular mechanisms during different developmental phases of horticultural crops as well as students will thoroughly understand the various bio-synthetic pathways of plant hormones

CO3: Students will be able apply the principles learnt in previous units in field level and able to assess the influence on growth pattern of crops during stressful situations.

CO4: Students will be able to analyse the impact of physical and chemical manipulation of growth and development.

Format-3

IIMTU-NEP IMPLEMENTATION
Year : I / Semester: I

Programme: Certificate/Diploma/Degree/UG/PG/Ph.D. **Class: M.Sc. (Hort.) Fruit Science**	**Year: I** **Semester: I**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Horticulture**
Course Code: FSC 508	**Title: Nutrition of Fruit Crops**

Course Objectives:

1. To give students a thorough understanding of fruit-bearing plants' nutritional needs as well as the elements that affect how well those nutrients are taken in, assimilated, and used.
2. This course's goals include managing nutrient functions, soil-plant interactions, nutrient deficiencies and toxicities, fertilizer management, and nutrient essentials.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L:2
T: 0
P: 1(In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction General Concepts and Principles: Importance and history of nutrition in fruit crops, essential plant nutrients, factors affecting plant nutrition; nutrient uptake and their removal from soil.	8
II	Diagnostics, Estimation and Application: Nutrient requirements, root distribution in fruit crops, soil and foliar application of nutrients in major fruit crops, fertilizer use efficiency. Methods and techniques for evaluating the requirement of macro- and micro-elements,	8
III	Diagnostic and interpretation techniques including DRIS. Role of different macro- and micro-nutrients, their deficiency and toXicity disorders, corrective measures to overcome deficiency and toXicity disorders.	8
IV	Integrated Nutrient Management (INM): Fertigation in fruit crops, bio-fertilizers and their use in INM systems.	8

Reference / Text Books:

- Atkinson D, Jackson JE and Sharples RO. 1980. Mineral Nutrition of Fruit Trees. Butterworth Heinemann.
- Bould C, Hewitt EJ and Needham P. 1983. Diagnosis of Mineral Disorders in Plants Vol.1 Principles. Her Majesty's Stationery Office, London.
- Cooke GW. 1972. Fertilizers for maximizing yield. Grenada Publishing Ltd, London.
- Mengel K and Kirkby EA. 1987. Principles of Plant Nutrition. 4thEd. International Potash Institute, Worblaufen-Bern, Switzerland.

• Tandon HLS. 1992. Management of Nutrient Interactions in Agriculture. Fertilizer Development and Consultation Organization, New Delhi.
If the course is available as Generic Elective then the students of following departments may opt it. NA

Evaluation/Assessment Methodology	
	Max. Marks
1. Class tasks/ Sessional Examination 2. Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report 3. ESE	30 20 50
Total:	**100**
Prerequisites for the course:	
Course Learning Outcomes: CO1: Know the importance and various types of nutrients and their uptake mechanisms CO2: Analyse soil and plant status with respect to various nutrients CO3: Make use of corrective measures to overcome deficiency or toxicity	

IIMTU-NEP IMPLEMENTATION
Year : I / Semester: II

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M.Sc. (Hort.) Fruit Science**	**Year: I** **Semester: II**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: : Horticulture**
Course Code: VSC 501	**Title:: Production of Cool Season Vegetable Crops**

Course Objectives:

1. To know about Soil and Climate requirement of Cool Season Vegetables
2. Familiar with different varieties and methods of sowing in different vegetables.
3. Knowledge of Seed production technology of cool season vegetable
4. Knowledge of crop protection measure in different crops

Nature of Paper: Core
Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction, commercial and nutritional importance, origin and distribution, botany and taXonomy, area, production, productivity and constraints, soil requirements, climatic factors for yield and quality, commercial varieties/ hybrids, seed rate and seed treatment, raising of nursery, sowing/ planting time and methods,hrydroponics and aeroponics, precision farming, cropping system, nutritional including micronutrients and irrigation requirements, intercultural operations, special horticultural practices, weed control, mulching, role of plant growth regulators, physiological disorders, maturity indices, harvesting, yield, post-harvest management (grading, packaging and marketing), pest and disease management and production economics of crops. **Viz. Bulb and tuber crops—Onion, garlic and potato.**	6
II	Introduction, commercial and nutritional importance, origin and distribution, botany and taXonomy, area, production, productivity and constraints, soil requirements, climatic factors for yield and quality, commercial varieties/ hybrids, seed rate and seed treatment, raising of nursery, sowing/ planting time and methods,hrydroponics and aeroponics, precision farming, cropping system, nutritional including micronutrients and irrigation requirements, intercultural operations, special horticultural practices, weed control, mulching, role of plant growth regulators, physiological disorders, maturity indices, harvesting, yield, post-harvest management (grading, packaging and marketing), pest and disease	6

	management and production economics of crops. **Viz.Cole crops—Cabbage, cauliflower, kohlrabi, broccoli, Brussels sprouts and kale.**	
III	Introduction, commercial and nutritional importance, origin and distribution, botany and taXonomy, area, production, productivity and constraints, soil requirements, climatic factors for yield and quality, commercial varieties/ hybrids, seed rate and seed treatment, raising of nursery, sowing/ planting time and methods,hrydroponics and aeroponics, precision farming, cropping system, nutritional including micronutrients and irrigation requirements, intercultural operations, special horticultural practices, weed control, mulching, role of plant growth regulators, physiological disorders, maturity indices, harvesting, yield, post-harvest management (grading, packaging and marketing), pest and disease management and production economics of crops. **Viz.Root crops—Carrot, radish, turnip and beetroot**	6
IV	Introduction, commercial and nutritional importance, origin and distribution, botany and taXonomy, area, production, productivity and constraints, soil requirements, climatic factors for yield and quality, commercial varieties/ hybrids, seed rate and seed treatment, raising of nursery, sowing/ planting time and methods,hrydroponics and aeroponics, precision farming, cropping system, nutritional including micronutrients and irrigation requirements, intercultural operations, special horticultural practices, weed control, mulching, role of plant growth regulators, physiological disorders, maturity indices, harvesting, yield, post-harvest management (grading, packaging and marketing), pest and disease management and production economics of crops. **Viz.Peas and beans—Garden peas and broad bean**	6
V	Introduction, commercial and nutritional importance, origin and distribution, botany and taXonomy, area, production, productivity and constraints, soil requirements, climatic factors for yield and quality, commercial varieties/ hybrids, seed rate and seed treatment, raising of nursery, sowing/ planting time and methods,hrydroponics and aeroponics, precision farming, cropping system, nutritional including micronutrients and irrigation requirements, intercultural operations, special horticultural practices, weed control, mulching, role of plant growth regulators, physiological disorders, maturity indices, harvesting, yield, post-harvest management (grading, packaging and marketing), pest and disease management and production economics of crops. **Viz.Leafy vegetables—Beet leaf, fenugreek, coriander and lettuce.**	6

Reference / Text Books:

- Handbook of Entomology
- Insecta: An introduction

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1. Class tasks/ Sessional Examination	30
2. Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3. ESE	50
Total:	**100**

Prerequisites for the course:
Course Learning Outcomes:
CO1 Able to know what are the basic criteria for selection of soil and climate for vegetable crops
CO2 Can use the basic knowledge regarding different cultural practices followed for cool season vegetables
CO3 Students are able to know about sowing time of different varieties according to temperature
CO4 Study of irrigation and nutrient management and their applications in production vegetables
CO5 By the end of course students will be able to control of different insect pests.

Format-3

IIMTU-NEP IMPLEMENTATION
Year : I / Semester: I

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M.Sc. (Hort.) Fruit Science**	**Year: I** **Semester: I**
Credits: 2 **Theory: 1** **Practical: 1**	**Subject: Horticulture**
Course Code: MCA 512N	**Title:Information Technology in Agriculture**

Course Objectives:

- This is a course on Introduction to Networking and Internet Applications that aims at exposing the students to understand analogy of computer, basic knowledge of MS Office. Also to understand Internet and WWW, use of IT application and different IT tools in Agriculture

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits : 50% Marks / Theory 1, Practical 1 = 2 Credits

L:02
T:00
P: 00 (In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 0 Hrs.=0 Credit (2Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction to Computers, Anatomy of computer, Operating Systems, definition and types, Applications of MS Office for document creation & Editing, Data presentation, interpretation and graph creation, statistical analysis, mathematical expressions	4
II	Database, concepts and types, uses of DBMS in Agriculture, World Wide Web (WWW): Concepts and components, Introduction to computer programming languages, concepts and standard input/output operations. e-Agriculture, concepts and applications.	4
III	Use of ICT in Agriculture, Computer Models for understanding plant processes. IT application for computation of water and nutrient requirement of crops, Computer controlled devices (automated systems) for Agri-input management, Smartphone Apps in Agriculture for farm advises, market price, postharvest management *etc.*.	4
IV	Geospatial technology for generating valuable agri-information. Decision support systems, concepts, components and applications in Agriculture, Agriculture Expert System, Soil Information Systems *etc.* for supporting Farm decisions, Preparation of contingent crop-planning using IT tools.	4

Reference / Text Books:

- Internet: The Complete Reference
- Sub Edition by Margaret Levine Young.
- Office 2013 All-In-One For Dummies by Peter Weverka.

- Computer Fundamentals (With CD) 6th Edition by PradeepSinha and PritiSinha.
- Principles of Programming Languages by Er. Anil Panghal.
- E-Agriculture and Rural Development by CharalamposPatrikakis, Blessing Maumbe.
- Vanitha G. 2011. *Agro-informatics*
- http://www.*agrimoon*.com
- http://www.agriinfo.in
- http://www.eagri.org
- http://www.agriglance.com

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1. Class tasks/ Sessional Examination	30
2. Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3. ESE	50
Total:	**100**

Prerequisites for the course:

Course Learning Outcomes:

By the end of the course, students will be able to:

- Understand Agriculture Challenges.
- Explore Agricultural Information Systems.
- Learn Data Collection Techniques.
- Study Data Analysis.
- Familiarize with GIS and Remote Sensing.
- Understand AgTech Innovations.

Foramat-3

IIMTU-NEP IMPLEMENTATION
Year: I / Semester:I

Programme: Certificate / Diploma/ Degree/ UG/PG/PhD **Class: M.Sc. (Hort.) Fruit Science**	**Year : I** **Semester: I**
Credits:1 **Theory: 1** **Practical: 0**	**Subject: Horticulture**
Course Code: PGS-506	**Title: (E-Course) DISASTER MANAGEMENT**

Course Objectives:

- To provide basic conceptual understanding of disasters.
- To understand approaches of Disaster Management.
- To build skills to respond to disaster.

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks / Theory 1, Practical 0 = 1 Credits

L: 01
T: 00
P: 00 (In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	UNIT	No. of Lectures Allotted
I	Natural Disasters Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves. Climatic change, Global warming, Sea level rise, Ozone depletion.	4
II	Man Made Disasters-Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, Industrial wastewater pollution, road accidents, rail accidents, air accidents, sea accidents	4
III	Disasters Management- Efforts to mitigate natural disasters at national and global levels. Concept of disaster management, International strategy for disasters reduction.	4
IV	National disaster management framework, financial arrangement, role of NGOs, Community-based organizations and media. Central, state, district and local administration, Armed forces in disaster response, Disaster response: Police and other organizations.	4

Suggested Readings:

1. Disaster Management Guidelines, GOI-UND Disaster Risk Program (2009-2012)
2. Damon, P. Copola, (2006) Introduction to International Disaster Management, Butterworth Heineman.
3. Gupta A.K., Niar S.S and Chatterjee S. (2013) Disaster management and Risk Reduction, Role of Environmental Knowledge, Narosa Publishing House, Delhi.
4. Murthy D.B.N. (2012) Disaster Management, Deep and Deep Publication PVT. Ltd. New Delhi.

5. Modh S. (2010) Managing Natural Disasters, Mac Millan publishers India LTD.	
If the course is available as Generic Elective then the students of following departments may opt it.NA	
Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/Sessional Examination 2) ESE	30 70
Total:	**100**

Course Learning Outcomes:

- Students can learn the basic concepts of disasters and disaster management.
- Students can learn to evaluate disaster risk reduction and management principles and practices,
- Students can learn about the phenomenon of disaster, its different dimensions, strategies for disaster reduction.
- Students can learn about various types of disasters, their causes and impacts on communities.

Format-3

IIMTU-NEP IMPLEMENTATION
Year : I / Semester: II

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M.Sc. (Hort.) Fruit Science**	**Year: I** **Semester: II**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Horticulture**
Course Code: FSC 503	**Title:Propagation and Nursery Management in Fruit Crops**

Course Objectives:

1. To impart knowledge to the students on plant propagation by sexual and asexual method of propagation
2. To impart knowledge to the students on physiological and anatomical aspects of plant propagation
3. To impart basic knowledge of plant propagating structure
4. To know about role of plant growth regulators on germination and rooting of cutting

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 00
P: 01 (In Hours/Week)
Theory - 2 Hrs. = 2 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction: General Concepts and Phenomena: Introduction, understanding cellular basis for propagation, sexual and asexual propagation, apomixes, polyembryony, chimeras. Factors influencing seed germination of fruit crops, dormancy, hormonal regulation of seed germination and seedling growth. Seed quality, treatment, packing, storage, certification and testing	8
II	Conventional Asexual Propagation: Cutting– methods, rooting of soft and hardwood cuttings under mist and hotbeds. Use of PGR in propagation, Physiological, anatomical and biochemical aspects of root induction in cuttings. Layering – principle and methods. Budding and grafting – principles and methods, establishment and management of bud wood bank. Stock, scion and inter stock relationship graft incompatibility, physiology of rootstock and top working	8
III	Micro propagation: Micro-propagation–principles and concepts, commercial exploitation in horticultural crops. Techniques – in-vitro clonal propagation, direct organogenesis, embryogenesis, micro grafting, meristem culture, genetic fidelity testing. Hardening, packaging and transport of micro-propagules.	8

IV	Management Practices and Regulation: Nursery – types, structures, components, planning and layout. Nursery management practices for healthy propagule production. Nursery Act, nursery accreditation, import and export of seeds and planting material and quarantine.	8

Reference / Text Books:

- Bose TK, Mitra SK and Sadhu MK. 1991. Propagation of Tropical and Subtropical Horticultural Crops. NayaProkash, Kolkatta.
- Davies FT, Geneve RL and Wilson SB. 2018. Hartmann and Kester's Plant Propagation-Principles and Practices. Pearson, USA/ Prentice Hall of India. New Delhi.
- Gill SS, BAL JS and Sandhu AS. 2016. Raising Fruit Nursery. Kalyani Publishers, New Delhi. Jain S and Ishil K. 2003. Micropropagation of Woody Trees and Fruits. Springer.
- Jain S and Hoggmann H. 2007. Protocols for Micropropagation of Woody Trees and Fruits. Springer.
- Joshi P. 2015. Nursery Management of Fruit Crops in India. NIPA, New Delhi.
- Sharma RR. 2014. Propagation of Horticultural Crops. Kalyani Publishers, New Delhi.
- Sharma RR and Srivastav M. 2004. Propagation and Nursery Management. Intl. Book Publishing Co., Lucknow.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3) ESE	50
Total:	**100**

Prerequisites for the course:

Course Learning Outcomes:

CO1 Study about the different methods of cutting, budding, layering and grafting.
CO2 Learn about the process of graft union
CO3 Students are able to know about role of green house in propagation of plants
CO4 Students are able to know about role of plastic in propagating structure
CO5 Study about different rootstock used for budding and grafting

Format-3

IIMTU-NEP IMPLEMENTATION
Year : I / Semester: II

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M.Sc. (Hort.) Fruit Science**	**Year : II** **Semester: II**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Horticulture**
Course Code:FSC 504	**Title:Breeding of Fruit Crops**

Course Objectives:

1. To give students a thorough understanding of the concepts, methods, and procedures related to the improvement and breeding of fruit-bearing plants.
2. Different breeding strategies, including traditional ones (mass selection, pedigree selection, etc.) and contemporary ones (molecular breeding, biotechnology), will be explained to the students. They will discover how to successfully use these techniques to accomplish particular breeding objectives.
3. The goal of this course is normally to give students the theoretical knowledge and practical skills needed to create new and improved fruit varieties with desirable characteristics.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction-Importance, Taxonomy and Genetic Resources: Introduction and Importance, origin and distribution, taxonomical status – species and cultivars, cytogenetics, genetic resources of Mango, Banana, Pineapple, Citrus, Grapes, Litchi, Guava, Pomegranate.	8
II	Introduction-Importance,Taxonomy and Genetic Resources: Introduction and Importance, origin and distribution, taxonomical status – species and cultivars, cytogenetics, genetic resources of Papaya, Apple, Pear, Plum, Peach, Apricot, Cherries, Strawberry, Kiwifruit, Nuts	8
III	Blossom Biology and Breeding Systems: Blossom biology, breeding systems–spontaneous mutations, polyploidy, incompatibility, sterility, parthenocarpy, apomiXis, breeding objectives, ideotypes.	8
IV	Conventional and Non-Conventional Breeding: Approaches for crop improvement–direct introduction, selection, hybridization, mutation breeding, polyploid breeding, rootstock breeding, improvement of quality traits, resistance breeding for biotic and abiotic stresses, biotechnological interventions, achievements and future thrusts.	8

Reference / Text Books:

- Abraham Z. 2017. *Fruit Breeding*. Agri-Horti Press, New Delhi.
- Badenes ML and Byrne DH. 2012. *Fruit Breeding*. Springer Science, New York.
- Dinesh MR. 2015. *Fruit Breeding*, New India Publishing Agency, New Delhi.
- Ghosh SN, Verma MK and Thakur A. 2018. *Temperate Fruit Crop Breeding-Domestication to Cultivar Development.* NIPA, New Delhi.
- Hancock JF. 2008. *Temperate Fruit Crop Breeding: Germplasm to Genomics*. Springer Science, New York.
- Jain SN and Priyadarshan PM. 2009. *Breeding Plantation and Tree Crops: Tropical Species.* Springer Science, New York.
- Jain S and Priyadarshan PM. 2009. *Breeding Plantation and Tree Crops: Temperate Species*. Springer Science, New York.
- Janick J and Moore JN. 1996. *Fruit Breeding*. Vols. I–III. John Wiley & Sons, USA.
- Kumar N. 2014. *Breeding of Horticultural* Crops:Principles and Practices. NIPA, N. Delhi.
- Moore JN and Janick J. 1983. *Methods in Fruit Breeding*. Purdue University Press, USA.
- Ray PK. 2002. Breeding Tropical and Subtropical Fruits. Narosa Publ. House, New Delhi.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1. Class tasks/ Sessional Examination	30
2. Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3. ESE	50
Total:	**100**

Prerequisites for the course:

Course Learning Outcomes:

1. Recognize the significance and unique characteristics of fruit breeding
2. Be up to date on genetics, reproduction biology, and natural breeding methods.
3. Be well-versed in the various methodologies and breeding techniques for fruit crops.

IIMTU-NEP IMPLEMENTATION
Year : I / Semester: II

Programme: Certificate/Diploma/Degree/UG/PG/Ph.D. **Class: M.Sc. (Hort.) Fruit Science**	**Year: I** **Semester: II**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Horticulture**
Course Code: FSC 505	**Title:Systematic of Fruit Crops**

Course Objectives:

1. To give pupils a thorough understanding of how fruit-bearing plants are classified, diverse, taxonomically classified, and related in terms of evolution.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L:2
T: 0
P: 1 (In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Nomenclature and Classification: Biosystematics–Introduction and significance; history of nomenclature of cultivated plants, classification and nomenclature systems; International code of nomenclature for cultivated plants.	8
II	Identification and Description: Methods of identification and description of cultivated fruit and nut species and their wild relatives features; development of plant keys for systematic identification and classification.	8
III	Development of fruit crop descriptors- based upon Bioversity International Descriptors and UPOV/ DUS test guidelines, botanical and pomological description of major cultivars and rootstocks of tropical, subtropical and temperate fruits and nut crops.	8
IV	Registration and Modern Systematic: Registration, Use of Chemotaxonomy, biochemical and molecular markers in modern systematic.	8

Reference / Text Books:

1. ASHS. 1997. *The Brooks and Olmo Register of Fruit and NutVarieties*. 3rdEd. ASHS Press.
2. Bhattacharya B and Johri BM. 2004. *Flowering Plants: Taxonomy and Phylogeny*. Narosa Pub. House, New Delhi.
3. Pandey BP. 1999. *Taxonomy of Angiosperms*. S. Chand & Co. New Delhi.
4. Pareek OP and Sharma S. 2017. *Systematic Pomology*. Scientific Publishers, Jodhpur.
5. Sharma G, Sharma OC and Thakur BS. 2009. *Systematics of Fruit Crops*. NIPA, New Delhi.
6. Simpson M. 2010. *Plant Systematics*. 2ndEdn. Elsevier.
7. Spencer RR, Cross R and Lumley P. 2003. *Plant Names*. 3rdEd. *A Guide to Botanical*

Nomenclature, CISRO, Australia.
8. Zielinski QB. 1955. *Modern Systematic Pomology.* Wm. C. Brown Co., Iowa, USA.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3) ESE	50
Total:	**100**

Prerequisites for the course:

Course Learning Outcomes:
After successful completion of the course, the students would be able to
CO1: Categorise different fruit species into broad groups.
CO2: Identify various fruit cultivars on basis of distinguishing features
CO3: Characterize fruit cultivars for description, registration and protection

Format-3

IIMTU-NEP IMPLEMENTATION
Year : I / Semester: II

Programme: Certificate/Diploma/Degree/UG/PG/Ph.D. **Class: M.Sc. (Hort.) Fruit Science**	**Year: I** **Semester: II**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Horticulture**
Course Code: FSC 509	**Title: Biotechnology of Fruit Crops**

Course Objectives:

1. Understanding the principles, theoretical aspects and developing skills in biotechnology of horticultural crops

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 00
P: 01 (In Hours/Week)
Theory - 2 Hrs. = 2 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction, History and Basic Principles: Introduction and significance, history and basic principles, influence of explant material, physical, chemical factors and growth regulators on growth and development of plant cell, tissue and organ culture.	6
II	In-vitro Culture and Hardening: Callus culture – types, cell division, differentiation, morphogenesis, organogenesis, embryogenesis; Organ culture – meristem, embryo, anther, ovule culture, embryo rescue, somaclonal variation, protoplast culture.	6
III	Use of bioreactors and in-vitro methods for production of secondary metabolites, suspension culture, nutrition of tissues and cells, regeneration of tissues. Hardening and ex vitro establishment of tissue cultured plants.	6
IV	In-vitro Breeding, Transgenics and Gene Technologies: Somatic cell hybridisation, construction and identification of somatic hybrids and cybrids, wide hybridization, in-vitro pollination and fertilization, haploids, in-vitro mutation, artificial seeds, cryopreservation, In-vitro selection for biotic and abiotic stress.	6
V	Genetic engineering-principles and methods, transgenics in fruit crops, use of molecular markers and genomics. Gene silencing, gene tagging, gene editing, achievements of biotechnology in fruit crops	6

Reference / Text Books:

1. Brown TA. 2001. Gene Cloning and DNA Analysis and Introduction. Blackwell Publishing, USA.
2. Chahal GS and Gosal SS. 2010. Principles and Procedures of Plant Breeding: Biotechnological

and Conventional Approaches. Narosa, New Delhi.
3. Chopra VL and Nasim A. 1990. Genetic Engineering and Biotechnology – Concepts, Methods and Applications. OXford& IBH, New Delhi.
4. Kale C. 2013. Genome Mapping and Molecular Breeding in Plant, Vol 4. Fruit and Nuts. Springers.
5. Keshavachandran R and Peter KV. 2008. Plant Biotechnology: Tissue Culture and Gene Transfer. Orient & Longman, Universal Press, US.
6. Peter KV. 2013. Biotechnology in Horticulture: Methods and Applications. NIPA, New Delhi.

If the course is available as Generic Elective then the students of following departments may opt it.
NA.

Evaluation/Assessment Methodology

	Max. Marks
1. Class tasks/ Sessional Examination	30
2. Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3. ESE	50
Total:	**100**

Prerequisites for the course:

Course Learning Outcomes:

After the successful completion of the course, the students are expected to know

CO.1: Basic principles and methods of plant tissue culture and other biotechnological tools.
CO.2: The use and progress of biotechnology in fruit crops.
CO.3: Learn the basic methods of fruit crop improvement and limitations of fruit crop breeding.
CO.4: Hands on training on tissue culture methods, various standardizing media for embryo and ovule culture were provided
CO.5: Students were exposed to various Micro-propagation – principles and concepts, commercial exploitation in horticultural crops.

Format-3

IIMTU-NEP IMPLEMENTATION
Year : I / Semester: II

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M.Sc. (Hort.) Fruit Science**	**Year: II** **Semester: II**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Horticulture**
Course Code: VSC 504	**Title: Principles of VegetableBreeding**

Course Objectives:

1. To give students a thorough understanding of both the academic and practical sides of breeding vegetable crops for better characteristics, productivity, and sustainability.

Nature of Paper: Core
Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks /Theory 2, Practical 1 = 3 Credits

L: 3
T: 0
P: 0 (In Hours/Week)
Theory - 3 Hr. = 3 Credit
Practical- 0 Hrs.=0Credit (3Hrs./Week = 3Credits)

Unit	Contents	No. of Lectures Allotted
I	Importance and history- Importance, history and evolutionary aspects of vegetable breeding and its variation from cereal crop breeding.	6
II	Selection procedures- Techniques of selfing and crossing; Breeding systems and methods; Selection procedures and hybridization; Genetic architecture; Breeding for biotic stress (diseases, insect pests and nematode), abiotic stress (temperature, moisture and salt) resistance and quality improvement; Breeding for water use efficiency (WUE) and nutrients use efficiency (NUE).	6
III	Heterosis breeding- Types, mechanisms and basis of heterosis, facilitating mechanisms like male sterility, self-incompatibility and seX forms	6
IV	Mutation and Polyploidy breeding; Improvement of aseXually propagated vegetable crops and vegetables suitable for protected environment.	6
V	Ideotype breeding- Ideotype breeding; varietal release procedure; DUS testing in vegetable crops; Application of In-vitro and molecular techniques in vegetable improvement.Study of phanerogamic plant parasites. Epidemiology: Factors affecting disease development	6

Reference / Text Books:

- Allard RW. 1960. Principle of plant breeding. John Willey and Sons, USA. Kalloo G. 1988. Vegetable breeding (Vol. I, II, III). CRC Press, Fl, USA.
- Kole CR. 2007. Genome mapping and molecular breeding in plants-vegetables. Springer, USA. Peter K V and Pradeep
- Singh Ram J. 2007. Genetic resources, chromosome engineering, and crop improvement-vegetable crops (Vol. 3). CRC Press, Fl, USA.

- Kumar T. 1998. Genetics and breeding of vegetables. ICAR, New Delhi, p.488.
- Prohens J and Nuez F. 2007. Handbook of plant breeding-vegetables (Vol I and II). Springer, USA.
- Singh BD. 2007. Plant breeding- principles and methods (8th edn.). Kalyani Publishers, New Delhi.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1. Class tasks/ Sessional Examination	30
2. Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3. ESE	50
Total:	**100**

Prerequisite for the course

Course Learning Outcomes:

Upon successful completion of this course/paper, students should be able to:
Students are more prepared to participate in vegetable breeding research and practices in the following ways:

1. Students are better able to address the challenges of sustainable agriculture;
2. Students can contribute to the development of improved vegetable varieties;
3. Students are better able to make decisions in the area of vegetable crop improvement.

Format-3

IIMTU-NEP IMPLEMENTATION
Year : I / Semester: II

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M.Sc. (Hort.) Fruit Science**	**Year: I** **Semester:II**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Horticulture**
Course Code: STAT 511	**Title:Experimental Designs**

Course Objectives:

- Basic concepts of Experiments, designs and analysis of covariance
- Comparative experiments, need for designing of experiments
- In depth knowledge of principles of design of experiment: randomization, replication and local control
- Knowledge of completely randomized design, Randomized Block Design and Latin square design and their analysis of variance
- Balanced Incomplete Block Design (BIBD) and its parameters
- Analysis of missing plot design (Fisher's Rule),analysis of Randomized Block Design with one missing observation

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L:02
T:00
P: 01 (In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Need for designing of experiments, characteristics of a good design. Basic principles of designs- randomization, replication and local control	8
II	Uniformity trials, size and shape of plots and blocks, Analysis of variance, completely randomized design, randomized block design and Latin square design.	8
III	Factorial experiments, (symmetrical as well as asymmetrical). Orthogonally and partitioning of degrees of freedom. Concept of confounding.	8
IV	Split plot and strip plot designs, analysis of covariance and missing plot techniques in randomized block and Latin square designs; Transformations, Balanced Incomplete Block Design, resolvable designs and their applications, Lattice design, alpha design - concepts, randomization procedure, analysis and interpretation of results. Response surfaces. Combined analysis.	8

Reference / Text Books:

- Cochran WG and Cox GM. 1957. *Experimental Designs*. 2nd Ed. John Wiley.
- Dean AM and Voss D. 1999. *Design and Analysis of Experiments*. Springer.

- Montgomery DC. 2012. *Design and Analysis of Experiments*, 8th Ed. John Wiley.
- Federer WT. 1985. *Experimental Designs*. MacMillan.
- Fisher RA. 1953. *Design and Analysis of Experiments*. Oliver & Boyd.
- Nigam AK and Gupta VK. 1979. *Handbook on Analysis of Agricultural Experiments*. IASRI Publ.
- Pearce SC. 1983. *The Agricultural Field Experiment: A Statistical Examination of Theory and Practice*. John Wiley.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1. Class tasks/ Sessional Examination	30
2. Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3. ESE	50
Total:	**100**

Prerequisites for the course:

Course Learning Outcomes:

- Students will have basic knowledge of Experiments, designs and analysis of covariance
- Students will have knowledge of Comparative experiments.
- The students will be able to prepare their experimental fields on the basis of designs.
- Students can have the knowledge of completely Randomized Design, Randomized Block Design and Latin square design and their analysis of variance.
- Students can analyze their results according to the designs.

Format-3

IIMTU-NEP IMPLEMENTATION
Year : I / Semester: II

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M.Sc. (Hort.) Fruit Science**	**Year: I** **Semester: II**
Credits: 1 **Theory: 1** **Practical: 0**	**Subject: Horticulture**
Course Code: PGS 503	**Title:Intellectual Property and its Management In Agriculture**

Course Objectives:

- Knowledge, concept and introduction of Intellectual Property Right regime; TRIPs and various provisions in TRIPS Agreement
- Basics of Legislations for the protection of various types of Intellectual Properties
- Fundamentals of patents, copyrights, geographical indications, designs and layout
- Basic concepts of Protection of plant varieties and farmers' rights and bio-diversity protection, Convention on Biological Diversity; International Treaty on Plant Genetic Resources for Food and Agriculture
- Study of Licensing of technologies, Material transfer agreements, Research collaboration Agreement, License Agreement

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / 1 Credits

L:01
T:00
P: 00 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 0 Hrs.=0 Credit (1Hr./Week=1Credits)

Unit	Contents	No. of Lectures Allotted
I	Historical perspectives and need for the introduction of Intellectual Property Right regime; TRIPs and various provisions in TRIPS Agreement; Intellectual Property and Intellectual Property Rights (IPR), benefits of securing IPRs;	4
II	Indian Legislations for the protection of various types of Intellectual Properties; Fundamentals of patents, copyrights, geographical indications, designs and layout, trade secrets and traditional knowledge, trademarks, protection of plant varieties and farmers' rights and biodiversity protection.	4
III	Protectable subject matters, protection in biotechnology, protection of other biological materials, ownership and period of protection; National Biodiversity protection initiatives; Convention on Biological Diversity.	4
IV	International Treaty on Plant Genetic Resources for Food and Agriculture; Licensing of technologies, Material transfer agreements, Research collaboration Agreement, License Agreement.	4

Reference / Text Books:

- Erbisch FH and Maredia K.1998. Intellectual Property Rights in Agricultural Biotechnology. CABI.
- Ganguli P. 2001. Intellectual Property Rights: Unleashing Knowledge Economy. McGraw-Hill.
- Intellectual Property Rights: Key to New Wealth Generation. 2001. NRDC and Aesthetic Technologies.
- Ministry of Agriculture, Government of India. 2004. State of Indian Farmer. Vol.V. Technology Generation and IPR Issues. Academic Foundation.
- Rothschild M and Scott N. (Ed.). 2003. Intellectual Property Rights in Animal Breeding and Genetics. CABI.
- Saha R. (Ed.). 2006. Intellectual Property Rights in NAM and Other Developing Countries: A Compendium on Law and Policies. Daya Publ. House.
- The Indian Acts - Patents Act, 1970 and amendments; Design Act, 2000; Trademarks Act, 1999; The Copyright Act, 1957 and amendments; Layout Design Act, 2000; PPV and FR Act 2001, and Rules 2003; The Biological Diversity Act, 2002.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1. Class tasks/ Sessional Examination	30
2. ESE	70
Total:	**100**

Prerequisites for the course:

Course Learning Outcomes:

1. Concept of Intellectual Property Right regime; TRIPs and various provisions in TRIPS Agreement.
2. Knowledge of Legislations for the protection of various types of Intellectual Properties.
3. Concepts of Protection of plant varieties and farmers' rights and bio-diversity protection, Convention on Biological Diversity; International Treaty on Plant Genetic Resources for Food and Agriculture.
4. Knowledge of Convention on Biological Diversity; International Treaty on Plant Genetic Resources for Food and Agriculture.
5. Knowledge of Socio-economic impact, Research collaboration Agreement, License Agreement.

Format-3

IIMTU-NEP IMPLEMENTATION
Year : I / Semester: II

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M.Sc. (Hort.) Fruit Science**	**Year: II** **Semester: II**
Credits: 1 **Theory: 1** **Practical: 0**	**Subject: Horticulture**
Course Code: PGS 505	**Title:Agricultural Research, Research Ethics and Rural Development Programmes**

Course Objectives:

1. Appreciate the objective and principle of extension education
2. Obtain idea on various development programmes in agriculture and allied area to help farmers.
3. To enlighten the students about the organization and functioning of agricultural research systems at national and international levels, research ethics, and rural development programmes and policies of Government.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / 1 Credits

L:01
T:00
P: 00 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 0 Hrs.=0 Credit (1Hr./Week=1Credits)

Unit	Contents	No. of Lectures Allotted
I	History of agriculture in brief; Global agricultural research system: need, scope, opportunities; Role in promoting food security, reducing poverty and protecting the environment; National Agricultural Research Systems (NARS) and Regional Agricultural Research Institutions; Consultative Group on International Agricultural Research (CGIAR):	8
II	International Agricultural Research Centres (IARC), partnership with NARS, role as a partner in the global agricultural research system, strengthening capacities at national and regional levels; International fellowships for scientific mobility.	8
III	Research ethics: research integrity, research safety in laboratories, welfare of animals used in research, computer ethics, standards and problems in research ethics.	8
IV	Concept and connotations of rural development, rural development policies and strategies. Rural development programmes: Community Development Programme, Intensive Agricultural District Programme, Special group – Area Specific Programme,	8
V	Integrated Rural Development Programme (IRDP) Panchayati Raj Institutions, Co-operatives, Voluntary Agencies/ Non-Governmental Organisations. Critical	8

	evaluation of rural development policies and programmes. Constraints in implementation of rural policies and programmes.	

Reference / Text Books:

- Bhalla GS and Singh G. 2001. *Indian Agriculture - Four Decades of Development*. Sage Publ.
- Punia MS. *Manual on International Research and Research Ethics.* CCS Haryana Agricultural University, Hisar.
- Rao BSV. 2007. *Rural Development Strategies and Role of Institutions - Issues, Innovations and Initiatives*. Mittal Publ.
- Singh K. 1998. *Rural Development - Principles, Policies and Management*. Sage Publ.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1. Class tasks/ Sessional Examination	30
2. ESE	70
Total:	**100**

Prerequisites for the course:

Course Learning Outcomes:

1. Students capable, efficient and self-reliant in character.
2. They gain knowledge to help rural families in better appreciation of SWOT in the village.
3. They know about to open new opportunities for developing talents and leadership of rural people.
4. To provide knowledge and help for better management of farms and increase incomes.
5. To promote better social, natural recreational intellectual and spiritual file among the people.

Format-3

IIMTU-NEP IMPLEMENTATION
Year :II / Semester: III

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M.Sc. (Hort.) Fruit Science**	**Year:II** **Semester: III**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject Horticulture**
Course Code: FSC 510	**Title: Organic Fruit Culture**

Course Objectives:
1. To familiarize procedure and methods of fruit growing & their fundamentals.
2. To study packages and practices of planting orchard.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L:2
T: 0
P: 1 (In Hours/Week)
Theory - 2 Hr. = 2 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Principles and Current Scenario: Organic horticulture, scope, area, production and world trade, definition, principles, methods and SWOT analysis.	8
II	Farming System and Practices: Organic farming systems including biodynamic farming, natural farming, homa organic farming, rishi krishi, EM technology, cosmic farming; on-farm and off-farm production of organic inputs, role of bio-fertilizers, bio enhancers, legumes, inter cropping, cover crops, green manuring, zero tillage, mulching and their role in organic nutrition management.	8
III	Organic seeds and planting materials, soil health management in organic production, weed management practices in organic farming, biological management of pests and diseases, trap crops, quality improvement in organic production of fruit crops	8
IV	Inspection, Control Measures and Certification: Inspection and certification of organic produce, participatory guarantee system (PGS), NPOP, documentation and control, development of internal control system (ICS), Concept of group certification, constitution of grower group as per NPOP, preparation of ICS manual, internal and external Practicals	8

Reference / Text Books:

- Claude A. 2004. The Organic Farming Sourcebook. Other India Press, Mapusa, Goa, India.
- Dabholkar SA. 2001. Plenty for All. Mehta Publishing House, Pune, Maharashtra.
- Das HC and Yadav AK. 2018. Advances in Organic Production of Fruit Crops. Westville

Publishing House, New Delhi.
- Deshpande MS. 2003. Organic Farming with respect to Cosmic Farming. Mrs. Pushpa Mohan Deshpandey, Kolhapur, Maharashtra.
- Gaur AC, Neblakantan S and Dargan KS. 1984 Organic Manures. ICAR, New Delhi.
- Lampkin, N. and Ipswich, S. 1990. Organic Farming. Farming Press. London, UK.
- Lind K, Lafer G, Schloffer K, Innershofer G and Meister H. 2003. Organic Fruit Growing. CAB International.
- Palaniappan SP and Annadurai K. 2008. Organic Farming-Theory and Practice. Scientific Publishers, Jodhpur, Rajasthan, India.
- Palekar S. 2004. The Technique of Spritual Farming. Chandra Smaritee, Sai Nagar, Amrawati, Maharashtra.
- Proctor P. 2008. Biodynamic Farming and Gardening. Other India Press, Mapusa, Goa.
- Ram RA and Pathak RK. 2017. Bioenhancers. Lap Lambert Academic Publishing, AP.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3) ESE	50
Total:	**100**

Prerequisites for the course:

Course Learning Outcomes:

Upon successful completion of this course/paper, students should be able to:

CO.1: Familiarize with the concepts and practices of organic and other natural farming systems

CO.2: Generate know-how on procedures, policies and regulation for inspection and certification of organic produce

CO.3: Students learn how maintain organic farming maintain soil fertility.

Format-3

IIMTU-NEP IMPLEMENTATION
Year : II / Semester: III

Programme: Certificate/Diploma/ Degree/UG/PG/Ph.D. **Class: M.Sc. (Hort.) Fruit Science**	**Year: II** **Semester: III**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Horticulture**
Course Code: FSC 511	**Title:Export Oriented Fruit Production**

Course Objectives:

1. To equip students with the specific knowledge and abilities needed for fruit production that is effective and targeted at global markets.
2. To comprehend the worldwide market, to choose cultivars that meet quality criteria, and to organize the production of fruit crops

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 02
T: 00
P: 01 (In Hours/Week)
Theory - 2 Hrs. = 2 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Statistics and World Trade: National and international fruit export and import scenario and trends; Statistics and India's position and potentiality in world trade; eXport promotion zones in India. Government Policies	8
II	Policies, Norms and Standards: Scope, produce specifications, quality and safety standards for export of fruits, Viz., mango, banana, grape, litchi, pomegranate, walnut, apple and other important fruits. Processed and value- added products, post harvest management for export including packaging and cool chain; HACCP, Codex alimentarius, ISO certification; WTO and its implications, sanitary and phyto-sanitary measures.	8
III	Infrastructure and Plant Material: Quality fruit production under protected environment; ifferent types of structures–Automated greenhouses, glasshouse, shade net, poly tunnels – Design and development of low cost greenhouse structures	8
IV	Seed and planting material; meeting eXport standards, implications of plant variety protection – patent regimes	8

Reference / Text Books:

- Chadha KL. 1995. Advances in Horticulture. Vol. XII. Malhotra Publ. House, New Delhi.
- Dattatreylul M. 1997. Export potential of Fruits, Vegetables and Flowers from India. NABARD, Mumbai.
- Islam, C.N. 1990. Horticultural Export of Developing Countries: Past Preferences, Future

Prospects and Policies. International Institute of Food Policy Research, USA	
If the course is available as Generic Elective then the students of following departments may opt it. NA	
Evaluation/Assessment Methodology	
	Max. Marks
1. Class tasks/ Sessional Examination 2. Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report 3. ESE	30 20 50
Total:	**100**
Prerequisites for the course:	
Course Learning Outcomes: Consequent upon successful completion of the course, the students are expected to have learnt about CO.1: National and international trade scenario of fruit crops CO.2: Set norms and standards for export of fruit crops CO.3: Requisite infrastructure and growing practices meeting export standards.	

Format-3

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: III

Programme: Certificate/Diploma/Degree/UG/PG/Ph.D. **Class: M.Sc. (Hort.) Fruit Science**	**Year: II** **Semester: III**
Credits: 1 **Theory: 0** **Practical: 1**	**Subject: Horticulture**
Course Code: PGS-501	**Title: LIBRARY AND INFORMATION SERVICES**

Course Objectives:

- Knowledge and concept of different techniques of crop production
- Basics of crop growth in relation to environment and sustainability
- Knowledge of tillage (zero and minimum tillage)
- Basic concepts of crop modelling for maximizing crop yield
- Study of Cropping and farming systems for sustainable agriculture

Nature of Paper: Core

Minimum Passing Marks/Credits : 50% Marks / 1 Credits

L: 03
T: 00
P: 012(In Hours/Week)
Theory - 3 Hr. = 3 Credit
Practical- 0 Hrs.=0 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction to library and its services; Role of libraries in education, research and technology transfer.	8
II	Classification systems and organization of library; Sources of information- Primary Sources, Secondary Sources and Tertiary Sources.	8
III	Intricacies of abstracting and indexing services (Science Citation Index, Biological Abstracts, Chemical Abstracts, CABI Abstracts, etc.)	8
IV	Tracing information from reference sources; Literature survey; Citation techniques/Preparation of bibliography	8
V	Use of CD-ROM Databases, Online Public Access Catalogue and other computerized library services; Use of Internet including search engines and its resources; e- resources access methods.	8

Suggested Readings:

1. Chhidda Singh, Modern techniques of raising field crops. Oxford and IBH Publishing Co. Ltd., Bangalore.
2. Gopal Chandra De. 1980., Fundamentals of Agronomy. Oxford and IBH Publishing Co. Ltd., Bangalore, Hand book of Agriculture, ICAR Publication.
3. Palaniappan, S.P., Cropping Systems in the tropics – Principles and Practices.Willey Eastern Ltd., New Delhi. Panda, S.C., 2006.Agronomy Agribios Publication, New Delhi.

If the course is available as Generic Elective then the students of following departments may opt it.NA

Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal 3) Practical/Research Project Report/Seminar On Research Project Report 4) ESE	0 100 0
Total:	**100**

Course Learning Outcomes:

- To acquaint students with the basic concepts of information and information science.
- To understand the concept communication of information, models of communication and role of libraries in information communication in society.
- To make students understand and appreciate the concept of information society and information policies formulated for societal development.
- To get familiarize with the concepts of economics and management of information and knowledge

Format-3

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: III

Programme: Certificate/Diploma/Degree/UG/PG/Ph.D. **Class: M.Sc. (Hort.) Fruit Science**	**Year: II** **Semester: III**
Credits: 1 **Theory: 0** **Practical:1**	**Subject: Horticulture**
Course Code: PGS-502	**Title: TECHNICAL WRITING AND COMMUNICATIONS SKILLS**

Course Objectives:

- Knowledge and concept of different techniques of crop production
- Basics of crop growth in relation to environment and sustainability
- Knowledge of tillage (zero and minimum tillage)
- Basic concepts of crop modelling for maximizing crop yield
- Study of Cropping and farming systems for sustainable agriculture

Nature of Paper: Common course

Minimum Passing Marks/Credits : 50% Marks / 1 Credits

L: 0
T: 0
P: 01(In Hours/Week)
Theory - 1 Hr. = 1Credit
Practical- 2 Hrs.=1 Credit (2Hrs./Week=1Credits)

Unit	Contents	No. of Lectures Allotted
	Technical Writing-Various forms of scientific writings- theses, technical papers, reviews, manuals, etc; Various parts of thesis and researchcommunications (title page, authorship contents page, preface, introduction, review of literature, material and methods, experimental results and discussion); Writing of abstracts, summaries, précis, citationsetc.; commonly used abbreviations in the theses and research communications; illustrations, photographs and drawings with suitable captions; pagination, numbering of tables and illustrations; Writing of numbers and dates in scientific write-ups; Editing and proof-reading; Writing of a review article. Communication Skills-Grammar (Tenses, parts of speech, clauses, punctuationmarks);Erroranalysis(Commonerrors) Concord; Collocation; Phonetic symbols and transcription; Accentual pattern: Weak forms in connected speech: Participation in group discussion: Facing an interview; presentation of scientific papers.	

Suggested Readings:

1. Chicago Manual of Style. 14th Ed. 1996. Prentice Hall of India.
2. Collins' Cobuild English Dictionary. 1995. Harper Collins.
3. Gordon HM & Walter JA. 1970. Technical Writing. 3rd Ed. Holt, Rinehart & Winston.
4. Hornby AS. 2000. Comp. Oxford Advanced Learner's Dictionary of Current English. 6th Ed. Oxford University Press.

5. James HS. 1994. Handbook for Technical Writing. NTC Business Books. Joseph G. 2000. MLA Handbook for Writers of Research Papers. 5th Ed.	
If the course is available as Generic Elective then the students of following departments may opt it.NA	
Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Assignments/internal Practical/ Practical/Research Project Report/Seminar On Research Project Report 3) ESE	0 100 0
Total:	**100**

Course Learning Outcomes:

- Learn in-demand skills from university and industry experts
- Master a subject or tool with hands-on projects
- Develop a deep understanding of key concepts
- Earn a career certificate from University of Colorado Boulder

Format-3

IIMTU-NEP IMPLEMENTATION
Year: II / Semester: III

Programme: Certificate/Diploma/Degree/UG/PG/Ph.D. **Class: M.Sc. (Ag.) Horticulture**	**Year: II** **Semester: III**
Credits: 3 **Theory: 2** **Practical: 1**	**Subject: Horticulture**
Course Code: VSC 512	**Title:ProductionTechnology of Spice Crops**

Course Objectives:

1. To give students specialized information and abilities about the methods, ideas, and procedures involved in creating high-quality vegetable crop seeds.
2. To impart basic knowledge about the importance and productiontechnology of spices grown in India.

Nature of Paper: Core/DSE/SEC/GE/AECC: Core, DSE, SEC, GE, Research Projects and Prerequisite/Remedial courses

Minimum Passing Marks/Credits: 50% Marks / Theory 2, Practical 1 = 3 Credits

L: 2
T: 0
P: 1 (In Hours/Week)
Theory - 2 Hrs. = 2 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=3Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction, importance of spice crops-historical accent, present status -national and international, future prospects, botany and taxonomy, climaticand soil requirements, commercial varieties/hybrids, site selection, layout,sowing/planting times and methods, seed rate and seed treatment,nutritional and irrigation requirements, intercropping, mixed cropping,intercultural operations, weed control, mulching, physiologicaldisorders,harvesting, post harvest management, plant protection measuresand seed planting material and micro-propagation, precision farming,organic resource management, organic certification, quality control,pharmaceutical significance and protected cultivation of **Black pepper and cardamom**	7
II	Introduction, importance of spice crops-historical accent, present status -national and international, future prospects, botany and taxonomy, climaticand soil requirements, commercial varieties/hybrids, site selection, layout,sowing/planting times and methods, seed rate and seed treatment,nutritional and irrigation requirements, intercropping, mixed cropping,intercultural operations, weed control, mulching, physiologicaldisorders,harvesting, post harvest management, plant protection measuresand seed planting material and micro-propagation, precision farming,organic resource management, organic certification, quality control,pharmaceutical significance and protected cultivation of **Clove, cinnamon and allspice**	7

III	Introduction, importance of spice crops-historical accent, present status -national and international, future prospects, botany and taxonomy, climaticand soil requirements, commercial varieties/hybrids, site selection, layout,sowing/planting times and methods, seed rate and seed treatment,nutritional and irrigation requirements, intercropping, mixed cropping,intercultural operations, weed control, mulching, physiologicaldisorders,harvesting, post harvest management, plant protection measuresand seed planting material and micro-propagation, precision farming,organic resource management, organic certification, quality control,pharmaceutical significance and protected cultivation of **Turmeric, ginger and garlic**	6
IV	Introduction, importance of spice crops-historical accent, present status -national and international, future prospects, botany and taxonomy, climaticand soil requirements, commercial varieties/hybrids, site selection, layout,sowing/planting times and methods, seed rate and seed treatment,nutritional and irrigation requirements, intercropping, mixed cropping,intercultural operations, weed control, mulching, physiologicaldisorders,harvesting, post harvest management, plant protection measuresand seed planting material and micro-propagation, precision farming,organic resource management, organic certification, quality control,pharmaceutical significance and protected cultivation of**Coriander, fenugreek, cumin, fennel and celery**	6
V	Introduction, importance of spice crops-historical accent, present status -national and international, future prospects, botany and taxonomy, climaticand soil requirements, commercial varieties/hybrids, site selection, layout,sowing/planting times and methods, seed rate and seed treatment,nutritional and irrigation requirements, intercropping, mixed cropping,intercultural operations, weed control, mulching, physiologicaldisorders,harvesting, post harvest management, plant protection measuresand seed planting material and micro-propagation, precision farming,organic resource management, organic certification, quality control,pharmaceutical significance and protected cultivation of**Tamarind and vanilla**	6

Reference / Text Books:

- Agarwal S, Sastry EVD & Sharma RK. 2001. Seed Spices:
- Production,Quality, Export. Pointer Publ.
- Arya PS. 2003.Spice Crops of India. Kalyani.
- Bhattacharjee SK. 2000. Hand Book of Aromatic Plants. Pointer Publ.
- Bose TK, Mitra SK, Farooqi SK & Sadhu MK (Eds.). 1999. Tropical
- Horticulture. Vol.I. NayaProkash.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	30
2) Presentations /Seminar/Assignments/internal Practical/Research Project Report/Seminar On Research Project Report	20
3) ESE	50
Total:	**100**

Course Learning Outcomes:

- Able to understand about the basic criteria for selection of under exploited vegetable crops on the basis of soil and climate requirement.
- Learn the basic knowledge regarding different cultural practices followed for underutilized vegetable crops
- Able to know about sowing time of specific varieties for different under exploited vegetables according to region and season.
- Study of irrigation and nutrient management and their applications in production of under exploited vegetable crops
- By the end of course students will be able to know different physiological disorders of under exploited vegetables and can control different insect pests and diseases.