K.R. MANGALAM UNIVERSITY

THE COMPLETE WORLD OF EDUCATION

SCHOOL OF AGRICULTURAL SCIENCES

(SOAS)

BACHELOR OF SCIENCE (HONS)

AGRICULTURE

Programme Code: 82

2021-25

Approved in the 26th Meeting of Academic Council Held on 11 August 2021

Academic Council
Member Secretary
K.R. Mangalam University

Registrar
K.R. Mangalam University
Road, Gurugram, (Haryana)

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Preamble

The objective of the School of Agricultural Science is to prepare their students for B.Sc. (Hons.) Agriculture degree to help the farming society at large. The KR Mangalam University envisions all its programmes in the best interest of its students and in this endeavour; it offers a new vision to all its Under-Graduate courses. It imbibes a Learning Outcome-based Curriculum Framework (LOCF) for all its Undergraduate programmes. The LOCF approach is envisioned to provide a focused, outcome- based syllabus at the undergraduate level with an agenda to structure the teaching-learning experiences in a more student-centric manner. The LOCF approach has been adopted to strengthen students' experiences as they engage themselves in the programme of their choice. The Under-Graduate Programmes will prepare the students for both, academia and employability. Each programme vividly elaborates its nature and promises the outcomes that are to be accomplished by studying the courses. The programmes also state the attributes that it offers to inculcate at the graduation level.

The values related to well-being, emotional stability, critical thinking, social justice and also skills for employability. In short, each programme prepares students for sustainability and life-long learning. The new curriculum of B.Sc. (Hons.) Agriculture offers in depth knowledge of ever-changing field of agriculture with focus on latest development through policy intervention, global integration and technological disruption related to smart agriculture.

After pursuing this course, the students will get expertise in the field of agriculture in general with specialization in the specific fields of Horticulture, Plant protection, Crop Production, Organic farming, Bee Keeping, Poultry farming etc. The KR Mangalam University hopes the LOCF approach of the programme B.Sc. (Hons.) Agriculture will help the students in making decisions to feed the increasing bellies from continuously squeezing land and tackling the issues like declining crop productivity etc., the emergence and adoption of innovative technologies and technical knowhow in the field of agriculture remain the only solution of the problem. To achieve the desired and required targets, the need of hour is to prepare agricultural graduates and postgraduates with latest knowledge along with innovative and modern research experience in agricultural and allied fields. The innovative and modern agricultural technology applied at farmer's field will ultimately help the students in achieving the goals.

Preparedby

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1. Introduction

The K.R. Mangalam Group has made a name for itself in the field of education. Over a period of time, the various educational entities of the group have converged into a fully functional corporate academy. Resources at KRM have been continuously upgraded to optimize opportunities for the students. Our students are groomed in a truly inter-disciplinary environment wherein they develop integrative skills through interaction with students from engineering, management, journalism and media studystreams.

The K.R. Mangalam story goes back to the chain of schools that offered an alternative option of world-class education, pitching itself against the established elite schools, which had enjoyed a position of monopoly till then. Having blazed a new trail in school education, the focus of the group was aimed at higher education. With the mushrooming of institutions of Higher Education in the National Capital Region, the University considered it very important that students take informed decisions and pursue career objectives in an institution, where the concept of education has evolved as a natural process.

K.R. Mangalam University was founded in the year 2013 by Mangalam Edu Gate, a company incorporated under Section 25 of the Companies Act, 1956.

K. R. Mangalam University is unique because of its

i. Enduring legacy of providing education to high achievers who demonstrate leadership in diversefields.
ii. Protective and nurturing environment for teaching, research, creativity, scholarship, social and economicjustice.

Objectives

i. To impart theoretical and practical knowledge about agriculture to undergraduate, post-graduate and Doctoral education.
ii. To undertake research programmes in identified fields of agriculture with agricultural and industrial interface.
iii. To integrate its growth with the global needs and expectations of the major stake holders through teaching, research, exchange & collaborative programmes with foreign, IndianUniversities.
iv. To act as a nodal centre for transfer of technology to the farmers and industries.
v. To provide job oriented professional education to the student community with particular focus on Haryana.

2. About School (School of Agricultural Sciences)

School of Agricultural Sciences at K. R. Mangalam University is fully equipped with the facilities of laboratories agriculture farms to carry out the Teaching, Practical and Research work. All the faculty members are well qualified (Ph.D. in their respective fields) and well experienced. The faculty remains in constant touch with various experts in the relevant fields and is willing to experiment with latest ideas in teaching and research.

School of Agricultural Sciences imparts students technical knowledge, enhances their practical skill and ability, motivating them to think creatively, helping them to act independently and take decisions accordingly in all their technical pursuits and other endeavours. It strives to empower its students and faculty members to contribute to the development of society and Nation.

School Vision

Aspires to become an internationally recognized School through excellence in interdisciplinary education, research, and innovation, preparing socially responsible life-long learners contributing to nation building.

School Mission

- Foster employability and entrepreneurship through inter-disciplinary curriculum and progressive pedagogy with cutting-edgetechnology.
- Install nation of lifelong learning through stimulating research, Outcomes-based education and innovative thinking.
- Integrate global needs and expectations through collaborative programs with premier universities, research centres, industries and professionalbodies
- Enhance leadership qualities among the youth having understanding of ethical values and environmentalreality.

Graduate Attributes

Critical Thinking, Good attitude and high values, Clear Communication, Excellent Creativity and innovation.

2 Programmes offered by the School

2.1 Department of Agriculture Science

Department of Agriculture Science on inception in the year 2019 has started the undergraduate Degree programme of B.Sc. (Hons.) Agriculture. It is designed to impart theoretical, practical knowledge and extension work. The hands-on experience helps to enrich student's skills and competence, as required by the industries and farmers today.

Realizing the potential of Agricultural Technology industry and rising food demands and in lined requirement of trained human resource, the course of B.Sc. (Hons.) Agriculture has

been developed. The School of Agricultural Sciences provides knowledge on a wide array of agricultural sciences and its related areas. Students will gain fundamental skills and knowledge in agriculture and related domains. The programme focuses on developing professional capabilities, skills and competence required in the field of agriculture. The Courses are composed of theory classes and practical in labs as well as on agriculture farms. The students are exposed to farmers' fields and attached with the farmers in the villages and agri-based Industries. Lab's work, site visits, seminars, workshops and educational tours in different Indian Agriculture Universities along with excursion tours are aimed to develop conceptual and analytical abilities of students as well as giving them practical and real time experience. The students are being trained in Agri- based and entrepreneurial skills like Organic farming, Herbal and Medicinal plant cultivation, Protected cultivation, Bee-keeping, Mushroom cultivation and Value-added Fruit and Vegetable Productspreparation.

Eligibility Criteria: Candidate must have pasesd 10+2 with 50% marks in PCB/PCM/ Agriculture with English as a compulsory subject from a recognized State or Central Board or Equivalent.

Course Outline

Agriculture Courses: Agronomy, Agro-Meteorology, Crop Physiology, Soil Science, Organic Farming, Entomology, Plant Pathology, Plant Breeding, Horticulture, Vegetables Science, Forestry, Livestock Production and Poultry Management, Agriculture Economics and Extension Education and Labs work in all these respective courses. For specialization twelve Introduction courses viz., Agribusiness Management, Agrochemicals Commercial Plant Breeding,Land scaping,Food Safety and Standards,Bio-Pesticides and Bio-fertilizers,

Protected Cultivation, Micro Propagation Technologies, Hi-Tech Horticulture, Weed Management System, Simulation and Agro advisory Agricultural journalism have been kept and out of these the students can opt any of three courses. In addition to this, students are attached with the farmers in villages and Agri-based Industries for job oriented practical.

Basic Sciences Courses: Basic Mathematics, Elementary Biology, Biochemistry, Microbiology, Rural Sociology and Educational Psychology.

Program Educational Objectives (PEOs)

PEO 1: Graduate will impart theoretical and practical knowledge, skills and competency related to the various disciplines of agriculture and allied sciences.
PEO 2: To undertake research programmes in identified fields of agriculture with agricultural and industrial interface.
PEO 3: Graduate will be agricultural professionalsor experts who will help to solve technological as well as production problems in the agriculture and allied fields
PEO 4: To integrate its growth with the global needs and expectations of the major stake holders through teaching, research, exchange & collaborative programmes with foreign, IndianUniversities.
PEO 5: To act as a nodal center for transfer of technology to the farmers andindustries.

PEO 6: To provide job oriented professional education to the student community with particular focus onHaryana.

PEO 7: To impart detailed knowledge of agriculture in India and Indian farmers' income generating enterprises.

PEO 8: Graduate will get detailed knowledge of agricultural market and marketing produce.

Program Outcomes (PO)

PO1: Acquire knowledge about various crops: Demonstrate knowledge and understanding of essential facts, concepts, principles and theories relating to Soil Science, Agronomy, Horticulture, Genetics and Plant Breeding, Plant Pathology, Entomology and other such areas of agriculture.

PO2: Acquire Professional knowledge: Understanding the value and processes of life-long learning and professional development.

PO3: Acquire knowledge of Communication & Extension Skills: Developing appropriate communication skills for effective transfer of knowledge and technologies through extension programs.

PO4: Acquire knowledge of Entrepreneurship Skills: Understanding the processes of setting up and managing viable business ventures.

PO5: Helps in inculcation of Teamwork: Play effective roles in multidisciplinary teams.

PO6: Educational Leadership: Recognize and meet emerging agriculture challenges of global society in the 21st century and developing leadership and strong linkages in the agro-industrialsetup.

PO7: Acquire knowledge of Data Handling: Collect, analyse and interpret scientific data.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the scientific practice.

PO9: Acquire knowledge of how to guide farmers: The raising the income of farmers with forestry, poultry, organic farming, bee farming and mushroom cultivation etc.

PO10: Having an ability: to apply mathematics and science in agricultural applications

PO11: Having a clear understanding: of the subject related concepts and of contemporary issues.

PO12. Having an ability to use techniques: skills and modern engineering tools necessary for agricultural practices

PO13. Having interest: in lifelong learning.

Career Options

Government Jobs in State Department of Agriculture as Agricultural Development Officer, Agriculture Inspector, Horticulture Development Officer, District Horticulture Officer, Soil Conservator, Soil Testing Officer, Plant Protection Inspector, Plant Protection Officer. Plant Protection Quarantines, National Diary Institutes, and Jobs in finance sector/institutes like Banks and NABARD as Agriculture Assistant, Agriculture Development Officer,

Jobs in Corporate sectors as Food Corporation of India, State warehouses, fertilizer companies like IFFCO, NFL, National and State, Seed Companies like National Seed Corporation, Haryana Seed Development Corporation, Central State Farms, Indo –Israeli,

Precision Farming projects. • Private Seed Companies like MAHYCO and Pioneer Seed Company Pesticide Companies like BAYER, HIL, SYNGENTA, DOW, CYNAMID INDIA LTD, LUPIN and Biotech International PVT Ltd etc.,

Self-Entrepreneurships as business in agriculture inputs like Fertilizers, Seed, Pesticides, Mushroom cultivation and high value fruit crop production like Strawberry cultivation, Poultry, Piggery Farms and Organic Farming etc., Jobs in National and International Universities/Institutions after PG as Scientist or Professor, Can Appear in all National and state competitive examinations, To excel in all above positions, it requires a high level skill and competence in respective field, high standard personal grooming and presentation.

4. Programme Duration

The minimum period required for the B.Sc. (Hons.) Agriculture Programme offered by the University shall extend over a period of four Academic Years, i.e., 8 semesters. The Programme will be considered completed when the candidate has earned minimum courses and credits required by the Programme curriculum.

5. Class Timings

The classes will be held from Monday to Friday from 9:10 am to 4:00 pm.

6. Syllabi

B.Sc. (Hons.) Agriculture

PROGRAMME SPECIFIC OUTCOMES (PSOs)

After the completion of B. Sc (Hons.) Agriculture programme, the students will be competent in:

PSO1: Applying the knowledge of crop cultivation, crop improvement, soil and crop management for sustainable organic agricultural production and development. Impart knowledge and understanding of fundamental concepts and techniques of maintaining and enhancing soil fertility, crop production, crop management, crop improvement.

PSO2: Analyzing and identifying complex agricultural problems and formulating ethical solutions using the principles of agricultural science, engineering, business and finance to develop profitable agricultural system.

PSO3: Developing innovative processes, products, and technologies to meet the challenges in agriculture and farmingpractice

The syllabi of all courses for B.Sc. (Hons.) Agriculture offered by SOAS are given in the following pages. For each course, the first line contains; Course Code, Tittle and Credits (C) of the course. This is followed by the course overview, objectives, syllabus (Theory and Practical), suggested readings (Textbook and Reference Books etc.

Four-year B.Sc. (Hons) Agriculture Programme at a Glance

Semester	Courses	Credits
Semester I	11	27
Semester II	9	24
Semester III	10	24
Semester IV	11	25
Semester V	11	23
Semester VI	12	26
Semester VII	2 MODULES+1(ELP)	22
Semester VIII	RAWE(Village attachment+ Plant Clinic) + AIA	20

Total: 191

Schemes of Syllabus – B.Sc. (Hons.) Agriculture

1st Year/ Semester I							Practical Exam	Total Marks
Sr. No.	Paper code	Subject/Paper Title	Credits	Theory Examination				
				Eval.1	Eval.2	End Term Exam		
1.	SAAG117A	Introductory Agro-Meteorology and Climate Change	2(1+1)	10	10	30	50	100
2.	UCIT131A	Introduction to Computer and IT Office Automation	4(4+0)	20	20	60	Nil	100
3.	SAAG121A	Agricultural Heritage	1(1+0)	20	20	60	Nil	100
4.	SAAG119A	Fundamentals of Entomology	4(3+1)	15	15	40	30	100
5.	SAAG107A	Fundamentals of Smart Agriculture	2(2+0)	20	20	60	Nil	100
6.	SAAG120	Fundamentals of Soil Science	3(2+1)	15	15	40	30	100
7.	SAEL155A	Communication Skills	4(4+0)	20	20	60	Nil	100
8.	SAMA149A	Introduction To Statistical Methods	2(2+0)	20	20	60	Nil	100
9.	SAMA163A or SAAG111A	Basics of Mathematics OR Introductory Biology (Optional)	2(2+0) OR 2(1+1)	20 OR 10	20 OR 10	60 OR 30	Nil OR 50	100 OR 100
10.	SADM301A	Disaster Management	3(3+0)	20	20	60	Nil	100
11.	NSS/NCC	NSS*	NC					
		Total	**27**					

Note: Students from biology in +2 will optElementary Math and Students from math will opt for Biology

***Non credit course**

1st Year/ Semester II							Practical Exam	Total Marks
Sr. No.	Paper code	Subject/Paper Title	Credits	Theory Examination				
				Eval.1	Eval. 2	End Term Exam		
1.	SAAG102A	Introduction to the use of sensors and artificial Intelligence in Agriculture	2(1+1)	10	10	30	50	100
2.	SAAG104A	Fundamentals of Agronomy	3(2+1)	15	15	40	30	100
3.	SAAG106A	Fundamentals of Plant Biochemistry and Biotechnology	3(2+1)	15	15	40	30	100
4.	SAAG108A	Fundamentals of Genetics	3(2+1)	15	15	40	30	100
5.	SAAG110A	Fundamentals of Agricultural Extension Education	3(2+1)	15	15	40	30	100
6.	SAAG112A	Fundamentals of Agricultural Microbiology	3(2+1)	15	15	40	30	100
7.	SAAG114A	Soil and Water conservation Engineering	2(1+1)	10	10	30	50	100
8.	SAAG118A	Fundamentals of Rural Sociology and Educational Psychology	2(2+0)	20	20	60	Nil	100
9.	SACH125A	Environmental Studies	3(3+0)	20	20	60	Nil	100
		Total	**24**					

List of Value added Courses: Non Credits

1. **VAC104-** Etiquette For Professionals
2. **VAC113-** Leadership Development
3. **VAC114-** Enhance Speaking and Writing Skills
4. **VAC116-**Understanding Research
5. **VAC117-**Sustainability Through Organic Kitchen Gardening
6. **VAC118-**Basic Software for Graduate Students
7. **VAC119-** Reshaping Intelligent Business and Industry: Convergence of AI and MI
8. **SEED544A-** Gandhian Philosophy
9. **SLHA132A-** French –li

2nd Year/ Semester III							Practical Exam	Total Marks
Sr. No.	Paper code	Subject/Paper Title	Credits	Theory Examination				
				Eval.1	Eval. 2	End Term Exam		
1.	SAAG201A	Crop Production Technology-I (Kharif Crops)	2(1+1)	10	10	30	50	100
2.	SAAG203A	Fundamentals of Crop physiology	2(1+1)	10	10	30	50	100
3.	SAAG204A	Fundamentals of Plant Breeding	3(2+1)	15	15	40	30	100
4.	SAAG205A	Fundamentals of Horticulture	2(1+1)	10	10	30	50	100
5.	SAAG207A	Introduction to Forestry	2(1+1)	10	10	30	50	100
6.	SAAG209A	Livestock and Poultry Management	4(3+1)	15	15	40	30	100
7.	SAAG213A	Renewable Energy and Green Technology	2(1+1)	10	10	30	50	100
8.	SAAG215A	Fundamentals of Plant Pathology	3(2+1)	15	15	40	30	100
9.	SAAG217A	Agriculture Finance and Cooperation	2(2+0)	20	20	60	Nil	100
10.	SAAG219A	Production Technology for Ornamental Crops, MAP and Landscaping	2(1+1)	10	10	30	50	100
		Total	**24**					

List of Value added Courses: Non Credits

1. **VAC111-** Fashion Event Management
2. **VAC129-** Basic Statistics
3. **VAC130-**Ancient Science
4. **VAC134-**3 D Printing Technology
5. **VAC137-** Service Learning Through Community Outreach
6. **VAC138-** Time management and Self-Regulation
7. **VAC139-** Science of Happiness
8. **VAC140-**Role of Bio fertilizers and Bio-Pesticides in Organic Farming
9. **VAC141-** Basics of Cooking
10. **VAC142-** Human Values and Sociology
11. **VAC144-** Sensitization Towards Law Related to Vulnerable Group
12. **VAC145-** Cyber Crime With Special reference To Social Media
13. **SMMC651**- Leadership Development

2nd Year/ Semester IV							Practical Exam	Total Marks
Sr. No.	Paper code	Subject/Paper Title	Credits	Theory Examination				
				Eval.1	Eval.2	End Term Exam		
1.	SAAG211A	Crop Production Technology –2 (Rabi Crops)	2(1+1)	10	10	30	50	100
2	SAAG212A	Production Technology for Vegetable and Spice Crops	2(1+1)	10	10	30	50	100
3	SAAG210A	Principles of Seed Technology	3(2+1)	15	15	40	30	100
4	SAAG214A	Farm Machinery and Power	2(1+1)	10	10	30	50	100
5	SAAG208A	Fundamentals of Agricultural Economics	2(2+0)	20	20	60	Nil	100
6.	SAAG206A	Production Technology of Fruits and Plantation Crops	3(2+1)	15	15	40	30	100
7.	SAAG216A	Agricultural Marketing Trade & Prices	3(2+1)	15	15	40	30	100
8.	SAAG218A	Problematic Soils and their Management	2(1+1)	10	10	30	50	100
9.	SAAG220A	Agriculture Informatics	2(2+0)	20	20	60	Nil	100
10.	SAAG202A	Farming System and Sustainable Agriculture	1(1+0)	20	20	60	Nil	100
11.	SAAG221A - SAAG232A	Elective	3(2+1)	15	15	40	30	100
		Total	**25**					

List of Value added Courses: Non Credits

1. **VAC104-** Etiquette For Professionals
2. **VAC120-** Understanding the Union Budget
3. **VAC124-** Business Simulation by Cesim
4. **VAC126-**Contemporary Issues Under Copyright Law
5. **VAC133-**Employbility and Analytical Skills III
6. **VAC136-**Life Skills Education
7. **VAC143-**English for Competitive Exams
8. **VAC148-** Sustainability In Interiors
9. **VAC149-**Skill Development for Technical Interviews
10. **VAC150-** Introduction to Indian Classical and Western Music
11. **SMMC651A-** Leadership Development

3rd Year/ Semester V							Practical Exam	Total Marks
Sr. No.	Paper code	Subject/Paper Title	Credits	Theory Examination				
				Eval. 1	Eval. 2	End Term Exam		
1.	SAAG301A	Principles of integrated disease management	2(1+1)	10	10	30	50	100
2.	SAAG303A	Pests of crops and stored grains and their management	3(2+1)	15	15	40	30	100
3	SAAG313A	Diseases of field and horticultural crops and their management I	3(2+1)	15	15	40	30	100
4.	SAAG305A	Crop improvement - 1 (Kharif Crops)	2(1+1)	10	10	30	50	100
5.	SAAG307A	Geoinformatics and Nanotechnology and Precision farming	2(1+1)	10	10	30	50	100
6.	SAAG308A	Intellectual Property rights	1(1+0)	20	20	60	Nil	100
7.	SAAG309A	Practical Crop Production - I (Kharif Crops)	2(0+2)	Nil	Nil	Nil	100	100
8.	SAAG311A	Rainfed Agriculture and Watershed Management	2(1+1)	10	10	30	50	100
9.	SAAG321A	Human Values and Ethics	1(1+0)	20	20	60	Nil	100
10	SAAG314A	Post-harvest management and value addition of fruits and vegetables	2(1+1)	10	10	30	50	100
11	SAAG221A - SAAG232A	Elective	3(2+1)	15	15	40	30	100
		Total	**23**					

3rd Year/ Semester VI							Practical Exam	Total Marks
Sr. No.	Paper code	Subject/Paper Title	Credits	Theory Examination				
				Eval.1	Eval. 2	End Term Exam		
1.	SAAG302A	Manures, Fertilizers and soil fertility management	2(1+1)	10	10	30	50	100
2.	SAAG304A	Diseases of field and horticultural crops -II	3(2+1)	15	15	40	30	100
3.	SAAG306A	Entrepreneurship Development and business communication	2(2+0)	20	20	60	Nil	100
4.	SAAG315A	Management of beneficial insects	2(1+1)	10	10	30	50	100
5.	SAAG312A	Protected Cultivation and Secondary Agriculture	2(1+1)	10	10	30	50	100
6.	SAAG316A	Principles of organic farming	2(1+1)	10	10	30	50	100
7.	SAAG317A	Crop Improvement-II (Rabi Crops)	2(1+1)	10	10	30	50	100
8.	SAAG318A	Farm management, Production and Resource Economics	2(1+1)	10	10	30	50	100
9.	SAAG319A	Practical Crop Production-II (Rabi Crops)	2(0+2)	Nil	Nil	Nil	100	100
10.	SAAG322A	Principles of Food Science and Nutrition	2(2+0)	20	20	60	Nil	100
11.	SAAG221A - SAAG232A	Elective	3(2+1)	15	15	40	30	100
		Total	**24**					

4th Year/ Semester VII (Students will opt Any Two Modules)							Practical Exam	Total Marks
Sr. No.	Paper code	Subject/Paper Title	Credits	Theory Examination				
				Eval. 1	Eval. 2	End Term Exam		
1.	SAAG401A	Commercial Beekeeping	10 (0+10)	Nil	Nil	Nil	100	100
2.	SAAG402A	Commercial Sericulture	10 (0+10)	Nil	Nil	Nil	100	100
3.	SAAG403A	Production Technology for Bioagents and Biofertilizers	10 (0+10)	Nil	Nil	Nil	100	100
4.	SAAG404A	Commercial Horticulture	10 (0+10)	Nil	Nil	Nil	100	100
5.	SAAG405A	Floriculture and Landscaping	10 (0+10)	Nil	Nil	Nil	100	100
6.	SAAG406A	Food Processing	10 (0+10)	Nil	Nil	Nil	100	100
7.	SAAG407A	Mushroom Cultivation Technology	10 (0+10)	Nil	Nil	Nil	100	100
8.	SAAG408A	Seed Production and Technology	10 (0+10)	Nil	Nil	Nil	100	100
9.	SAAG409A	Organic Crop Production Technology	10 (0+10)	Nil	Nil	Nil	100	100
10	SAAG410A	Soil, Plant, Water and Seed Testing	10 (0+10)	Nil	Nil	Nil	100	100
11	SAAG411A	Poultry Production Technology	10 (0+10)	Nil	Nil	Nil	100	100
12	SAAG412A	Agriculture Waste Management	10 (0+10)	Nil	Nil	Nil	100	100
13	SAAG413A	(Evaluation of Experiential Learning Programme (ELP)	2(0+2)	-	-	-	100	100
		Total	**22**					

Note: A student has to register 20 credits opting for any two modules 10 (0+10) credits each (Total 20 Credits) from the above-mentioned modules. In addition to this the module Experimental Learning Programme (ELP) of credits 2 is compulsory for all students.

4th Year/ Semester VIII							Practical Exam	Total Marks
Sr. No.	**Paper code**	**Subject/Paper Title**	**Credits**	**Theory Examination**				
				Eval.1	**Eval .2**	**End Term Exam**		
1.	SAAG414 A	Rural Agriculture Work Experience and Agro industries Attachment- **Component-I**	14 (0+14)	Nil	Nil	Nil	100	100
3.	SAAG415 A	Rural Agriculture Work Experience and Agro industries Attachment- **Component-II**	6(0+6)	Nil	Nil	Nil	100	100
		Total	**20**					

9. ELECTIVE COURSES

Elective Courses: A student can select three elective courses out of the following and offered during 4th, 5th and 6th semesters.

S. No.	Paper Code	Courses	Credits	Theory Examinations			Practical Exam	Total Marks
				Eval. 1	Eval.2	End Term Exam		
11.	SAAG221A	Agribusiness Management	3 (2+1)	15	15	40	30	100
2.	SAAG222A	Agrochemicals	3 (2+1)	15	15	40	30	100
3.	SAAG223A	Commercial Plant Breeding	3 (1+2)	15	15	40	30	100
4.	SAAG224A	Landscaping	3 (2+1)	15	15	40	30	100
5.	SAAG225A	Food Safety and Standards	3 (2+1)	15	15	40	30	100
6.	SAAG226A	Biopesticides & Biofertilizers	3 (2+1)	15	15	40	30	100
7.	SAAG227A	Protected Cultivation	3 (2+1)	15	15	40	30	100
8.	SAAG228A	Micro propagation Technologies	3 (1+2)	15	15	40	30	100
9.	SAAG229A	Hi-tech. Horticulture	3 (2+1)	15	15	40	30	100
10.	SAAG230A	Weed Management	3 (2+1)	15	15	40	30	100
11.	SAAG231A	System Simulation and Agro-advisory	3 (2+1)	15	15	40	30	100
12.	SAAG232A	Agricultural Journalism	3 (2+1)	15	15	40	30	100

Semester 1, Course Syllabi

Course Code	Course Title	L	T	P	C
SAAG117A	Introductory agro-meteorology and climate change	1	0	1	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

1. To study the agricultural meteorological aspects.
2. To study the environmental factors responsible for agriculture production
3. To study the climatic disasters and their management in better crop growth.
4. To study the rain precipitation, soil radiations and global warming.
5. To make prediction for future climatic and weather conditions related to crop growth and crop pests and diseases outbreaks

Course Outcomes: The students will learn from this course about

CO1: The best climatic conditions for crops

CO2: Forecasting the favorable and unfavorable conditions for healthy agriculture.

CO3: Factors responsible for crop production

CO4: Rainfall, soil radiation and global warming

Catalogue Description

This subject has been designed to impart knowledge on weather parameters and climate conditions. This subject emphasizes the non-living climatic and weather factors important from agriculture point of view. This course will help in making the weather predictions which help in better crop production.

Course Content

Theory:

Unit –1

- Definition and importance of agricultural meteorology, meaning and scope and relevance of agriculturalmeteorology
- Its composition, extent and structure, atmospheric pressure, daily and seasonal variation of wind speed anddirection,
- Cyclones, anticyclones and airmasses

- Nature and properties of solar radiation, solar constant, depletion of solar radiation,

Unit -2

- Short wave and thermal radiation, net radiation,albedo
- Atmospheric temperature, daily and seasonal variations of temperature
- Heat balance of earth and global warming
- Atmospheric humidity, concept of saturation, vapour pressure

Unit -3

- Process of condensation, formation of dew, fog, mist, frost, snow, rain and hail, precipitation
- Cloud formation and movement, evaporation and evapo transpiration
- Agriculture and weather relations, Introduction to monsoon
- Impact of climate on crop production, livestock

Unit -4

- Agro-climatic requirements of major crops of Haryana (rice,wheat,
- Pearl millet, sorghum, mustard andcotton
- Crop microclimate and its modification
- Weather forcasting and its types (Learn by Agromet DSS software)
- Agroclimatic zones of Haryana andIndia,
- Concept of climate change and global warming
- Introduction to remote sensing and GIS

Practical

Agro-meteorological observatory – its site selection, installation and exposure to instruments, weather data recording; measurement of total solar radiation, short wave and long wave radiation, albedo and sunshine duration; Maximum and minimum ambient temperature, soil temperature, dew point temperature; Determination of vapour pressure, relative humidity, atmospheric pressure, wind speed and wind direction; Measurement of rain, open pan evaporation and evapo-transpiration, Processing, tabulation and presentation of weather data.

Textbooks

1. Khadekar, S.R. 2001. Meteorology. Agromet publishers, Nagpur
2. PrasadaRao, G.S.L.H.V. 2005. Agricultural Meteorology. Second Edition. Kerala Agricultural University,Thrissur

Reference Books/Materials

1. Varshneya, M.C. and Balakrishna Pillai, B. 2003. Textbook of Agricultural Meteorology. ICAR, New Delhi.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination Examination Scheme:

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	10	10	30	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	The best climatic conditions for crops	PO1, PSO2
CO2	Forecasting the favorable and unfavorable conditions for healthy agriculture.	PO7
CO3	Factors responsible for crop production	PO10, PSO2
CO4	Rainfall, soil radiation and global warming	PO12

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO 1	PSO 2	PSO 3
SAAG117A	Introductory agro-meteorology	CO1						CO2			CO3		CO4		CO1	CO3	

Programme and Course Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1		3									3			
CO2							1							
CO3		1												
CO4		2				2								
CO5									3					
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course code	Course title	L	T	P	C
UCIT131A	Introduction to Computers & IT Office Automation	4	0	0	4
Version 1.0					
Pre-requisites/Exposure	Basics of Computer				
Co-requisites	--				

Course Objectives

1. To introduce IT in a simple language to all undergraduate students, regardless of their specialization.
2. To pursue specialized programs leading to technical and professional careers and certifications in the ITindustry.
3. To introduce skills relating to IT basics, computer applications, programming, interactive media, Internet basics,etc.
4. To develop good programming skills and to develop problem solvingskills.
5. Clearly formulate a program's requirements and develop an algorithm for solving a problem Identify functions for solution of a problem and identify and classify theparameters.
6. Build sets of test data in order to evaluate computer programs and thoroughly test a program

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand basic concepts and terminology of information technology. **CO2**: Have a basic understanding of personal computers and their operations.

CO3: Understand the process of algorithm development and documentation. **CO4**: Identify the basic elements required in a computer system.

CO5: Illustrate the role of the computer for personal and professional uses.

CO6: Students should develop fundamental skills such as problem solving and abstract reasoning through computer programming.

CO7: Understand the fundamental hardware components that make up a computer's hardware and the role of each of thesecomponents.

CO8: understand the difference between an operating system and an application program, and what each is used for in a computer.

Catalogue Description

Computing and programming is essential to leverage the technical skills of a student. These techniques equip the students with know-how of the latest technologies and reduce considerable time in solving problems. The course of Information Technology Fundamentals has become essentially the present age of computer technology and information, as the applications of information technology can be found in all aspects of our lives.

Course Content

Unit- 1:

Introduction to Computers: The evolution of computers: Computer Generation from First Generation to Fifth Generation. Classifications of Computers: Micro, Mini, Mainframe and super computers, Distributed Computer System, Parallel Computers. Computer Hardware: Major Components of a digital computer, Block Diagram of a computer Input devices, Output Device. Computer Memory: Memory Cell, Overview of Memory Organization, Primary Memory: RAM & ROM, Secondary memory: Magnetic tapes, Magnetic disk, CD- ROM, DVD.

Unit- 2:

Introduction to System Software and Operating System: Computer Software: Machine language, assembly language, high-level languages, fourth generation language, assemblers, compilers, interpreters, linkers, loaders. Operating System concepts: different types of operating systems, functions of operating system, concept of multiprogramming, multitasking, multithreading, multiprocessing, timesharing, real time, single user & multi- user operatingsystem.

Unit- 3:

Programming Concepts & Techniques: Algorithms, flow chart, decision tables, pseudo code, characteristics of a good programming language, planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming methodologies viz. top-down and bottom up programming, Advantages and disadvantages of Structuredprogramming, Documentation. Structured programming concepts, Programming.

Unit- 4:

Computer Networks & The Internet: Basic elements of a communication system, Data transmission modes, Data transmission media, Network topologies, Network Types (LAN, WAN and MAN), Client and Servers, Intranet, Extranet. Internet: Terminology related to Internet: Protocols, TCP/IP, HTTP, Internet addressing, Domain Names, DNS,

URL, World Wide Web. Overview of various services on Internet: Webservers, E-mail, FTP, Telnet.

Textbooks

1. P. K. Sinha&PritiSinha, “Computer Fundamentals”, BPBPublications.

2. Anita Goel “Computer Fundamentals”,Pearson.

Reference Books/Materials

1.B. Ram, “Computer Fundamentals Architecture and Organization”, New Age Intl.

2. Alex Leon & Mathews Leon, “Introduction to Computers”, Vikas Publishing.

3. Norton Peter, “Introduction to computers”,TMH.

4. Vikas Gupta, “Comdex Computer Kit”, Wiley Dreamtech,Delhi

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination Examination Scheme:

Components	Eval. I	Eval.II	Practical	End Term Exam
Weightage (%)	20	20	00	60

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
Sr. No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Understand basic concepts and terminology of information technology.	**PO2**
CO2	Have a basic understanding of personal computers and their operations.	**PO3**
CO3	Understand the process of algorithm development and documentation.	**PO4**
CO4	Identify the basic elements required in a computer system.	**PO5**
CO5	Illustrate the role of the computer for personal and professional uses.	**PO4**

CO6	Students should develop fundamental skills such as problem solving and abstract reasoning through computer programming.	**PO4**
CO7	Understand the fundamental hardware components that make up a computer's hardware and the role of each of these components.	**PO9**
CO8	Understand the difference between an operating system and an application program, and what each is used for in a computer.	**PSO1**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
UCIT131A	Introduction To Computers & IT, Office Automation	CO1	CO2	CO3	CO3	CO3				CO3				CO3		

Programme and Course Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3											3		
CO2			2				2					3		
CO3						2						3		

CO4											3		3	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	**Course Title**	L	T	P	C
SAAG121A	Agricultural Heritage	1	0	0	1
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective

1. To study the heritage and ancient history and importance ofagriculture.
2. To study the fundaments, concepts ofagriculture.
3. To study the factors affecting crop production, Indian agriculture balance sheet, contrasting trends in agriculturegrowth.
4. To study the environment, ecology and ecosystem.
5. To study the multifaceted roles and tasks of women inagriculture

Course Outcome: The students will learn

CO1 the Indian tradition of agriculture
CO2 distinguish past and current agricultural conditions.
CO3 Comparison of different traditional agricultural technologies. **CO4** Evaluate the scope and future prospects of agricultural sciences.
CO5 Role of women in agriculture.

Catalogue Description

This subject enriches the students about the need for and importance of value addition in agriculture and multifaceted roles and tasks of women in agriculture. This course imparts basic knowledge about history of agricultural practices, development of human culture and status of farmers in the society which are constantly adapting to time, place, and local culture, but the ways of growing are informed by heritage.

Course Content

Theory:

Unit -1

- Definition and importance of agriculture, Meaning and scope ofagriculture,
- Plant growth and development– concept and differences, general growthcurves

- Elements affecting crop production, classification of crops

Unit -2

- Art, science and business of cropproduction.
- Agricultural heritage, chronological agricultural technology development inIndia,
- Ancient Indian agriculture in civilization era, conversion of man from food gatherer to foodproducer,
- Development of agriculture, chronological agricultural development inIndia.

Unit -3

- Factors affecting crop production, Indian agriculture balance sheet, contrasting trends in agriculture growth,
- Aspects of food chain and energy flow, soil physiographic and diversity
- Aquaculture, water resources of Haryana and India.

Unit -4

- Environment, ecology and ecosystem, economicecology
- Classification of agriculture on the basis of irrigation (Rainfall), cropping and farming system
- Need for and importance of valve addition in agriculture, requirement of new technology
- Women in agriculture, multifaceted roles and tasks, work stress factors, nutritional and rural standards, drudgery reduction for farm women, women friendly technology, empowerment of women, role and impact of extension and training of farm women.

Textbooks

1. Ahmed, S. 2004. Gender Issues in Agricultural and Rural Livelihoods-Vol. I M.S. Swaminathan Research Foundation, Chennai and Kerala Agricultural University, Thrissur.
2. Noor Mohammed.1992. Origin, diffusion and development of agriculture. In: Noor Mohammed(ed.),NewDimensionsinAgriculturalGeography:Vol.1.Historical Dimensions of Agriculture. Concept Publishing Co., New Delhi. Pp29-75.
3. Husain, M. 1996. Systematic Agricultural Geography. Rawat Publications,Jaipur

Reference Books

1. Commonwealth Secretariat.1996. Women and Natural Resource Management: A Manual for the Asian Region. Gender and Youth Affairs Division,London.
2. FAO [Food and Agriculture Organization of the United Nations]. 2001. Field Level Handbook, SEAGA Socio–Economic and Gender Analysis Programme. FAO, Rome (Available:http://www.fao.org/sd/seaga/downloads/En/fieldEn.pdf).

Modes of Evaluation: Quiz/Assignment/ Presentation/ Extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**20**	**20**	**0**	**60**

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	The Indian tradition of agriculture	**PO1**
CO2	Distinguish past and current agricultural conditions	**PO7**
CO3	Comparison of different traditional agricultural technologies.	**PO10, PSO2**
CO4	Evaluate the scope and future prospects of agricultural sciences.	**PO12, PSO3**
CO5	Role of women in agriculture	**PO2**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG121A	Agricultural Heritage	CO1	CO5					CO2			CO3		CO4			CO3	CO4

Programme and Course Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	**2**													
CO2					**2**									
CO3		**2**	**3**					**1**						
CO4										**2**				
CO5														
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG119A	Fundamentals of Entomology	3	0	1	4
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective

1. To study the dominance of insects on earth and their economicimportance.
2. To study the external morphology, classification. and systems of insects.
3. To study the insect ecology

Course Outcome: After studying this course the students will be able

CO1: Know about the morphology, Economic importance of Insects,

CO2: Insect Systematics, classification and Identification of insects

CO3: Insect ecology and factors affecting the pest population

CO4: Types of pest, Pest survey, forecasting and pest management

Catalogue Description: This subject is designed to impart fundamental knowledge on the morphological characters of insect, the modifications of antennae, legs, wings and mouth parts, digestive, reproductive, other systems and classification of insects in various orders. The subject will provide the fundamental knowledge about the insect ecology and pest management.

Course Content

Theory:

Unit – 1

History of Entomology in India. Major points related to dominance of Insecta in Animal with other classes of Arthropoda. Morphology: Structure and functions of insect cuticle and moulting. Body segmentation.Structure of Head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts, legs, Wing venation, modifications and wing coupling apparatus. Structure of male and female genital organ.Metamorphosis and diapause in insects.Types of larvae and pupae.Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretary (Endocrine) and reproductive system, in insects.

Types of reproduction in insects. Major sensory organs like simple and compound eyes, chemoreceptorkingdom. Classification of phylum Arthropoda up to classes.Relationship of class Insecta.

Unit- 2

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 present day insects with special emphasis to orders and families of Agricultural importance like Orthoptera: Acrididae, Tettigonidae, Gryllidae, Gryllotalpidae; Dictyoptera: Mantidae, Blattidae; Odonata; Isoptera: Termitidae; Thysanoptera: Thripidae; Hemiptera: Pentatomidae, Coreidae, Cimicidae, Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Lophophidae, Aleurodidae, Pseudococcidae; Neuroptera: Chrysopidae; Lepidoptera: Pieridae, Papiloinidae, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Saturnidae, Bombycidae; Coleoptera: Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidae, Bruchidae, Scarabaeidae; Hymenoptera: Tenthridinidae, Apidae. Trichogrammatidae, lchneumonidae, Braconidae, Chalcididae; Diptera: Cecidomyiidae, Tachinidae, Agromyziidae, Culicidae, Muscidae, Tephritidae.

Unit- 3

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.

Unit- 4

Categories of pests.Concept of IPM, Practices, scope and limitations of IPM.Classification of insecticides, toxicity of insecticides and formulations of insecticides.Chemical control- importance, hazards and limitations. Recent methods of pest control, repellents, antifeedants, hormones, attractants, gamma radiation. Insecticides Act 1968-Important provisions. Application techniques of spray fluids. Symptoms of poisoning, first aid and antidotes, Use of GIS for insect and pest survey.

Practical

Methods of collection and preservation of insects including immature stages; External features of Grasshopper/Cockroach; Types of insect antennae, mouthparts and legs; Wing venation, types of wings and wing coupling apparatus. Types of insect larvae and pupae; Dissection of digestive system in insects (Grasshopper); Dissection of male and female reproductive systems in insects (Grasshopper); Study of characters of ordersOrthoptera,

Dictyoptera, Odonata, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance. Insecticides and their formulations.Pesticide appliances and their maintenance.Sampling techniques for estimation of insect population and damage.

Textbooks

1. Srivastava, P. D. and Singh, R. P. 1997. An Introduction to Entomology, Concept Publishing Company, New Delhi,269p
2. Atwal, A. S and Bains, S. S. 1989. Applied Animal Ecology. Kalyani Publishers. New Delhi.245p
3. David, B.V. and Kumaraswami, T. 1996 Elements of Economic Entomology. Popular Book Depot, Madras. 536p.
4. Dhaliwal, G. S. and Ramesh Arora. 1998. Principles of Insect Pest Management. Kalyani Publishers, New Delhi. 297p.

Reference Books

1. Chapman, R.F. 1988. *Insects*: *Structure and Function*. Cambridge Univ. Press,UK
2. Mani, M. S. 1968. General Entomology. Oxford and IBH Publishing Company, NewDelhi. 912p.
3. Richards, O.W. and Davies, R. G. 1977. Imm's General Textbook of Entomology, Vol.1and2, Chapman and Hill Publication, London,1345p.
4. Charles A Triplehom and Norman F. Johnson 2005 Borror and DeLong's *Introduction to the Study of Insects* Thomson Brooks/Cole Publishing. U.S.A.
5. Snodgrass, R.E. 2001. *Principles of Insect Morphology*. CBS Publishers & Distributors

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	15	15	30	40

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	know about the morphology, Economic importance of Insects,	PO1
CO2	Insect Systematics, classification and Identification of insects	PO2, PSO1
CO3	Insect ecology and factors affecting the pest population	PO12
CO4	Types of pests, Pest survey, forecasting and pest management	PO13, PSO3

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3

SAAG119A	Fundamentals of Entomolog	C	C										C	C	C		C

Programme and Course Mapping													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**											**3**		
CO2			**2**				**2**					**3**		
CO3						**2**						**3**		
CO4											**3**		**3**	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	**Course Title**	L	T	P	C
SAAG107A	Fundamentals of Smart Agriculture	2	0	0	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective

1. To study the fundamentals of smart agriculture
2. To study the PrecisionFarming
3. To study the Traffic ManagementSystem

Course Outcome: After studying this course the students will be able

CO1: Know about the principles of smart farming **CO2:** Economic importance of smart farming **CO3:** Urban Transportation Technology
CO4: Know about the techniques of smart farming

Catalogue Description: This subject is designed to impart knowledge of principle and procedures of smart farming. The subject will provide the fundamental knowledge about the

Smart and precision farming.

Course Content

Theory

Unit- 1

What is smart farming, techniques of smart farming, its benefits and challenges, Introduction to Industrial Internet of Things, What is IoT solutions provider? Structure and Devices of IoT, Role of IoT providers in smart agriculture, Real time farm monitoring, Applicability of IoT in Agriculture: Prerequisites of IoT Models, use of sensors in smart agriculture, Types of sensors

Unit- 2

Benefits of Internet of Things in Agriculture, Climate Conditions: What is Precision Farming? Introduction to smart greenhouse, hydroponics, alternative farming, data analytics

Unit- 3

Introduction to drones, types of drones, Role of drones in agriculture, Handling and maintenance of drones. Introduction to Remote sensing and GIS. Knowing of GPS system, use of GPS in agriculture

Unit- 4

Introduction to Smart Transportation, Definition and scope of Smart Transportation, Working of transportation, The Main Benefits of Transportation Technology "Intelligent Transportation Systems (ITS), Security during transportation, Environmental Considerations, Examples of Urban Transportation Technology, Traffic Management System

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	20	20	0	60

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
Sr. No.	Course Outcomes (COs)	Mapped Program Outcomes

CO1	Know about the principles of smart farming	**PO1, PSO1**
CO2	Economic importance of smart farming	**PO2**
CO3	Urban Transportation Technology	**PO12**
CO4	Know about the techniques of smart farming	**PO12, PSO3**

Course Code	**Course Title**	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**PO10**	**PO11**	**PO12**	**PO13**	**PSO1**	**PSO2**	**PSO3**
SAAG107A	Fundamentals of Smart Farming	CO1	CO2										CO3 CO4		CO1		CO4

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1				**1**				**2**						
CO2		**3**												
CO3												**3**		
CO4			**3**					**3**						
CO5														
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	**Course Title**	L	T	P	C
SAAG120A	Fundamentals of Soil Science	2	0	1	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

1. To study the Soil: Pedological concepts, Origin of theearth.
2. To study soil formation, factors affecting soilformation
3. To study Taxonomy of soil, Soil physical properties their significance inagriculture.
4. Soil organisms and theirsignificance.

The student will be enriched with the knowledge of soil, its properties and soil microorganisms.

Course Outcome: Students will learn about

CO1: Earth's crust, soil parent material, rocks and minerals.

CO2: Soil, soil formation and weathering processes.

CO3: basic soil physical and chemical properties in the context of soil health. soil types and soil classification.

CO4: soil colloids and composition of organic matter, soil microorganisms in nutrient availability to plants

Catalogue Description: This subject is very important from agricultural point of view, student learn about soil, formation, pedology, Composition of soil; Taxonomic classification of soils, Soil physical properties, soil compaction, Soil air and gaseous exchange, soil, Properties, nature, types and significance, Soil organisms and their significance.

Course Contents

Theory:

Unit- 1

Soil: Pedological and edaphological concepts, Origin of the earth, Earth'scrust. Composition of soil; Soil forming rocks and minerals, Soilformation, Factors affecting soil formation, soil forming processes; soil colour, Development, of Soil profile.

Unit -2

Taxonomic classification of soils; soils of Haryana andIndia.Soil physical properties, Soil texture, Particle size distribution system, Soil structure classification and its significance, Soil aggregates, Soil consistency and itstypes,Bulk density and particle density of soils & porosity, their significance

Unit- 3

Soil crusting; soil compaction; Soil water, forms, hygroscopic, capillary and gravitational, soil moisture constants-hygroscopic coefficient, wiltingpoint,Field capacity, moisture equivalent, maximum water holding capacity, soil temperature and thermal properties. Soil air and gaseous exchange; influence of soil temperature and air on plant growth.

Unit- 4

Soil colloids, Properties, nature, types and significance. Layer silicate clays- genesis, charges; adsorption of ions, ion exchange and its significance. Soil reaction-pH,soil acidity and alkalinity,buffering,effect of pH on nutrient availability. Electrical conductivity, soil organic matter- composition, decomposition, mineralization and humus and its fractionation. Humic substances - nature and properties. Soil organisms and their significance, soil enzymes.Introduction to soil carbon sequestration, soil as carbon store house and its role in climate fight. Introduction to soil and water sensors,new soil monitoring technologies and soil surveying.

Practical:

Identification of rocks and minerals; study and description of a soil profile; determination of bulk density and particle density; soil strength; soil moisture determination; determination of field capacity, infiltration rate, water holding capacity; mechanical analysis of soil; soil temperature; collection and processing of soil samples; determination of organic carbon, pH and electrical conductivity.

Textbooks

1. Biswas, T.D. and Mukherjee, S.K. 2001. Textbook of Soil Science. Tata McGraw Hill Publishing Co., NewDelhi
2. Das.D. K, 1997. Introductory Soil Science. Kalyani Publishers, NewDelhi.
3. ISSS, 2002. Fundamentals of Soil Science. Published by Indian Society of Soil Science, IARI, New Delhi
4. Jaiswal, P.C. *2006*. Soil, Plant and Water Analysis. 2nd Edn. Kalyani Publishers, Ludhiana

Reference Books

1. Brady, N.C. 1990. Nature and Properties of Soils. 10th Edn, Macmillian Publishing Co. Inc., NewYork
2. Foth, H.D. and Turk, L. M. 1972. Fundamental of Soil Science. 5th Edn. Wiley Eastern Pvt. Ltd., NewDelhi
3. Gupta, P.K. 2007. Soil, Plant, Water and Fertilizer Analysis. Published by AGROBIOS (India),Jodhpur

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	15	15	30	40

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Earth's crust, soil parent material, rocks and minerals.	**PO1**
CO2	Soil formation and weathering processes.	**PO2**
CO3	Basic soil physical and chemical properties in the context of soil health. soil types and soil classification.	**PO8, PSO1**
CO4	Soil colloids and composition of organic matter, soil microorganisms in nutrient availability to plants	**PO13, PSO2**

Course Code	**Course Title**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PO13**	**PSO1**	**PSO2**	**PSO3**
SAAG120A	**Fundamentals of Soil Science**	CO1	CO2						CO3					CO4		CO3	CO4

Programme and Course Mapping													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**											**3**		
CO2			**2**				**2**					**3**		
CO3						**2**						**3**		
CO4											**3**		**3**	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAEL155A	Communication Skills	4	0	0	4
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

1. To perform all managerial functions and to achieve predeterminedgoals
2. To exchange information, formulate and execute theplans
3. To create consciousness and coordinate andcooperate
4. To create relationship, in solving problems and decisionmaking

Course Outcome: The course has been designed to help the students

CO1: In building the confidence and speak confidently.

CO2: It will help them to focus on communication activities in functional and situational contexts

CO3: as well as enhance the four language skills of reading, writing,

CO4: listening and speaking through real-life and professional situations.

The course will make the students capable of effective Communicator which will helps the candidate in building a good relationship between the employer and the employee.

UNIT-1

Communication –Types & Process; Introduction, definitions, Process of communication, Types of communication, upward, downward, horizontal, vertical and diagonal, verbal, nonverbal and oral and written. Interpersonal communication - one way/ two way, Mediums ofcommunication.

Written Communication: Business report, business representation, formal letter.Drafting effective letter, formats, style of writing, Use of jargons.

UNIT-2

Interviews - Types and uses. Techniques of handling interviews of different types.Group discussion, stress interview.Aptitude tests. Traits of a good interviewee, Resume and Job applications. Pronunciation & body language, Pronunciation, stress, invocation, rhythm. Greetings, First name, handshakes, some polite expressions, apologies, remarks,

etiquette and manners, speeches: Drafting, a speech, presentation, Personal grooming, Paragraphs and creative writing, extempore speaking.

UNIT – 3

Group Presentation, Realizing the difference between a team and a group. Audience orientation, group projects. Planning a presentation - Mind Mapping, Theme, Subject, Handling question and feedback.

UNIT – 4

Communications: Importance-Message Component, Communication and Information, Conflict and its Resolution, Communication and Empathy, Aids and Barriers to Communication, Listening.

Textbooks

1. Bhaskar,W.W.S. and Prabhu,N.S., English Through Reading, Publisher MacMillan, 1978
2. Business Correspondence and Report Writing" -Sharma, R.C. and Mohan K. Publisher: Tata Mc Graw Hill1994
3. Business Communication-K.K.Sinha
4. Essentials of Business Communication by Marey Ellen Guffey, Publisher: Thompson Press

Reference Books

1. How to win Friends and Influence People by Dale Carnegie, Publisher: PocketBooks
2. Basic Business Communication by Lesikar&Flatley, Publisher Tata Mc GrawHills
3. Body Language by Allan Pease, Publisher SheldonPress

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	20	20	-	60

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	Course Outcomes (COs)	Mapped Program Outcomes

CO1	In building the confidence and speak confidently.	**PO1**
CO2	It will help them to focus on communication activitiesin functional and situational contexts	**PO2**
CO3	Enhance the four language skills of reading, writing	**PO8**
CO4	Listening and speaking through real-life and professional Situations.	**PO13,PSO2**

Course Code	**Course Title**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
UCCS155A	Communication Skills	CO1	CO2						CO3					CO4		CO4	

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**2**								**1**					
CO2														
CO3			**2**						**1**					
CO4					**2**									
CO5														
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAMA149A	Introduction to Statistical Methods	2	0	0	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

1. To study the basic aspects ofstatistics.
2. To study the concept, correlations, probability anddistribution.
3. To study the hypothesis andsignificance.
4. To study the principles of experimental design, layout, model andanalysis

Course Outcome: Students will learn
CO1: Fundamentals of statistics
CO2: Datahandling
CO3: Skill of field layouts
CO4: Enrich the knowledge for higher course

Catalogue Description: This subject deals with the fundamentals of statistics, concept, and correlation of data, probability, statistical hypothesis, level of significance and tests of significance, experimental design, layout and analysis of data.

Course Contents

Theory

Unit-1

- Definition, uses and limitations ofStatistics,
- Concepts of population and sample, concepts of data types- nominal, ordinal, discrete and continuousdata,
- Graphical presentation of data. Frequency distribution, frequency curve, Measures of central tendency (Arithmetic Mean, Median andMode),
- Measures of dispersion (Range, Mean deviation, Standard deviation and Coefficient of variation). Measures of skewness and kurtosis

Unit- 2

- Concepts of bivariate data, correlation and theirtypes,
- Scatter diagram, Karl Pearson correlationcoefficient,
- Spearman rank correlation coefficient, Simple linear regression analysis

Unit-3

- Basic concepts of probability, Simple Problems Based onProbability,
- Normal distribution and its properties, Concept of parameter,statistics
- Statistical hypothesis, null and alternative hypothesis, level of significance, type-I and type-II errors, degrees offreedom.
- Tests for single mean and comparison of two means, F-test and applications, Chi- square test in 2X2 contingency table, Yates correction forcontinuity

Unit-4

- Principle of experimental design, layout,model
- Analysis of completely randomized design (CRD), randomized block design (RBD) and Latin square design(LSD)

Textbooks

1. Gupta, S.C. And Kapoor,V.K. (1997): Fundamentals of Mathematical Statistics. Sultan Chand and Sons Publisher, New Delhi.
2. Chakravorthi, S.R. and Giri,N. (2002): Basic Statistics. South Asian Publishers, NewDelhi-110014.
3. Rangaswamy, R. (2002): A textbook of Agricultural Statistics. John Wiley and Sons.

Reference Books

1. Balakrishnan, N. (2002): Statistical Methods and Practice. Prentice Hall of India.
2. Ferrold, H.Zar.(2005): BiostatisticalAnalysis: Fourth Edition, Pearson Education,India.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	20	20	00	60

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Fundamentals of statistics	PO1
CO2	Data handling	PO7,PSO2
CO3	Skill of field layouts	PO12,PSO3
CO4	Enrich the knowledge for higher course	PO13

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAMA149A	Introduction to statistical methods	CO1						CO2					CO3	CO4		CO 2	CO 3

Programme and Course Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3											3		
CO2			2				2					3		
CO3						2						3		
CO4											3		3	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAMA163A	Basics of Mathematics	2	0	0	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

1. To study thematrices.
2. To study the various forms of the equation of a line, angle between two lines
3. To study trigonometric ratios of five standard angles; alliedangles
4. To study Trigonometric ratios of five standard angles; allied angles

Course Outcome: The student will learn

CO1: Basics of algebra, Matrices, Trigonometry and calculus

CO2: Coordinated geometry

CO3: Slope of a line, various forms of the equation of a line,

CO4: Trigonometric ratios

Catalogue Description: This subject has been planned to impart the basic knowledge of algebra, co-ordinated geometry, trigonometry and calculus to biology-based students.

Course Contents

Theory:

Unit-1

- **Algebra**: Properties of determinants up to 3rd order and theirevaluation.
- Definition of matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order and theirproperties

Unit-2

- Co- ordinate geometry: Distance between twopoints,
- Slope of a line, various forms of the equation of a line, angle between twolines

Unit 3

- Trigonometry: Trigonometric ratios of five standard angles; alliedangles,
- Addition and subtraction formulae, sum and productformulae.
- t-ratios of multiple and sub –multipleangles

Unit-4

- **Calculus**: Differentiation of x^n, e^x, sin x, cos x from first principle, Derivative of sum, difference, product and quotient of twofunction,
- Differentiation of function of function, logarithmic,substitution,
- inverse Trigonometric ratios of five standard angles; alliedangles,
- integration by substitution and by parts; definite integralsproperties

Textbooks

1. Algebra by D. C. Kapoor and GurbaxSingh
2. Algebra by T. N. Nagpal and K. K.Gupta.
3. Trigonometry by Jiwan

Reference Books

1. Comprehensive Calculus by R. S.Dahiya.
2. New Style Calculus for T. D. C. –I.
3. New Style coordinator Geometry by R. K.Sondhi

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	20	20	00	60

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Basics of algebra, Matrices, Trignometry and calculus	PO1
CO2	Coordinated geometry	PO2
CO3	Slope of a line, various forms of the equation of a line,	PO7,PSO2
CO4	Trigonometric ratios	PO12

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3

SAMA155A	Elementary Mathematics	CO1	CO2					CO3					CO4			CO3	

Programme and Course Mapping													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**											**3**		
CO2			**2**				**2**					**3**		
CO3						**2**						**3**		
CO4											**3**		**3**	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	**Course Title**	**L**	**T**	**P**	**C**
SAGA111A	Introductory Biology	1	0	1	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

1. To study the origin of lifediversity.
2. To study the Binomial nomenclature and classification and celldivision
3. To study the morphology of flowering plants and role of animals in agriculture

Course Outcome: The students will learn

CO1: Living world, evolution

CO2: Multiplication plants and classification

CO3: Role of plants in agriculture

CO4: Role of animals in agriculture.

Catalogue Description: This subject has been planned to impart the basic knowledge of algebra, co-ordinated geometry, trigonometry and calculus to biology-based students.

Course Contents

Unit –1

Introduction to the living world, diversity and characteristics of life, Origin of life, Kingdoms of Life, Life relation with H and C

Unit –2

Evolution and Eugenics. Binomial nomenclature

Classification Cell and celldivision.

Unit –3

Morphology of flowering plants.

Seed and seed germination

Unit-4

Plant systematic- *viz*; Brassicaceae, Fabaceae and Poaceae.

Role of animals in agriculture, Role of machinery in agriculture

Practical

Morphology of flowering plants – root, stem and leaf and their modifications.Inflorescence, flower and fruits.Cell, tissues & cell division. Internal structure of root, stem and leaf. Study of specimens and slides.Description of plants - Brassicaceae, Fabaceae and Poaceae.

Textbooks

1. A.C. Dutta: Textbook of Botany (Latest Ed.). Oxford University Press-India, 2000.
2. Vidyarthi: Textbook of Botany Part – I. S. Chand and Company, New Delhi, 2002.

Reference Books

1. Widge and Bhatia: Introduction of Botany. Truman Publishers, Jalandhar,2010.
2. Bhojwani, S.S. and Bhatnagar, S.P., 1992, the Embryology of Angiosperms, Vikas Publishing House, NewDelhi.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	10	10	50	30

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Living world, evolution	PO1
CO2	Multiplication plants and classification	PO2,PSO1
CO3	Role of plants in agriculture	PO8,PSO2
CO4	Role of animals in agriculture.	PO12

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAGA111A/107	Introductory Biology	CO1	CO2						CO3				CO4		CO2	CO3	

Programme and Course Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1											1		
CO2														
CO3								3						
CO4												2		
CO5			2											
1=lightly mapped 2= moderately mapped 3=strongly mapped														

SADM301A	Disaster Management	**L**	**T**	**P**	**C**
Version 1.0		3	0	0	3
Pre-requisites/Exposure					
Co-requisites	--				

Course Objectives

1. To create awareness about various types ofdisasters.
2. To educate the students about basic disaster management strategies and problemsolving.
3. To examine disaster profile of our country and illustrates the role of governmental and non- governmental organizations in its effectivemanagement.
4. To acquaints students with the existing legal frame work for disaster management and understanding the appropriate rules andregulations.

Course Outcomes

On completion of this course, the students will be able to

CO1. To enable the students to know the difference between natural and man- made disaster

CO2. Acquire the knowledge related to disaster preparedness

CO3. To aware the student about recovery after disaster

CO4. To know the structure and functioning of disaster management framework of our country

CO5. To provide the knowledge about disaster management act

Catalogue Description

This course imparts the basic concepts of environment which enable them to solve basic problems related to their surroundings. This course helps them to get an idea adverse effect of industrialization, population and degradation of natural resources on the

environment. The course introduces the concepts of renewable and non-renewable resources.

Course Content

UNIT- 1

Introduction to Disasters: Concept and definitions- Disaster, Hazard, vulnerability, resilience, risks. Different Types of Disaster: Causes, effects and practical examples for all disasters. Natural Disaster: such as Flood, Cyclone, Earthquakes, and Landslides etc. Man-made Disaster: such as Fire, Industrial Pollution, Nuclear Disaster, Biological Disasters, Accidents (Air, Sea, Rail & Road), Structural failures (Building and Bridge), War & Terrorism etc.

UNIT- 2

Disaster Preparedness: Concept and Nature, Disaster Preparedness Plan, Prediction, Early Warnings and Safety Measures of Disaster, Role of Information, Education, Communication, and Training, Role of Government, International and NGO Bodies, Role of IT in Disaster Preparedness, Role of Engineers on Disaster Management, Relief and Recovery, Medical Health Response to Different Disasters

UNIT- 3

Rehabilitation, Reconstruction and Recovery

Reconstruction and Rehabilitation as a Means of Development, Damage Assessment, Post Disaster effects and Remedial Measures, Creation of Long-term Job Opportunities and Livelihood Options, Disaster Resistant House Construction, Sanitation and Hygiene, Education and Awareness, Dealing with Victims' Psychology, Long-term Counter Disaster Planning, Role of Educational Institute.

UNIT- 4

Disaster Management in India

Disaster Management Act, 2005: Disaster management framework in India before and after Disaster Management Act, 2005, National Level Nodal Agencies, National Disaster Management Authority Liability for Mass Disaster: Statutory liability, Contractual

liability, Tortious liability, Criminal liability, Measure of damages, Epidemics Diseases Act, 1897: Main provisions, loopholes.

Textbooks

1. Content building programme (CBP) book on Disaster Management, Forum AS.

Reference Books/Materials

1. Government of India, Department of Environment, Management of Hazardous Substances Control
2. Act and Structure and Functions of Authority CreatedThereunder.
3. Indian Chemical Manufacturers' Association & Loss Prevention Society of India, Proceedings of the National Seminar on Safety in Road Transportation of Hazardous Materials: (1986).
4. Author Title Publication Dr. Mrinalini Pandey Disaster Management Wiley India Pvt.Ltd.
5. Tushar Bhattacharya Disaster Science and Management McGraw Hill Education (India) Pvt. Ltd.
6. Jagbir Singh Disaster Management: Future Challenges and Opportunities K W Publishers Pvt. Ltd.
7. J. P. Singhal Disaster Management LaxmiPublications.
8. ShaileshShukla, ShamnaHussain Biodiversity, Environment and Disaster Management Unique Publications
9. C. K. Rajan, NavalePandharinath Earth and Atmospheric Disaster Management: Nature and Manmade B SPublication
10. Indian law Institute (UpendraBaxi and Thomas Paul (ed.), Mass Disasters and Multinational Liability: The Bhopal Case (1986)
11. Indian Law Institute, UpendraBaxi (ed.), Environment Protection Act: An Agenda for Implementation (1987)
12. Asian Regional Exchange for Prof. Baxi., Nothing to Lose But our Lives: Empowerment to Oppose
13. Industrial Hazards in a Transnational world(1989)

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/

Written Examination Examination Scheme:

Components	Eval. I	Eval. II	Prctical	End Term Exam
Weightage (%)	20	20	00	60

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs

	Course Outcomes (COs)	Mapped Program Outcomes
CO1	To enable the students to know the difference between natural and man- made disaster	**PO6**
CO2	Acquire the knowledge related to disaster preparedness	**PO10**
CO3	To aware the student about recovery after disaster	**PO8**
CO4	To know the structure and functioning of disaster management framework of our country	**PO9**
CO5	To provide the knowledge about disaster management act	**PO2**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
UCDM301A	Disaster Management		2				3		3	3	2			3	

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**											**3**		
CO2	**3**												**3**	
CO3			**3**									**3**		
CO4										**3**			**3**	
CO5			**3**									**3**		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

1st Year/II SEMESTER, Course Syllabi

Course Code	Course Title	L	T	P	S	C
SAAG102A	Introduction to the use of sensors and artificial intelligence in agriculture	**1**	**0**	**1**	**0**	**2**

Course Objectives:

- To study the introduction and importance of artificial intelligence and sensors inagriculture.
- To study the application of AI and sensor based technologies in cropproductivity.
- To study about introduction to smart and sustainablefarming.
- To study the future prospects and challenges to be faced in the use of sensors and artificial intelligence inagriculture.

Course Outcomes

The students will learn from this course about the role of

CO1. Artificial intelligence and sensors inagriculture.

CO2. Application of AI and sensor-based technologies in cropproductivity.

CO3. AI and sensors in smart and sustainablefarming.

CO4. Challenges to be faced in the use of sensors and artificial intelligence inagriculture.

Course Syllabus:

Unit 1: General Introduction

- Introduction to artificial intelligence, robotics andsensors.
- Introduction to Drones and its applications inagriculture
- Scope and importance of AI and drones inAgriculture.

Unit 2: Role of AI and sensor-based technologies in increasing crop productivity

- Application of AI and sensors for optimization of irrigation, monitoring soil health, weeding operations, precision nutrient management, soil moisture sensing, detecting crop diseases and monitoring crophealth.
- Introduction to GIS and remotesensing.
- Using AI for intelligent spraying ofchemicals.

Unit 3: Introduction to smart and sustainable farming

- What is smart farming and sustainablefarming?
- How is it related to use of AI and sensors? Benefits of smart and sustainablefarming.
- Contribution of AI in achieving SDGs.
- Data mining in Agriculture
- Database in agriculture and its importance in agriculture.

Unit 4: Future prospects and challenges to be faced in the use of sensors and artificial intelligence in agriculture

- Future of AI and sensors in agriculture and how it can transform the agricultureindustry.
- How AI can be combined with other technologies for advancement inagriculture.

Practicals:

- Practical acquaintance with the various applications of artificialintelligence.
- Working and maintenance ofsensors.
- Familiarization with various types of drones and their handling andmaintenance.
- Working of drip and mini sprinkler irrigationsystem.
- Demonstration of weeding, picking, spraying byrobots.

- Practical demonstration of GIS and remotesensing.
- Physical monitoring of soil moisture and its comparison withsensors.
- Practical demonstration of use of sensors in monitoring crophealth.
- Practical of precision nutrient management in differentcrops.

Text book [TB]:

1. Singh, R., Gehlot, A., Prajapat, M. K. and Singh, B. 2021. Artificial Intelligence in Agriculture. 1st Edn. CRC Press, UnitedStates.
2. Bhabhor, M., Gupta, P. and Agravat, V. 2019. Application of Artificial Intelligence in Agriculture, 1st Edn. LAP Lambert AcademicPublishing.

Reference book(s) [RB]:

Ahmad, L. and Nabi, F. 2021. Agriculture 5.0: Artificial Intelligence, IoT and Machine Learning CRC Press, United States.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination Examination Scheme:

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	10	10	50	30

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Know about use of artificial intelligence and sensors in Agriculture.	**PO6, PO11**
CO2	Application of AI and sensor-based technologies in Enhancing crop productivity.	**PO11, PSO1**
CO3	AI and sensors in smart and sustainable farming	**PO11, PSO1**
CO4	Challenges to be faced in the use of sensors and artificial intelligence in agriculture	**PO11, PO12**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG102A	Introduction to the use of sensors and artificial intelligence in agriculture						CO1					CO1, CO2, CO3, CO4	CO4		CO2, CO3		

Programme and Course Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1													
CO2					3					3		1		
CO3				2		1		2		2			2	
CO4											1			
CO5														
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG104A	Fundamentals of Agronomy	2	0	1	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

- To study history importance and scope ofagronomy.
- To study Classification of crops and waterrequirements.
- To study the principal involved in crop production and Soil fertility andproductivity,

- To study soil health, Cropping system, Nutrient content and fertilizer requirements of crops.

Course Outcome: The students will know about

CO1 Agronomy of crops, crop classification, **CO2** Soil fertility, productivity, soil health

CO3 Cropping systems of Haryana

CO4 Nutrient contents of different fertilizers and their requirements to different crops.

Catalogue Description: The main purpose of the subject is to understand the history and importance of agronomy, Classification of crops, yield attributes, agronomic principals, Soil fertility and productivity and Factors affecting soil health. The students will also be apprised with knowledge Cropping system, Manures and fertilizers and Nutrient content of different fertilizers and fertilizer requirement of various crops.

Course Contents

Theory:

Unit- 1

- Definition, history and importance of agronomy, meaning and scope ofagronomy,
- Classification of crops according to agronomy, seasonal, life span, seed size, root depth, and water requirementetc.
- National and international agricultural research institutes in India and abroad

Unit- 2

- Characteristics of good seed, its type and multiplication, crop growth rate,
- Yield attributes factors affecting them, agronomic principal involved in crop production, tilth and tillage, its importance, objective and its requirements for major crops of Haryana

Unit- 3

- Soil fertility and productivity, their importance in crop production
- Factors affecting soil health, management of degraded soils

Unit- 4

- Cropping system, cropping pattern, farmingsystems,
- Manures and fertilizers, time and method ofapplication,
- Nutrient content of different fertilizers, and fertilizer requirement estimation of major crops of Haryana

Practical:

Study of primary and secondary tillage implements, ploughing, puddling and soil preparation, seeding equipment, methods of sowing, study of inter cultivation implements, identification of crops (rabi, kharif or both), weeds and their seeds, seed test for purity, germination and moisture content, calculation of seed rate, seedarium, identification of simple and complex fertilizers their nutrientcomposition.

Textbooks

1. Balasubramaniyan, P and Palaniappan, S.P. 2001. Principles and Practices of Agronomy. AgroBios (India) Ltd.,Jodhpur.
2. Reddy. T.Y and Reddy, G.H.S.1995. Principles of Agronomy, Kalyani Publishers, Ludhiana.
3. Khadekar, S.R. 2001. Meteorology. Agromet publishers,Nagpur
4. Varshneya, M.C. and Balakrishna Pillai, B. 2003. Textbook of Agricultural Meteorology. ICAR, NewDelhi.

Reference Books

1. Brady, N.C. and Well, R.R. 2002. The Nature and Properties of Soils (13th ed.). Pearson Education, Delhi.
2. De, G.C.1989. Fundamentals of Agronomy. Oxford and IBH Publishing Co.,New Delhi.
3. PrasadaRao, G.S.L.H.V. 2005. Agricultural Meteorology. Second Edition. KeralAgricultural University, Thrissur.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**15**	**15**	**30**	**40**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Agronomy of crops , crop classification	**PO1,PSO1**
CO2	Soil fertility, productivity, soil health	**PO2**
CO3	Cropping systems of Haryana	**PO8,PSO2**
CO4	Nutrient contents of different fertilizers and their requirements to different crops.	**PO12,PSO3**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG104A	Fundamentals of Agronomy	CO1	CO2						CO3				CO4		CO1	CO3	CO4

Programme and Course Mapping													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	3											3		
CO2			2				2					3		
CO3						2						3		
CO4											3		3	
CO5	3											3		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG106A	Fundamentals of Plant Biochemistry and Biotechnology	2	0	1	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

1. To study Importance of Biochemistry, Carbohydrate, lipids and Proteins.
2. To study Concepts and applications of plant biotechnology.
3. To study introduction to recombinant DNAmethods
4. To study Transgenic and Biotechnology regulations.

Course Outcome: The students will be benefitted by

CO1 knowing the fundamentals of biochemistry

CO2 Concepts and applications of plant biotechnology

CO3 Use of transgenic in agriculture.

CO4 PCR techniques and its applications; RFLP, RAPD, SSR; Biotechnology regulations.

Catalogue Description

This course has been designed to impart fundamental knowledge of Biochemistry, Carbohydrate, Lipids and Proteins. Concepts and applications of plant biotechnology,

Somatic hybridization and cybrids; Cryo-preservation. Introduction to recombinant DNA methods: Transgenic PCR techniques and its applications; RFLP, RAPD, SSR; Biotechnologyregulations.

Course Contents

Theory:

Unit –1

- Importance of Biochemistry. Properties of water, pH andbuffer.
- Carbohydrate: importance andclassification.
- Structures of monosaccharide, disaccharides andpolysaccharides,

Unit –2

- Lipid: importance and classification; Structures and properties of fatty acids; storage lipids and membranelipids.
- Proteins: structural organization and classification of proteins. Enzymes: general properties andclassification.
- Michaelis & Menten and Line Weaver Burk equation; Introduction to allosteric enzymes.Nucleicacids, Importance and classification;A,B&Z DNA, RNA.

Unit –3

- Concepts and applications of plant biotechnology: Scope, organ culture, embryo culture, cell suspension culture, callus culture, anther culture, pollen culture and ovule

  culture and their applications.
- Micro-propagation methods; organogenesis and embryogenesis, Embryo rescue and its significance; Somatic hybridization and cybrids; Cryo-preservation. Chloroplast transformation.

Unit –4

- Introduction to recombinant DNA methods: physical (gene gunmethod),
- chemical (PEG mediated) and *Agrobacterium* mediated gene transfermethods.
- Transgenics and its importance in cropimprovement.
- PCR techniques and its applications; RFLP, RAPD, SSR; Biotechnologyregulations.
- RNAi and Genome editing: Types and Successful casestudies
- Edible vaccine plant bodies

Practical

Preparation of solution, pH & buffers, qualitative tests of carbohydrates, lipid and amino acids, sterilization techniques.Composition of various tissue culture media and preparation of stock solutions for MS nutrient medium. Callus induction from various

explants. Micro- propagation technique. Demonstration on isolation of DNA and gel electrophoresis techniques. Visit to Biotechnology and Biochemistry labs

Textbooks

1. Jain JL, 2004, Fundamentals of Biochemistry, 5thedn, S. Chand and Company, New Delhi
2. Conn EE and Stump PK, 1989, Outline of Biochemistry, Wiley Eastern Ltd. New Delhi.
3. Chawla HS., 2002, Introduction to Plant Biotechnology, 2ndedn, Sciencepublishers.

Reference Books

1. David L. Nelson and Michael M. Cox, 2009, Lehninger Principles of Biochemistry, 5thedn, WHfreeman.
2. Bhojwani SS and Razdan MK, 1996, Plant Tissue Culture theory and practice, Elsevierpublishers.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	15	15	30	40

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Introduction to recombinant DNA methods: physical (gene gun method),	PO1, PSO1
CO2	chemical (PEG mediated) and Agrobacterium mediated gene transfer methods;	PO2
CO3	Transgenic and its importance in crop improvement;	PO8, PSO2
CO4	PCR techniques and its applications; RFLP, RAPD, SSR; Biotechnology regulations	PO12, PSO3

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3

SAGA106A	Fundamentals of Plant Biochemistry and Biotechnology	CO1	CO2						CO3				CO4		CO1	CO3	CO4	

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1					**1**									
CO2	**1**									**2**				
CO3		**2**			**2**		**3**			**3**				
CO4		**2**					**3**				**1**			
CO5														
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	**Course Title**	**L**	**T**	**P**	**C**
SAAG108A	Fundamentals of Genetics	2	0	1	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

1. To study the fundamentals of genetics, Pre and Post Mendelianconcepts.
2. To study Cell cycle and cell division, Linkage and its estimation.
3. To study Cytoplasmicinheritance
4. To study the Geneconcepts

Course Outcomes: The students will be trained

CO1 with the knowledge of concepts and principles of heredity,
CO2 Cell cycle and cell division
CO3 Linkage and its estimation
CO4 Gene concepts

Catalogue description: This subject has been designed to enrich the students with the knowledge of fundamentals genetics with Pre and Post Mendelian concepts of heredity, special types of chromosomes and Chromosomal theory of inheritance. Cell cycle and cell division, Mutation, classification, Sex determination and sex linkage,

Protein synthesis, Transcription and translational mechanism of genetic material, Gene concept

Course Contents

Theory

Unit –1

- Pre and Post Mendelian concepts ofheredity
- Mendelian principles ofheredity
- Architecture of chromosome i.e., chromonemata, chromosome matrix, chromomeres, centromere, secondary constriction andtelomere.
- Special types of chromosomes and Chromosomal theory ofinheritance.

Unit –2

- Cell cycle and cell division- mitosis andmeiosis.
- Probability and Chi-square Test. Dominance relationships and Epistatic interactions with example.
- Multiple alleles, pleiotropism and pseudoalleles,
- Sex determination and sex linkage, sex limited, and sex influenced traits, Blood group genetics.

Unit –3

- Linkage and its estimation, crossing over mechanisms and chromosome mapping.
- Structural and numerical variations in chromosome and their implications,
- Use of haploids, dihaploids and doubled haploids inGenetics.
- Mutation, classification, Methods of inducing mutations & CIB technique and mutagenic agents. Qualitative & Quantitative traits,
- Polygenes and continuous variations and multiple factor hypotheses.

Unit –4

- Cytoplasmic inheritance. Geneticdisorders.
- Nature, structure & replication of geneticmaterial.
- Protein synthesis, Transcription and translational mechanism of genetic material,
- Gene concept: Gene structure, function and regulation,
- Genetic Engineering

Practical

Study of microscope.Study of cell structure. Mitosis and Meiosis cell division. Experiments on monohybrid, dihybrid, trihybrid, test cross and back cross. Experiments on epistatic interactions including test cross and back cross. Experiments on probability and Chi-square

test. Determination of linkage and cross-over analysis (through two-point test cross and three- point test cross data). Study on sex linked inheritance in Drosophila. Study of models on DNA and RNA structures.

Textbooks

1. Gupta, P. K. 2007. Cytogenetics Rastogi Publishers,Meerut
2. Phundan Singh 1995, Elements of genetics Kalyani Publishers,Ludhiana
3. Singh B. D., Genetics. Kalyani publisher, NewDelhi.

Reference Books

1. Strickberger, M.W. 1996. Genetics (3rd edn.). Mac Millan Publishing Co., NewDelhi

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ WrittenExamination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**15**	**15**	**30**	**40**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	With the knowledge of concepts and principles of heredity,	**PO1, PSO1**
CO2	Cell cycle and cell division	**PO2, PSO2**
CO3	Linkage and its estimation	**PO8**
CO4	Gene concepts	**PO12**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAGA108A	Fundamentals of Genetics	CO1	CO2						CO3				CO4		CO1	CO2	

Programme and Course Mapping													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3											3		
CO2			2				2					3		
CO3						2						3		
CO4											3		3	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG110A	Fundamentals of Agricultural Extension Education	2	0	1	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

- To study Extension Education-scope objectives and principles of Extension Programme planning.
- To study concept and definition, monitoring and evaluation of extensionprogrammes.

- To study various extension/ agriculture development programmes launched by ICAR/Govt. ofIndia
- To study Principles and Functions of Communication, models and barriers to communication. Agriculture journalism.

Course Outcomes: The students will know about the

CO1 Extension programme planning of rural communities launched by governments.

CO2 Philosophy of C.D. Rural Leadership

CO3 Principles and Functions of Communication

CO4 New trends in agriculture extension

Catalogue Description: This subject has been designed to impart knowledge regarding the scope and process; objectives, principles of Extension Education and Extension Programmes plannings pertaining to Rural Development: concept, Community Development, monitoring and evaluation of extension programmes; Transfer of technology: concept and models, capacity building of extension personnel, Principles and Functions of Communication, models and barriers to communication and Agriculturejournalism.

Course Contents

Theory
Unit –1

- Extension Education- meaning, definition,types.
- Scope and process; objectives and principles of ExtensionEducation.
- Extension Programme Planning-Meaning,
- Process, Principles and Steps in Programme Development.

Unit –2

- Rural Development: concept, meaning, definition.
- Various rural development programs launched by Govt. of India.
- Community Dev.-meaning, definition, concept &principles,
- Philosophy of C.D. RuralLeadership:
- Concept and definition, types of leaders in rural context; extension administration: meaning and concept, principles and functions.
- Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programmes.

Unit –3

- Extension systems in India: extension efforts in pre-independence era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment,etc.)
- Post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.); various extension/ agriculture development programmes launched by ICAR/Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND, NATP, NAIP,etc.).
- New trends in agricultureextension:
- Privatization extension, cyber extension/ e-extension, market-led extension, farmer- led extension, expert systems,*etc*.

Unit –4

- Transfer of technology: concept and models, capacity building of extensionpersonnel.
- Extension teaching methods: meaning,classification,
- Individual, group and mass contactmethods,
- ICT Applications in TOT (News and social media), media mix strategies; communication: meaning anddefinition.
- Principles and Functions of Communication, models and barriers to communication. Agriculture journalism; diffusion and adoption ofinnovation:
- Concept and meaning, process and stages of adoption, adopter categories.

Practical

Group discussion- exercise; handling and use of audio visual equipments and digital camera and LCD projector; preparation and use of AV aids, preparation of extension literature – leaflet, booklet, folder, pamphlet news stories and success stories; Presentation skills exercise; micro teaching exercise; A visit to village to understand the problems being encountered by the villagers/ farmers; to study organization and functioning of DRDA and other development departments at district level; visit to NGO and learning from their experience in rural development; understanding PRA techniques and their application in village development planning; exposure to mass media: visit to community radio and television studio for understanding the process of programme production; script writing, writing for print and electronic media, developing script for radio andtelevision.

Textbooks

1. Dharma, O.P. and Bhatnagar, O.P 2000. Education and Communication for Development. Oxford, IBH, NewDelhi
2. Desai, A.R. 2003. Rural Sociology in India. Popular Prakashan,Bombay
3. Khana, B.S. 1991. Rural Development in South Asia-India. Deep and Deep Publication, NewDelhi.
4. Khatari, G.R. 1991. Rural Development Vo. I and II. Marak Publications Pvt. Ltd., Delhi.

Reference Books

1. Mollett, S.M. 1984. Planning for Agricultural Development. Martin Press, London.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	15	15	30	40

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Extension programme planning of rural communities launched by governments	**PO2**
CO2	Philosophy of C.D. Rural Leadership	**PO6**
CO3	Principles and Functions of Communication	**PO3**
CO4	New trends in agriculture extension	**PO9,PSO3**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAGA110A	Fundamentals of Agricultural Extension Education		CO1	CO3			CO2		CO3	CO4			CO4				CO4

Programme and Course Mapping													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	1													
CO2										**3**				
CO3			**2**											
CO4			**2**								**3**		**2**	
CO5														
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG112A	Fundamentals of Agricultural Microbiology	2	0	1	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective

1. To study the fundamentals of agriculture microbiology.
2. To study microbial genetics andrecombination.
3. To study the role of microbes in cropimprovement
4. To study the concept of microbial genetic engineering in agriculture

Course Outcomes

CO1 Introduction to microbial world:
CO2 Microorganisms can be used in agriculture for better abiotic stress tolerant.
CO3 Role of microbes in soil fertility and crop production
CO4 production (biofertilizer) and protection (biopesticide)

Catalogue Description: This subject has been designed to enrich the students with the knowledge of microbiology, as we all know microbes are present everywhere somehow influences our daily life either by positively or negatively. Basically, we taught the students to how microbe can be improving agriculture production (biofertilizer) and protection (biopesticide)

Course Contents

Theory
Unit –1

- Introduction to microbial world: Prokaryotic and eukaryoticmicrobes.
- Microbial taxonomy.
- Microscopy and other techniques supplementing Microscopy (Cytochemistry,X-ray Diffraction)

Unit –2

- Bacteria: cell structure, chemoautotrophy, photo autotrophy,growth.
- Bacterial genetics: genetic recombinationtransformation,

- Conjugation and transduction, plasmids, transposon.
- Endosymbiosis theory (Origin of Mitochondrial and Chloroplastic DNA)

Unit –3

- Role of microbes in soil fertility and crop production: Carbon, nitrogen, phosphorus and sulphurcycles.
- Biological nitrogen fixation- symbiotic, associative andasymbiotic.
- Azolla, blue-green algae and mycorrhiza. Rhizosphere and phyllosphere.

Unit –4

- Microbes in human welfare: silageproduction,
- Biofertilizers, biopesticides, biofuelproduction
- Biodegradation ofagro-waste.
- Microbes in Nanotechnology, Fermentation.

Practical

Introduction to microbiology laboratory and its equipments; Microscope - parts, principles of microscopy, resolving power and numerical aperture. Methods of sterilization.Nutritional media and their preparations. Methods of isolation and purification of microbial cultures.Isolation of *Rhizobium* from legume root nodule.Isolation of *Azotobacter* from soil. Isolation of *Azospirillum*from roots.Isolation of BGA. Staining and microscopic examination of microbes.

Textbooks

1. Tauro P, Kapoor KK and Yadav KS, 1989, An Introduction to Microbiology, Wiley Publications, NewDelhi.
2. SubbaRao, NS, 1999, Biofertilizers in Agricultural and Agroforestry, Oxford and IBH, NewDelhi.
3. Pelczar MJ, Chan ECS and Kreig NR, 1998, Microbiology. Tata McGraw Hill Publishing Co., Ltd., NewDelhi

Reference Books

1. Stanier RY, Ingraham, Wheelis MG and Paintor PR, 1986, The Microbiology World, Prentice Hall, NewJersey.
2. Alexander M, 1985, Introduction to Soil Microbiology, John Wiley and Sons, New York

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	15	15	30	40

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Introduction to microbial world	PO1
CO2	Microorganisms can be used in agriculture for better abiotic stress tolerant.	PO9,PSO1
CO3	Role of microbes in soil fertility and crop production	PO2
CO4	production (biofertilizer) and protection (biopesticide)	PO12,PSO3

Course Code	Course Title	PO1	PO2		PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG112A	Fundamentals of Agricultural Microbiology	CO1	CO3							CO2			CO4		CO2		CO4

Programme and Course Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3											3		
CO2			2				2					3		
CO3						2						3		
CO4											3		3	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG114A	Soil and Water conservation Engineering	1	0	1	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

1. To study the Soil and Water Conservation causes of soil erosion.
2. To study Soil loss estimation by universal Loss Soil Equation.
3. To study the principles of wind and water erosion control measures.

Course Outcomes The students will be benefitted with the knowledge of

CO1 Soil conservation, water and air erosion and their control.
CO2 Soil loss measurement techniques.
CO3 Principles of erosion control
CO4 Grassed water ways and their design.
CO5 Water harvesting and its techniques.

Catalogue Description: This subject has been designed to impart knowledge of Soil and Water Conservation, Forms of water erosion, Gully classification, Soil loss estimation, Introduction to contouring, strip cropping. Contour bund. Principles of erosion control, Principles of wind erosion control

Course Contents

Theory

Unit –1

- Introduction to Soil and Water Conservation causes of soil erosion.

- Definition and agents of soil erosion, water erosion: Forms of water erosion.

Unit –2

- Gully classification and controlmeasures.
- Soil loss estimation by universal Loss Soil Equation,
- Soil loss measurement techniques.

Unit –3

- Principles of erosion control: Introduction to contouring, strip cropping.
- Contour bund. Graded bund and benchterracing.
- Introduction to conservation agriculture and itsprinciples.
- Grassed water ways and their design. Water harvesting and its techniques.

Unit –4

- Wind erosion: mechanics of wind erosion, types of soil movement.
- Principles of wind erosion and its contro lmeasures.

Practical

General status of soil conservation in India. Calculation of erosion index. Estimation of soil loss. Measurement of soil loss. Preparation of contour maps. Design of grassed water ways. Design of contour bunds. Design of graded bunds. Design of bench terracing system. Problem on wind erosion.

Textbooks

1. Singhal, O.P., 1997, AgriculturalEngineering.
2. Kanetkar, Kulkarni, 2005, Surveying and levelling, AVG Prakasan, 23rdedition

Reference Book

1. Ojha, T.P. and A.M. Michael, 2001, Principles of Agricultural Engineering, 3rd edition, Vol. II. Jain Brothers NewDelhi.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	10	10	50	30

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs

S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Soil conservation, water and air erosion and their control.	PO1, PSO1
CO2	Soil loss measurement techniques	PO2
CO3	Principles of erosion control	PO9
CO4	Grassed water ways and their design. Water harvesting and its techniques.	PO13, PSO3

Course Code	Course Title	PO1	PO2		PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG114A	**Soil and Water conservation Engineering**	CO1	CO3							CO2			CO4		CO2		CO4

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1		**3**									**3**			
CO2							**1**							
CO3		**1**												
CO4		**2**				**2**								
CO5									**3**					
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG118A	Fundamentals of Rural Sociology and Educational Psychology	2	0	0	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

1. To study the Rural sociology its significance in agriculture.
2. To study Rural society, Social Groups, SocialStratification.
3. To study the educational psychology, Theories of Motivation

Course Outcomes The students will be able to understand the

CO1 Rural sociology and agriculture
CO2 Rural people structure and their profession
CO3 Personality and the motivational components for rural development.
CO4 Educational psychology

Catalogue description: This subject has designed to impart knowledge about the rural community, Rural society, Social Groups, Social Stratification, Culture and Social Change. It is also concerned with the educational psychology, Personality and Theories of Motivation and Intelligence.

Course Contents

Theory

Unit –1

- Sociology and Rural sociology: Definition andscope,
- its significance in agriculture extension

Unit –2

- Social Ecology, Rural society,
- Social Groups, Social Stratification

Unit-3

- Culture concept, Social Institution,
- Social Change & Development.

Unit –4

- Educational psychology: Meaning & its importance in agriculture extension.
- Behaviour: Cognitive, affective, psychomotor domain,
- Personality, Learning, Motivation,
- Theories of Motivation, Intelligence.

Textbooks

1. Desai A. R, 2003, Rural Sociology in India. Popular Parkasan,Bombay.
2. Samanta. R. K. and Arora, S. K., 1997, An Introduction to Sociology. KitabMahalS.D.Pvt. Ltd., Allahabad.
3. Doshi, S.L. and P. C. Jain, 2016, Rural Sociology, Rawat Publications,Jaipur.

Reference Book

1. Mondal, S. and Ray G. L., 2007, A Textbook of Rural Development. Kalyani Publishers, Chennai.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	20	20	0	60

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Rural sociology and agriculture	PO1
CO2	Rural people structure and their profession	PO2
CO3	Personality and the motivational components for rural development.	PO11, PSO2
CO4	Educational psychology	PO13

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAGA118A	**Rural Sociology and Educational Psychology**	CO1	CO2									CO3		CO4		CO3	

Programme and Course Mapping													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1			**3**										**2**	
CO2													**2**	
CO3						**3**								
CO4								**2**						
CO5								**2**						
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SACH125A	**Environmental Studies**	3	0	0	3
Pre-requisites/Exposure					

Co-requisites	--

Course Objectives

- To aware the students about theenvironment.
- To learn the students concepts and methods from ecological and physical sciences and their application in environmental problemsolving.
- To think across and beyond existing disciplinary boundaries, mindful of the diverse forms of knowledge and experience that arises from human interactions with the world aroundthem.
- Communicate clearly and competently matters of environmental concern and understanding to a variety of audiences in appropriate forms.

Course Outcomes

On completion of this course, the students will be able to:

CO1. To comprehend and become responsive regarding environmental issues.

CO2. Acquire the techniques to protect our mother earth, as without a clean, healthy, aesthetically beautiful, safe and secure environment no specie can survive and sustain.

CO3. Enable the students to discuss their concern at national and international level with respect to formulate protection acts and sustainable developments policies.

CO4. To know that the rapid industrialization, crazy consumerism and over-exploitation of natural resources have resulted in degradation of earth at all levels.

CO5. Become consciousness about healthy and safe environment.

Catalogue Description

This course imparts the basic concepts of environment which enable them to solve basic problems related to their surroundings. This course helps them to get an idea adverse effect of industrialization, population and degradation of natural resources on the environment. The course introduces the concepts of renewable and non-renewable resources.

Course Content

UNIT- 1

Environment and Natural Resources:

Multidisciplinary nature of environmental sciences; Scope and importance; Need for public awareness. Land resources; land use change; Land degradation, soil erosion and desertification.
Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state). Energy resources: Renewable and non- renewable energy sources, use of alternate energy sources, growing energy needs, casestudies.Carbon footprinting.

UNIT- 2

Ecosystems and Biodiversity:

Ecosystem: Definition and Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession.
Case studies of the following ecosystems:

a) Forestecosystem

b) Grasslandecosystem

c) Desertecosystem

d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans,estuaries)

Biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots ; India as a mega-biodiversity nation; Endangered and endemic species of India; Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity; Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

UNIT- 3

Environmental Pollution and Environmental Policies:

Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution Nuclear hazards and human health risks; Solid waste management: Control measures of urban and industrial waste; Pollution case studies. Insights into Thermal pollution and Ocean acidification.

Sustainability and sustainable development; Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture; Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

UNIT- 4

Human Communities and the Environment and Field work:

Human population growth: Impacts on environment, human health and welfare; Resettlement and rehabilitation of project affected persons; case studies; Disaster management: floods, earthquake, cyclones and landslides; Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan; Environmental ethics: Role of Indian and other religions and cultures in environmental conservation; Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).
Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc. Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
Study of common plants, insects, birds and basic principles of identification. Study of simple ecosystems-pond, river, Delhi Ridge, etc.

Textbooks

1. Kaushik and Kaushik, Environmental Studies, New Age International Publishers (P) Ltd. NewDelhi.

Reference Books/Materials

1. A.K. De, Environmental Chemistry, New Age International Publishers (P) Ltd. NewDelhi.
2. S.E. Manahan, Environmental Chemistry, CRCPress.
3. S.S Dara and D.D. Mishra, Environmental Chemistry and Pollution Control, S.Chand& Company Ltd, NewDelhi.
4. R. Gadi, S. Rattan, S. Mohapatra, Environmental Studies Kataria Publishers, NewDelhi.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/

Written Examination

Examination Scheme:

Components	Eval I	EvaII	Practical	End Term Exam
Weightage (%)	**20**	**20**	**00**	**60**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**

CO1	The learners will be able to comprehend and become responsive regarding environmental issues.	PO6
CO2	Students will acquire the techniques to protect our mother earth, as without a clean, healthy, aesthetically beautiful, safe and secure Environment no specie can survive and sustain.	PO10
CO3	It enables the students to discuss their concern at national and International level with respect to formulate protection acts and sustainable developments policies.	PO8
CO4	Students come to know that the rapid industrialization, crazy consumerism and over-exploitation of natural resources have resulted in degradation of earth at all levels.	PO9
CO5	Students become consciousness about healthy and safe environment.	PO2

Course Code	**Course Title**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
UCES125A	Environmental Studies		2				3		3	3	2			3	

Programme and Course Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3											3		
CO2			2				2					3		
CO3						2						3		
CO4											3		3	

1=lightly mapped 2= moderately mapped 3=strongly mapped

3rd Semester, Course Syllabi

Course Code	Course Title	L	T	P	C
SAAG201A	**Crop Production Technology – I (Kharif Crops)**	1	0	1	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

- To know origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *Kharif* cereal crops.
- To kno**w** origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *Kharif* pulse crops
- To kno**w** origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of fiber and fodder crop*s*.

Course Outcomes: The students will learn from this course about the

CO1 Origin, distribution of kharif crops

CO2 Economic importance and climatic requirement

CO3 Cultural practices for kharif crops

CO4 Best and latest technology to grow high yielding kharif crops and varieties.

Catalogue Description: This subject has been designed to impart knowledge on the latest and best technology for the production of high yielding crops. This subject emphasizes on growing of high yielding varieties for high food grains.

Course Contents

Theory:

Unit –1

Crop introduction, Origin, geographical distribution, economic importance, soil and climatic requirements, sowing time and methods, varieties, major pest and diseases management, cultural practices, Manure and fertilizer management and yield of *Kharif* cereal crops: –Rice,Maize,Sorghum,Pearlmillets.

Unit -2

Crop introduction, Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, major pest and diseases management, cultural practices, Manure and fertilizer management and yield of *Kharif* pulse crops:Pigeon pea,Mung bean,Urdbean

Unit -3

Crop introduction, Origin, geographical distribution, economic importance, soil and
climatic requirements, varieties, major pest and diseases management, cultural Practices, Major and fertilizer management and yield of *Kharif* oilseed crops: Groundnut, and Soybean, Fibre crops- cotton & jute.

Unit -4

Crop introduction, Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, Manure and pest and diseases management, cultural practices, Major and fertilizer management and yield of *Kharif* fodder crops: Sorghum, cowpea, Cluster bean and Napier grass.

Practical

Rice nursery preparation, transplanting of rice, sowing of soybean, pigeon pea and mungbean. maize, groundnut and cotton, effect of seed size on germination and seedling vigour of kharif season crops, effect of sowing depth on germination of kharif crops, identification of weeds in *kharif* season crops**,** study of crop varieties and important agronomic experiments at experimental farm. study of forage experiments, morphological description of kharif season crops, visit to research centres of relatedcrops.

Textbooks

1. Chatterjee, B.N. 1989. Forage Crop Production- Principles and Practices. Oxfordand IBH. New Delhi.
2. Chidda Singh, Prem Singh and Rajbir Singh. 2003. Modern Techniques of Raising Field Crops (2nd ed.). Oxford and IBH, New Delhi.
3. Prasad, R. 1999. A Textbook of Rice Agronomy, Jain Brothers, NewDelhi,

4. Reddy, S.R.2000.Principles of crop production. KalyaniPublication

Reference Books

1. Handbook of Agriculture, 2006, ICAR NewDelhi
2. Pal, M., Deka, J., and Rai, R.K. 1996. Fundamentals of Cereal Crop Production. Tata McGraw Hill Pub., NewDelhi
3. Sankaran, S. Mudaliar, T.V.S.1997. Principles of Agronomy the Bangalore Printing and Publishing Company

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**10**	**10**	**50**	**30**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Origin, distribution of kharif crops	PO1
CO2	Economic importance and climatic requirement	PO2, PSO1
CO3	Cultural practices for kharif crops	PO11, PSO2
CO4	Best and latest technology to grow high yielding kharif crops and varieties.	PO13, PSO3

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAGA201A	Crop Production Technology –I (KharifCrops)	CO1	CO2									CO3		CO4	CO2	CO3	CO4

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**

CO1			**3**										**2**	
CO2													**2**	
CO3						**3**								
CO4								**2**						
CO5								**2**						
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	**Course Title**	**L**	**T**	**P**	**C**
SAAG203A	Fundamentals of Crop Physiology	1	0	1	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

- To know crop physiology
- To know plan tcell
- To know mineral nutrition of plants
- To know respiration and glycolysis

Course Outcomes: The students will learn from thisabout

CO1 The physiology of various crops **CO2** Nutrient requirements of crops **CO3** best climatic conditions and

CO4 forecasting the favourable and unfavourable conditions for healthy agriculture.

Catalogue Description: This subject has been designed to impart knowledge of plants physiology, plant cell its minerals and respiration. This course will help the students in making the students capable of learning about physiology of the crops.

Course Contents

Unit –1

- Introduction to crop physiology and its importance inagriculture.
- Plant cell: an overview; diffusion andosmosis.
- Absorptionofwater, Ascent of transpiration and stomata physiology.

Unit –2

- Mineral nutrition ofplants:
- Functions and deficiency symptoms ofnutrients,
- Nutrient uptake mechanisms; Photosynthesis,
- Light and dark reactions, C3, C4 and CAM plants
- Phytochromes. Effect of Light (Green, Red, and Far-red light) on Photo-morphogenesis.

Unit –3

- Respiration: Glycolysis,
- TCA cycle and electron transport chain.
- Fat metabolism: Fatty acid synthesis and breakdown

Unit –4

- Plant growth regulators:
- Physiological roles and agricultural uses
- physiological aspects of growth and development of major crops:
- Growth analysis, role of physiological growth parameters in crop productivity

Practical

Study of plant cells, structure and distribution of stomata, inhibitions, osmosis, plasmolysis, measurement of root pressure, rate of transpiration, separation of photosynthetic pigments through paper chromatography, estimation of relative water content.

Textbooks

1. Lincoln Taiz and Eduardo Zeiger, 2002, Plant Physiology, 3rd ed, SinauerAssociates
2. Pessarakli M, 2003, Handbook of Plant and Crop Physiology, Marcel Dekker, Inc., NewYork.

Reference Book

1. Hans Mohr and Peter Schopfer, 1995, Plant physiology, Springer Publications.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**10**	**10**	**50**	**30**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	The physiology of various crops	PO1, PSO1
CO2	Nutrient requirements of crops	PO2
CO3	best climatic conditions	PO11, PSO2
CO4	Forecasting the favourable and unfavourable conditions for healthy agriculture.	PO12, PSO3

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG203A	Fundamentals of Crop Physiology	CO1	CO2									CO3	CO4		CO1	CO3	CO4

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1			**3**					**1**					**2**	
CO2													**2**	
CO3	**2**					**3**								
CO4								**2**						
CO5								**2**						

1=lightly mapped	2= moderately mapped	3=strongly mapped

Course Code	Course Title	L	T	P	C
SAAG204A	Fundamentals of Plant Breeding	2	0	1	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective

- To know genetics in relation to plant breeding.
- To know genetic basis and breeding methods.
- To know concepts of population genetics.
- To know development of inbred lines and hybrids, composite and synthetic varieties.
- To know breeding methods and biotechnological tools

Course Outcome: The students will be benefitted by

CO1 knowing the importance of plant breeding

CO2 Imparting knowledge on means of exploiting plants through breeding

CO3 Role of biotechnology and IPR in crop improvement.

CO4 Correlate the genetics behind breeding of crops

CO5 Realize the necessity of protecting farmers and breeders

Catalogue Description

This subject has been designed to impart knowledge on the latest and best technology for the development of high yielding varieties of various crops. This subject emphasizes on evolving

of high yielding varieties for high food grains. This course will help in making the students capable for the development of quality and high yielding varieties

Course Contents

Theory:

Unit –1

- Historical development, concept, nature and role of plant breeding, major achievements and futureprospects.
- Genetics in relation to plant breeding, modes of reproduction and apomixes, self-incompatibility and male sterility - genetic consequences, cultivaroptions.

Unit –2

- Domestication, Acclimatization and Introduction; Centres of origin/diversity, components of Geneticvariation.
- 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; bulk, pedigree and back cross method, Multiline concept.

Unit –3

- 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, recurrent selection schemes; Heterosis and inbreeding depression, development of inbred lines and hybrids, composite and synthetic varieties.

Unit –4

- Breeding methods in asexually propagated crops, clonal selection and hybridization; Maintenance of breeding records and data collection; Wide hybridization and pre- breeding.
- Polyploidy in relation to plant breeding, Mutation breeding-methods anduses.
- Biotechnological tools-DNA markers, marker assisted selectionand molecular breding. Participatory plant breeding.

Practical

Plant Breeder's kit, Study of germplasm of various crops. Study of floral structure of self-pollinated and cross-pollinated crops.Emasculation and hybridization techniques in self & cross pollinated crops.Study of male sterility system.Methods of calculating mean, range, variance, standard deviation, heritability. Designs used in plant breeding experiments, analysis of Randomized Block Design. To work out the mode of pollination in a given crop and extent of natural out-crossing.Prediction of performance of double crosshybrids.

Textbooks

1. Choudhari, T.C. 1982. Introduction to Plant Breeding. Oxford and IBH Publishing Co., NewDelhi.
2. Elliot. 1958. Plant Breeding and Cytogenetics. Mc Grow Hill. NewYork
3. Phundan Singh. 2015. Essentials of Plant Breeding. Kalyani Publishers, India.
4. Singh, B.D. 2018. Plant Breeding principles and methods. Kalyani Publishers,India.

Reference Books

1. Hayward, M.D., Bosemark, N.O and Romagosa (eds) 1993 Plant breeding- principles and prospects Chapman and Hall,London
2. J Allard, R.W. 1960. Principles of Plant Breeding. John Wiley and Sons INC. USA. Toppan Co. Ltd.Japan

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	15	15	30	40

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Knowing the importance of plant breeding	PO1, PSO1
CO2	Imparting knowledge on means of exploiting plants through breeding	PO2
CO3	Role of biotechnology and IPR in crop improvement	PO8, PSO3
CO4	Correlate the genetics behind breeding of crops	PO12, PSO2
CO5	Realize the necessity of protecting farmers and breeders	PO9

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG204A	Fundamentals of Plant Breeding	CO1	CO2						CO3	CO5			CO4		CO1	CO4	CO3

Programme and Course Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2										3		
CO2			2				2			1		3		
CO3						2						3		
CO4											3		3	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG205A	Fundamentals of Horticulture	1	0	1	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

- To know branches, importance ofhorticulture
- To know climate and soil, propagation and Seed germination of fruittrees.
- To know the Importance of plant bio-regulators inhorticulture

Course Outcomes: The students will learn from this subject about the

CO1 Climate and soil for horticultural crops.
CO2 Plant propagation-methods and propagating structures.
CO3 Principles of orchard establishment.
CO4 Importance of plant bio-regulators in horticulture

Catalogue Description: This subject has been designed to impart knowledge about the classification, seed germination and propagation of fruit trees. Orchard establishment and role of plant growth hormones. This course helps in making the students capable of multiplication of horticultural crops.

Course Contents

Theory:

Unit –1

- Horticulture - Its definition and branches, importance andscope.
- Horticultural and botanical classification.
- Climate and soil for horticulturalcrops.

Unit -2

- Plant propagation-methods and propagating structures.
- Seed dormancy, Seed germination.

Unit -3

- Principles of orchard establishment.

- Principles and methods of training and pruning,
- Chilling requirement, bud dormancy, juvenility,
- Flower bud differentiation, fruit development and fruit ripening.
- Unfruitfulness; pollination, pollinizers and pollinators; fertilization and parthenocarpy.

Unit -4

- Importance of plant bio-regulators inhorticulture
- Irrigation – methods, Fertilizer application in horticultural crops.

Practical:

Identification of garden tools. Identification of horticultural crops. Preparation of seed bed/nursery bed. Practice of sexual and asexual methods of propagation including micro- propagation. Layout and planting of orchard. Training and pruning of fruit trees. Preparation of potting mixture. Fertilizer application in different crops. Visit to commercial nurseries/orchard

Textbooks

1. Singh, J. 2008. Basic Horticulture, Kalyanipublishers.
2. Gupta, S. N. 2010. Instant Horticulture, Jain BrothersPublications
3. Kumar, N. 2017. Introduction To Horticulture, Oxford &Ibh.

Reference Books

1. Chadha, K.L.2001. Handbook of Horticulture, ICAR, NewDelhi.
2. Muthukumar, P. & R Selvakumar, R. 2017. Glaustas Horticulture, Daya Publishing House

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**10**	**10**	**50**	**30**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs

S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Climate and soil for horticultural crops	PO1
CO2	Plant propagation-methods and propagating structures	PO2, PSO1

CO3	Principles of orchard establishment	PO11
CO4	Importance of plant bio-regulators in horticulture	PO12, PSO3

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG 205A	Fundamentals of Horticulture	CO1	CO2									CO3	CO4		CO1		CO4

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1			**3**					**1**					**2**	
CO2	**2**												**2**	
CO3	**2**					**3**					**1**			
CO4								**2**						
CO5								**2**						
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	**Course Title**	**L**	**T**	**P**	**C**
SAAG207A	Introduction to Forestry	1	0	1	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

- To know silviculture, forestclassification,
- To know the climate, soil, propagation and Seed germination of foresttrees.
- Forest regeneration, Natural regeneration of forest trees.

Course Outcomes The students will learn from this subject about the

CO1 Basic knowledge of forestry

CO2 Forest regeneration, **CO3** Forest regeneration,

CO4 Agroforestry

Catalogue description: This subject has been designed to impart knowledge about the growing and raising technologies of forest and timber trees. Forest regeneration, Forest regeneration, Agroforestry. This course will help in making the students capable of raising and maintenance of forests in a particular climate.

Course Contents

Theory

Unit –1

Introduction – definitions of basic terms related to forestry, objectives ofsilviculture, Forest classification, salient features of Indian ForestPolicies.

Unit –2

Forest regeneration, Natural regeneration from seed and vegetative parts, coppicing, pollarding, rootsuckers. Artificial regeneration – objectives, choice between natural and artificial regeneration, essential preliminaryconsiderations. Crown classification.

Unit –3

Tending operations – weeding, cleaning, thinning –mechanical, ordinary, crown and advance thinning. Forest mensuration–Objectives, diameter measurement, instruments used in diameter measurement; Non instrumental methods of height measurement - shadow and single pole method.Instrumental methods of height measurement- geometric and trigonometric principles, instruments used in height measurement, tree stem form, form factor, form quotient, Measurement of volume of felled and standing trees, age determination of trees.

Unit –4

Agroforestry – definitions, importance, criteria of selection of trees in agroforestry, different agroforestry systems prevalent in thecountry, Shifting cultivation, taungya, alley cropping, wind breaks and shelter belts, home gardens, Cultivation practices of two important fast growing tree species of theregion.

Practical:

Identification of tree-species.Diameter measurements using callipers and tape, diameter measurements of forked, buttressed, fluted and leaning trees.Height measurement of standing trees by shadow method, single pole method and hypsometer.Volume measurement of logs using various formulae. Nursery lay out, seed sowing, vegetative propagation techniques. Forest plantations and their management.Visits of nearby forest-based industries.

Textbooks

1. SubbaRao, N.S. 1999. Biofertilizers in Agricultural and Agro forestry. Oxford and IBH, NewDelhi.
2. Grebner, D, Bettinger, P and Siry, J. Introduction to Forestry and Natural Resources AcademicPress.
3. P. K. R. Nair, 1993, An introduction toagroforestry

Reference Books

1. Edmonds, R.L, Agee, J. K. andGara, R.I. Forest Health andProtection

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**10**	**10**	**50**	**30**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Basic knowledge of forestry	PO1
CO2	Forest regeneration	PO2, PSO2
CO3	Forest regeneration	PO11
CO4	Agroforestry	PO12, PSO1

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG 207A	Introductory Forestry	CO1	CO2									CO3	CO4		CO4	CO2	

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1			**3**					**1**					**2**	
CO2	**2**												**2**	
CO3	**2**					**3**					**1**			
CO4								**2**						
CO5								**2**						
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	**Course Title**	**L**	**T**	**P**	**C**
SAAG209A	**Livestock and Poultry Management**	3	0	1	4
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective

- To know Role of livestock in the nationaleconomy
- To know Reproduction in farm animals andpoultry
- To know important Indian and exotic breeds of cattle, buffalo, sheep, goat, swine and poultry.
- To know prevention and control of important diseases of livestock and poultry

Course Outcomes: The students will learn from this subject about

CO1 Role of livestock in the national economy

CO2 Housing and manage of livestock and poultry

CO3 Prevention and control of important diseases of livestock

CO4 Raising of dairy and poultry farms as entrepreneur.

Catalogue Description: This subject has been designed to impart knowledge about the role of livestock in the national economy, reproduction, Management of milch animals, poultry and prevention from diseases. This course will help in making the students capable of raising of dairy and poultry farms.

Course Contents

Theory

Unit –1

- Role of livestock in the national economy. Introduction of livestock Present status and future prospectus of various livestock programme.
- Reproduction in farm animals
- Housing principles, space requirements for different species of livestock

Unit –2

- Management of calves, growing heifers and milch animals. Feeding and management of calves, growing heifers and milch animalsetc.
  Management of sheep, goat and swine

Unit –3

- Important Indian and exotic breeds of cattle, buffalo, sheep, goat,swine
- Improvement of farm animals
- Prevention and control of important diseases of livestock

Unit –4

- Housing principles poultry, Digestion in poultry.
- Reproduction Exotic breeds of poultry. Reproduction in poultry, Incubation, hatching and brooding. Management of growers and layers.
- Poultry diseases. Prevention and control
- Classification of feeds tuffs. Proximate principles of feed.

Practical

External body parts of cattle, buffalo, sheep, goat, swine and poultry. Handling and restraining of livestock. Identification methods of farm animals and poultry. Visit to IDF and IPF to study breeds of livestock and poultry and daily routine farm operations and farm records. Judging of cattle, buffalo and poultry.Culling of livestock and poultry.Planning and layout of housing for different types of livestock.Computation of rations for livestock.Formulation of concentrate mixtures. Clean milk production, milking methods. Hatchery operations, incubation and hatching equipments.Management of chicks, growers and layers.Debeaking, dusting and vaccination. Economics of cattle, buffalo, sheep, goat, swine and poultry production.

Textbooks

1. Banerjee, G.C. 2018. A Textbook of Animal Husbandry. Oxford & IBH Publishing Co. Pvt. Ltd., NewDelhi
2. Dairy India Yearbook 2001. A-25, PriyadarshiniVihar,Delhi.
3. Sastry, N.S.R & Thomas C.K, 2018: Livestock Production and Management, Kalyani Publishers,India

Reference Books

1. Handbook of Animal husbandry-Indian Council of Agricultural Research Publication, New Delhi, Third Edition,2002

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**15**	**15**	**30**	**40**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Role of livestock in the national economy	PO1
CO2	Housing and manage of livestock and poultry	PO2
CO3	Prevention and control of important diseases of livestock	PO9, PSO2
CO4	Raising of dairy and poultry farms as entrepreneur.	PO13, PSO3

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG 209A	Livestock and Poultry Management	CO1	CO2							CO3				CO4		CO3	CO4

Programme and Course Mapping													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1			**3**					**1**					**2**	
CO2	**2**												**2**	
CO3	**2**					**3**					**1**			
CO4				**2**				**2**						
CO5								**2**						
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG213A	Renewable Energy and Green Technology	1	0	1	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

- To know the classification of energy sources,
- To familiarize with different types of biogas solar energy, wind energy plants

Course Outcome

The students will learn from this subject about the

CO1 Classification of energy sources,

CO2 Familiarization with types of biogas plants and gasifies

CO3 Familiarization with solar energy gadgets

CO4 application of solar and wind energy

Theory

Unit –1

Classification of energy sources, contribution of these of sources in agricultural sector, Familiarization with biomass utilization for biofuel production and their application.

Unit –2

Familiarization with types of biogas plants and gasifiers, biogas, bio alcohol, biodiesel and bio oil production and their utilization as bioenergy resource, Introduction of solar energy, collection and their application.

Unit –3

Familiarization with solar energy gadgets: solar cooker, solar water heater, application of solar energy: solar drying, solar pond, solar distillation, solar photovoltaic system and their application

Unit –4

Introduction of wind energy and their application.

Practical

Familiarization with renewable energy gadgets. To study biogas plants, To study gasifier, To study the production process of biodiesel, To study briquetting machine, To study the production process of bio-fuels. Familiarization with different solar energy gadgets. To study solar photovoltaic system: solar light, solar pumping, solar fencing. To study solar cooker, To study solar drying system. To study solar distillation and solar pond.

Suggested Readings:

Jeremy Shere, 2013, Renewable: The World-Changing Power of Alternative Energy, St. Martin's Press
Robert Ehrlich, 2013, Renewable Energy: A First Course, CRC Press
David M. Buchla, Thomas E. Kissell, Thomas L. Floyd, 2014, Renewable Energy Systems, Pearson Publisher

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**10**	**10**	**50**	**30**

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Classification of energy sources,	**PO1**
CO2	Familiarization with types of biogas plants and gasifiers	**PO2,PSO1**
CO3	Familiarization with solar energy gadgets	**PO9,PSO2**
CO4	application of solar and wind energy:	**PO13,PSO3**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG 213A	Renewable Energy and Green Technology	CO1	CO2							CO3				CO4	CO2	CO3	CO4

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	3											3		
CO2			2									3		
CO3						2						3		
CO4											3		3	
CO5	3											3		
1=lightly mapped **2= moderately mapped** **3=strongly mapped**														

Course Code	**Course Title**	**L**	**T**	**P**	**C**
SAAG215A	Fundamentals of Plant Pathology	2	0	1	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective

- To know about the plant pathogenic organisms, different groups: fungi, bacteria, fastidious vesicular bacteria, phytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa, phanerogamic parasites and nematodes

Course Outcome

To know about the factors affecting disease development

CO1. To know types of parasitism and variability in plant pathogens.

CO2. To Epidemiology of crop disease

CO3. To know classification, mode of action and formulations of fungicides

CO4. Know about the crop diseases, their causal organisms and fungicides.

Theory

Unit –1

Introduction: History, Scope and objectives of Plant Pathology with special reference to Indian work. Importance, concepts and classification of plant diseases. Important plant pathogenic organisms, different groups: fungi, bacteria, fastidious vesicular bacteria, phytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa, phanerogamic parasites and nematodes with examples of diseases caused by them. Diseases and symptoms due to abiotic causes. Causes / factors affecting disease development: disease triangle and tetrahedron.

Unit –2

Fungi: Definition of fungus, general characters, somatic structures, types of fungal thalli, fungal tissues, modifications of thallus, reproduction (asexual and sexual). Binomial system of nomenclature, rules of nomenclature, Classification of fungi. *Bacteria*: general morphological characters and basic methods of reproduction.

Unit –3

Viruses: Nature, structure, replication and transmission. Study of phanerogamic plant parasites. *Nematodes:* General morphology and reproduction, Symptoms and nature of damage caused by plant nematodes (*Heterodera, Meloidogyne, Anguina, Radopholus* etc.) Liberation / dispersal and survival of plant pathogens.

Unit –4

Types of parasitism and variability in plant pathogens. Pathogenesis. Role of enzymes, toxins and growth regulators in disease development. Defense mechanism in plants. Epidemiology: Factors affecting disease development. Nature, chemical combination, classification, mode of action and formulations of fungicides

Practical

Acquaintance with various laboratory equipments and microscopy. Collection and preservation of disease specimen. Preparation of media, isolation and Koch's postulates. General study of different structures of fungi. Study of symptoms of various plant diseases. Study of representative fungal genera. Staining and identification of plant pathogenic bacteria. Transmission of plant viruses. Study of morphological features and identification of plant parasitic nematodes. Sampling and extraction of nematodes from soil. Study of fungicides and their formulations.

Suggested Readings:

Agrios, G.N. 2003. Plant Pathology Academy Press. New York.
Dasgupta, M.K. 1998. Principles of Plant Pathology. Allied Publishers Pvt. Ltd.Bangalore
Walia, Raman K. and Bajaj, Harish K., 2003, Textbook on Introductory Plant Nematology, Directorate of Information and Publications of Agriculture, ICAR, New Delhi
Nene,Y.L. and Thapliyal,P.N. 1998. Fungicides in Plant Disease Control. Oxford and IBH New Delhi
Singh. R.S 2002. Introduction to Principles of Plant Pathology. Oxford and IBH Publishing, New Delhi

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**15**	**15**	**30**	**40**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Importance of crop disease.	PO1, PSO1
CO2	Crop diseases, their causal organisms and fungicides.	PO2, PSO2
CO3	Factors affecting disease development	PO7
CO4	Classification of fungicides	PO11

Course Code	**Course Title**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PO13**	**PSO1**	**PSO2**	**PSO3**
SAAG 215A	Fundamentals of Plant Pathology	CO1	CO2					CO3				CO4			CO1	CO2	

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**											**3**		
CO2			**2**									**3**		
CO3						**2**						**3**		
CO4											**3**		**3**	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG217A	Agricultural Finance and Cooperation	2	0	0	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

- To know about Agricultural finance: nature and scope
- To know different parameters of credit
- To know factors for private loan system
- To know Agricultural cooperation: philosophy and principles

Course Outcomes: The students will learn from this subject about the

CO1 Agriculture Finance
CO2 Production, storage and marketing of good seeds.
CO3 Agricultural cooperation
CO4 Philosophy and Principle

Catalogue Description: This subject has been designed to impart knowledge about agricultural finance, agricultural credit, financing agriculture, cooperative credit structure and Private lease system of farming.

Course Content:

Theory

Unit-1

Agricultural finance: nature and scope; time value of money: compounding and discounting; agricultural credit: meaning, definition, Classification, need, micro finance; credit analysis: different parameters of credit (4Rs, 5Cs and 7Ps) repayment plans for credit.

Unit-2

History of financing agriculture in India; commercial banks: their nationalization lead bank scheme, regional rural banks, graminbanks, Scale of finance; higher financing agencies-RBI, NABARD, AFC, Asian Development Bank (ADB), World Bank, Insurance and Credit Guarantee Corporation of India. Factors for private loan system.

Unit-3

Factors and assessment of crop losses: determination of compensation: crop insurance, FasalBimaYojna and other government scheme advantages and limitations in application, estimation of cropyields.

Unit-4

Agricultural cooperation: philosophy and principles, history of Indian cooperative movement, Pre-independence and post-independence periods, cooperative credit structure-PACS, DCCB, SCB. Private lease system of farming

Textbooks

1. Kahlon, A.S., Singh, Karam. Managing Agricultural Finance. Allied Publishers, New Delhi
2. Reddy, S., Raghuram, P., Neelakantan, T.V and Bhavani D.I.2004. Agricultural Economics. Oxford and IBH Publishers, NewDelhi.

Reference Book

1. Reddy, S., and Ram, P.R. Agricultural Finance and Management. Oxford and IBH, NewDelhi.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	20	20	00	60

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Agriculture Finance	**PO1**
CO2	production, storage and marketing of good seeds.	**PO2,PSO1**
CO3	Agricultural cooperation	**PO7,PSO2**
CO4	Philosophy and Principle	**PO13**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG 217A	Agricultural Finance and Cooperation	CO1	CO2					CO3						CO4	CO2	CO3	

Programme and Course Mapping													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	**3**											**3**		
CO2			**2**									**3**		
CO3						**2**						**3**		
CO4											**3**		**3**	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG219A	Production Technology for Ornamental Crops, MAP and Landscaping	1	0	1	2
Prerequisites/Exposure	None				
Co-requisites	--				

Course Objectives

- To know the Importance and scope of ornamental crops, medicinal and aromatic plants and landscaping
- To know production technology of important ornamental plants, medicinal plants.
- To know about the processing and value addition in ornamental crops

Course Outcomes: The students will learn

CO1 Importance ornamentals, medicinal and aromatic plants
CO2 The package and practices of production
CO3 Processing of flowers, medicinal and aromatic plants
CO4 Value addition of these crops

Catalogue Description: The course is designed to impart knowledge regarding the advanced technologies to produce high quality flowers and medicinal and aromatic plants and the art of landscaping.

Course Contents

Theory

Unit –1

Importance and scope of ornamental crops, medicinal and aromatic plants and landscaping. Principles of landscaping. Landscape uses of trees, shrubs andclimbers.

Unit –2

Production technology of important cut flowers like rose, gerbera, carnation, lilium and orchids under protected conditions and gladiolus, tuberose, chrysanthemum under open conditions. Package of practices for loose flowers like marigold and jasmine under open conditions.

Unit –3

Production technology of important medicinal plants like ashwagandha, asparagus, aloe, coleus, Cinnamomum, periwinkle, isabgol and aromatic plants like mint, lemongrass, citronella, palmarosa, ocimum, rose, geranium, vetiver.

Unit –4

Processing and value addition in ornamental crops and MAPsproduce.

Practical

Identification of Ornamental plants.Identification of Medicinal and Aromatic Plants.Nursery bed preparation and seed sowing.Training and pruning of Ornamental plants.Planning and layout of garden.Bed preparation and planting of MAP.Protected structures – care and maintenance.Intercultural operations in flowers and MAP.Harvesting and post-harvest handling of cut and loose flowers.Processing of MAP. Visit to commercial flower/MAP unit.

Textbooks

1. Kirthikar.K.R. and Basu.B.D. 1993. Indian Medicinal Plants, Vol. 1-4. Lalit Mohan
2. Kurian, A and Sankar, M.A.2007. Medicinal Plants. New India Publishing Agency, New Delhi

Reference Book

1. Chadha, K.L.2001. Handbook of Horticulture, ICAR, NewDelhi

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	10	10	50	30

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Importance ornamentals, medicinal and aromatic	**PO1,PSO1**
	plants	
CO2	The package and practices of production	**PO2,PSO2**
CO3	Processing of flowers, medicinal and aromatic plants	**PO7,PSO3**
CO4	Value addition of these crops	**PO13**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG 219A	Production Technology for Ornamental Crops, Medicinal and Aromatic Plants and Landscaping	CO1	CO2					CO3						CO4	CO1	CO2	CO3

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**											**3**		
CO2			**2**									**3**		
CO3						**2**						**3**		
CO4											**3**		**3**	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

IVSemester 2nd Year

Course Code	Course Title	L	T	P	C
SAAG211A	Crop Production Technology – 2 (Rabi Crops)	1	0	1	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

- To know origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi cereal crops.
- To know origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi pulse crops
- To know origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi fodder crops.

Course Outcomes: The students will learn from this course about the

CO1 Origin, distribution of rabi crops

CO2 Economic importance and climatic requirement

CO3 Cultural practices for rabi crops

CO4 Best and latest technology to grow high yielding rabi crop varieties.

Catalogue Description: This subject has been designed to impart knowledge on the latest and best technology for the production of high yielding crops. This subject emphasizes on growing of high yielding varieties for high food grains.

Course Contents

Theory:

Unit –1

Origin, geographical distribution, economic importance, soil and climatic Requirements, sowing time and methods, pest and diseases management, fertilizer management requirements, of *Rabi* cereal crops–wheat and barley and sugarcane,Varieties, cultural practices and yield of *Rabi* crops: –wheat, barley and sugarcane

Unit –2

Rabi pulse crops-chickpea, lentil, peas,

Unit –3

Rabi oilseed crops: -rapeseed, mustard and sunflower; sugarcrops-sugarcane

Unit –4

Rabi Fodder crops: - berseem, lucerne andoats

Practical

Sowing methods of wheat and sugarcane, identification of weeds in *rabi*season crops, study of morphological characteristics of *rabi*crops, study of yield contributing characters of *rabi* season crops, yield and juice quality analysis of sugarcane, study of important agronomic experiments of *rabi* crops at experimental farms. Study of *rabi*forage experiments, oil extraction of medicinal crops, visit to research stations of related crops.

Textbooks

1. Chatterjee, B.N. 1989. Forage Crop Production- Principles and Practices. Oxford and IBH. NewDelhi.
2. Chidda Singh, Prem Singh and Rajbir Singh. 2003. Modern Techniques of Raising Field Crops (2nd edi.). Oxford and IBH, New Delhi.
3. Prasad, R. 1999. A Textbook of Rice Agronomy, Jain Brothers, NewDelhi,
4. Reddy, S.R.2000.Principles of crop production. KayaniPublication

Reference Books

1. Handbook of Agriculture, 2006, ICAR NewDelhi
2. Pal, M., Deka, J., and Rai, R.K. 1996. Fundamentals of Cereal Crop Production. Tata McGraw Hill Pub., NewDelhi
3. Sankaran, S. Mudaliar, T.V.S.1997. Principles of Agronomy the Bangalore Printing and PublishingCompany

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	10	10	50	30

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Origin, distribution of rabi crops	PO1
CO2	Economic importance and climatic requirement	PO2, PSO1
CO3	Cultural practices for rabi crops	PO11
CO4	Best and latest technology to grow high yielding rabi crops varieties.	PO13, PSO3

Course Code	**Course Title**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PO13**	**PSO1**	**PSO2**	**PSO3**
SAAG 211A	Crop Production Technology – 2 (Rabi Crops)	CO1	CO2									CO3		CO4	CO2		CO4

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**						**1**					**3**		
CO2			**2**						**3**			**3**		
CO3	**1**					**2**						**3**		
CO4							**2**				**3**		**3**	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG212A	Production Technology of Vegetable and Spice crops	1	0	1	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective

- To know the status and scope of olericulture in India andHaryana
- To know the origin, geographical distribution and cultural practices of *kharif,rabi* vegetable and spice crops.
- To know the physiological disorders of *kharif, rabi*vegetable and spice crops.

Course Outcome:

The students will learn-

CO1 Nursery raising of vegetable crops

CO2 Scientific cultivation of vegetables and spices

CO3 Kitchen gardening

CO4 Insect-pest management

Catalogue Description

The course will help the students to know about the Origin, geographical distribution, economic importance, soil, climatic requirements and physiological disorders of *Rabi* and *kharif* vegetables and spice crops. Also, they'll get acquainted with status and scope of olericulture in India.

Course Contents

Theory

Unit –1

Importance of vegetables & spices in human nutrition and national economy, types of vegetable gardens. Brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield of vegetable and spices of kharif, rabiseasons, Physiological disorders of vegetables: Tomato, Brinjal, Chilli, Capsicum, Tuber crops, Cole crops, bulb crops such as Potato, onion, and garlic. Leafy vegetables such as Amaranth, spinach; Perennial vegetables.

Unit –2

Brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting andyield, Physiological disorders, of vegetables: Cucumber, Melons, Gourds Pumpkin, French bean, Peas.

Unit –3

Brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting andyield, Physiological disorders, of vegetables: Cole crops such as Cabbage, Cauliflower, Knol-khol; Bulb crops such as Onion, Garlic; Root crops such as Carrot, Radish, beet root.

Unit –4

Brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, Physiological disorders and processing of spices: Ginger, turmeric pepper, cardamom, coriander, cumin, fenugreek, clove and cinnamon

Practical

Identification of vegetables & spice crops and their seeds. Nursery raising. Direct seed sowing and transplanting. Study of morphological characters of different vegetables & spices. Fertilizers applications. Harvesting & preparation for market. Processing of spices, Economics of vegetables and spicescultivation.

Textbooks

1. Das, P. C.1993. Vegetable crops in India. KalyaniPublishers
2. Choudhury, B.1983. Vegetables. National Book Trust, NewDelhi.
3. Chadha, K. L. 2003. Handbook of Horticulture, ICAR, NewDelhi.

Reference books

1. Thamburaj, S. and Singh, N. 2005. Vegetables, Tuber Crops and Spices. ICAR, New Delhi.
2. Pruthi, J. S. 2001 Minor Spices and Condiments-Crop Management and Postharvest Technology, ICAR, New Delhi, India.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Eval.1	Eval.2	Practical	End Term Exam
Weightage (%)	10	10	50	30

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Nursery raising of vegetable crops	**PO1**
CO2	Scientific cultivation of vegetables and spices	**PO2,PSO1**
CO3	Kitchen gardening	**PO12**
CO4	Insect-pest management	**PO9, PO13,PSO3**

Course Code	**Course Title**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PO13**	**PSO1**	**PSO2**	**PSO3**
SAAG 212A	Production Technology for Vegetable and Spicecrops	CO1	CO2							CO4			CO3	CO4	CO2		CO4

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**					**2**						**3**		
CO2	**3**												**3**	
CO3			**3**									**3**		
CO4										**3**			**3**	
CO5			**3**									**3**		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG210A	Principles of Seed Technology	2	0	1	3
Pre-requisites/Exposure	Fundamentals of Plant breeding				
Co-requisites					

Course Objective

- To know Seed and seed technology:
- To know Seed certification
- To know Seed storage
- To know Seed Processing, production and marketing strategies

Course Outcome The students will learn from this subject about

CO1 Seed and seed technology

CO2 Seed certification,

CO3 Molecular and Biochemical test.

CO4 Seed Processing plant and Seed marketing:

Catalogue Description: This subject has been designed to impart knowledge about the Seed and seed technology, Seed certification, seed storage Seed Processing, production and marketing strategies. This course helps in making the students capable of producing the good quality seed of crops.

Course Contents

Theory

Unit –1

Seed and seed technology: introduction, definition and importance. Deterioration causes of crop varieties and theircontrol. Maintenance of genetic purity during seed production, seed quality; Definition, Characters of good quality seed, different classes of seed.

Unit –2

Foundation and certified seed production of important cereals, pulses, oilseeds, fodder andvegetables. Seed certification, phases and procedure for seed certification, field inspection. Seed Act and Seed Act enforcement. Duty and powers of seed inspector, offences and penalties. Seeds Control Order 1983. Varietal Identification through Grow Out Test and Electrophoresis - Molecular and Biochemicaltest.

Unit –3

Detection of genetically modified crops, Transgene contamination in non-GM crops, and organic seed production. Seed drying, processing and their steps, seed testing for quality assessment, seed treatment, its importance, method of application and seed packing. Seed storage; general principles, stages and factors affecting seed longevity during storage. Measures for pest and disease control during storage.

Unit –4

Seed Processing plant and Seed marketing: structure and organization, sales generation activities, promotional media. Factors affecting seed marketing, Role of WTO and OECD in seedmarketing. Private and public sectors and their production and marketing strategies.

Practical

Seed production in major cereals: Wheat, Rice, Maize, Sorghum, Bajra and Ragi. Seed production in major pulses: Urd, Mung, Pigeon pea, Lentil, Gram, Field bean, pea. Seed production in major oilseeds: Soybean, Sunflower, Rapeseed, Groundnut and Mustard. Seed production in important vegetable crops. Seed sampling and testing: Physical purity, germination, viability, etc. Seed and seedling vigour test. Genetic purity test: Grow out test and electrophoresis. Visit to seed production farms, seed testing laboratories and seed processing plant.

Textbooks

1. Agrawal, P.K. 1994. Principles of Seed Technology, Kalyani Publishers, Ludhiana Agrawal, R.L. 1990. Seed Technology Kalyani Publishers, Ludhiana
2. Agrawal, P.K. and N. Dadlani 1995. Techniques in Seed Science andTechnology

Reference Books

1. Neal C. Stoskop, Dwight T. Tomes and B.R. Christie. 2006. Plant Breeding Theory and Practice. Scientific Publishers (India), Jodhpur.
2. Dahiya, B.S.; Rai, K.N. 1995 Seed Technology, Kalyani Publishers,Ludhiana

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	15	15	30	40

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Seed and seed technology	PO1, PSO1
CO2	Seed certification	PO2
CO3	Molecular and Biochemical test.	PO9, PSO2
CO4	Seed Processing plant and Seed marketing	PO13, PSO3

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG 210A	Principles of seed Technology	CO1	CO2							CO3				CO4	CO1	CO3	CO4

Programme and Course Mapping													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	**3**	**2**										**3**		
CO2			**2**				**2**			**1**		**3**		
CO3						**2**						**3**		
CO4											**3**		**3**	
CO5									**3**					
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG214A	Farm Machinery and Power	1	0	1	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

- To know about different types of engines
- To know the about different types of tractors and agriculture implements.

Course Outcomes

CO1 Familiarization with different systems of I.C. engines

CO2 Familiarization with Power transmission system

CO3 Implement for hillagriculture

CO4 Familiarization with sowing and planting equipment, harvesting and spraying equipments

Catalogue Description: The course will help the students in knowing the various types of engines and familiarization with Power transmission system. It also tells the students about Tractor types and implement for agriculture.

Course Contents

Theory

Unit –1

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 cycleengines, Study of different components of I.C. engine, I.C. engine terminology and solved problems.

Unit –2

Familiarization with different systems of I.C. engines: Air cleaning, cooling, lubrication, fuel supply and hydraulic control system of atractor, Familiarization with Power transmission system: clutch, gear box, differential and final drive of a tractor.

Unit –3

Tractor types, Cost analysis of tractor power and attached implement, Familiarization with Primary and Secondary Tillage implement, Implement for hill agriculture, implement for inter cultural operations.

Unit –4

Familiarization with sowing and planting equipment, calibration of a seed drill and solved examples, Familiarization with Plant Protection equipment, Familiarization with land development and soil conservation (Dozers,Bladeharrow, Land levelling, Sub-soil Plough) Familiarization with harvesting and threshing equipment.

Practical

Study of different components of I.C. engine. To study air cleaning and cooling system of engine, Familiarization with clutch, transmission, differential and final drive of a tractor, Familiarization with lubrication and fuel supply system of engine, Familiarization with brake, steering, hydraulic control system of engine, Learning of tractor driving, Familiarization with operation of power tiller, Implements for hill agriculture, Familiarization with different types of primary and secondary tillage implements: mould plough, disc plough and disc harrow . Familiarization with seed cum-fertilizer drills their seed metering mechanism and calibration, planters and trans-planter Familiarization with different types of sprayers and dusters Familiarization with different inter-cultivation equipment, Familiarization with harvesting and threshing machinery.

Textbooks

1. Ojha, T.P. and A.M. Michael 2001. Principles of Agricultural Engineering, Vol.I. Jain Brothers New Delhi.3rdedition
2. Singhal, O.P. 1977. Agricultural Engineering,

Reference Book

1. Sahay, Jagdiswar. 1977. Elements of Agricultural Engineering. Agro book Agencies

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**10**	**10**	**50**	**30**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Familiarization with different systems of I.C. engines	PO1, PSO1
CO2	Familiarization with Power transmission system	PO2
CO3	Implement for hill agriculture	PO9
CO4	Familiarization with sowing and planting equipment, harvesting and spraying equipment	PO11, PSO2

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG 214A	Farm Machinery and Power	CO1	CO2							CO3		CO4			CO1	CO4	

Programme and Course Mapping													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**											**3**		
CO2	**3**												**3**	
CO3			**3**									**3**		
CO4										**3**			**3**	
CO5			**3**									**3**		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG208A	Fundamentals of Agricultural Economics	2	0	0	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives:

- To know micro and macroeconomics
- To know economic laws as generalization
- To know agricultural planning and development in the country.
- To know demand and supply of commodities.

Course Outcome: The students will learn from this subject about the

CO1 approaches to economic analysis
CO2 Agricultural planning and development
CO3 Consumer'sequilibrium
CO4 Concepts of economy and its functions

Catalogue Description: This subject has been designed to impart knowledge about the micro and macro economics, economic laws as generalization and agricultural planning and development in the country. This course will help in making the students capable of agricultural planning, demand and supply of agricultural commodities.

Course Contents

Theory:

Unit –1

Economics: Meaning, scope and subject matter, definitions, Activities, approaches to economic analysis. Micro and macroeconomics, positive and normative analysis. Nature of economic theory; rationality assumption, Concept of equilibrium, economic laws as generalization of human behaviour.

Unit –2

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.

Unit –3

Demand: meaning, law of demand, schedule and demand curve, determinants, utility theory; law of diminishing marginal utility, equi-marginal 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 crosselasticity. Production: process, creation of utility, factors of production, input output relationship. *Laws of returns:* Law of variable proportions and law of returns to scale. *Cost:* concepts, short run and long run costcurves. Supply: Stock v/s supply, law of supply, schedule, supply curve, determinants of supply, elasticity of supply.

Unit –4

National income: Meaning and importance, circular flow, concepts of national income accounting and approaches to measurement, difficulties in measurement. Money: Barter system of exchange and its problems, evolution, meaning and functions of money, classification of money, supply, general price index, inflation and deflation. Banking: Role in modern economy, types of banks, functions of commercial and central bank, credit creation policy. *Tax:* meaning, direct and indirect taxes, agricultural taxation, GST. *Economic systems:* Concepts of economy and its functions, elements of economic planning.

Textbooks

1. Dewett, K.K. 2005. Modern Economic Theory. S. Chand, New Delhi.
2. Dewett, K.K., Verma. 2004 Elementary Economic Theory, S. Chand, NewDelhi
3. Jhingam, M. L. 2001. Micro Economic Theory. Konark publishers, NewDelhi
4. Reddy, S., Raghuram, P., Neelakantan, T.V., Bhavani D. I. 2004. Agricultural Economics. Oxford and IBH Publishers, New Delhi.

Reference Books

1. Kenneth, E.B.1941. Economic Analysis. Harper and Row, NewYork.
2. Lekhi, R.K. and Singh, J.2015.Agricultural Economics: An Indian Perspective. 10th Edition Kalyani Publishers, NewDelhi-1100012

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	20	20	00	60

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	approaches to economic analysis	PO1
CO2	Agricultural planning and development	PO2, PSO3
CO3	Consumer's equilibrium	PO9
CO4	Concepts of economy and its functions,	PO13, PSO1

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG 208A	Fundamentals of Agricultural Economics	CO1	CO2							CO3				CO4	CO4		CO2

Programme and Course Mapping													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2										3		
CO2			2				2			1		3		
CO3						2						3		
CO4											3		3	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG206A	Production Technology of Fruits and Plantation Crops	2	0	1	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

- To know status and potential of horticultural sector inIndia
- To know the importance and concepts of scientific fruitproduction
- To know production technology of tropical, sub-tropical and temperatefruits
- To know different propagation methods suitable to different fruit crops and climatic conditions

Course Outcomes:

The students will get acquainted with –

CO1 Various fruit and plantation crops

CO2 Latest varieties and techniques for commercial cultivation

CO3 Climatic and specific requirements of fruit and plantation crops

CO 4 Nutrient and pest management in orchard

Catalogue Description

This subject has been designed to impart knowledge about the technologies for growing and raising of fruit and plantation crops. This course will help in making the students capable of commercial management of horticultural crops for getting the high production of fruits and nuts.

Course contents

Theory

Unit –1

Importance and scope of fruit and plantation crop industry in India. Importance and use of root stocks.

Unit –2

Production technologies for the cultivation of tropical fruits sapota. Banana litchi, strawberry,Sub-tropical fruits-mango, citrus, grape, guava, papaya, date, ber,pomegranate

Unit –3

Production technologies for the cultivation of temperate fruits: apple, pear, peach, walnut,almond, Other fruits- pineapple, jackfruit.

Unit –4

Production technologies for the cultivation of plantation crops-coconut, arecanut, cashew, Tea, cocoa coffee & rubber.

Practical

Seed propagation. Scarification and stratification of seeds. Propagation methods for fruit and plantation crops. Description and identification of fruits. Preparation of plant bio regulators and their uses, Important pests, diseases and physiological disorders of above fruit and plantation crops, Visit to commercial orchards.

Textbooks

1. Bose, T.K, Mitra, S.K. and Sanyal, D. 2002. Fruits: Tropical and Subtropical. Vol. I and II, Nayaprakash Publications,Calcutta.
2. Kumar.N, Abdul Khader.J.B.M. Rangaswami.P. and Irulappan., 1993. Introduction to Spices – Plantation Crops, Medicinal and Aromatic Plants, Rajalakshmi Pub, Nagercoil.
3. Amar Singh, 1986. Fruit Physiology and Production. Kalyani Publishers,Delhi.

Reference books

1. Chadha, K.L.2001. Handbook of Horticulture, ICAR, NewDelhi.
2. CPCRI, 2003. Coffee Guide, Central Coffee Research Institute, Coffee Board, Chickamangalur, Karnataka.
3. Bal, J.S.2010 Fruit Growing. Kalyani Publications

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**15**	**15**	**30**	**40**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Various fruit and plantation crops	PO1, PSO1
CO2	Latest varieties and techniques for commercial cultivation	**PO2**
CO3	Climatic and specific requirements of fruit and plantation crops	**PO12**
CO4	Nutrient and pest management in orchard	**PO13, PSO3**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG 206A	Production Technology of Fruits and Plantation Crops	CO1	CO2										CO3	CO4	CO1		CO4

Programme and Course Mapping													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**	**2**										**3**		
CO2			**2**				**2**			**1**		**3**		
CO3						**2**						**3**		
CO4											**3**		**3**	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG216A	Agricultural Marketing, Trade and Prices	2	0	1	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective

- To know concepts of agricultural marketing
- To know pricing and promotion strategies
- To know marketing process-concentration
- To know concepts of International Trade

Course Outcome: The students will learn about

CO1 Classification and characteristics of agricultural markets

CO2 Pricing and promotion strategies

CO3 Market functionaries and marketing channels

CO4 Trade: Concept of International Trade and its need

Catalogue Description: The course will help the students to knowing the agricultural marketing concepts its classification and characteristics, pricing and promotion strategies, marketing process-concentration, role of Govt. in agricultural marketing and concepts of International Trade.

Course contents

Theory

Unit –1

Agricultural Marketing: Concepts and definitions of market, marketing, agricultural marketing, market structure, marketing mix and market segmentation, 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.

Unit –2

Producer's surplus – meaning and its types, marketable and marketed surplus, factors affecting marketable surplus of agri-commodities. Pricing and promotion strategies: pricing considerations and approaches – cost based and competition-based pricing; market promotion – advertising, personal selling, sales promotion and publicity – their meaning and merits & demerits; marketing process and functions:

Unit –3

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). Market functionaries and marketing channels: Types and importance of 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 prices pread: 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

Unit –4

Role of Govt. in agricultural marketing: Public sector institutions- CWC, SWC, FCI, CACP & DMI – their objectives and functions; cooperative marketing inIndia. 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.

Practical

Plotting and study of demand and supply curves and calculation of elasticities**;** Study of relationship between market arrivals and prices of some selected commodities; Computation of marketable and marketed surplus of important commodities; Study of price behaviour overtime for some selected commodities; Construction of index numbers; Visit to a local market to study various marketing functions performed by different agencies, identification of marketing channels for selected commodity, collection of data regarding marketing costs, margins and price spread and presentation of report in the class; Visit to market institutions – NAFED, SWC, CWC, cooperative marketing society, etc. to study their organization and functioning; Application of principles of comparative advantage of international trade.

Textbooks

Acharya, S.S., Agarwal, N.L.1987. Agricultural Marketing in India. Oxford and IBH, NewDelhi.

Acharya, S.S., Agarwal, N.L.1994. Agricultural Prices and Policy. Oxford and IBH, NewDelhi.

Reference Books

Philip, K. 2004. Principles of Marketing. Prentice Hall, New Delhi

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	15	15	30	40

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Classification and characteristics of agricultural markets	PO1, PSO1
CO2	Pricing and promotion strategies	PO2,PSO2
CO3	Market functionaries and marketing channels	PO7
CO4	Trade: Concept of International Trade and its need	PO13

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG 216A	Agricultural Marketing, Trade and Prices	CO 1	CO 2					C						C	C	C	

Programme and Course Mapping													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3											3		
CO2	3												3	
CO3			3									3		
CO4										3			3	
CO5			3									3		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG218A	Problematic Soils and their Management	1	0	1	2
Pre- requisites/Exposure	None				
Co-requisites					

Course Objectives

- To know differentAgro-ecosystems
- To know soil quality and health
- To know about the reclamation and management of problematic soils

Course Outcome: The students will learn about -

CO1 Different agro-ecosystems

CO2 Parameters of soil health

CO3 Various salt affected soils and their extent

CO4 Reclamation of problematic soils

Catalogue Description

The course is designed to impart knowledge regarding Problematic soils under different Agro-ecosystems, soil quality and health, Reclamation and management, Irrigation water – quality and standards and management of problematic soils.

Course contents

Theory

Unit-1

Soil quality and health, Distribution of Waste land and problem soils inIndia.Their categorization based on properties.

Unit- 2

Reclamation and management of Saline and sodic soils, Acid soils, Acid Sulphate soils, Compacted soils, Flooded/ Waterloggedsoils.

Unit- 3

Irrigation water – quality and standards, utilization of saline water inagriculture. Remote sensing and GIS in diagnosis and management of problem soils. Recent technological advances in characterization and reclamation of salt-affected soils. Reclamation of Problem Soils-as sub scheme of Rashtriya KrishiVikasYojana(RKVY).

Unit- 4

Multi purpose tree species, bio remediation through MPTs of soils, Land capability and classification, land suitability classification. Problematic soils under differen t Agro-ecosystems. Problematic soils and food security in India.

Practical

Reclamation and management of Saline and sodic soils, Acid soils, Acid Sulphate soils, Compacted soils, Flooded/ Waterlogged soils.utilization of saline water in agriculture. Multipurpose tree species, bioremediation

Textbooks

1. Biswas, T.D. and S.K. Mukherjee. 1995.Textbook of Soil Science. Tata McGraw-Hill Publishing Company Limited, NewDelhi.
2. Das, D.K. 1997. Introductory Soil Science. Kalyani Publishers

Reference books

1. Adams, F., 1984. Soil Acidity and Liming. 2nd Edn, American Society of Agronomy, Madison, U.S.A.
2. Brady, N.C. and R.R. Well. 2007. The Nature and Properties of soil. 13th edition. Dorling Kindersley (India) Pvt. Ltd., New Delhi –110092

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Eval.1	Eval. 2	Practical	End Term Exam
Weightage (%)	10	10	50	30

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Different agro-ecosystems	**PO2**
CO2	Parameters of soil health	**PO12, PSO2**
CO3	Various salt affected soils and their extent	**PO11,PSO1**
CO4	Reclamation of problematic soils	**PO9**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG 218A	Problematic Soils and their Management		CO1							CO4		CO3	CO2		CO3	CO2	

Programme and Course Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3											3		
CO2	3												3	
CO3			3									3		
CO4										3			3	
CO5			3									3		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG220A	Agriculture informatics	2	0	0	2
Prerequisites/Exposure	None				
Co-requisites	--				

Course Objectives

- To know Computers, Operating Systems
- To know World Wide Web (WWW): Concepts and components.
- To know IT application for computation Smartphone Apps in Agriculture
- To know Geospatial technology for generating valuable in agriculture

Course Outcome:

The students will learn-

CO1 Types of computers and their operating systems

CO2 Tools of data presentation and analysis

CO3 Uses of DBMS in Agriculture

CO4 Contingent crop-planning using various IT tools

Catalogue Description

The course is designed to impart knowledge regarding Computers, Operating Systems, Data presentation, interpretation and graph creation, statistical analysis, mathematical expressions, Database, concepts and types, uses of DBMS in Agriculture, World Wide Web (WWW): Geospatial technology for generating valuable agri-information. Preparation of contingent crop-planning using IT tools.

Course contents

Theory

Unit –1

Introduction to Computers, Operating Systems, Data presentation, interpretation and graph creation, statistical analysis, mathematical expressions, Database, concepts and types, uses of DBMS in Agriculture

Unit-2

World Wide Web (WWW): Concepts and components. Introduction to computer programming languages, concepts and standard input/output operations. e- Agriculture,

concepts andapplications, Use of ICT in Agriculture. Computer Models for understanding plant processes.

Unit-3

IT application for computation of water and nutrient requirement of crops, Computer-controlled devices (automated systems) for Agri-inputmanagement, Smartphone Apps in Agriculture for farm advises, market price, postharvest management*etc*.

Unit-4

Geospatial technology for generating valuable agri-information. Decision support systems, concepts, components and applications inAgriculture, Agriculture Expert System, Soil Information Systems etc for supporting Farm decisions. Preparation of contingent crop-planning using ITtools.

Textbooks

1. P.K. Sinha 2009. Computer Fundamentals-Third Edition. BPBpublication
2. Capron.H.L. 1996. Computers – Tools for an information age – Fourth Edition. The Benjamin / Cummings Publishing Company, Inc., NewYork.

Reference books

1. Peter Nortons. 2001. Introduction to Computers – Fourth Edition. Tata Mc Graw Hill Publishing Co. Ltd., NewDelhi.
2. Sharma K.V.S. 2001. Statistics made simple: Do it yourself on PC. Prentice Hall of India.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**20**	**20**	**00**	**60**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Types of computers and their operating systems	**PO2**
CO2	Tools of data presentation and analysis	**PO4, PSO1**
CO3	Uses of DBMS in Agriculture	**PO7, PO12**

CO4	Contingent crop-planning using various IT tools	**PO9, PSO2**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG 220A	Agriculture informatics		CO1		CO2			CO3		CO4					CO2	CO4	

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**											**3**		
CO2	**3**												**3**	
CO3			**3**									**3**		
CO4										**3**			**3**	
CO5			**3**									**3**		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG202A	Farming System and Sustainable Agriculture	1	0	0	1
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective

- To know Problems and prospects of present-day agriculture
- To know the importance and concepts of agriculture
- To know cropping system and pattern
- To know Integrated farming system

Course Outcome:

The students will learn from this subject about

CO1 the best climatic conditions for farming operations and forecasting the favorable and unfavorable conditions for healthy agriculture

CO2 the cropping system most suitable to prevailing climatic and socio-economic conditions

CO3 the basics of sustainable agriculture

CO4 modern agriculture practices

Catalogue Description

This course has been designed to impart knowledge of present-day agriculture, Cropping system and pattern, integrated farming system and Wasteland development. This course helps in making the students capable for better crop production.

Course contents

Theory:

Unit –1

Problems and prospects of present-day agriculture, Farming System-scope, importance, andconcepts, Types and systems of farming system, Factors affecting types offarming, Farming system components and their maintenance.

Unit -2

Cropping system and pattern, Multiple cropping system, Efficient cropping system and theirevaluation, Allied enterprises and their importance, Tools for determining production and efficiencies in cropping and farming system; Sustainable agriculture-problems and its impact on agriculture, Indicators of sustainability, adaptation and mitigation, Conservation agriculture strategies in agriculture, HEIA, LEIA and LEISA and its techniques for sustainability,

Unit -3

Integrated farming system-historicalbackground, Objectives and characteristics, components of IFS and itsadvantages, Site specific development of IFS model for different agro-climaticzones, Resource use efficiency and optimization techniques.

Unit -4

Resource cycling and flow of energy in different farming system, Farming system and environment,Wasteland and their development, Visit of IFS model in different agro-climatic zones of nearby states University/ institutes and farmer'sfield.

Textbooks

1. Singh, S.S.2006. Principles and practices of agronomy, KalyaniPublications
2. Panda, S.C.2003. Cropping and Farming system AgrobiosPublications
3. Sharma, A.K. 2005. Biofertilizers for Sustainable Agriculture. Published by AGROBIOS (India)Jodhpur

Reference books

1. Dahama, A.K. 2007. Organic Farming for Sustainable Agriculture. 2nd Edn. Published by AGROBIOS (India)Jodhpur
2. Gupta, P.K. 2006. Vermi-composting for Sustainable Agriculture. Published by AGROBIOS (India)Jodhpur
3. Sharma, A.K. 2006. A Handbook of Organic Farming. Published byAGROBIOS

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	20	20	00	60

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	the best climatic conditions for farming operations and forecasting the favourable and unfavourable conditions for healthy agriculture	**PO1**
CO2	the cropping system most suitable to prevailing climatic and socio-economic conditions	**PO2, PO9**
CO3	the basics of sustainable agriculture	**PO12,PSO1**
CO4	modern agriculture practices	**PO13,PSO3**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG202A	Farming System and Sustainable Agriculture	CO1	CO2										CO3	CO4	CO3		CO4

Programme and Course Mapping													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**											**3**		
CO2			**2**				**2**					**3**		
CO3						**2**						**3**		
CO4											**3**		**3**	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

5th Sem. (3rdYear)

Course Code	Course Title	L	T	P	C
SAAG301A	Principles of Integrated Disease Management	1	0	1	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective

- To know the importance of plant diseases.
- To know the classification of plant diseases.
- To know the methods of detection and diagnosis of diseases
- To know the principles and tools of IDM and safety during pesticide uses

Course Outcome: The students will learn from this subject about
CO1 history, importance, concepts, Categories of crop diseases
CO2 Methods of control
CO3 Survey surveillance and forecasting of diseases.

CO4 Implementation and impact of IDM (IDM module for disease).

Catalogue Description: The course will help the students to knowing the economic importance of crop diseases, methods of detection and diagnosis of diseases and principles and methods of plant disease management.

Course Contents

Theory
Unit –1

- Categories of diseases, IDM: Introduction, history, importance, concepts,
- Principles and methods of plant disease management, principles and tools of IDM.
- Economic importance of diseases. Methods of detection and diagnosis ofdiseases.

Unit –2

- Methods of control: Host plant resistance, cultural, mechanical, physical, legislative, biological and chemical control. Ecological management of crop environment.

Unit –3

- Introduction to conventional pesticides for diseasemanagement.
- Survey surveillance and forecasting of diseases. Development and validation of IDM module.

Unit –4

- Implementation and impact of IDM (IDM module fordisease).
- Safety issues in pesticide uses. Ecological, social and legal implication of IDM.

Practical

Methods of diagnosis and detection of various plant diseases, Methods of plant disease measurement, Assessment of crop yield losses, calculations based on economics of IDM, Mass multiplication of *Trichoderma, Pseudomona*s, etc. Mass multiplication of *Bacillus*.Identification and nature of damage of important diseases and their management.Crop (agroecosystem) dynamics of selected diseases. Plan & assess preventive strategies (IDM module) and decision making. Crop monitoring attacked by pathogen.

Textbooks

1. Dasgupta, M.K. 1998. Principles of Plant Pathology. Allied Publishers Pvt. Ltd. Bangalore
2. Nene, Y.L. and Thapliyal, P.N. 1998. Fungicides in Plant Disease Control. Oxfordand IBH NewDelhi
3. Singh. R.S 2002. Introduction to Principles of Plant Pathology. Oxford and IBH Publishing, NewDelhi

Reference Book

1. Agrios, G.N. 2003. Plant Pathology Academy Press. NewYork.
2. Maloy. O.C. 1993. Plant Disease Control. Principles and Practice. John Wiley and Sons.Inc. NewYork

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**10**	**10**	**50**	**30**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	history, importance, concepts, Categories of crop diseases	**PO1,PSO1**
CO2	Methods of control	**PO2**
CO3	Survey surveillance and forecasting of diseases.	**PO9**
CO4	Implementation and impact of IDM (IDM module for disease).	**PO12,PSO3**

Course Code	**Course Title**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PO13**	**PSO1**	**PSO2**	**PSO3**
SAAG301A	Principles of Integrated Disease Management	CO1	CO2							CO3			CO4		CO1		CO4

Programme and Course Mapping													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**											**3**		
CO2			**2**									**3**		
CO3						**2**						**3**		
CO4											**3**		**3**	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG303A	**Pests of Crops and Stored Grains and their Management**	2	0	1	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective

1. To know the distribution, importance, biology and damage by insect pests in various crops.
2. To know the non-insect pests of various crops and stored grains.
3. To non-insect pests of various crops and stored grains
4. To know the management practices of pests of crops and stored grains.

Course Outcome: The students will learn about the

CO1 importance, biology and damage by insect pests
CO2 non insect pests of various crops and sored grains
CO3 non insect pests of various crops and sored grains
CO4 Saving of crops by the management of pests

Catalogue Description: This course has been designed to enrich the students with the knowledge of pests of various field crops and stored grains. The course will help the students to knowing the different types of non-insect pests and their management.

Course Contents

Theory

Unit –1

Classification, host range, distribution, biology and bionomics, nature of damage, and management of major insect pests and non-insect pests of field crops, vegetable, fruit, and plantation crops.

Unit –2

Classification, host range, distribution, biology and bionomics, nature of damage, and management of major insect pests and non-insect pests of ornamental, spices and condiment crops.

Unit –3

Insect pests, mites, rodents, birds and microorganisms associated with stored grain and their management. Storage structure and methods of grain storage.

Unit –4

Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain.

Practical

Identification of various insect pests and their nature of damage on Field, Vegetable, Fruit, Plantation, spice crops & condiments.study of life cycle and seasonal history.Pesticide application techniques. Identification of insect pests and Mites, rodents, birds associated with stored grains and their management, assessment of losses due to insect pests. Determination of moisture content of grain.Methods of grain sampling under storage condition. Visit to Indian Storage Management and Research Institute, Hapur Visit to nearby silos/ FCI godowns.

Textbooks

1. David, B. V. 2001. Elements of Economic Entomology. Popular Book Depot, Madras, 536p.
2. Ghosh, S. K. Dubey, S. L. 2003. Integrated Management of Stored Grain Pests. International Book Distributing Company.263p.
3. Pradhan, S. 1983. Agricultural Entomology and Pest Control. Indian Council of Agricultural Research, New Delhi.267p.

Reference Books

1. Atwal, A. S. 1991. Agricultural Pests of India and South – East Asia. Kalyani Publishers, New Delhi.529p
2. Nair, M. R. G. K. 1986. Insects and Mites of Crops in India. Indian Council of Agricultural Research, New Delhi.267p.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	15	15	30	40

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Importance, biology and damage by insect pests	**PO1, PSO1**
CO2	Non insect pests of various crops and stored grains	**PO2**
CO3	Insect pests of various crops and sored grains	**PO9**
CO4	Saving of crops by the management of pests	**PO13, PSO3**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG303A	Pests of Crops and Stored Grains and their Management	CO1	CO2							CO3				CO4	CO1		CO4

Programme and Course Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3					2						3		
CO2			2									3		
CO3						2			1			3		
CO4	1										3		3	
CO5	3					2						3		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG313A	Diseases of Field and Horticultural Crops and their Management- I	2	0	1	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective

1. To know symptoms, etiology, diseasecycle
2. To know the importance of diseases of various kharif grain and vegetablecrops
3. To know the management practices of diseases of fieldcrops
4. To learn management of vegetable crops and fruittrees.

Course Outcome: The students will learn from this course about

CO1 Crop disease symptoms and etiology
CO2 the importance of diseases of various kharif grain and vegetable crops
CO3 field crops diseases management
CO4 vegetable and fruit trees disease management

Catalogue Description: The course has been designed to teach the students to about the symptoms, etiology of different types of diseases of various kharif grain and vegetable crops and fruit trees and their management.

Course contents

Theory

Unit –1

- Symptoms, etiology, disease cycle and management of major diseases of Field Crops: Rice: blast, brown spot, bacterial blight, sheath blight, false smut, khaira and tungro; Maize: stalk rots, downy mildew, leaf spots.
- Sorghum: smuts, grain mould and anthracnose, Bajra (pearl millet): downy mildew, powdery mildew and ergot; Groundnut: Tikka and wilt.

Unit –2

- Symptoms, etiology, disease cycle and management of major diseases of Soybean: *Rhizoctonia* blight, bacterial spot, and mosaic; Pigeon pea: *Phytophthora* blight, wilt and sterility mosaic.
- Finger millet: Blast and leaf spot; black & green gram: *Cercospora*leaf spot and anthracnose, web blight and yellowmosaic.

Unit –3

- Symptoms, etiology, disease cycle and management of major diseases of Horticultural Crops: Guava: wilt and anthracnose; Banana: Panama wilt, bacterial wilt, *Sigatoka* and bunchytop.
- Papaya: foot rot, leaf curl and mosaic, Pomegranate: bacterial blight; Cruciferous vegetables: *Alternaria* leaf spot and black rot; Brinjal: *Phomopsis* blight and fruit rot and *Sclerotinia*blight.

Unit –4

- Symptoms, etiology, disease cycle and management of major diseases of Tomato: damping off, wilt, early and late blight, leaf curl and mosaic; Okra: Yellow Vein Mosaic.
- Beans:anthracnoseandbacterialblight;Ginger:softrot;Colocasia:*Phytophthora*

  blight; Tea: blister blight; Coffee: rust

Practical

Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visit for the diagnosis of field problems. Collection and preservation of plant diseased specimens for Herbarium; Note: Students should submit 50 pressed and well mounted specimens.

Textbook

1. Singh, R.S 2001. Plant Disease Management, Oxford and IBH PublishingCo N. Delhi.
2. Mehrotra. R. S. Plant Pathology. TATA McGraw Hill Pub. Co. N.Delhi.
3. Sharma, P. D. 2001. Plant Pathology, Rastogi Publications, Shivaji Road, Meerut.

Reference Book

1. Ramakrishnan, T. S. 1971. Diseases of Millets.ICAR
2. Singh, R. S. 1995. Diseases of Vegetables Crops. Oxford and IBH Publishing Co

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**15**	**15**	**30**	**40**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Crop disease symptoms and etiology	**PO1**
CO2	The importance of diseases of various kharif grain and vegetable crops	**PO2,PSO1**
CO3	Field crops diseases management	**PO9,PSO2**
CO4	Vegetable and fruit trees disease management	**PO12**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG304A	Diseases of Field and Horticultural Crops and their Management- I	CO1	CO2							CO3			CO4		CO2	CO3	

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**											**3**		
CO2	**3**							**2**					**3**	
CO3			**3**			**2**						**3**		
CO4										**3**			**3**	
CO5			**3**									**3**		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	**Course Title**	**L**	**T**	**P**	**C**
SAAG305A	**Crop Improvement-I (*Kharif* Crops)**	1	0	1	2
Pre-requisites/Exposure	Nil				
Co-requisites	--				

Course Objective

- To know the origin, distribution various *kharif crops and their wild relatives*
- To know the major breeding objectives and procedures of field crops and vegetable crops and fruittrees.
- To study Germplasm of various kharif crops
- To Learn various steps of variety release procedures

Course Outcome: The students will be benefitted by

CO1 Knowledge on the use of genetic resources
CO2 Describing concepts of breeding crops based on objective
CO3 Understanding hybrid seed product
CO4 introducing to modern breeding concepts

Catalogue Description: The course will help the students to knowing the origin, distribution of species, wild relatives in different field crops, vegetable crops and fruit trees and adaptability, stability, abiotic and biotic stress tolerance and quality of different crops.

Course contents

Theory

Unit –1

Centres of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds.Fibres; fodders and cash crops; vegetable and horticultural crops.

Unit –2

Plant genetic resources, its utilization and conservation, Study of genetics of qualitative and quantitative characters.

Unit –3

Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties foryield, Adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional). Precision Breeding

Unit –4

Hybrid seed production technology in Maize, Rice, Sorghum, Pearl millet and Pigeon pea, etc. Ideotype concept and climate resilient crop varieties forfuture.

Practical

Floral biology, emasculation and hybridization techniques in different crop species; viz., Rice, Jute, Maize, Sorghum, Pearl millet, Ragi, Pigeon pea, Urd bean, Mung bean, Soybean, Groundnut, Sesame, Caster, Cotton, Cowpea, Tobacco, Brinjal, Okra and Cucurbitaceous crops. Maintenance breeding of different *Kharif* crops. Study of field techniques for seed production and hybrid seeds production in *Kharif* crops; Estimation of heterosis, inbreeding depression and heritability; Layout of field experiments; Study of quality characters, donor parents for different characters; Visit to seed production plots; Visit to AICRP plots of different fieldcrops.

Textbooks

1. B. D. Singh 2015 Plant Breeding. Principles & Methods. Kalyani Publishers.10 th Edition.
2. Vanangamudi, K and Vijayakumar, A. 2015. Hybrid Seed Production of Agronomic Crops. Agrobios, India.

Reference Books

1. Strickberger, M.W. 1996. Genetics (3rd edn.). Mac Millan Publishing Co., NewDelhi
2. Neto, R.F. and A. Borem. 2012. Plant breeding for abiotic stress tolerance. Springer-Verlag, Germany.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	10	10	50	30

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Knowledge on the use of genetic resources	PO1
CO2	Describing concept of breeding crops based on objectives	PO2, PSO2
CO3	Understanding hybrid seed production techniques and introducing to modern breeding concepts	PO9
CO4	introducing to modern breeding concepts	PO13, PSO3

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG305A	Crop Improvement-I (Kharif Crops)	CO1	CO2							CO3				CO4		CO2	CO4

Programme and Course Mapping													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**					**2**						**3**		
CO2			**2**									**3**		
CO3						**2**			**1**			**3**		
CO4	**1**										**3**		**3**	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG307A	Geoinformatics and Nano-technology and Precision Farming	1	0	1	2
Pre-requisites/Exposure	Nil				
Co-requisites	--				

Course Objective

- To know the concept of Geo-informatics and Precision Agriculture
- To know the remote sensing concepts and application in agriculture

Course Outcome: The students will be benefitted by

CO1 Introducing techniques involved in precision agricultural farming

CO2 Explaining the role of geographic information system, global positioning system and remote sensing in precision farming

CO3 Imparting knowledge on the use of nanotechnology in improving farm productivity

CO4 Apply geoinformatics and nanotechnology in precision farming project

Catalogue Description: The course will help the students to knowing Geo-informatics concepts, tool and techniques; their use in Precision Agriculture and remote sensing concepts and application in agriculture and Land use planning: concept, techniques.

Course contents

Theory:

Unit –1

- Precision agriculture: concepts and techniques; their issues and concerns for Indian agriculture and its contribution tosustainability.
- Geo-informatics- definition, concepts, tool and techniques; their use in Precision Agriculture.

Unit –2

- Crop discrimination and Yield monitoring, soil mapping; fertilizer recommendation using geospatial technologies; Spatial data and their management in GIS.
- Remote sensing concepts and application in agriculture; Basic concepts of remote sensing and GIS; Global positioning system (GPS), components and its functions.

Unit –3

- Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs; STCR approach for precisionagriculture.
- Nanotechnology, definition, concepts and techniques, brief introduction about nanoscale effects, nanoparticles, nano-pesticides, nano-fertilizers, nano-sensors,
- Use of nanotechnology in seed, water, fertilizer, plant protection for scaling-up farm productivity.
- Nanotechnology in sustainable agriculture.

Unit –4

- Introduction to soil survey and digital soil mapping technologies.
- Land use planning: concept, techniques and factors governing present land use; land evaluation methods and soil suitability evaluation for different crops.
- Land capability classification and constraints in application.

Practical

Introduction to GIS software, spatial data creation and editing. Introduction to image processing software. Visual and digital interpretation of remote sensing images. Use of aerial photographs, RS imagery, toposheets and other maps; ground truth study using GPS and visual markings; supervised and unsupervised classification of digital image; Fertilizers recommendations based of VRT and STCR techniques. Crop stress (biotic/abiotic) monitoring using geospatial technology. Use of GPS for agricultural survey.

Textbooks

1. John V. S. (2005). PrecisionAgriculture.
2. Rattan Lal, B.A. Stewar (2015). Soil-Specific Farming: PrecisionAgriculture
3. Pedersen, S. M and Martin, K. (2017). Precision Agriculture: Technology and Economic Perspectives.

Reference Books

1. Srinivasan, A. (2006). Handbook of Precision Agriculture: Principles and Applications
2. National Academy Press, Washington, D.C. (1997). Precision Agriculture in the 21st Century: Geospatial and Information Technologies. National Academies

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam

Weightage (%)	**10**	**10**	**50**	**30**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Introducing techniques involved in precision agricultural farming	**PO1**
CO2	Explaining the role of geographic information system, global positioning system and remote sensing in precision farming	**PO2**
CO3	Imparting knowledge on the use of nanotechnology in improving farm productivity	**PO9, PSO2**
CO4	Apply geoinformatics and nanotechnology in precision farming projects	**PO11, PSO3**

Course Code	**Course Title**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PO13**	**PSO1**	**PSO2**	**PSO3**
SAAG307A	Geoinformatics and Nano-technology and Precision Farming	CO1	CO2							CO3		CO4				CO3	CO4

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**					**2**						**3**		
CO2			**2**									**3**		
CO3						**2**			**1**			**3**		
CO4	**1**										**3**		**3**	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	**Course Title**	L	T	P	C
SAAG308A	**Intellectual Property Rights**	1	0	0	1
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

1. To know the intellectual property right, patenting, trademark and copyrights.
2. To know the international treaty on plant genetic resources and Indian Biological Diversity Act,2002

Course Outcome: The students will be benefitted by

CO1 Skill to understand the concept of intellectual property rights.
CO2 Develops procedural knowledge to Legal System and solving the problem relating to intellectual property rights.
CO3 Skill to pursue the professional programs in Company Secretaryship, Law, Business, Agriculture, International Affairs, Public Administration and Other fields.
CO4 Employability as the Compliance Officer, Public Relation Officer and Liaison Officer.

Catalogue Description

The course will help the students to knowing the Introduction and meaning of intellectual property, types of Intellectual Property and legislations, patent, filing and international treaty on plant genetic resources for food and agriculture

Course contents

Theory

Unit –1

- Introduction and meaning of intellectual property, brief introduction to GATT, WTO, TRIP sand WIPO, Treaties for IPRprotection:
- Madrid protocol, Berne Convention, Budapest treaty,*etc.*

Unit –2

- Types of Intellectual Property and legislations covering IPR in India: -Patents, Copyrights Trademark, Industrial design, Geographical indications, Integrated circuits
  Case studies.
- Trade secrets. 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, Patent Cooperation Treaty,
- Patent search and patent database.

Unit –3

- 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, Plant breeders' rights,
- Registration of plant varieties under PPV&FR Act 2001, breeders, researcher and farmersrights.

Unit –4

- Traditional knowledge-meaning and rights of TK holders. Convention on Biological Diversity,
- International treaty on plant genetic resources for food and agriculture (ITPGRFA).
- Indian Biological Diversity Act, 2002 and its salient features access and benefit sharing.
- Govt. Schemes in IPR – Career Opportunities in IP - IPR in current scenario with casestudies

Textbooks

1. Apte, Tejaswini. A Simple Guide to Intellectual Property Rights, Biodiversity and Traditional Knowledge.

Reference Books

1. Intellectual Property Rights: Key to new wealth generation, -Delhi NRDC and Aesthetic technologies,2001
2. ICAR, 2006. ICAR Guidelines for Intellectual Property Management and Technology Transfer/Commercialization. Indian Council of Agricultural Research, NewDelhi
3. CCSHAU, 2007. Intellectual Property Rights: Policy and Regulations. CCS Haryana Agricultural University,Hisar

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	20	20	0	60

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Skill to understand the concept of intellectual property rights	PO2, PSO1
CO2	Develops procedural knowledge to Legal System and solving the problem relating to intellectual property rights	PO3
CO3	Skill to pursue the professional programs in Company Secretaryship, Law, Business, Agriculture, International Affairs, Public Administration and Other fields.	PO4
CO4	Employability as the Compliance Officer, Public Relation Officer and Liaison Officer.	PO5, PSO3

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG308A	Intellectual Property Rights	d	CO1	CO2	CO3	CO4									CO1		CO4

Programme and Course Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3											3		
CO2	3							2					3	
CO3			3			2						3		
CO4										3			3	
CO5			3									3		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

SEMESTER 5th					
SAAG309A	**Practical Crop Production-I (Kharif crops)**	**L**	**T**	**P**	**C**
Version 2.0		**0**	**0**	**2**	**2**
Total Contact Hours	60 Hours				
Pre-requisites/Exposure	None				
Co-requisites	-				

Course Objectives

The course will enable the student-teacher to:

1. To know the origin, distribution various *kharif*grain and vegetable crops.
2. To know the major breeding objectives and procedures of field crops and vegetable crops and fruit trees.

Course Outcome: The students will be benefitted by

CO1 Introducing techniques involved in precision agricultural farming

CO2 Explaining the role of geographic information system, global positioning system and remote sensing in precision farming.

Programme and Course Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PSO 1	PSO 2	PSO3
CO1	**3**					**2**						**3**		
CO2			**2**									**3**		
CO3						**2**			**1**			**3**		
CO4	**1**										**3**		**3**	

1=lightly mapped 2= moderately mapped 3=strongly mapped

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	00	00	100	00

Course Code	Course Title	L	T	P	C
SAAG311A	**Rainfed Agriculture and Watershed Management**	1	0	1	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

1. To know the actual rainfed agriculture
2. To know the concepts, objective, principles and components of watershed management

Course Outcomes: The students will learn about the
CO1 Problems and prospects of rainfed agriculture
CO2 Soil conservation techniques
CO3 Water conservation techniques

CO4 Contingent crop planning for aberrant weather conditions

Catalogue Description: This course will help the students to knowing Rainfed agriculture its Problems and prospects, soil and climatic conditions prevalent in rainfed, management of crops in rainfed areas. Factors affecting watershed management and principles of inter cropping.

Course Contents

Theory

Unit –1

- Rainfed agriculture: Introduction, types, climatic and edaphic characteristics, History of rainfed agriculture and watershed in India.
- Problems and prospects of rainfed agriculture in India.

Unit –2

- Soil and climatic conditions prevalent in rainfed areas; Soil and water conservation techniques
- Drought: types, effect of water deficit on physio-morphological characteristics of the plants, Crop adaptation and mitigation to drought.

Unit –3

- Soil and water conservation techniques; critical stages of life savingirrigations.
- Water harvesting: importance, its techniques, efficient utilization of water through soil and crop management practices,
- Management of crops in rainfed areas.

Unit –4

- Contingent crop planning for aberrant weather conditions,

- Concept, objective, principles and components of watershed management, factors affecting watershed management. Study of mulches andanti-transpirants.
- Water harvesting and moisture conservation; principles of intercropping, cropping systems/intercropping in rainfed agriculture.

Practical

Studies on climate classification, studies on rainfall pattern in rainfed areas of the country and pattern of onset and withdrawal of monsoons. Studies on cropping pattern of different rainfed areas in the country and demarcation of rainfed area on map of India. Interpretation of meteorological data and scheduling of supplemental irrigation on the basis of evapo- transpiration demand of crops.Critical analysis of rainfall and possible drought period in the country, effective rainfall and its calculation. Studies on cultural practices for mitigating moisture stress. Characterization and elineation of model watershed.Field demonstration on soil & moisture conservation measures.Field demonstration on construction of water harvesting structures. Visit to rainfed research station/watershed**.**

Textbooks

1. Gurmel Singh, C. Venkataraman, G., Sastry, B. and Joshi, P. 1990. Manual of Soil and Water Conservation Practices. Oxford and IBH Publishing Co., NewDelhi.
2. Lenka, D. 2001. Irrigation and Drainage. Kalyani Publishers,New-Delhi.
3. Mal, B. C.2002. Introduction to Soil and Water Conservation Engineering, Kalyani Publishers,New-Delhi

Reference Books

1. Hansen, V.E., Israelsen, O.W., and Stringham, G.E. 1979. Irrigation Principles and Practices (4th ed.). John Wiley and Sons, NewYork
2. IARI [Indian Agricultural Research Institute]. 1977. Water Requirement and Irrigation Management of Crops in India, IARI Monograph No.4, Water Technology Centre, IARI,New-Delhi

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**10**	**10**	**50**	**30**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Problems and prospects of rainfed agriculture	**PO1,PSO2**
CO2	Soil conservation techniques	**PO2**
CO3	Water conservation techniques	**PO11**
CO4	Contingent crop planning for aberrant weather conditions	**PO9, PSO3**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG311A	Rainfed agriculture and Watershed management	CO1	CO2							CO4		CO3				CO1	CO4

Programme and Course Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO 3
CO1	3											3		
CO2	3							2					3	
CO3			3			2						3		
CO4										3			3	
CO5			3									3		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG321A	Human Value and Ethics	1	0	0	1
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective

- The course will help the students to knowing the basics on human values, and human ethics.

Course Outcome

CO1. To know the vision and philosophy of life.
CO2. To know the rights and responsibilities being a responsible citizen.
CO3. To know the family and society values
CO4. To learn way of live social life

Theory

Unit-I

Values and Ethics-An Introduction. Goal and Mission of Life. Vision of Life. Principles and Philosophy. Universal Human Aspirations, Fundamental Values.

Unit-II

Self-Exploration. Self-Awareness. Self -Satisfaction. Decision Making. Motivation. Sensitivity. Sensitize others particularly senior citizens and developmentally challenged, Success. Selfless Service. Case Study of Ethical Lives.

Unit-III

Rights and responsibilities. Ethics: professional, Road safety conept Team volunteering, manage anger and stress Spirituality and positive attitude.

Unit-IV

Body, Mind and Soul. Attachment and Detachment. Spirituality Quotient. Humans relations and family harmony

Course Code	Course Title	L	T	P	C
SAAG314A	**Post-harvest management and value addition of fruits and vegetables**	1	0	1	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

- To know the symptoms, etiology, disease cycle and management of diseases of rabi field and vegetable crops and fruit trees.
- To know the management of plant diseases.

Course Outcomes: The students will learn about the

CO1 Importance of post-harvest processing

CO2 factors affecting postharvest quality

CO3 Value addition concept

CO4 Principles and methods of preservation.

Catalogue Description: This course will help the students in knowing the diseases of rabi gain crops, vegetable crops and fruit trees, symptoms and management of diseases.

Course Contents

Theory

Unit –1

- Importance of post-harvest processing of fruits and vegetables,
- Extent and possible causes of post-harvest losses

Unit –2

- Pre-harvest factors affecting postharvest quality, maturity, ripening and changes occurring duringripening.
- Respiration and factors affecting respirationrate.

Unit –3

- Harvesting and field handling; Storage (ZECC, cold storage, CA, MA, and hypobaric).
- Value additionconcept

Unit –4

- 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; Drying/ Dehydration of fruits and vegetables – Concept and methods, osmotic drying. Canning- Concepts and Standards, packaging of products.

Practical

Applications of different types of packaging, containers for shelf-life extension.Effect of temperature on shelf life and quality of produce.Demonstration of chilling and freezing injury in vegetables and fruits.Extraction and preservation of pulps and juices. Preparation of jam, jelly, RTS, nectar, squash, osmotically dried products, fruit bar and candy and tomato products, canned products. Quality evaluation of products -- physico-chemical and sensory. Visit to processing unit/industry.

Test Books

1. Prusky, D. and Gullino, M. L. 2010. Postharvest Pathology,Springer.
2. Shewfelt, R. L. and Stanley, P. E. 1992. Post-Harvest Handling: A Systems Approach, Academic PressInc

Reference Book

1. Wills, R. B. H. 1998. Postharvest, UNSWPress.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	10	10	50	30

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Importance of post-harvest processing	**PO1**
CO2	factors affecting postharvest quality	**PO2**
CO3	Value addition concept	**PO12,PSO1**
CO4	Principles and methods of preservation;	**PO13,PSO3**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG314A	Post-harvest management and value addition of fruits and vegetables	CO1	CO2										CO3	CO4	CO1		CO4

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**					**2**						**3**		
CO2			**2**									**3**		
CO3						**2**			**1**			**3**		
CO4	**1**										**3**		**3**	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

6thSem (3rdYr)

Course Code	Course Title	L	T	P	C
SAAG302A	Manures, Fertilizers and Soil Fertility Management	1	0	1	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective

- To know the importance of organicmanures
- To know the classification, composition and properties offertilizers
- To know the role, deficiency and toxicity symptomsnutrients.
- To know the factors influencing nutrientuse

Course Outcome: The students will learn

CO1 organic manures, properties and methods of preparation

CO2 classification, composition and properties of fertilizers

CO3 Soil fertility, deficiency and toxicity symptoms of fertilizers

CO4 Factor influencing nutrient use efficiency

Catalogue Description: The course will help the students to knowing the importance of organic manures and fertilizers, integrated nutrient management, classification, composition, Soil fertility, productivity and methods of fertilizer use.

Course Content

Theory

Unit –1

- Introduction and importance of organic manures, properties and methods of preparation of bulky and concentrated manures. Green/leaf manuring.
- Fertilizer recommendation approaches. Integrated nutrient management.

Unit –2

- Chemical fertilizers and types: classification, composition and properties of major nitrogenous, phosphatic and potassic fertilizers, secondary & micronutrient fertilizers.
- Complex fertilizers, Nano-fertilizers Soil amendments, Fertilizer Storage, Fertilizer Control Order.

Unit –3

- Soil fertility and productivity, plant nutrition. Criteria of essentiality.
- Role, deficiency and toxicity symptoms of essential plant nutrients,
- Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants.
- Introduction to Integrated soil fertility managemnt (ISFM)technologies.
- Nuclear and isotopic techniques for soil fertility evaluation.
- Link between Sustainable Development Goals (SDGs) and soil fertility.

Unit –4

- Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients. Soil fertilityevaluation,
- Soil testing. Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Fertilizers Indicator plants(crop).
- Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions.

Practical

Introduction of analytical instruments and their principles, calibration and applications, Colorimetry and flame photometry. Estimation of soil organic carbon, Estimation of alkaline hydrolysable N in soils. Estimation of soil extractable P in soils.Estimation of exchangeable K; Ca and Mg in soils.Estimation of soil extractable S in soils.Estimation of DTPA extractable Zn in soils.Estimation of N in plants.Estimation of P in plants.Estimation of K in plants.Estimation of S inplants.

Textbooks

1. Donahu, L. R., Miller, W. R. and Shickuluna, 1977. Soils. Prentice Hall of India Pvt. Ltd., New Delhi
2. Nyle.C. Brady 1995. The Nature and Properties of Soils. 10th Edn. Printice Hall India Pvt. Ltd. New Delhi
3. Mengel, K.J. and Kirkby, A. 1978. Principles of Plant Nutrition. International Potash Institute, Switzerland

Reference Books

1. Burges, A, and Raw, F. 1967. Soil Biology. Acad. Press, NewYork
2. Raymond W Miller and Roy L. Donahue. 1992. Soils and Introduction to Soils and Plant Growth. 6th edn. Printice Hall India pvt. Ltd. New Delhi

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**10**	**10**	**50**	**30**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	organic manures, properties and methods of preparation	**PO1**
CO2	classification, composition and properties of fertilizers	**PO2,PSO1**
CO3	Soil fertility, deficiency and toxicity symptoms of fertilizers	**PO9,PSO2**
CO4	Factor influencing nutrient use efficiency	**PO13**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG 302A	Manures, Fertilizers and Soil Fertilit	CO1	CO1	CO1	CO1	CO1	CO1	CO1	CO1	CO1	CO1	CO1	CO1	CO1	CO1	CO1	CO1

	y Manag ement																

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**											**3**		
CO2	**3**												**3**	
CO3			**3**									**3**		
CO4										**3**			**3**	
CO5			**3**									**3**		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	**Course Title**	**L**	**T**	**P**	**C**
SAAG312A	Protected Cultivation and Secondary Agriculture	1	0	1	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

- To know the green house technology
- To know the important engineering properties and handling of equipment.

Course Outcome: The students will learn about

CO1 Green house technology

CO2 Greenhouse equipments, Cost estimation and economic analysis.

CO3 Important Engineering properties

CO4 Material handling equipment

Catalogue Description: This practical course will help the students in knowing the types of Green Houses, design criteria, Cost estimation and economic analysis, Important Engineering properties and material and equipment handling.

Course Contents

Theory

Unit –1

- Green house technology: Introduction, Types of Green Houses, Plant response to Greenhouse environment, Planning and design of greenhouses,
- Design criteria of green house for cooling and heating purposes.

- Hydroponics, aeroponics and aquaponics.

Unit –2

- Green house equipments, materials of construction for traditional and low-cost green houses.
- Irrigation systems used in greenhouses, typical applications, passive solar greenhouse, hot air greenhouse heating systems, green housedrying,
- Cost estimation and economicanalysis.

Unit –3

Important Engineering properties such as physical, thermal and aero & hydrodynamic properties of cereals, pulses and oilseed,their applicationin PHT equipment design and operation.

Unit –4

- Drying and dehydration; moisture measurement, EMC, drying theory, various drying method, 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.

Practical

Study of different type of greenhouses based on shape. Determination of the rate of air exchange in an active summer winter cooling system. Determination of drying rate of agricultural products inside green house. Study of greenhouse equipments. Visit to various Post Harvest Laboratories. Determination of Moisture content of various grains by oven drying & infrared moisture methods. Determination of engineering properties (shape and size, bulk density and porosity of biomaterials). Determination of Moisture content of various grains by moisture meter.Field visit to seed processing plant.

Textbooks

1.Balraj Singh. 2005. Protected Cultivation of Vegetable Crops, Kalyani Publishers
2.Brahma Singh. 2015. Advances in Protected Cultivation, New India Publishing Agency.

Reference Book

1.Dahiya, B.S.; Rai, K.N. 1995 Seed Technology, Kalyani Publishers,Ludhiana

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	10	10	50	30

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Green house technology	**PO1, PSO3**
CO2	Green house equipments, Cost estimation and economic analysis.	**PO2, PSO1**
CO3	Important Engineering properties	**PO12,PSO2**
CO4	Material handling equipment	**PO4**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG312A	Protected Cultivation and Secondary agriculture	CO1	CO2		CO4								CO3		CO2	CO3	CO1

Programme and Course Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3					2						3		
CO2			2									3		
CO3						2			1			3		

CO4	**1**										**3**		**3**	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	**Course Title**	**L**	**T**	**P**	**C**
SAAG304A	**Diseases of Field and Horticultural Crops - II**	2	0	1	3
Pre-requisites/Exposure	**None**				
Co-requisites	**--**				

Course Objective

- To know the importance of diseases of various rabi grains and vegetable crops
- To know the disease management practices of field crops and vegetable crops and fruit trees

Course Outcome: The students will learn-

CO1 Diseases of rabi grains
CO2 Vegetable crops and fruit crops diseases
CO3 Management of various plant diseases
CO4 Real time diagnostics in field

Catalogue Description: The course will help the students to know the different types of diseases of various kharif grain and vegetable crops and fruit trees and their management.

Course contents

Theory

Unit –1

- Symptoms, etiology, disease cycle and management of diseases of Field Crops: Wheat: rusts, loose smut, Karnal bunt, powdery mildew, *Alternaria* blight,

- Ear cockle/*molya disease*; Sugarcane: red rot, smut, wilt, grassy shoot, ratoon stunting and Pokkah Boeng.

Unit –2

- Symptoms, etiology, disease cycle and management of diseases of Sunflower: Sclerotinia stem rot and Alternaria blight; Mustard: Alternaria blight, white rust, downy mildew
- Sclerotinia stem rot; chickpea: wilt, grey mould and Ascochyta blight; Cotton: anthracnose, vascular wilt, and black arm; Pea: downy mildew, powdery mildew and rust.

Unit –3

- Symptoms, etiology, disease cycle and management of diseases of Horticultural Crops: Mango: anthracnose, malformation, bacterial blight and powdery mildew; Citrus: canker and gummosis; Grape vine: downy mildew, Powdery mildew and anthracnose.
- Apple: scab, powdery mildew, fire blight and crown gall; Peach: leaf curl.Strawberry: leaf spot Potato: early and late blight, leaf roll, and mosaic.

Unit –4

- Symptoms, etiology, disease cycle and management of diseases of Cucurbits: downy mildew, powdery mildew, wilt; Onion and garlic: purple blotch, and Stemphylium blight; Chillies: anthracnose and fruit rot, wilt and leaf curl; Turmeric: leaf spot, Rose: dieback, powdery mildew and black leafspot.

Practical

Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visit for the diagnosis of field problems. Collection and preservation of plant diseased specimens forherbarium.
Note: Students should submit 50 pressed and well-mounted specimens.

Textbooks

1. Singh, R. S. 1995. Diseases of Vegetables Crops. Oxford and IBH PublishingCo.
2. Singh, R.S 2001. Plant Disease Management, Oxford and IBH Publishing Co N. Delhi.
3. Singh,R S. 2000. Diseases of fruit crops, Oxford & IBH Publishing Co.Pvt.Ltd., New Delhi

Reference books

1. Sharma, P. D. 2001. Plant Pathology, Rastogi Publications, Shivaji Road, Meerut.

2. Ramakrishnan, T. S. 1971. Diseases of Millets.ICAR.
3. Mehrotra. R. S. Plant Pathology. TATA McGraw Hill Pub. Co. N.Delhi
4. Chenulu,V V. 1993. Virus and mycoplasma diseases of fruit crops in India, ICAR, NewDelhi
5. SnowdonAnnal. 1990. Colour atlas of post-harvest diseases and disorders of fruits and vegetables: general introduction and fruits. V.1, Wolfe Scientific Ltd,Spain

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**15**	**15**	**30**	**40**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Diseases of rabi grains	**PO1, PSO1**
CO2	Vegetable crops and fruit crops diseases	**PO2**
CO3	Management of various plant diseases	**PO13**
CO4	Real time diagnostics in field	**PO9, PSO3**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAA G313	Diseases of Field and Horticultural Crops and their Management- II	CO1	CO2							CO4				CO3	CO1		CO4

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**

CO1	**3**											**3**		
CO2	**3**							**2**					**3**	
CO3			**3**			**2**						**3**		
CO4										**3**			**3**	
CO5			**3**									**3**		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	**Course Title**	**L**	**T**	**P**	**C**
SAAG306A	Entrepreneurship Development and Business communication	2	0	0	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

- To know the concept of entrepreneur and business.
- To know the Government policy and programs and institutions for entrepreneurship

Course Outcomes: The students will learn about the

CO1 Concept of Entrepreneur, Entrepreneurship Development

CO2 Entrepreneurial Development Process; Business Leadership Skills

CO3 Developing Managerial skills,

CO4 Opportunities for agri-entrepreneurship

Catalogue Description: The course will help the students to knowing the concepts of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs, impact of economic reforms on Agribusiness and developing the managerial skills and business leadership skills.

Course Contents

Theory

Unit –1

- Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs; SWOT Analysis & achievementmotivation,
- Government policy and programs and institutions for entrepreneurship development

Unit –2

- Impact of economic reforms on Agribusiness/Agri-enterprises,
- Entrepreneurial Development Process; Business LeadershipSkills.

Unit –3

- Developing organizational skill (controlling, supervising, problem solving, monitoring &evaluation),
- Developing Managerial skills, Business Leadership Skills (Communication, direction and motivation Skills), Problem solving skill, Supply chain management and Total quality management.

Unit –4

- Project Planning Formulation and report preparation; Financing ofenterprise,
- Opportunities for agri-entrepreneurship and ruralenterprise.

Textbooks

1. Downey, W.D., Troche, J.K. 1981. Agribusiness Management. Mc Graw Hill Inc., NewDelhi
2. Alagumani, T., Chinnaiyan, P., Elangovan, S.1998. Agricultural Management. Publishers K9 International,Madurai.
3. Philip, K. 2004. Marketing Management. Prentice Hall, New Delhi.

Reference Book

1. Gittinger, J.P.1982. Economic Analysis of Agricultural Projects. The Johns Hopkins University Press,Baltimore

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	20	20	0	60

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Concept of Entrepreneur, Entrepreneurship Development	**PO1,PSO1**
CO2	Entrepreneurial Development Process; Business Leadership Skills	**PO2**
CO3	Developing Managerial skills,	**PO4**
CO4	Opportunities for agri-entrepreneurship	**PO12,PSO3**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG306A	Entrepreneurship Development and Business communication	CO1	CO2		CO3								CO4		CO1		CO4

Programme and Course Mapping													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3											3		
CO2	3							2					3	
CO3			3			2						3		

CO4										**3**			**3**	
CO5			**3**									**3**		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	**Course Title**	**L**	**T**	**P**	**C**
SAAG315A	Management of Beneficial insects	1	0	1	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objectives

- To know Importance of beneficial Insects
- To know the commercial rearing of be useful insects.

Course Outcomes: Students will learn about

CO1 Importance of beneficial Insects

CO2 Commercial methods ofrearing

CO3 Parasitoids and predators commonly being used in biological control.

CO4 Pollinator, weed killers and scavengers

Catalogue Description: This course will help the students in knowing Importance of beneficial Insects, pollinators and their role in cross pollinated crops, Beekeeping Commercial methods of rearing, rearing of silkworm, identification of major parasitoids and Important species of pollinator, weed killersetc.

Course Contents

Theory

Unit –1

- Importance of beneficial Insects, pollinators and their role in cross pollinated crops, Beekeeping, bee biology, Bee pasturage, bee foraging andcommunication
- Commercial methods of rearing, equipment used, seasonal management, bee enemies, Insect pests and diseases ofhoneybee.

Unit –2

- Types of silkworms, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties and methods of harvesting and preservation ofleaves.
- Rearing, mounting and harvesting ofcocoons.
- Pest and diseases of silkworm, management, rearing appliances of mulberry silkworm and methods ofdisinfection.

Unit –3

- Species of lac insect, morphology, biology, host plant, lac production – seed lac, button lac, shellac, lac-products.
- Identification of major parasitoids and predators commonly being used in biological control.

Unit –4

- Insect orders bearing predators and parasitoids used in pest control and their mass multiplicationtechniques.
- Important species of pollinator, weed killers and scavengers with theirimportance.
- Use of plant products for the management of parasites of usefulinsects.

Practical

Honeybee species, castes of bees.Beekeeping appliances and seasonal management, bee enemies and disease.Bee pasturage, bee foraging and communication.Types of silkworms, voltinism and biology of silkworm.Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves. Species of lac insect, host plant identification. Identification of other important pollinators, weed killers and scavengers. Visit to research and training institutions devoted to beekeeping, sericulture, lac culture and natural enemies. Identification and techniques for mass multiplication of natural enemies.

Textbooks

1. David, B.V. and Kumaraswami, T. 1996 Elements of Economic Entomology. Popular Book Depot, Madras. 536p.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	10	10	50	30

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Importance of beneficial Insects	**PO1, PSO1**
CO2	Commercial methods of rearing	**PO4,PSO2**
CO3	parasitoids and predators commonly being used in biological control.	**PO9**
CO4	pollinator, weed killers and scavengers	**PO13**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG315A	Management of Beneficial insects	CO1			CO2					CO3				CO4	CO1	CO2	

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**											**3**		
CO2	**3**							**2**					**3**	
CO3			**3**			**2**						**3**		
CO4										**3**			**3**	
CO5			**3**									**3**		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG316A	Principles of Organic Farming	1	0	1	2

Pre-requisites/Exposure	None
Co-requisites	--

Course Objectives

- To know Importance of organicfarming,
- To know the certification process and standards of organicfarming

Course Outcomes: Students will learn about

CO1 Organic farming, principles

CO2 Organic farming Certification

CO3 Organic nutrient resources and its fortification

CO4 economic considerations and viability

Catalogue Description: This course will help the students in knowing Importance Organic farming, principles, relevance in present context and its scope, organic ecosystem and their concepts, fundamentals of insect, pest, disease and weed management under organic mode of production and marketing and export potential of organic products.

Course contents

Theory

Unit –1

Organic farming, principles, relevance in present context and its scope in India; Initiatives taken by Government (central/state), NGOs and other organizations for promotion of organic agriculture.

Unit –2

Organic ecosystem and their concepts; Organic nutrient resources and its fortification; Restrictions to nutrient use in organic farming; Organic fertilizer, vermi-composting, green manuring, recycling of organic residues, bio-fertilizers.

Unit-3

Choice of crops and varities in organic farming. Fundamentals of insect, pest, disease and weed management under organic mode of production

Unit –4

Operational structure of NPOP; Certification process and standards of organic farming; Processing, levelling, economic considerations and viability, marketing and export potential of organic products.

Practical

Visit of organic farms to study the various components and their utilization; Preparation of enrich compost, vermicompost, bio-fertilizers/bio-inoculants and their quality analysis; Indigenous technology knowledge (ITK) for nutrient, insect, pest disease and weed management; Cost of organic production system; Post harvest management; Quality aspect, grading, packaging and handling.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	10	10	50	30

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Organic farming, principles	**PO1**
CO2	Organic farming certification	**PO4,**
CO3	Organic nutrient resources and its fortification	**PO12,PSO1**
CO4	economic considerations and viability,	**PO13,PSO2**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG316A	Principles of Organic Farming	CO1			CO2								CO3	CO4	CO3	CO4	

Programme and Course Mapping													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3					2						3		
CO2			2									3		
CO3						2			1			3		

CO4	**1**									**3**		**3**		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	**Course Title**	**L**	**T**	**P**	**C**
SAAG317A	Crop Improvement-II (*Rabi* crops)	1	0	1	2
Pre-requisites/Exposure	Fundamentals of Plant Breeding				
Co-requisites	--				

Course Objectives

- To know the centers of origin of rabicrops.
- To study of genetics of qualitative and quantitativecharacters.
- To know about the hybrid seed production technology of *rabi*crops.

Course Outcome: The students will be benefitted by

CO1 Imparting knowledge on the use of genetic resources

CO2 Describing concepts of breeding crops based on objectives

CO3 Understand hybrid seed production techniques and introducing to modern breeding concepts

CO4 Design crop specific breeding methodology

Catalogue Description

The course will help the students to knowing the origin, distribution of species, wild relatives in different field crops, vegetable crops and fruit trees and adaptability, stability, abiotic and biotic stress tolerance and quality of different rabi crops.

Course Contents

Theory:

Unit –1

- Centres of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fodder crops and cash crops; vegetable and horticulturalcrops.

Unit –2

- Plant genetic resources, its utilization and conservation; study of genetics of qualitative and quantitativecharacters.

Unit –3

- Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties foryield,
- Adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional). Precision Breeding

Unit –4

- Hybrid seed production technology of *rabi*crops. Ideotype concept and climate resilient crop varieties forfuture. Molecular Breeding

Practical

Floral biology, emasculation and hybridization techniques in different crop species namely Wheat, Oat, Barley, Chickpea, Lentil, Field pea, Rajma, Horse gram, Rapeseed Mustard, Sunflower, Safflower, Potato, Berseem.Sugarcane, Tomato, Chilli and Onion. Study of field techniques for seed production and hybrid seeds production in *Rabi* crops; Estimation of heterosis, inbreeding depression and heritability; Layout of field experiments; Study of quality characters, study of donor parents for different characters; Visit to seed production plots; Visit to AICRP plots of different fieldcrops

Textbooks

1. B. D. Singh, 2015, Plant Breeding. Principles & Methods,10th edition, Kalyani Publishers, NewDelhi.
2. Vanangamudi, K and Vijayakumar, A. 2015. Hybrid Seed Production of Agronomic Crops. Agrobios, India.

Reference Books

1. Strickberger, M.W. 1996. Genetics (3rd edn.). Mac Millan Publishing Co., New Delhi.
2. Phundan Singh. 2015. Essentials of Plant Breeding. Kalyani Publishers,India.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	10	10	50	30

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Imparting knowledge on the use of genetic resources	**PO1**
CO2	Describing concepts of breeding crops based on objectives	**PO2**
CO3	Understand hybrid seed production techniques and introducing to modern breeding concepts	**PO9, PSO2**
CO4	Design crop specific breeding methodology	**PO10, PSO3**

Course Code	**Course Title**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PO13**	**PSO1**	**PSO2**	**PSO3**
SAAG317A	Crop Improvement-II (Rabi crops)	CO1	CO2							CO3	CO4					CO3	CO4

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**											**3**		
CO2	**3**							**2**					**3**	
CO3			**3**			**2**						**3**		
CO4										**3**			**3**	
CO5			**3**									**3**		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	**Course Title**	L	T	P	C
SAAG318A	Farm Management, Production and Resource Economics	1	0	1	2

Pre-requisites/Exposure	
Co-requisites	--

Course Objectives

- To know the concepts of farmmanagement
- To study farm businessanalysis

Course Outcomes: Students will learn about the

CO1 concept of farm management, objectives

CO2 Farm business analysis

CO3 farm records and accounts in managing a farm

CO4 Concepts of resource economics.

Catalogue Description: This course will help the students in knowing the meaning and concept of farm management, objectives, Principles of farm management, concepts of cost, farm business analysis, Importance of farm records, concepts of risk and uncertainty occurs in agriculture production and crop/livestock/machinery insurance

Theory

Unit-1

- 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 offarms.
- 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 comparativeadvantage.

Unit –2

- 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 labour income and farm businessincome.

- Farm business analysis: meaning and concept of farm income and profitability, technical and economi

Unit –3

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'senterprises.

Unit –4

- Concept of risk and uncertainty occurs in agriculture production, nature and sources of risks and its managementstrategies**,**
- Crop/livestock/machinery insurance– weather-based crop insurance, features, determinants of compensation. Concepts of resource economics.

Practical

Preparation of farm layout.Determination of cost of fencing of a farm. Computation of depreciation cost of farm assets. Application of equi-marginal returns/opportunity cost principle in allocation of farm resources. Determination of most profitable level of inputs use in a farm production process. Determination of least cost combination of inputs. Selection of most profitable enterprise combination. Application of cost principles including CACP

concepts in the estimation of cost of crop and livestock enterprises. Preparation of farm plan and budget, farm records and accounts and profit & loss accounts. Collection and analysis of data on various resources in India.

Textbooks

1. S. Subha Reddy, P. Raghu Ram, V. NeelaKantaSasgtri, I. Bhavani Devi. AgriculturalEconomics.
2. Agrawal, A. N. Indian Agricultural Problems, Progress and Prospects. Vikas Publishing House Pvt.Ltd
3. S S. Johl and C.V. Moore. Essentials of FarmManagement

Reference Book

1. E.O. Heedy and J.L. Dillon. Agricultural Production Functions.Kalyani Publishers.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	10	10	50	30

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Concept of farm management, objectives	**PO1,PSO1**
CO2	Farm business analysis	**PO2**
CO3	Farm records and accounts in managing a farm	**PO9,PSO2**
CO4	Concepts of resource economics.	**PO11**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3

Programme and Course Mapping														
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3					2						3		
CO2			2									3		
CO3						2			1			3		
CO4	1										3		3	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG319A	Practical Crop Production-II (Rabi crops)	0	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**0**	**0**	**100**	**0**

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**											**3**		
CO2	**3**							**2**					**3**	
CO3			**3**			**2**						**3**		
CO4										**3**			**3**	
CO5			**3**									**3**		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Elective Course 3 (2+1)	Eval.1	Eval.3	Pract.	End Term	Total
	15	**15**	**30**	**40**	**100**

Course Code	Course Title	L	T	P	C
SAAG322A	Principles of Food Science and Nutrition	2	0	0	0
Pre-requisites/Exposure	-				
Co-requisites	--				

Course Objectives

- To study Concepts of Food Science
- To impart knowledge food science & food compositions.
- To study Food and nutrition, Malnutrition
- To study the new trends in food science and nutrition.

Course Outcome: The students will learn about the

CO1 Research, process, and, preserve food's nutrients

CO2 Understant the role of maintaining the health

CO3 Identifying and applying food principles to food and nutrition system

CO4 Students learn the fundamental of food chemistry and food microbiology.

Catalogue Description: This subject has been designed to impart knowledge food science & food compositions. Analyze microbial agents of foods. Also provide the informations of food nutrition, malnutrition.

Course Contents

Theory

Unit-I

Concepts of Food Science (definitions, measurements, density, phase change, pH, osmosis, surface tension, colloidal systems etc.).

Unit-II

Food composition and chemistry (water, carbohydrates, proteins, fats, vitamins, minerals, flavours, colours, miscellaneous bioactives, important reactions).

Unit-III

Food microbiology (bacteria, yeast, moulds, spoilage of fresh & processed foods, Production of fermented foods); Principles and methods of food processing and preservation (use of heat, low temperature, chemicals, radiation, drying etc.).

Unit-IV

Food and nutrition, Malnutrition (over and under nutrition), nutritional disorders; Energy metabolism (carbohydrate, fat, proteins); Balanced/ modified diets, Menu planning, New trends in food science and nutrition.

Electives Courses

Course Code	Course Title	L	T	P	C
SAAG221A	Agri-business Management	2	0	1	3
Pre-requisites/Exposure	-				
Co-requisites	--				

Course Objectives

- To study transformation of agriculture
- To study agro-based industries.
- To study Agri-value chain
- To study marketing strategies

Course Outcome: The students will learn about the

CO1 Agribusiness and various stakeholders

CO2 Distinctive features of Agribusiness Management

CO3 Financial statements and their importance.

CO4 Marketing mix and marketing strategies.

Catalogue Description: This subject has been designed to impart knowledge transformation of agriculture into agribusiness. Constraints in establishing agro-based industries.Agri-value chain, Components of a business plan and Marketing mix and marketing strategies.

Course Contents

Theory

Unit-1

- Transformation of agriculture into agribusiness, various stakeholders and components of agribusiness systems. Importance of agribusiness in the Indian economy and New AgriculturalPolicy.
- Distinctive features of Agribusiness Management: Importance and needs of agro-basedindustries,

- Classification of industries and types of agro based industries. Institutional arrangement, procedures to set up agro based industries. Constraints in establishing agro-basedindustries.

Unit-2

- Agri-value chain: Understanding primary and support activities and their linkages. Business environment: PEST & SWOTanalysis.
- Management functions: Roles & activities, Organization culture. Planning, meaning, definition, types of plans. Purpose or mission, goals or objectives, Strategies, polices procedures, rules, programs andbudget.

Unit-3

- Components of a business plan, Steps in planning and implementation. Organization staffing, directing and motivation. Ordering, leading, supervision, communications, control.
- Capital Management and Financial management of Agribusiness.
- Financial statements and their importance. Marketing Management: Segmentation, targeting &positioning.

Unit-4

- Marketing mix and marketing strategies. Consumer behaviour analysis, Product Life Cycle (PLC). Sales & Distribution Management. Pricing policy, various pricing methods.
- Project Management definition, project cycle, identification, formulation, appraisal, implementation, monitoring andevaluation.
- Project Appraisal and evaluationtechniques.

Practical

Study of agri-input markets: Seed, fertilizers, pesticides. Study of output markets: grains, fruits, vegetables, flowers. Study of product markets, retails trade commodity trading, and value-added products.Study of financing institutions- Cooperative, Commercial banks, RRBs, Agribusiness Finance Limited, NABARD.Preparations of projects and Feasibility reports for agribusiness entrepreneur.Appraisal/evaluation techniques of identifying viable project- non-discounting techniques.Case study of agro-based industries. Trend and growth rate of prices of agricultural commodities. Net present worth technique for selection of viable project.Internal rate ofreturn.

Textbooks

1. SubbaRao Reddy, S. and P. Raghav Rao. Agriculture finance and management. Oxford and IBH Publication company Ltd. NewDelhi
2. Dwivedi, D.N. Managerial Economics. Vikas Publishing House. NewDelhi

Reference Book

1. Dhingra, I.C, Indian economic problems. Sultan Chand and sons, New Delhi

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	15	15	30	40

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Agribusiness and various stakeholders	PO1,PSO1
CO2	Distinctive features of Agribusiness Management	PO2
CO3	Financial statements and their importance.	PO11,PSO2
CO4	Marketing mix and marketing strategies.	PO13

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG221A	Agri-business Management	CO1	CO2									CO3		CO4	CO1	CO3	

Programme and Course Mapping														
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO 10	PO11	PSO1	PSO2	PSO 3
CO1	3					2						3		

CO2			**2**									**3**		
CO3						**2**			**1**			**3**		
CO4	**1**										**3**		**3**	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	**Course Title**	**L**	**T**	**P**	**C**
SAAG222A	Agrochemicals	2	0	1	3
Pre-requisites/Exposure	Fundamentals of Agronomy				
Co-requisites	--				

Course Objective

1. To study agrochemicals Herbicides, fungicides,insecticides

2. Bio pesticides & Biofertilizers

3. Fertilizers and theirimportance

Course Outcome: The students will be benefitted by

CO1 Understanding the role of agrochemicals in agriculture and its effect on environment
CO2 Imparting knowledge on herbicides, fungicides, insecticides and its applications
CO3 Emphasising the use of right dose of agrochemicals for sustainable agriculture
CO4 Analyse fertilizers application related to crop growth

Catalogue Description: This subject has been designed to impart knowledge introduction to agrochemicals, management of agrochemicals Herbicides, fungicides, insecticides, Biopesticides & Biofertilizers and fertilizers and their importance.

Course Contents

Theory:

Unit-1

- Introduction of agronomy, types of farming, classification of crops, An introduction to agrochemicals, their type and role in agriculture, effect on environment, soil, human and animal health, merits and demerits of their uses inagriculture,
- Management of agrochemicals for sustainable agriculture.

Unit-2

- Herbicides-Major classes, properties and important herbicides. Fate of herbicides. Fungicides - Classification – Inorganic fungicides - characteristics, preparation and use of sulphur andcopper,
- Mode of action-Bordeaux mixture and copper oxychloride. Organic fungicides-Mode of action- Di thiocarbamates-characteristics, preparation and use of Zineb and Maneb.

Unit-3

- Systemic fungicides- Benomyl, carboxin, oxycarboxin, Metalaxyl, Carbendazim, characteristics anduse.
- Introduction and classification of insecticides: inorganic and organic insecticides Organochlorine, Organophosphates, Carbamates, Synthetic pyrethroids Neonicotinoids, Biorationals,
- Insecticide Act and rules, Insecticides banned, withdrawn and restricteduse,
- Fate of insecticides in soil & plant. IGRs Biopesticides reduced risk insecticides, Botanicals, plant and animal systemic insecticides their characteristics anduses.

Unit-4

- Fertilizers and their importance. Nitrogenous fertilizers: Feedstocks and Manufacturing of ammonium sulphate, ammonium nitrate, ammonium chloride, urea. Slow-release N-fertilizers. Phosphatic fertilizers: feedstock and manufacturing of single superphosphate.
- Preparation of bone meal and basic slag. Potassic fertilizers: Natural sources of potash, manufacturing of potassium chloride, potassium sulphate and potassium nitrate. Mixed and complex fertilizers: Sources and compatibility–preparation of major, secondary and micronutrientmixtures.
- Complex fertilizers: Manufacturing of ammonium phosphates, nitro-phosphates and NPK complexes. Fertilizer control order. Fertilizer logistics and marketing. Plant bio-pesticides for ecological agriculture, Bio-insectrepellent.

Practical

Sampling of fertilizers and pesticides.Pesticides application technology to study about various pesticides appliances.Quick tests for identification of common fertilizers.Identification of anion and cation in fertilizer.Calculation of doses of insecticides to be used.To study and identify various formulations of insecticide available kin market.Estimation of nitrogen in

Urea.Estimation of 120 Report of the ICAR Fifth Deans' Committee water soluble P2O5 and citrate soluble P2O5 in single super phosphate.Estimation of potassium in Muriate of Potash/ Sulphate of Potash by flame photometer.Determination of copper content in copper oxychloride.Determination of sulphur content in sulphur fungicide.Determination of thiram. Determination of ziramcontent

Textbooks

1. Ranjan Kumar Basak. 2016. Fertilizers: A Textbook. Kalyani publishers,India.

2. AmitavaRakshit, PriyankarRaha and Nirmal De. 2015. Manures fertilizers and pesticides-Theory and applications. CBS Publishers and Distributors Pvt. Ltd.,India

Reference Books

1. ParameshwarHegde, H. 2009. Textbook of Agro-Chemistry. Discovery Publishing Pvt.Ltd.,India.

2. Yawalkar, K.S., J.P. Agarwal and S. Bokde. 2012. Manures and fertilizers. 12th edition, Jain publishing,India.

3. Himadri Panda. 2018. The Complete Technology Book on Herbicides, Fungicides, Nematicides, Weedicides and other Agro Chemicals with Formulations. EIRI,India.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	15	15	30	40

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Understanding the role of agrochemicals in agriculture and its effect on environment	PO1
CO2	Imparting knowledge on herbicides, fungicides, insecticides and its applications	PO2, PSO3
CO3	Emphasizing the use of right dose of agrochemicals for sustainable agriculture	PO9, PSO1
CO4	Analyse fertilizers application related to crop growth	PO10, PSO2

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG222A	Agrochemicals	CO1	CO2							CO3	CO4				CO3	CO4	CO2

Programme and Course Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3											3		
CO2	3							2					3	
CO3			3			2						3		
CO4										3			3	
CO5			3									3		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG223A	Commercial Plant Breeding	1	0	2	3
Pre-requisites/Exposure	Fundamentals of Plant Breeding				
Co-requisites	--				

Course Objectives

- To study plantreproduction
- Genetic purity and Quality seed production
- IPR issues and release ofvariety

Course Outcome: The students will be benefitted by

CO1. Imparting knowledge on commercial hybrid seed production

CO2. Applying biotechnological techniques to conventional plant breeding

CO3. Describing the norms involved in testing and release of crop varieties in India

CO4. Practice hybridisation and plant breeding

Course Content

Theory

Unit- 1

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 seedproduction. Genetic purity test of commercial hybrids.

Unit-2

Advances in hybrid seed production of maize, rice, sorghum, pearl millet, castor, sunflower, cotton pigeon pea, Brassicaetc. Quality seed production of vegetable crops under open and protectedenvironment.Precision breeding using Artificial Intelligence

Unit-3

Alternative strategies for the development of the line and cultivars: haploid inducer, tissue culture techniques and biotechnological tools such as CRISPR/Cas9. IPR issues in commercial plant breeding: DUS testing and registration of varieties under PPV & FRAct.

Unit-4

Variety testing, release and notification systems inIndia. Principles and techniques of seed production, types of seeds, quality testing in self and cross pollinatedcrops.

Practical

Floral biology in self and cross pollinated species, selfing and crossing techniques. Techniques of seed production in self and cross pollinated crops using A/B/R and two line system. Learning techniques in hybrid seed production using male-sterility in field crops. Understanding the difficulties in hybrid seed production, Tools and techniques for optimizing Hybrid seed production. Concept of rouging in seed production plot.Concept of line its multiplication and purification in hybrid seed production.Role of pollinators in hybrid seed production.Hybrid seed production techniques in sorghum, pearl millet, maize, rice, rapeseed-mustard, sunflower, castor, pigeon pea, cotton and vegetable crops.Sampling and analytical procedures for purity testing and detection of spurious seed. Seed drying and storage structure in quality seed management. Screening techniques during seed processing viz., grading and packaging. Visit to public private seed production and processing plants.

Textbooks

1. Singh, B.D. 2018. Plant breeding principles and methods. Kalyani Publishers, India.

2. Vanangamudi, K and Vijayakumar, A. 2015. Hybrid Seed Production of Agronomic Crops. Agrobios,India.

Reference Books

1. Phundan Singh. 2011. IPR and Plant Breeders rights. New Vishal Publications,India.

2. AluízioBorém Roberto Fritsche-Neto. 2014. Biotechnology and Plant Breeding. Applications and Approaches for Developing Improved Cultivars. Academic Press,USA.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	15	15	30	40

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Imparting knowledge on commercial hybrid seed production	PO1
CO2	Applying biotechnological techniques to conventional plant breeding	PO12,PSO2
CO3	Describing the norms involved in testing and release of crop varieties in India	PO6
CO4	Practice hybridisation and plant breeding	PO7,PSO3

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3

SAAG223A	Commercial Plant Breeding	CO1					CO3	CO4				CO2			CO2	CO4

Programme and Course Mapping														
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO9**	**PO1 0**	**PO11**	**PSO1**	**PSO2**	**PSO 3**
CO1	**3**					**2**						**3**		
CO2			**2**									**3**		
CO3						**2**			**1**			**3**		
CO4	**1**										**3**		**3**	
CO5	**3**					**2**						**3**		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	**Course Title**	**L**	**T**	**P**	**C**
SAAG224A	Landscaping	2	0	1	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective

- To study landscaping establishment and maintenance.
- Bio-aestheticplanning,
- Bonsai establishment

Course Outcome:

The students will get acquainted with knowledge of-

CO1 Importance of landscaping and planning

CO2 Bonsai development and aftercare

CO3 Propagation of pot plants

CO4 Lawn development

Catalogue Description

This subject has been designed to impart knowledge of landscaping, propagation, Pot plants, Bio-aesthetic planning, lawn and Bonsai establishment and maintenance.

Course contents

Theory

Unit-1

- Importance and scope of land scaping.
- Principles of landscaping, garden styles and types, terrace gardening, vertical gardening, garden components, adornments, lawn making, rockery, water garden, walk-paths, bridges, other constructed features etc. gardens for special purposes.

Unit-2

- Trees: selection, propagation, planting schemes, canopy management, shrubs and herbaceous perennials: selection, propagation, planting schemes, architecture.
- Climber and creepers: importance, selection, propagation,planting

Unit-3

- Annuals: selection, propagation, planting scheme, other garden plants: palms, ferns, grasses and cactisucculents.
- Pot plants: selection, arrangement, management. Bio-aesthetic planning: definition, need, planning.

Unit-4

- Landscaping of urban and rural areas, Peri-urban landscaping, Landscaping of schools, public places like bus station, railway station, townships, riverbanks, hospitals, playgrounds, airports, industries,institutions.
- Bonsai: principles and management, lawn: establishment and maintenance. CAD application.

Practical

Identification of trees, shrubs, annuals, pot plants; Propagation of trees, shrubs and annuals, care and maintenance of plants, potting and repotting, identification of tools and implements used in landscape design, training and pruning of plants for special effects, lawn establishment and maintenance, layout of formal gardens, informal gardens, special type of gardens (sunken garden, terrace garden, rock garden) and designing of conservatory and lathe house. Use of computer software, visit to important gardens/ parks/institutes.

Textbooks

1 Bose T K, Yadav L P. 1998. Commercial flowers, Naya Prakash,India
2 Singh, A.K. 2017. Textbook of floriculture and landscaping, NIPA Paperbacks, New Delhi

Reference books

1. Choudhary, M L | Yadav, I S. 1997 Progressive Floriculture: Production Technologies of Important Commercial Flower Crops, House of Sarpan,Bangalore
2. Desh Raj. 2015. Floriculture at a Glance, Kalyani Publisher, NewDelhi

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	15	15	30	40

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Importance of landscaping and planning	**PO2**
CO2	Bonsai development and aftercare	**PO9, PSO2**
CO3	Propagation of pot plants	**PO12**
CO4	Lawn development	**PO13, PSO3**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG224A	Landscaping		CO1							CO2			CO3	CO4		CO2	CO4

Programme and Course Mapping														
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO9**	**PO1 0**	**PO11**	**PSO1**	**PSO2**	**PSO 3**
CO1	**3**											**3**		
CO2	**3**							**2**					**3**	
CO3			**3**			**2**						**3**		
CO4										**3**			**3**	
CO5			**3**									**3**		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG225A	Food Safety and Standards	2	0	1	3
Pre-requisites/Exposure	-				
Co-requisites	--				

Course Objectives

1. To study Food Safety, Hazards andRisks
2. Hazards andRisks
3. Food laws andStandards
4. Organicfoods

Course Outcomes: The students will learn about the

CO1 Importance, Scope and Factors affecting Food Safety.

CO2 Management of hazards Food storage,

CO3 Water Analysis, Surface Sanitation and Personal Hygiene

CO4 Indian and International Standards for food products.

Catalogue Description: This subject has been designed to impart knowledge regarding the Factors affecting Food Safety, Hazards and Risks, Food storage, Waste Disposal, Food laws and Standards, Organic foods

Course Contents

Theory

Unit-1

- Food Safety – Definition, Importance, Scope and Factors affecting FoodSafety.
- Hazards and Risks, Types of hazards - Biological, Chemical, Physicalhazards.
- Management of hazards - Need. Control of parameters. Temperature control.

Unit-2

- Food storage. Product design. Hygiene and Sanitation in Food Service Establishments- Introduction. Sources of contamination and theircontrol.
- Waste Disposal. Pest and Rodent Control. Personnel Hygiene. Food SafetyMeasures.
- Food Safety Management Tools- Basic concepts. PRPs, GHPs, GMPs, SSOPs etc. HACCP. ISOseries.

Unit-3

- TQM- concept and need for quality, components of TQM, Kaizen. Risk Analysis. Accreditation andAuditing,
- Water Analysis, Surface Sanitation and PersonalHygiene.
- Food laws and Standards- Indian Food Regulatory Regime, FSSA. Global Scenario CAC. Other laws and standards related tofood.

Unit-4

- Recent concerns- New and Emerging Pathogens.
- Packaging, Product labelling and Nutritional labelling. Genetically modified foods\ transgenics
- Organic foods. Newer approaches to foodsafety.
- Recent Outbreaks. Indian and International Standards for foodproducts.

Practical

Water quality analysis physico-chemical and microbiological.Preparation of different types of media.Microbiological Examination of different food samples.Assessment of surface sanitation by swab/rinse method.Assessment of personal hygiene. Biochemical testsfor identification of bacteria. Scheme for the detection of food borne pathogens. Preparation of plans for Implementation of FSMS - HACCP, ISO: 22000

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	15	15	30	40

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Importance, Scope and Factors affecting Food Safety.	PO1
CO2	Management of hazards Food storage,	PO5
CO3	Water Analysis, Surface Sanitation and Personal Hygiene	PO12,PSO1
CO4	Indian and International Standards for food products.	PO13,PSO2

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG225A	Food Safety and Standards	CO1				CO2							CO3	CO4	CO3	CO4	

Programme and Course Mapping														
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO9**	**PO1 0**	**PO11**	**PSO1**	**PSO2**	**PSO 3**
CO1	**3**					**2**						**3**		
CO2			**2**									**3**		
CO3						**2**			**1**			**3**		
CO4	**1**										**3**		**3**	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG226A	Biopesticides and Biofertilizers	2	0	1	3
Pre-requisites/Exposure					
Co-requisites	--				

Course Objectives

- To study about the biopesticides andBiofertilizers
- Mass production of biopesticides andBiofertilizers

Course Outcomes: The students will learn about the

CO1 concept of biopesticides and biofertilizers

CO2 Mass production technology of bio-pesticides and biofertilizers

CO3 Structure and characteristic features of bio-pesticides and biofertilizers

CO4 Storage, shelf life, quality control and marketing of bio-pesticides and biofertilizers

Catalogue Description: This subject has been designed to impart knowledge of biopesticides. Classification, Mass production, Biofertilizers.Factors influencing the efficacy of biofertilizers.

Course Contents

Theory

Unit-1

- History and concept ofbiopesticides.
- Importance, scope and potential ofbiopesticide.
- Definitions, concepts and classification of biopesticides viz. pathogen, botanical pesticides, and biorationales. Botanicals and theiruses.

Unit-2

- Mass production technology of bio-pesticides. Virulence, pathogenicity and symptoms of entomopathogenic pathogens and nematodees.
- Methods of application of biopesticides.
- Methods of quality control and Techniques of biopesticides. Impediments and limitation in production and use ofbiopesticide.

Unit-3

- Biofertilizers - Introduction, status and scope. Structure and characteristic features of bacterial biofertilizers- *Azospirillum, Azotobacter, Bacillus, Pseudomonas,Rhizobium*
- *Frankia*; Cyanobacterialbiofertilizers- *Anabaena*, *Nostoc*, Hapalosiphon and fungal biofertilizers- AM mycorrhiza andectomycorrhiza.

Unit-4

- Nitrogen fixation -Free living and symbiotic nitrogen fixation. Mechanism of phosphate solubilization and phosphate mobilization, Ksolubilization.
- Production Report of the ICAR Fifth Deans' Committee technology: Strain selection, sterilization, growth and fermentation, mass production of carrier based and liquid biofertilizers.
- FCO specifications and quality control of biofertilizers. Application technology for seeds, seedlings, tubers, sets etc.

- Biofertilizers -Storage, shelf life, quality control and marketing. Factors influencing the efficacy of biofertilizers.

Practical

Isolation and purification of important biopesticides: *Trichoderma Pseudomonas, Bacillus, Metarhyzium*etc. and its production. Identification of important botanicals. Visit to biopesticide laboratory in nearby area. Field visit to explore naturally infected cadavers. Identification of entomopathogenic entities in field condition.Quality control of biopesticides.Isolation and purification of *Azospirillum, Azotobacter, Rhizobium*, P-solubilizers and cyanobacteria.Mass multiplication and inoculums production of biofertilizers. Isolation of AM fungi -Wet sieving method and sucrose gradient method. Mass production of AMinoculants.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	15	15	30	40

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	concept of biopesticides and biofertilizers	**PO1**
CO2	Mass production technology of bio-pesticides and biofertilizers	**PO2**
CO3	Structure and characteristic features of bio-pesticides and biofertilizers	**PO11,PSO1**
CO4	Storage, shelf life, quality control and marketing of bio-pesticides and biofertilizers	**PO12,PSO2**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG226A	Biopesticides and Biofertilizers	CO1	CO2									CO3	CO4		CO3	CO4	

Programme and Course Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3											3		
CO2	3							2					3	
CO3			3			2						3		
CO4										3			3	
CO5			3									3		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG227A	Protected Cultivation	2	0	1	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective

1. To study about Protected cultivation
2. Greenhousedesign
3. Off-season productioncrops

Course Outcome:

The students will learn-

CO1 Protected cultivation of vegetables and flowers

CO2 Off-season vegetable production

CO3 Different type of greenhouse designs

CO4 Fertigation

Catalogue Description

This subject has been designed to impart knowledge of protected cultivation, Greenhouse design, Soil preparation, Irrigation and fertigation, Cultivation of Off-season production crops, pest and disease management.

Course Contents

Theory

Unit-1

- Protected cultivation- importance and scope, Status of protected cultivation inIndia
- World types of protected structure based on site andclimate.

Unit-2

- Cladding material involved in greenhouse/ polyhouse.
- Greenhouse design, environment control, artificial lights

Unit-3

- Automation. Soil preparation and management, Substratemanagement.
- Types of benches andcontainers.
- Irrigation and fertigationmanagement.

UNIT-4

- Propagation and production of quality planting material of horticultural crops. Greenhouse cultivation of important horticultural crops – rose, carnation, chrysanthemum, gerbera, orchid, anthurium, lilium, tulip, tomato, bell pepper, cucumber, strawberry, pot plants,etc.
- Cultivation of economically important medicinal and aromatic plants. Off-season production of flowers and vegetables. Insect pest and diseasemanagement.

Practical

Raising of seedlings and saplings under protected conditions, use of protrays in quality planting material production, Bed preparation and planting of crop for production, Intercultural operations, Soil EC and pH measurement, Regulation of irrigation and fertilizers through drip, fogging ad misting.

Textbooks

1 S. Prasad and U. Kumar. 2015. Greenhouse Management for HorticulturalCrop Production, Agrobios, India
2 Singh,DK.and K V Peter. 2014. Protected Cultivation of Horticultural Crops,New India Publishing Agency, New Delhi

Reference books

1 David W DoolanCherubinoLeonardi. 2005. Vegetable Seedling Production Manual, Daya Publishing House, Delhi
2 Balraj,Singh.2014.AdvancesinProtectedCultivation,NewIndiaPublishing Agency, New Delhi

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	15	15	30	40

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Protected cultivation of vegetables and flowers	PO1
CO2	Off-season vegetable production	PO2, PO12, PO13
CO3	Different type of greenhouse designs	PO9, PSO1
CO4	Fertigation	PO2

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG227A	Protected Cultivation	CO1	CO2, CO4							CO3					CO3		

Programme and Course Mapping													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3					2						3		
CO2			2									3		
CO3						2			1			3		

CO4	**1**									**3**		**3**	
1=lightly mapped 2= moderately mapped 3=strongly mapped													

Course Code	**Course Title**	**L**	**T**	**P**	**C**
SAAG228A	Micro propagation Technologies	1	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective

- To study about the cultures,callus
- Secondarymetabolites
- Cryopreservation

Course Outcome:

The students will get acquainted with knowledge of-

CO1 Micropropagation techniques

CO2 Different types of cultures in micropropagation

CO3 Somaclonal variation and its exploitation in variety development

CO4 Principles of cryopreservation

Catalogue Description

This subject has been designed to impart knowledge of cultures, callus and direct organ formation, secondary metabolites, and Cryopreservation.

Course Contents

Theory

Unit-1

- Introduction,History,
- Advantages andlimitations

Unit-2

- Types of cultures (seed, embryo, organ, callus,cell),
- Stages of micropropagation, Axillary bud proliferation (Shoot tip and meristem culture, budculture)

Unit-3

- Organogenesis (callus and direct organ formation), Somatic embryogenesis, cell suspensioncultures,

UNIT-4

- Production of secondary metabolites, Soma clonal variation, Cryopreservation

Practical

Identification and use of equipments in tissue culture Laboratory, Nutrition media composition, sterilization techniques for media, containers and small instruments, sterilization techniques for Report of the ICAR Fifth Deans' Committee explants, Preparation of stocks and working solution, Preparation of working medium, Culturing of explants: Seeds, shoot tip and single node, Callus induction, Induction of somatic embryos regeneration of whole plants from different explants, Hardening procedures.

Textbooks

1. Chhatwal,G.R. 1995. Textbook of biotechnology, Anmol publications, NewDelhi
2. Chadha,K L. 2000. Biotechnology in Horticultural and plantation Crops, Malhotra Publishing House, NewDelhi

Reference books

3. Punia,M S. 1999. Plant biotechnology and molecular biology: a laboratory manual. Scientific Publishers,Jodhpur
4. Ramesh, Chandra. 2003. Comprehensive micropropagation of horticultural crops. International Book Distributers, UttarPradesh

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	15	15	30	40

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs

S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Micropropagation techniques	**PO2**
CO2	Different types of cultures in micropropagation	**PO9**
CO3	Somaclonal variation and its exploitation in variety development	**PO12, PSO1**
CO4	Principles of cryopreservation	**PO11**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG228A	Micro propagation Technologies		CO1							CO2		CO4	CO3		CO3		

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**											**3**		
CO2	**3**							**2**					**3**	
CO3			**3**			**2**						**3**		
CO4										**3**			**3**	
CO5			**3**									**3**		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG229A	Hi-Tech. Horticulture	2	0	1	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective

- To study high techhorticulture
- Planting methods, Microirrigation
- Remote sensing & planting methods, Micro irrigation

Course Outcome: The students will learn

CO1 Principles and practices of micro irrigation

CO2 Hi-tech horticulture

CO3 Precision farming

CO4 Mechanized harvesting of fruits and vegetables

Catalogue Description: This subject has been designed to impart knowledge of hi-tech horticulture, micro propagation, planting methods, Micro irrigation, precision farming, planting methods, Micro irrigation and mechanized harvesting of produce

Course Contents

Theory

Unit-1

- Introduction & importance of high-techhorticulture
- Nursery management and mechanization; micro propagation of horticulturalcrops.

Unit-2

- Modern field preparation and plantingmethods,
- Protected cultivation: advantages, controlled conditions, method, andtechniques,
- Hydroponics, Aeroponics andAquaponics

Unit-3

- Micro irrigation systems and its components; EC, pH-based fertilizer scheduling, canopy management, high densityorcharding,
- Components of precisionfarming

Unit-4

- Remote sensing, Geographical Information System(GIS),
- Differential Geo-positioning System(DGPS),
- Variable Rate applicator(VRA),
- application of precision farming in horticultural crops (fruits, vegetables, and ornamental crops); mechanized harvesting ofproduce.

Practical

Types of polyhouses and shade net houses, Intercultural operations, tools and equipments identification and application, Micro propagation, Nursery-protrays, micro-irrigation, EC, pH-based fertilizer scheduling, canopy management, visit to hi-tech orchard/nursery.

Textbooks

1 S. Prasad and U. Kumar. 2015. Greenhouse Management for HorticulturalCrop Production, Agrobios, India
2 Singh,DK.and K V Peter. 2014. Protected Cultivation of Horticultural Crops,New India Publishing Agency, New Delhi
3 Goyal, Megh Raj. 2013. Management of drip/trickle or micro irrigation, Apple Academic Press,Canada
4 Ray, P K. 2012. Plant nursery management: how to start and operate a plant nursery, Jodhpur Scientific publishers(India)

Reference books

1 David W DoolanCherubinoLeonardi. 2005. Vegetable Seedling Production Manual, Daya Publishing House, Delhi
2 Balraj,Singh.2014.AdvancesinProtectedCultivation,NewIndiaPublishing Agency, New Delhi
3 Goyal, Megh R. 2015. Sustainable micro irrigation principles and practices V. 1, Apple Academic Press,Canada

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	15	15	30	40

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Principles and practices of micro irrigation	**PO2**
CO2	Hi-tech horticulture	**PO12, PSO1**
CO3	Precision farming	**PO10, PSO3**
CO4	Mechanized harvesting of fruits and vegetables	**PO9**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG229A	Hi-Tech. Horticulture		CO1							CO4	CO3		CO2		CO2		CO3

Programme and Course Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	**3**					**2**						**3**		
CO2			**2**									**3**		
CO3						**2**			**1**			**3**		
CO4	**1**										**3**		**3**	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG230A	Weed Management	2	0	1	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective

- To study reproduction and dissemination ofweeds
- Herbicide formulations and compatibility

Course Outcome:

The students will get acquainted with knowledge of-

CO1 Weed identification

CO2 Weed management

CO3 Methods of herbicide application and calculation of herbicide doses

CO4 Herbicide resistance and methods to mitigate resistance

Catalogue Description

This subject has been designed to impart knowledge of reproduction and dissemination of weeds, Herbicide, Herbicide compatibility, herbicideformulation

Course contents

Theory

Unit-1

- Introduction to weeds, characteristics of weeds their harmful and beneficial effects on ecosystem.
- Classification, reproduction and dissemination ofweeds.

Unit-2

- Herbicide classification, concept of adjuvant,surfactant,
- Herbicide formulation and their use. Introduction to mode of action of herbicides and selectivity

Unit-3

- Allelopathy and its application for weedmanagement.
- Bio-herbicides and their application inagriculture.

Unit-4

- Concept of herbicide mixture and utility in agriculture. Herbicide compatibility with agro-chemicals and theirapplication.
- Integration of herbicides with non-chemical methods of weed management. Herbicide Resistance and itsmanagement.

Practical

Techniques of weed preservation. Weed identification and their losses study. Biology of important weeds.Study of herbicide formulations and mixtures. Herbicide and agrochemicals study. Shift of weed flora study in long term experiments. Methods of herbicide application, spraying equipment. Calculations of herbicide doses and weed control efficiency and weed index.

Textbooks

1. Rao, V S. 2003. Principles of weed science, Oxford & IBH Publishing Co. Pvt. Ltd., NewDelhi
2. Gupta,O P. 1998. Weed management: principles and practices, Agro botonica, Bikaner
3. Saraswat,V N. 2003. Weed management, ICAR, NewDelhi

Reference books

1. Gupta,O P. 2000. Modern weed management, Agrobios,Jodhpur
2. Mishra,J A. 2004. Tillage and weed management, National Research Centre for Weed Science,Jabalpur
3. Shanmugavelu,K G. 1985. Weed management of Horticultural crops, Agro botanical publishers,India

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	15	15	30	40

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	**Course Outcomes (COs)**	**Mapped Program Outcomes**
CO1	Weed identification	**PO1**
CO2	Weed management	**PO2, PO13**
CO3	Methods of herbicide application and calculation of herbicide doses	**PO9, PO12, PSO2**
CO4	Herbicide resistance and methods to mitigate resistance	**PO12**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG230A	Weed Management	CO1	CO2							CO3			CO4			CO3	

Programme and Course Mapping													
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	3											3		
CO2	3							2					3	
CO3			3			2						3		
CO4										3			3	
CO5			3									3		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG231A	**System Simulation and Agro advisory**	2	0	1	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective

- To study about the Crop models
- Growth models, nutrientsbalance
- Weather forecasting

Course Outcome: The students will be benefitted by

CO1 Demonstrate the role of crop models in studying soil, plant and water relationship

CO2 Discuss about different types of crop growth models to forecast crop yields

CO3 Outline the preparation of agro advisory bulletin based on weather forecast and its use Make

CO4 use of crop models and statistical approaches to predict yield of crops, forecast pests and diseases and prepare agro-advisories

Catalogue Description

This subject has been designed to impart knowledge of Crop models, concepts & techniques, weather elements; growth models, nutrients balance, Weather forecasting, simulation model, Agro-advisory

Course contents

Theory:

Unit-1

- System Approach for representing soil-plant-atmospheric continuum, system boundaries, Crop models, concepts &techniques

Unit-2

- Types of crop models, data requirements, relationaldiagrams.
- Report of the ICAR Fifth Deans' Committee Evaluation of crop responses to weather elements.

Unit-3

- Elementary crop growth models; calibration, validation, verification and sensitivity analysis. Potential and achievable crop production- concept and modelling techniques for theirestimation.
- Crop production in moisture and nutrients limited conditions, components of soil water and nutrientsbalance.

Unit-4

- Weather forecasting, types, methods, tools & techniques, forecastverification.
- Value added weather forecast, ITK for weather forecast and its validity; Crop-WeatherCalendars.
- Preparation of agro-advisory bulletin based on weatherforecast. Use of crop simulation model for preparation of Agro-advisory and its effective dissemination.

Practical

Preparation of crop weather calendars. Preparation of agro-advisories based on weather forecast using various approaches and synoptic charts. Working with statistical and simulation models for crop growth. Potential & achievable production; yield forecasting, insect & disease forecasting models.Simulation with limitations of water and nutrient management options. Sensitivity analysis of varying weather and crop management practices. Use of statistical approaches in data analysis and preparation of historical, past and present meteorological data for medium range weather forecast.Feedback from farmers about the agroadvisory.

Textbooks

1. Mahi, G.S. and P.K. Kingra. 2018. Fundamentals of agrometeorology and climate change. Kalayani Publishers, India.
2. 2. Daniel. W, David. M, James W.J and Francois. B. 2014. Working with Dynamic Crop Models: Methods, Tools and Examples for Agriculture and Environment. 3rd edition, Academic press.USA.

Reference Books

1. Das, H.P. 2012. Agrometeorology in Extreme Events and Natural Disasters. CRS Press, BS Publications, India.

2. S.R. Reddy. 2014. Introduction to Agriculture and Agrometeorology. Kalayani Publishers, India.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	15	15	30	40

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Demonstrate the role of crop models in studying soil, plant and water relationship	PO2
CO2	Discuss about different types of crop growth models to forecast crop yields	PO10,PSO1
CO3	Outline the preparation of agro advisory bulletin based on weather forecast and its use	PO12
CO4	Make use of crop models and statistical approaches to predict yield of crops, forecast pests and diseases and prepare agro-advisories	PO11, PSO2

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG231A	System Simulation and Agro advisory		CO1								CO2	CO4	CO3		CO2	CO4	

Programme and Course Mapping													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3					2						3		
CO2			2									3		
CO3						2			1			3		
CO4	1										3		3	
CO5	3					2						3		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

Course Code	Course Title	L	T	P	C
SAAG232A	**Agricultural Journalism**	2	0	1	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Objective:

- To study agriculturaljournalism
- Agriculturalinformation
- Writing, proofreading

Course Outcome: The students will be benefitted by

CO1 Acquire knowledge on agricultural journalism

CO2 Explaining the importance of journalism in agricultural extension

CO3 Demonstrating how communication media can be utilized in presenting readable agricultural stories

CO4 Developing skills in editing, copy reading, headline and title writing, proofreading and lay outing.

Catalogue Description: This subject has been designed to impart knowledge of agricultural journalism, communication media, agricultural stories, agricultural information, interviews, Illustrations writing, proofreading, lay outing.

Course Contents

Theory

Unit-1

- Agricultural Journalism: The nature and scope of agricultural journalism characteristics and training of the agriculturaljournalist,
- How agricultural journalism is similar to and different from other types of journalism. Newspapers and magazines as communicationmedia:

Unit-2

- Characteristics; kinds and functions of newspapers and magazines, characteristics of newspaper and magazine readers. Form and content of newspapers andmagazines:
- Style and language of newspapers and magazines, parts of newspapers and magazines. The agriculturalstory:

Unit-3

- Types of agricultural stories, subject matter of the agriculturalstory,
- Structure of the agricultural story. Gathering agriculturalinformation:

Unit-4

- Sources of agricultural information, interviews, coverage of events, abstracting from research and scientific materials, wire services, other agricultural newssources.
- Writing the story: Organizing the material, treatment of the story, writing the news lead and the body, readability measures. Illustrating agriculturalstories:
- Use of photographs, use of artwork (graphs, charts, maps, etc.), writing the captions. Editorial mechanics: Copy reading, headline and title writing, proofreading, lay outing.

Practical

Practice in interviewing. Covering agricultural events.Abstracting stories from research and scientific materials and from wire services.Writing different types of agricultural stories.Selecting pictures and artwork for the agricultural story. Practice in editing, copy reading, headline and title writing, proofreading, lay outing. Testing copy with a readability formula. Visit to a publishing house.

Textbooks

1 Singh, A K. 2014. Agricultural Extension and Farm Journalism, Agrobios, India.

2. Bhaskaran C. 2008. Farm Journalism and Media Management, Agrotech Publishing Academy, India.

Reference Books

1. Jana, B.L. 2014. Agricultural Journalism. Agrotech Publishing Academy,India.

2. Shahzad Ahmad. 2006. Art of Modern Journalism. Anmol Publications Pvt. Ltd.,India.

Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	15	15	30	40

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
S.No.	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Acquire knowledge on agricultural journalism	PO2

CO2	Explaining the importance of journalism in agricultural extension	**PO3,PSO2**
CO3	Demonstrating how communication media can be utilized in presenting readable agricultural stories	**PO7**
CO4	Developing skills in editing, copy reading, headline and title writing, proofreading and lay outing	**PO11**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO1	PSO2	PSO3
SAAG232A	Agricultural Journalism		CO1	CO2				CO3				CO4				CO2	

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**											**3**		
CO2	**3**							**2**					**3**	
CO3			**3**			**2**						**3**		
CO4										**3**			**3**	
CO5			**3**									**3**		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

7thSem (4thYear) (Complete Practical –No Theory Class)

S.No.	Paper Code	Title of the module	Credits
1	**SAAG401A**	Commercial Beekeeping	10 (0+10)
2	**SAAG402A**	Commercial Sericulture	10 (0+10)
3	**SAAG403A**	Production Technology for Bioagents and Biofertilizers	10 (0+10)
4	**SAAG404A**	Commercial Horticulture	10 (0+10)
5	**SAAG405A**	Floriculture and Landscaping	10 (0+10)
6	**SAAG406A**	Food Processing	10 (0+10)
7	**SAAG407A**	Mushroom Cultivation Technology	10 (0+10)

8	**SAAG408A**	Seed Production and Technology	10 (0+10)
9	**SAAG409A**	Organic Production Technology	10 (0+10)
10	**SAAG410A**	Soil, Plant, Water and Seed Testing	10 (0+10)
11	**SAAG411A**	Poultry Production Technology	10 (0+10)
12	**SAAG412A**	Agriculture Waste Management	10 (0+10)
13	**SAAG413A**	(Evaluation of Experiential Learning Programme (ELP)	02 (0+2)

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.
Note: In addition to above modules other important modules may be given to the students by SAUs.

Evaluation of Experiential Learning Programme (ELP)

S. No.	Parameter	Max. Marks
	Project Planning and Writing	10
	Presentation	10
	Regularity	10
	Monthly Assessment	10
	Output Delivery	10
	Technical Skill Development	10
	Technical Skill Development	10
	Business Networking Skills	10
	Report Writing Skills	10
	Final Presentation	10
	Total	100

7thSemester 4thYear (No Theory Class)

Course Code	Course Title	L	T	P	C
Module-I	**Module-I(SAAG401-412A)**	0	0	10	10

Pre-requisites/Exposure	None
Co-requisites	--

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**00**	**00**	**100**	**00**

Course Code	Course Title	L	T	P	C
Module-II	**Module-I (SAAG401-412A)**	0	0	10	10
Pre-requisites/Exposure	None				
Co-requisites	--				

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**00**	**00**	**100**	**00**

Course Code	Course Title	L	T	P	C
SAAG413A	**Evaluation of ExperimentialLaerning Programme (ELP)**	0	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**00**	**00**	**100**	**00**

Programme and Course Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**					**2**						**3**		
CO2			**2**									**3**		
CO3						**2**			**1**			**3**		
CO4	**1**										**3**		**3**	
1=lightly mapped 2= moderately mapped 3=strongly mapped														

8thSemester 4thYear (No Theory Class)

Rural Agricultural Work Experience and Agro-industrial Attachment

(RAWE & AIA) Paper Code: SAAG414A and SAAG415A

Credits: 20(0+20)

Course Code	Course Title	L	T	P	C
SAAG414A	Rural Agriculture Work Experience and Agro-industries Attachment -Component -1	0	0	14	14
Pre-requisites/Exposure	None				
Co-requisites	--				

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**00**	**00**	**100**	**00**

Course Code	Course Title	L	T	P	C
SAAG415A	Rural Agriculture Work Experience and Agro industries Attachment -Component -2	0	0	6	6
Pre-requisites/Exposure	None				
Co-requisites	--				

Components	Evaluation 1	Evaluation 2	Practical	End Term Exam
Weightage (%)	**00**	**00**	**100**	**00**

Sr. No.	Activities	No. of weeks	Credits
1.	General orientation & on campus training by different faculties	1	14
2.	Village attachment	8	
	Unit attachment in Univ. / College. KVK/ Research Station attachment	5	
3.	Village attachment	2	2
4.	Agro-Industrial attachment	3	4
5.	Project report preparation, presentation and evaluation	1	

Total weeks for RAWE & AIA	**20**	**20**

Agro- Industrial Attachment: The students would be attached with the agro- industries for a period of 3 weeks to get an experience of the industrial environment andworking.

RAWE & AIA Component-I

Village Attachment Training Programme

Sr. No.	Activity	Duration
1.	Orientation and Survey of Village	1 week
2.	Agronomical Interventions	1 week
3.	Plant Protection Interventions	1 week
4.	Soil Improvement Interventions (Soil sampling and testing)	1 week
5.	Fruit and Vegetable Production Interventions	1 week
6.	Food Processing and Storage Interventions	1 week
7.	Animal Production Interventions	1 week
8.	Extension and Transfer of Technology activities	1 week

Programme and Course Mapping														
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**											**3**		
CO2	**3**							**2**					**3**	
CO3			**3**			**2**						**3**		
CO4										**3**			**3**	
CO5			**3**									**3**		
1=lightly mapped 2= moderately mapped 3=strongly mapped														

RAWE & AIA Component –II

Agro Industrial Attachment

- Students shall be placed in Agro-and Cottage industries and Commodities Boards for 03weeks.
- 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 andstaff
- Study of structure, functioning, objective and mandates of theindustry
- Study of various processing units and hands-on trainings under supervision of industrystaff
- Ethics of industry
- Employment generated by theindustry
- Contribution of the industry promotingenvironment
- Learning business network including outlets of theindustry
- Skill development in all crucial tasks of theindustry
- Documentation of the activities and task performed by thestudents
- Performance evaluation, appraisal and ranking ofstudent

Programme and Course Mapping														
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**					**2**						**3**		
CO2			**2**									**3**		
CO3						**2**			**1**			**3**		
CO4	**1**										**3**		**3**	
1=lightly mapped 2= moderately mapped 3=strongly mapped														