Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Protected Cultivation And Secondary Agriculture
Course Code	AENG-321[T]

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					1	0	1	2
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Agronomy			**Co-Requisite/s**	Agronomy			
Course Outcomes & Bloom's Level	**CO1-** List out the importance of Protected cultivation and its scope in India. **(BL1-Remember)** **CO2-** Discuss various types of greenhouse structures **(BL2-Understand)** **CO3-** Apply the concept of protected cultivation in major crops of India. **(BL3-Apply)** **CO4-** Examine the basics of nursery management under protected structures. **(BL4-Analyze)** **CO5-** Evaluate the utility of different growing media and growing conditions under protected structures. **(BL5-Evaluate)** **CO6-** Create the budget and design for protected cultivation and structures. **(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Introduction to Protected cultivation and Secondary Agriculture Importance and scope of protected cultivation Greenhouse effects and types of greenhouses	ABL, PBL, Guided learning and Field & outdoor Learning	3
Unit 2	Planning and design of greenhouses Components of greenhouse Orientations of Greenhouse Design and size of Greenhouse Load distribution Green house materials of construction for traditional and low- cost green houses.	ABL, PBL, Guided learning and Field & outdoor Learning	3
Unit 3	Irrigation under Protected Structures . Types of irrigation . Installation of Irrigation . Fertigation	ABL, PBL, Guided learning and Field & outdoor Learning	3
Unit 4	Cooling and Heating System Active heating and components Active Cooling system and Components Cost estimation and economic analysis of Greenhouse Important Engineering properties such as physical, thermal and aero & hydrodynamic properties of cereals, pulses and oilseed, their application in PHT equipment design and operation.	ABL, PBL, Guided learning and Field & outdoor Learning	3
Unit 5	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, recirculatory dryer and solar dryer), Material handling equipment; conveyer and elevators, their principle, working and selection	ABL, PBL, Guided learning and Field & outdoor Learning	4

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Greenhouse effects and types of greenhouses	Experiments	BL2-Understand	2
Practical 2	Greenhouse design and Concept of greenhouse orientation	Experiments	BL2-Understand	2
Practical 3	Load distribution under greenhouse design	Experiments	BL2-Understand	2
Practical 4	Greenhouse components and structures	Experiments	BL3-Apply	2
Practical 5	Visit to various Post Harvest Laboratories	Experiments	BL3-Apply	2
Practical 6	Determination of Moisture content of various grains by oven drying & infrared moisture methods.	Experiments	BL4-Analyze	2
Practical 7	Determination of Moisture content of various grains by moisture meter.	Experiments	BL4-Analyze	2
Practical 8	Field visit to seed processing plant or Storage structure	Field work	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Salone, V.M. and Sharma, A.K. (2012). Greenhouse Technology and Applications. Agrotech Publishers. New Delhi.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	1	1	-	-	-	-	-	-	-	3	1	-
CO2	-	2	1	-	2	-	1	-	-	-	2	-	-	3	-
CO3	2	-	2	1	2	-	1	-	-	-	1	1	-	-	2
CO4	-	1	1	-	-	-	-	-	-	-	-	2	-	-	-
CO5	-	1	-	-	-	-	-	-	-	-	2	-	-	-	-
CO6	-	-	-	-	-	2	-	-	-	-	2	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Crop Production Technology-I (Kharif crops)
Course Code	AGRON- 211[T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					1	0	1	2
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Fundamentals of Agronomy			**Co-Requisite/s**	Introductory Agro-meteorology & Climate Change			
Course Outcomes & Bloom's Level	**CO1-** Describe the nutraceuticals values and economic importance of various Kharif agricultural crops**(BL1-Remember)** **CO2-** Understand the soil and climatic requirements of different Kharif crops**(BL2-Understand)** **CO3-** Demonstrate the nursery preparation and transplanting in rice**(BL3-Apply)** **CO4-** Examine the impact of various biotic and abiotic stress on the productivity of different crops**(BL4-Analyze)** **CO5-** Determine the cost of cultivation of different crops**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif Cereals crops, viz., rice, maize, sorghum, pearl millet and finger millet, pulses-pigeonpea, mungbean and urdbean; oilseeds-groundnut, and soybean; fibre crops- cotton & jute; forage crops-sorghum, cowpea, cluster bean and napier	Problem-based learning: Fieldwork and outdoor learning Guided Questioning	6
Unit 2	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif pulses crops, viz., pigeonpea, mungbean and urdbean	Problem-based learning: Fieldwork and outdoor learning Guided Questioning	6
Unit 3	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif oilseeds crops, viz., groundnut, and soybean	Problem-based learning: Fieldwork and outdoor learning Guided Questioning	6
Unit 4	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif fibre crops, viz., cotton & jute	Problem-based learning: Fieldwork and outdoor learning Guided Questioning	6
Unit 5	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif forage crops, viz., sorghum, cowpea, cluster bean and napier grass	Problem-based learning: Fieldwork and outdoor learning Guided Questioning	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Sowing and transplanting methods of rice	Field work	BL2-Understand	2
Practical 2	Sowing methods of different Kharif crops	Field work	BL2-Understand	2
Practical 3	Identification of weeds in kharif season crops	Field work	BL3-Apply	2
Practical 4	Study of morphological characteristics of kharif crops	Field work	BL3-Apply	2
Practical 5	Study of yield contributing characters of kharif season crops	Field work	BL4-Analyze	2
Practical 6	Yield and protein percent analysis of green gram and black gram	Field work	BL4-Analyze	2
Practical 7	Study of important agronomic experiments of kharif crops at experimental farms.	Field work	BL5-Evaluate	2
Practical 8	Visit to research stations of related crops	PBL	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Amanullah, M. M., Rajendran, K. and Marimuthu, S. 2022. Crop Production Technology-I (Kharif Crops). New India Publishing Agency
Articles	NA
References Books	
MOOC Courses	
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	1	2	-	-	3	-	-	-	-	-	-	-	-	-
CO2	-	-	-	2	-	1	-	-	3	-	-	-	-	-	-
CO3	3	-	-	-	-	2	-	-	-	-	-	-	-	-	-
CO4	2	-	-	3	-	1	-	-	-	-	-	-	-	-	-
CO5	-	3	-	-	-	1	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Crop Production Technology - II (Rabi crops)
Course Code	AGRON- 221[T]

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					1	0	1	2
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Fundamentals of Agronomy			**Co-Requisite/s**	Crop Production Technology - I (Kharif crops)			
Course Outcomes & Bloom's Level	**CO1-** Describe the basic concepts of cultivation practices and post-harvest technologies of different Rabi crops **(BL1-Remember)** **CO2-** Explain steps involved in preparation of field outline, crop production and management **(BL2-Understand)** **CO3-** Apply the principles and concepts of agronomy on the field to improve the crop productivity and resource use efficiency **(BL3-Apply)** **CO4-** Investigate the role of different agricultural inputs on yield the quality of different Rabi crops **(BL4-Analyze)** **CO5-** Assess the economic viability of different methods and technologies in different cropping system **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG12(Responsible consuption and production) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Rabi cereals crops, viz., Wheat and Barley	Problem-based learning: Fieldwork and outdoor learning Guided Questioning	3
Unit 2	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Rabi pulses crops, viz., chickpea, Lentil, Peas	Problem-based learning: Fieldwork and outdoor learning Guided Questioning	3
Unit 3	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi oilseeds crops, viz., Rapeseed, Mustard and Sunflower	Problem-based learning: Fieldwork and outdoor learning Guided Questioning	3
Unit 4	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi sugar crop viz., Sugarcane	Problem-based learning: Fieldwork and outdoor learning Guided Questioning	3
Unit 5	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi forage crops viz., Berseem, Lucerne and Oat	Problem-based learning: Fieldwork and outdoor learning Guided Questioning	4

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Sowing methods of wheat and sugarcane	Field work	BL2-Understand	2
Practical 2	Identification of weeds in rabi season crops	Field work	BL2-Understand	2
Practical 3	Study of morphological characteristics of rabi crops	Field work	BL3-Apply	2
Practical 4	Study of yield contributing characters of rabi season crops	Field work	BL3-Apply	2
Practical 5	Yield and juice quality analysis of sugarcane	Field work	BL4-Analyze	2
Practical 6	Study of important agronomic experiments of rabi crops at experimental farms	Field work	BL4-Analyze	2
Practical 7	Study of oil extraction of medicinal crops	Field work	BL5-Evaluate	2
Practical 8	Visit to research stations of related crops	Field work	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Singh, C. (2020). Modern Techniques of Raising Field Crops. CBS
Articles	NA
References Books	
MOOC Courses	
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	3	2	-	1	-	-	-	-	-	3	1	-
CO2	-	1	3	2	2	2	1	-	-	-	-	-	1	1	-
CO3	2	-	3	2	2	2	2	1	-	-	1	1	-	-	2
CO4	-	1	-	3	-	-	-	1	-	-	1	-	-	1	-
CO5	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Farming System & Sustainable Agriculture
Course Code	AGRON- 222 [T]

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					1	0	0	1
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Fundamentals of Agronomy			**Co-Requisite/s**	Fundamentals of Agronomy			
Course Outcomes & Bloom's Level	**CO1-** Describe the basic concepts cropping systems and sustainable agriculture **(BL1-Remember)** **CO2-** Explain the interaction between different farm enterprises **(BL2-Understand)** **CO3-** Utilize the different concepts of IFS to enhance the crop productivity in sustainable ecosystem **(BL3-Apply)** **CO4-** Investigate the sustainability of different indicators in various framing system **(BL4-Analyze)** **CO5-** Judge the sustainability of various farming system models in different agro-climatic conditions to get the optimum output of the resources in sustainable manner **(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG6(Clean water and sanitation) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Farming system-scope, importance, and concept; Types and systems of farming system and factors affecting types of farming	Field work, scenario Planning, Project and Thematic teaching	3
Unit 2	Farming system components and their maintenance; Cropping system and pattern, multiple cropping system, efficient cropping system and their evaluation; Allied enterprises and their importance, tools for determining production and efficiencies in cropping and farming system.	Field work, scenario Planning, Project and Thematic teaching	3
Unit 3	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	Field work, scenario Planning, Project and Thematic teaching	3
Unit 4	Integrated farming system, historical background, objectives and characteristics, components of IFS and its advantages, site specific development of IFS model for different agro-climatic zones.	Field work, scenario Planning, Project and Thematic teaching	3
Unit 5	: Resource use efficiency and optimization techniques, resource cycling and flow of energy in different farming system, farming system and environment; Visit of IFS model in different agro-climatic zones of nearby states University/ institutes and farmers field.	Field work, scenario Planning, Project and Thematic teaching	4

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Sharma, A.K. 2006. A hand book of organic farming - Agrobios (India) Jodhpur
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	3	2	-	1	-	-	-	-	-	3	1	-
CO2	-	1	3	2	2	2	1	-	-	-	-	-	1	2	-
CO3	2	-	3	2	2	2	2	1	-	-	1	1	-	-	2
CO4	-	1	-	3	-	-	-	1	-	-	1	-	-	1	-
CO5	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Fundamental of Agronomy
Course Code	AGRON-111 [T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Science and Biology at secondary level			**Co-Requisite/s**	Agriculture at secondary level			
Course Outcomes & Bloom's Level	**CO1-** Define the importance and scope of agronomy in relation to agricultural crop production **(BL1-Remember)** **CO2-** Explain various types of agricultural inputs, which required for crop cultivation **(BL2-Understand)** **CO3-** Calculate the required amount/number of various crop production factors (i.e., seed rate, fertilizers, agrochemicals, plant population) for specific land area **(BL3-Apply)** **CO4-** Analyse the role of various intercultural operations with reference to crop yield and its contributing traits **(BL4-Analyze)** **CO5-** Evaluate the effect of various production factors on overall crop production **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) SDG5(Gender equality) SDG6(Clean water and sanitation) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Agronomy and its scope, seeds and sowing, tillage and tilth, crop density and geometry, Crop nutrition, manures and fertilizers, nutrient use efficiency.	Cooperative Learning Strategies (CLS), Stimulus activities, Guided Questioning and Field trials	9
Unit 2	water resources, soil plant water relationship, crop water requirement, water use efficiency, irrigation-scheduling criteria and methods, quality of irrigation water, water logging.	Cooperative Learning Strategies (CLS), Stimulus activities, Guided Questioning and Field trials	9
Unit 3	Weeds- importance, classification, crop weed competition, concepts of weed management principles and methods. herbicides- classification, selectivity and resistance, allelopathy.	Cooperative Learning Strategies (CLS), Stimulus activities, Guided Questioning and Field trials	10
Unit 4	Growth and development of crops, factors affecting growth and development, plant ideotypes, crop rotation and its principles.	Cooperative Learning Strategies (CLS), Stimulus activities, Guided Questioning and Field trials	10
Unit 5	Adaptation and distribution of crops, crop management technologies in problematic areas, harvesting and threshing of crops.	Cooperative Learning Strategies (CLS), Stimulus activities, Guided Questioning and Field trials	10

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Identification of crops and seeds,	Experiments	BL2-Understand	2
Practical 2	Identification of fertilizers, pesticides and tillage implements,	Experiments	BL2-Understand	2
Practical 3	Methods of herbicide and fertilizer application	Experiments	BL2-Understand	2
Practical 4	Study of yield contributing characters and yield estimation,	Experiments	BL3-Apply	2
Practical 5	Seed germination and viability test,	Experiments	BL3-Apply	2
Practical 6	Numerical exercises on fertilizer requirement, plant population, herbicides and water requirement,	Experiments	BL4-Analyze	2
Practical 7	Study of soil moisture measuring devices,	Field work	BL4-Analyze	2
Practical 8	Measurement of field capacity, bulk density and infiltration rate,	Field work	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	ICAR. (2020). Handbook of Agriculture, ICAR, New Delhi
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	1	3	-	2	-	-	-	-	-	3	1	-
CO2	-	-	-	-	2	-	2	-	-	-	-	1	1	2	-
CO3	2	-	3	-	2	-	-	-	-	-	-	1	-	-	2
CO4	-	2	-	-	-	-	-	1	-	-	1	-	-	-	-
CO5	-	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Introductory Agrometeorology and Climate Change
Course Code	AGRON-223[T]

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					1	0	1	2
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Science at secondary level			**Co-Requisite/s**	Agriculture at secondary level			
Course Outcomes & Bloom's Level	**CO1-** Describe the basic terminology and definitions in the field of Agro-meteorology **()** **CO2-** Understand the climatic normal, process of weather formation, relationship between weather variables and agriculture. **()** **CO3-** Apply the technics for modification of climate to minimization the losses and improve the crop yield. **()** **CO4-** Analysis the causes of extreme weather conditions and the factors responsible for climate change and global warming. **()** **CO5-** Appraise the impact of particular weather and climate on crop and livestock production. **()**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Introduction: The three spheres of the earth; Terminology and definitions: Meteorology, Climatology, Agrometeorology, Agroclimatology climate and weather - Scope and importance of agrometeorology, Agro- climatic regions of India and Agro-climatic zones of Madhya Pradesh	Assignment, Field visits, Poster, Class room teaching, Presentation, ABL, Quiz.	3
Unit 2	Atmospheric weather variables; Atmospheric pressure, its variation with height; Wind, types of wind, daily and seasonal variation of wind speed, cyclone, anticyclone, land breeze and sea breeze.	Assignment, Field visits, Poster, Class room teaching, Presentation, ABL, Quiz.	3
Unit 3	Nature and properties of solar radiation, solar constant, depletion of solar radiation, short wave, long wave and thermal radiation, net radiation, albedo; Atmospheric temperature, temperature inversion, lapse rate, daily and seasonal variations of temperature, vertical profile of temperature, energy balance of earth.	Assignment, Field visits, Poster, Class room teaching, Presentation, ABL, Quiz.	3
Unit 4	Atmospheric humidity, concept of saturation, vapor pressure, process of condensation, formation of dew, fog, mist, frost, cloud; Precipitation, process of precipitation, types of precipitation such as rain, snow, sleet, and hail, cloud formation and classification; Artificial rainmaking. Monsoon, mechanism and importance in Indian agriculture; Weather hazards, drought, floods, frost, tropical cyclones and extreme weather conditions such as heat-wave and coldwave.	Assignment, Field visits, Poster, Class room teaching, Presentation, ABL, Quiz.	4
Unit 5	Agriculture and weather relations, modifications of crop microclimate, climatic normals for crop and livestock production; Weather forecasting, types of weather forecast and their uses; Climate change, climatic variability, global warming, causes of climate change and its impact on regional and national Agriculture.	Assignment, Field visits, Poster, Class room teaching, Presentation, ABL, Quiz.	3

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Visit of Agrometeorological observatory, site selection of observatory, exposure of instruments and weather data recording.	Field work		2
Practical 2	Measurement of total, shortwave and long wave radiation, and its	Field work	BL2-Understand	2
Practical 3	Measurement of albedo and sunshine duration, computation of Radiation Intensity using BSS. Measurement of maximum and minimum air temperatures, its tabulation, trend and variation analysis.	Field work	BL2-Understand	2
Practical 4	Measurement of soil temperature.	Field work	BL3-Apply	2
Practical 5	Determination of vapour pressure and relative humidity.	Field work	BL4-Analyze	2
Practical 6	Determination of dew point temperature	Field work	BL4-Analyze	2
Practical 7	Measurement of atmospheric pressure and analysis of atmospheric conditions;	Field work	BL5-Evaluate	2
Practical 8	Measurement of wind speed and wind direction, preparation of windrose.	Field work	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Pandey, V. 2021. Introductory Agrometeorology and Climate Change. Daya Publishing House.
Articles	NA
References Books	
MOOC Courses	
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	2	3	-	-	-	-	-	-	-	3	1	-
CO2	-	1	1	2	2	-	-	-	-	-	-	1	1	2	-
CO3	2	-	2	-	3	-	-	-	-	-	1	-	-	-	2
CO4	-	3	-	2	-	-	-	-	-	-	-	-	-	1	-
CO5	-	3	2	-	-	-	-	-	-	-	-	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Geoinformatics and Nano-technology and Precision Farming
Course Code	AGRON-311 [T]

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					1	0	1	2
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Agronomy			**Co-Requisite/s**	Ag. Engineering			
Course Outcomes & Bloom's Level	**CO1-** Describe the basics of geoinformatics and nanotechnology in relation to precision farming **(BL1-Remember)** **CO2-** Explain about the effective use of inputs result in greater crop yield with good quality without affecting the environment **(BL2-Understand)** **CO3-** Apply precision agriculture which address both economic and environmental issues that surround production agriculture today **(BL3-Apply)** **CO4-** Simplify and encourage the farmers to study of special and temporal variability of the input parameters using primary data in field level **(BL4-Analyze)** **CO5-** Judge about the consequences of applying imbalance dose of farm input like irrigation, fertilizer, insecticides and pesticides **(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Precision agriculture: concepts and techniques; their issues and concerns for Indian agriculture	ABL, PBL, Field & Outdoor Learning and guided learning	3
Unit 2	Geo-informatics- definition, concepts, tool and techniques; their use in Precision Agriculture. Crop discrimination and Yield monitoring, soil mapping; fertilizer recommendation using geospatial technologies	ABL, PBL, Field & Outdoor Learning and guided learning	3
Unit 3	Spatial data and their management in GIS; Remote sensing concepts and application in agriculture; Image processing and interpretation; Global positioning system (GPS), components and its functions	ABL, PBL, Field & Outdoor Learning and guided learning	3
Unit 4	Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs; STCR approach for precision agriculture	ABL, PBL, Field & Outdoor Learning and guided learning	3
Unit 5	Nanotechnology, definition, concepts and techniques, brief introduction about nanoscale effects, nano-particles, nano-pesticides, nano-fertilizers, nanosensors, Use of nanotechnology in seed, water, fertilizer, plant protection for scaling-up farm productivity.	ABL, PBL, Field & Outdoor Learning and guided learning	4

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module-1	To study about Introduction to GIS software, spatial data creation and editing	Experiments	BL2-Understand	2
Module-2	To study about Introduction to image processing software	Experiments	BL2-Understand	2
Module-3	To study about Visual and digital interpretation of remote sensing images.	Experiments	BL3-Apply	2
Module-4	To study about Generation of spectral profiles of different objects.	Experiments	BL3-Apply	2
Module-5	To study about Supervised and unsupervised classification and acreage estimation.	Experiments	BL3-Apply	2
Module-6	To study about Soil fertility map by GIS	Experiments	BL3-Apply	2
Module-7	To study about Calculation of crop stress geospatial technique	Experiments	BL4-Analyze	2
Module-8	To study about Project related by precision farming	PBL	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Reddy, S.R. (2017). Geoinformatics and Nanotechnology for Precision Farming B.Sc. 6th Sem. Kalyani Pub., Ludhiana.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	2	3	-	3	-	-	-	-	-	3	-	-
CO2	-	2	2	2	3	2	3	-	-	-	-	-	1	2	-
CO3	-	-	2	2	3	2	3	-	-	-	-	-	-	2	1
CO4	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-
CO5	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Practical Crop Production-I (Kharif Crop)
Course Code	AGRON-312 [P]

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s	Agronomy			**Co-Requisite/s**	Agronomy			
Course Outcomes & Bloom's Level	**CO1-** Describe the basic concepts and principles of crop production, management and protection **(BL1-Remember)** **CO2-** Illustrate the conventional practices and novel technological advances in the field of crop production, seed production and crop protection **(BL2-Understand)** **CO3-** Utilize the conventional and novel technologies in field to achieve high economic return in sustainable manner **(BL3-Apply)** **CO4-** Analyse the impact of various intercultural operation, technological intervention on yield and quality in different kharif crops **(BL4-Analyze)** **CO5-** Assess the sustainability of various crop production technologies for commercial crop production and quality seed production with better cost benefit ratio **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	To study about the field preparation, seed rate and sowing	Field work	BL2-Understand	4
Practical 2	To calculate fertilizer requirement for different kharif crops	Field work	BL2-Understand	4
Practical 3	To study about the time and methods of fertilizer application in kharif Crops	Field work	BL2-Understand	4
Practical 4	To study about the water management in different kharif crops	Field work	BL2-Understand	4
Practical 5	To study about the Weed management in kharif crops	Field work	BL3-Apply	4
Practical 6	To study about the methods of weed control and calculate the weed control efficiency for different kharif crops	Field work	BL3-Apply	4
Practical 7	To study about the Harvesting threshing and storage	Field work	BL4-Analyze	4
Practical 8	Preparation of Balance Sheet Including Cost of Cultivation, Net Returns per Student as well as per Team of a Group of Students	Field work	BL5-Evaluate	4

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	Taunk , S.K., Choudhary, J.L. and Tomar, G.S. (2011). Science of Crop Production Vol 1: Kharif Crops. Kushal Publications and Distributors.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	2	3	-	3	-	-	-	-	-	3	-	-
CO2	-	2	2	2	3	2	3	-	-	-	-	-	1	2	-
CO3	-	-	2	2	3	2	3	-	-	-	-	-	-	2	1
CO4	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-
CO5	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Rainfed Agriculture and Watershed Management
Course Code	AGRON-321[T]

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					1	0	1	2
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Agronomy			**Co-Requisite/s**	Agronomy			
Course Outcomes & Bloom's Level	**CO1-** Study the concepts of watershed management and its effect on land, water and ecosystem resources **(BL1-Remember)** **CO2-** Understand public policies and practices of watershed planning **(BL2-Understand)** **CO3-** Apply the principles and concepts in the field to conserve water resources and improve the crop productivity in Rainfed ecosystems **(BL3-Apply)** **CO4-** Analyse the impact of watershed planning through case studies **(BL4-Analyze)** **CO5-** Assess control and mitigation techniques for watershed problem **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Rainfed agriculture: Introduction, types, History of rainfed agriculture & watershed in India. Problems and prospects of rainfed agriculture in India . Soil and climatic conditions prevalent in rainfed areas.	Cooperative Learning Strategies, Case studies, outdoor learning and project management	3
Unit 2	Drought: types, effect of water deficit on physio- morphological characteristics of the plants, Mechanism of crop adaptation under moisture deficit condition.	Cooperative Learning Strategies, Case studies, outdoor learning and project management	3
Unit 3	Water harvesting: importance, its techniques. Efficient utilization of water through soil and crop management practices, Management of crops in rainfed areas.	Cooperative Learning Strategies, Case studies, outdoor learning and project management	3
Unit 4	Contingent crop planning for aberrant weather conditions, Concept, objective, principles and components of watershed management, factors affecting watershed management.	Cooperative Learning Strategies, Case studies, outdoor learning and project management	3
Unit 5	Crop adaptation and mitigation to drought; Mulching and its importance, Evapo-transpiration and method of reduction it	Cooperative Learning Strategies, Case studies, outdoor learning and project management	4

<4d style="border: 1px solid black;">Experiments

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Studies on climate classification, studies on rainfall pattern in rainfed areas of the country and pattern of onset and withdrawal of monsoons.	Experiments	BL2-Understand	2
Practical 2	Studies on cropping pattern of different dry land areas in the country	Experiments	BL2-Understand	2
Practical 3	Demarcation of dry land area on map of India.	Experiments	BL3-Apply	2
Practical 4	Interpretation of meteorological data	Experiments	BL3-Apply	2
Practical 5	Scheduling of supplemental irrigation on the basis of evapo-transpiration demand of crops.	Experiments	BL3-Apply	2
Practical 6	Critical analysis of rainfall and possible drought period in the country, effective rainfall and its calculation.	Experiments	BL4-Analyze	2
Practical 7	Studies on cultural practices viz. mulching, plant density, depth of sowing, thinning and leaf removal for mitigating moisture stress.	Experiments	BL4-Analyze	2
Practical 8	Characterization and delineation of model watershed.	BL5-Evaluate	2	

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	ICAR. (2017). Handbook of Agriculture. ICAR, New Delhi.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
CO3	-	3	3	1	1	2	1	1	2	-	1	1	-	-	2
CO4	-	3	3	1	1	-	-	1	-	-	1	1	-	1	-
CO5	-	3	2	-	-	-	-	-	-	-	-	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Principal Of Organic Farming
Course Code	AGRON-322[T]

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					1	0	1	2
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Agronomy			**Co-Requisite/s**	Agronomy			
Course Outcomes & Bloom's Level	**CO1-** Describe the principles and scopes of organic farming. **(BL1-Remember)** **CO2-** Explain the concept of organic ecosystem; and organic nutrient resources and its fortification **(BL2-Understand)** **CO3-** Demonstrate the restrictions to nutrient use in organic farming. **(BL3-Apply)** **CO4-** Analyse the certification process and standards of organic farming. **(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Organic farming, principles and its scope in India; Initiatives taken by Government (central/state), NGOs and other organizations for promotion of organic agriculture.	Cooperative Learning Strategies (CLS), Stimulus activities, Guided Questioning and Field trials	3
Unit 2	Organic ecosystem and their concepts; Organic nutrient resources and its fortification.	Cooperative Learning Strategies (CLS), Stimulus activities, Guided Questioning and Field trials	3
Unit 3	Restrictions to nutrient use in organic farming; Choice of crops and varieties in organic farming.	Cooperative Learning Strategies (CLS), Stimulus activities, Guided Questioning and Field trials	3
Unit 4	Fundamentals of insect, pest, disease and weed management under organic mode of production; Operational structure of NPOP	Cooperative Learning Strategies (CLS), Stimulus activities, Guided Questioning and Field trials	3
Unit 5	Certification process and standards of organic farming; Processing, leveling, economic considerations and viability, marketing and export potential of organic products.	Cooperative Learning Strategies (CLS), Stimulus activities, Guided Questioning and Field trials	4

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Preparation of enrich compost and their quality analysis.	Experiments	BL2-Understand	2
Practical 2	Preparation of vermi-compost and their quality analysis.	Experiments	BL2-Understand	2
Practical 3	Preparation of bio-fertilizers and their quality analysis.	Experiments	BL2-Understand	2
Practical 4	Preparation of bio-inoculants and their quality analysis.	Experiments	BL2-Understand	2
Practical 5	Indigenous technical knowledge (ITK) for nutrient, insect, pest disease and weed management.	Experiments	BL3-Apply	2
Practical 6	Cost of organic production system.	Field work	BL3-Apply	2
Practical 7	Post harvest management. Quality aspect, grading, packaging and handling.	Field work	BL4-Analyze	2
Practical 8	Visit of organic farms to study the various components and their utilization.	Field work	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Reddy, S.R. 2017. Principles of Organic Farming. Kalyani Publishers.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-
CO3	-	3	3	1	1	2	1	1	2	-	1	1	-	-	2
CO4	-	3	3	1	1	-	-	1	-	-	1	1	-	1	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Practical Crop Production-II (Rabi Crop)
Course Code	AGRON-323 [P]

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s	Agronomy			**Co-Requisite/s**	Agronomy			
Course Outcomes & Bloom's Level	**CO1-** Describe the basic concepts and principles of crop production, management and protection **(BL1-Remember)** **CO2-** Illustrate the conventional practices and novel technological advances in the field of crop production, seed production and crop protection **(BL2-Understand)** **CO3-** Utilize the conventional and novel technologies in field to achieve high economic return in sustainable manner **(BL3-Apply)** **CO4-** Analyse the impact of various intercultural operation, technological intervention on yield and quality in different Rabi crops **(BL4-Analyze)** **CO5-** Assess the sustainability of various crop production technologies for commercial crop production and quality seed production with better cost benefit ratio in different Rabi crops **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	To study about the field preparation, seed rate and sowing	Field work	BL2-Understand	4
Practical 2	To calculate fertilizer requirement for different Rabi crops	Field work	BL2-Understand	4
Practical 3	To study about the time and methods of fertilizer application in Rabi Crops	Field work	BL2-Understand	4
Practical 4	To study about the water management in different Rabi crops	Field work	BL3-Apply	4
Practical 5	To study about the Weed management in Rabi crops	Field work	BL3-Apply	4
Practical 6	To study about the methods of weed control and calculate the weed control efficiency for different Rabi crops	Field work	BL4-Analyze	4
Practical 7	To study about the Harvesting threshing and storage	Field work	BL4-Analyze	4
Practical 8	Preparation of Balance Sheet Including Cost of Cultivation, Net Returns per Student as well as per Team of a Group of Students	Field work	BL5-Evaluate	4

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Prasad, R. (2017). Textbook of Field Crop Production. ICAR.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	1	3	-	2	-	-	-	-	-	3	1	-
CO2	-	-	-	-	3	-	2	-	-	-	-	1	1	2	-
CO3	2	-	3	-	2	-	-	-	-	-	-	1	-	-	2
CO4	-	2	-	-	-	-	-	1	-	-	1	-	-	-	-
CO5	-	3	2	-	-	-	-	-	-	-	-	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Live-stock and Poultry Management
Course Code	AHS- 211[T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Biology at secondary level			**Co-Requisite/s**	Agriculture at secondary level			
Course Outcomes & Bloom's Level	**CO1-** Describe the principles of Livestock production and management **(BL1-Remember)** **CO2-** Understand the various concepts and procedures of livestock and poultry management **(BL2-Understand)** **CO3-** Organize the livestock and poultry farms in sustainable and efficient manner **(BL3-Apply)** **CO4-** Analyze the various challenges/problems of livestock and poultry management and suggest the appropriate solution for them **(BL4-Analyze)** **CO5-** Evaluate the impact of livestock and poultry on sustainable integrated farming systems **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG6(Clean water and sanitation) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Role of live-stock in the national economy. Important Indian and exotic breeds of cattle, buffalo, sheep, goat, swine and poultry.	Fieldwork and outdoor learning, Problem-based learning, Brainstorming and Group discussion	9
Unit 2	Management of calves, growing heifers and milch animals. Digestion in livestock. Classification of feedstuffs. Proximate principles of feed. Nutrients and their functions. Feed ingredients for ration for livestock. Feed supplements and feed additives. Feeding of live-stock.	Fieldwork and outdoor learning, Problem-based learning, Brainstorming and Group discussion	9
Unit 3	Incubation, hatching and brooding. Management of growers and layers. Digestion in poultry. Classification of feedstuffs. Proximate principles of feed. Nutrients and their functions. Feed ingredients for ration for poultry. Feed supplements and feed additives. Feeding of poultry.	Fieldwork and outdoor learning, Problem-based learning, Brainstorming and Group discussion	10
Unit 4	Housing principles, space requirements for different species of livestock and poultry.	Fieldwork and outdoor learning, Problem-based learning, Brainstorming and Group discussion	10
Unit 5	Introduction of live-stock and poultry diseases. Prevention (including vaccination schedule) and control of important diseases of livestock and poultry.	Fieldwork and outdoor learning, Problem-based learning, Brainstorming and Group discussion	10

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Familiarizing with body points/parts of different domesticated animals and poultry	Field work	BL2-Understand	2
Practical 2	Approaching, handling methods of restraining	Field work	BL2-Understand	2
Practical 3	Identification methods of farm animals and poultry (branding, tattooing, notching & tagging).	Field work	BL4-Analyze	2
Practical 4	A visit to the live-stock and poultry farms	Field work	BL2-Understand	2
Practical 5	Identification of various breeds and familiarizing with various farm routines and farm records	Field work	BL3-Apply	2
Practical 6	Judging of cattle, buffalo and poultry	Field work	BL3-Apply	2
Practical 7	Culling of live-stock and poultry	Field work	BL4-Analyze	2
Practical 8	Layout plans for different live-stock and Poultry houses	Field work	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
70	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Banerjee G. C. (2019). Textbook of Animal Husbandry. Oxford
Articles	NA
References Books	
MOOC Courses	
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	-	-	-	-	-	-	-	-	-	-	3	-
CO2	-	-	1	-	3	-	-	-	-	-	-	-	3	-	-
CO3	-	-	2	3	-	1	-	-	-	-	-	-	-	1	3
CO4	-	-	-	3	2	-	-	-	-	-	-	2	-	-	-
CO5	-	-	1	-	2	-	2	-	-	-	-	1	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Fundamental of Plant Biochemistry and Biotechnology
Course Code	BIOCHEM-BT-111 [T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Science and biology in secondary level			**Co-Requisite/s**	Agriculture at secondary level			
Course Outcomes & Bloom's Level	**CO1-** Describe the role and importance of various biomolecules in sustaining the life **()** **CO2-** Explain the metabolic processes involving different bio-molecules **(BL2-Understand)** **CO3-** Apply the various concepts biotechnology in crop plant improvement **(BL3-Apply)** **CO4-** Analyse the different biomolecules in agricultural samples using different biochemical techniques **(BL4-Analyze)** **CO5-** Evaluate the role of biomolecules in affecting the nutritional quality and productivity of agricultural crops **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG6(Clean water and sanitation) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Importance of Biochemistry. Properties of Water, pH and Buffer. Carbohydrate: Importance and classification. Structures of Monosaccharides, Reducing and oxidizing properties of Monosaccharides, Mutarotation; Structure of Disaccharides and Poly saccharides. Metabolism of carbohydrates: Glycolysis, TCA cycle, Glyoxylate cycle, Electron transport chain.	Guided Questioning, Fieldwork and outdoor learning, Problem-based learning and Brainstorming	6
Unit 2	Lipid: Importance and classification; Structures and properties of fatty acids; storage lipids and membrane lipids. Metabolism of lipids: Beta oxidation, Biosynthesis of fatty acids. Proteins: Importance of proteins and classification; Structures, titration and zwitterions nature of amino acids; Structural organization of proteins	Guided Questioning, Fieldwork and outdoor learning, Problem-based learning and BrainstormingGuided Questioning, Fieldwork and outdoor learning, Problem-based learning and Brainstormingignment, Classroom teaching, PPT Presentation, Quiz, Seminar, debate, Assignment, Extempore, Group discussions	6
Unit 3	Enzymes: General properties; Classification; Mechanism of action; Michaelis & Menten and Line Weaver Burk equation & plots; Introduction to allosteric enzymes. Nucleic acids: Importance and classification; Structure of Nucleotides, A, B & Z DNA; RNA: Types and Secondary & Tertiary structure.	Guided Questioning, Fieldwork and outdoor learning, Problem-based learning and Brainstorming	6
Unit 4	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 Micropropagation methods; organogenesis and embryogenesis, Synthetic seeds and their significance; Embryo rescue and its significance; somatic hybridization and cybrids; Somaclonal variation and its use in crop improvement; cryo-preservation.	Guided Questioning, Fieldwork and outdoor learning, Problem-based learning and Brainstorming	6
Unit 5	Introduction to recombinant DNA methods: physical (Gene gun method), chemical (PEG mediated) and Agrobacterium mediated gene transfer methods; Transgenics and its importance in crop improvement; PCR techniques and its applications; RFLP, RAPD, SSR; Marker Assisted Breeding in crop improvement; Biotechnology regulations.	Guided Questioning, Fieldwork and outdoor learning, Problem-based learning and Brainstorming	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Study of safety measures and Laboratory Instruments	Experiments	BL2-Understand	2
Practical 2	Preparation of Solution	Experiments	BL2-Understand	2
Practical 3	Qualitative Analysis of Carbohydrates	Experiments	BL3-Apply	2
Practical 4	Qualitative analysis of Protein	Experiments	BL4-Analyze	2
Practical 5	Qualitative Analysis of Lipids	Experiments	BL5-Evaluate	2
Practical 6	Study of Sterilization Techniques	Experiments	BL3-Apply	2
Practical 7	Study of composition of various tissue culture media	Experiments	BL4-Analyze	2
Practical 8	Demonstration on isolation of DNA.	Experiments	BL6-Create	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Satyanarayana, U. (2007). Textbook of biochemistry. 3rd edition. Books and Allied (P) ltd, Kolkata. Plummer, D. T. (1987). An Introduction to Practical Biochemistry. 3rd edition. McGraw-Hill, USA
Articles	NA
References Books	
MOOC Courses	
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	1	-	-	-	-	-	-	-	3	-	-
CO2	-	1	-	1	-	-	-	-	-	-	-	-	1	2	-
CO3	2	-	-	1	1	-	1	1	-	-	-	1	-	1	2
CO4	-	-	-	1	-	-	-	1	-	-	-	2	-	-	-
CO5	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Agribusiness Management
Course Code	ELCT-AE-221[T]

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Electives							
Pre-Requisite/s	Agriculture Economics business management			**Co-Requisite/s**	Agriculture Economics business management			
Course Outcomes & Bloom's Level	**CO1-** Remember various functions of management**(BL1-Remember)** **CO2-** Describe agribusiness, its concepts and value addition chain**(BL2-Understand)** **CO3-** Apply the knowledge of management functions in establishing and running agribusiness profitably. **(BL3-Apply)** **CO4-** Analyse agri-business situations, implement plans and manage strategic change**(BL4-Analyze)** **CO5-** Appraise the projects for their economic feasibility and profitability**(BL5-Evaluate)** **CO6-** Prepare profitable agribusiness projects with capital and market management**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Management: Functions, roles & activities, Organization culture. Planning, meaning, definition, types of plans. Purpose or mission, goals or objectives, Strategies, polices procedures, rules, programs and budget. Components of a business plan, Steps in planning and implementation. Organization staffing, directing and motivation. Ordering, leading, supervision, communications, control.	ABL activities, Assignment, Class room teaching, PPT presentation, Quiz, Report writing Economic model.	6
Unit 2	Agribusiness: Transformation of agriculture into agribusiness, various stakeholders and components of agribusiness systems. Importance of agribusiness in the Indian economy and New Agricultural Policy. Distinctive features of Agribusiness Management: Importance and needs of agro-based industries, Classification of industries and types of agro based industries. Institutional arrangement, procedures to set up agro based industries. Constraints in establishing agro-based industries.	ABL activities, Assignment, Class room teaching, PPT presentation, Quiz, Report writing Economic model.	6
Unit 3	Agri-value chain: Understanding primary and support activities and their linkages. Business environment: PEST & SWOT analysis.	ABL activities, Assignment, Class room teaching, PPT presentation, Quiz, Report writing Economic model.	6
Unit 4	Capital Management and Financial management of Agribusiness: Financial statements and their importance. Marketing Management: Segmentation, targeting & positioning. Marketing mix and marketing strategies. Consumer behaviour analysis, Product Life Cycle (PLC):. Sales & Distribution Management. Pricing policy, various pricing methods.	ABL activities, Assignment, Class room teaching, PPT presentation, Quiz, Report writing Economic model.	7
Unit 5	Project Management: definition, project cycle, identification, formulation, appraisal, implementation, monitoring and evaluation. Project Appraisal and evaluation techniques. Undiscounted measures and decision rules. PBP ROR, and discounted measures and decision rules NPW, BCR, IRR, N/K ratio, Sensitivity analysis.	ABL activities, Assignment, Class room teaching, PPT presentation, Quiz, Report writing Economic model.	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Practical Study of agri-input markets: Seed, fertilizers, pesticides.	Field work	BL2-Understand	2
Practical 2	Study of output markets: grains, fruits, vegetables, flowers	Field work	BL2-Understand	2
Practical 3	Study of product markets, retails trade commodity trading, and value added products.	Field work	BL2-Understand	2
Practical 4	Study of financing institutions- Cooperative, Commercial banks, RRBs,	Field work	BL2-Understand	2
Practical 5	Agribusiness Finance Limited, NABARD	Field work	BL3-Apply	2
Practical 6	Preparations of projects and Feasibility reports for agribusiness entrepreneur	Field work	BL4-Analyze	2
Practical 7	Appraisal/evaluation techniques of identifying viable project- Non-discounting techniques	Field work	BL4-Analyze	2
Practical 8	Case study of agro-based industries	Field work	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Aswathappa, K. and Sridhar, K. (2015). Production and Operations Management. Himalaya Pub.House
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	1	1	-	-	-	-	-	-	-	3	1	-
CO2	-	2	1	-	2	-	1	-	-	-	2	-	-	3	-
CO3	2	-	2	1	2	-	1	-	-	-	1	1	-	-	2
CO4	-	1	1	-	-	-	-	-	-	-	-	2	-	-	-
CO5	-	1	-	-	-	-	-	-	-	-	2	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	System Simulation And Agro-Advisory
Course Code	ELCT-AEXT-321[T]

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline-linked Engineering Science Courses							
Pre-Requisite/s	Agronomy			**Co-Requisite/s**	Agronomy			
Course Outcomes & Bloom's Level	**CO1-** Describe the basic concepts of various System simulation tools and techniques used in agriculture fields**(BL1-Remember)** **CO2-** Compare the various simulation systems with their pros and cons**(BL2-Understand)** **CO3-** Demonstrate the use of various software for crop modelling, weather forecasting, dissemination of agroadvisory**(BL3-Apply)** **CO4-** Analyse the results obtained from different simulation systems with scientific interpretation**(BL4-Analyze)** **CO5-** Assess the suitability of different systems in optimum crop modelling diseases forecasting and weather forecasting**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	System Approach for representing soil-plant-atmospheric continuum, system boundaries, Crop models, concepts & techniques, types of crop models, data requirements, and relational diagrams.	Classroom teaching with AV aids, Activity based learning using different tools, Flipped classes teaching model, Collaborative learning Socratic method of teaching, Power Point Presentations, ABL activities, Field demonstration of cultivation practices, Assignment, Unannounced test, Seminars with open discussions, Group discussions or debate, Quiz	6
Unit 2	Evaluation of crop responses to weather elements; Elementary crop growth models; calibration, validation, verification and sensitivity analysis. Potential and achievable crop production- concept and modelling techniques for their estimation	Classroom teaching with AV aids, Activity based learning using different tools, Flipped classes teaching model, Collaborative learning Socratic method of teaching, Power Point Presentations, ABL activities, Field demonstration of cultivation practices, Assignment, Unannounced test, Seminars with open discussions, Group discussions or debate, Quiz	6
Unit 3	Crop production in moisture and nutrients limited conditions; components of soil water and nutrients balance.	Classroom teaching with AV aids, Activity based learning using different tools, Flipped classes teaching model, Collaborative learning Socratic method of teaching, Power Point Presentations, ABL activities, Field demonstration of cultivation practices, Assignment, Unannounced test, Seminars with open discussions, Group discussions or debate, Quiz	6
Unit 4	Weather forecasting, types, methods, tools & techniques, forecast verification; Value added weather forecast, ITK for weather forecast and its validity	Classroom teaching with AV aids, Activity based learning using different tools, Flipped classes teaching model, Collaborative learning Socratic method of teaching, Power Point Presentations, ABL activities, Field demonstration of cultivation practices, Assignment, Unannounced test, Seminars with open discussions, Group discussions or debate, Quiz	7
Unit 5	Crop-Weather Calendars; Preparation of agro-advisory bulletin based on weather forecast. Use of crop simulation model for preparation of Agro-advisory and its effective dissemination.	Classroom teaching with AV aids, Activity based learning using different tools, Flipped classes teaching model, Collaborative learning Socratic method of teaching, Power Point Presentations, ABL activities, Field demonstration of cultivation practices, Assignment, Unannounced test, Seminars with open discussions, Group discussions or debate, Quiz	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Preparation of crop weather calendars	Experiments	BL2-Understand	2
Practical 2	Preparation of agro-advisories based on weather forecast using various approaches and synoptic charts.	Experiments	BL2-Understand	2
Practical 3	Working with statistical and simulation models for crop growth	Experiments	BL2-Understand	2
Practical 4	Potential & achievable production; yield forecasting, insect & disease forecasting models.	Experiments	BL3-Apply	2
Practical 5	Simulation with limitations of water and nutrient management options	Simulation	BL3-Apply	2
Practical 6	Sensitivity analysis of varying weather and crop management practices.	Experiments	BL4-Analyze	2
Practical 7	Use of statistical approaches in data analysis and preparation of historical, past and present meteorological data for medium range weather forecast	Experiments	BL4-Analyze	2
Practical 8	Feedback from farmers about the agro advisory	Field work	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Prasad, R. (2017). Textbook of Field Crop Production. ICAR.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	2	1	-	2	-	-	-	-	-	1	3	-
CO2	-	2	3	3	2	2	2	1	-	-	-	-	3	1	-
CO3	2	-	2	2	2	1	-	-	-	-	-	-	-	-	2
CO4	-	2	-	1	-	-	-	1	-	-	-	1	-	-	-
CO5	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Biopesticides and Biofertilizers
Course Code	ELCT-ENT-311[T]

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Electives							
Pre-Requisite/s	Agricultural Chemicals			**Co-Requisite/s**	Plant Protection			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance of bio-pesticides in present scenario. **(BL1-Remember)** **CO2-** Explain the concepts and classification of bio-fertilizers and bio-pesticides **(BL2-Understand)** **CO3-** Utilize the quality parameters of various agricultural products and bio-fertilizer in maintaining the soil health**(BL3-Apply)** **CO4-** Examine the significance and implementation of bio-pesticide and bio-fertilizer in organic farming**(BL4-Analyze)** **CO5-** Determine the performance of bio-pesticides/ bio-fertilizers through field application**(BL5-Evaluate)** **CO6-** Formulate the various bio-pesticides and bio-fertilizers**(BL6-Create)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG10(Reduced inequalities) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	History and concept of biopesticides. Importance, scope and potential of biopesticide. Definitions, concepts and classification of biopesticides viz. pathogen, botanical pesticides, and biorationales. Botanicals and their uses.	Class room teaching (chalk-board) Power Point Presentations ABL activities Assignments Quiz	6
Unit 2	Mass production technology of bio-pesticides. Virulence, pathogenicity and symptoms of entomopathogenic pathogens and nematodes.	Class room teaching (chalk-board) Power Point Presentations ABL activities Assignments Quiz	6
Unit 3	Methods of application of biopesticides. Methods of quality control and Techniques of biopesticides. Impediments and limitation in production and use of biopesticide. Application technology for seeds, seedlings, tubers, sets etc. Biofertilizers -Storage, shelf life, quality control and marketing. Factors influencing the efficacy of biofertilizers.	Class room teaching (chalk-board) Power Point Presentations ABL activities Assignments Quiz	6
Unit 4	Biofertilizers - Introduction, status and scope. Structure and characteristic features of bacterial biofertilizers- Azospirillum, Azotobacter, Bacillus, Pseudomonas, Rhizobium and Frankia; Cynobacterial biofertilizers- Anabaena, Nostoc, Hapalosiphon and fungal biofertilizers- AM mycorrhiza and ectomycorhiza.	Class room teaching (chalk-board) Power Point Presentations ABL activities Assignments Quiz	7
Unit 5	Nitrogen fixation -Free living and symbiotic nitrogen fixation. Mechanism of phosphate solubilization and phosphate mobilization, K solubilization. Production technology: Strain selection, sterilization, growth and fermentation, mass production of carrier based and liquid biofertiizers. FCO specifications and quality control of biofertilizers.	Class room teaching (chalk-board) Power Point Presentations ABL activities Assignments Quiz	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Isolation and purification of important biopesticides: Trichoderma, Pseudomonas, Bacillus, Metarhyzium etc. and its production.	Experiments	BL2-Understand	2
Practical 2	Identification of important botanicals	Field work	BL3-Apply	2
Practical 3	Visit to biopesticide laboratory in nearby area.	Field work	BL3-Apply	2
Practical 4	Field visit to explore naturally infected cadavers.	Field work	BL3-Apply	2
Practical 5	Identification of entomopathogenic entities in field condition	Experiments	BL4-Analyze	2
Practical 6	Quality control of biopesticides	Experiments	BL4-Analyze	2
Practical 7	Isolation and purification of Azospirillum, Azotobacter, Rhizobium, P-solubilizers and cyanobacteria	Field work	BL4-Analyze	2
Practical 8	Mass multiplication and inoculums production of biofertilizers.	Experiments	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	David, B. V. and Ramamurthy, V.V. 2016. Elements of Economic Entomology. Brillion Publishing. Prasad, T.V. 2014. Handbook of Entomology. New Vishal Publications Das, D.K. 2011. Soil Science. Kalyani.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	1	1	-	-	-	-	-	-	-	3	1	-
CO2	-	1	1	-	2	-	1	-	-	-	2	-	-	3	-
CO3	2	-	2	1	2	-	1	-	-	-	1	1	-	-	2
CO4	-	1	1	-	-	-	-	-	-	-	-	2	-	-	-
CO5	-	1	-	-	-	-	-	-	-	-	2	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Agrochemicals
Course Code	ELCT-ENT-321[T]

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Agricultural chemicals			**Co-Requisite/s**	Agricultural chemicals			
Course Outcomes & Bloom's Level	**CO1-** acquaint with the advantages and disadvantages of pesticides, plant growth regulators and fertilizers in present scenario. **(BL1-Remember)** **CO2-** classify pesticides and fertilizers on the basis of various parameters**(BL2-Understand)** **CO3-** apply pesticides for the protection of plants and fertilizers to maintain soil health. **(BL3-Apply)** **CO4-** analyze the residual effect of pesticides and fertilizers. **(BL4-Analyze)** **CO5-** evaluate the efficacy of pesticides formulation and fertilizers through field application. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	An introduction to agrochemicals, their type and role in agriculture, effect on environment, soil, human and animal health, merits and demerits of their uses in agriculture, management of agrochemicals for sustainable agriculture.	Activity based learning through lab experimentation Power Point Presentations ABL activities Assignments Flip Class/ Seminars One word/ single phrase answer tests	3
Unit 2	Herbicides-Major classes, properties and important herbicides - Fate of herbicides. Fungicides - Classification Inorganic fungicides - Characteristics, preparation and use of sulphur and copper - Mode of action-Bordeaux mixture and copperoxychloride. Organic fungicides-Mode of action-Dithiocarbamates-Characteristics, preparation and use of Zineb and Maneb. Systemic fungicides- Benomyl, carboxin, oxycarboxin, Metalaxyl, Carbendazim, characteristics and use.	Activity based learning through lab experimentation Power Point Presentations ABL activities Assignments Flip Class/ Seminars One word/ single phrase answer tests	3
Unit 3	Introduction and classification of insecticides: inorganic and organic insecticides - Organochlorine, Organophosphates, Carbamates, Synthetic pyrethroids, Neonicotinoids, Biorationals, Insecticide Act and rules, Insecticides banned, withdrawn and restricted use, Fate of insecticides in soil & plant. IGRs Bio-pesticides, Reduced risk insecticides, Botanicals, plant and animal systemic insecticides their characteristics and uses.	Activity based learning through lab experimentation Power Point Presentations ABL activities Assignments Flip Class/ Seminars One word/ single phrase answer tests	3
Unit 4	Fertilizers and their importance. Nitrogenous fertilizers- Feed stocks and Manufacturing of ammonium sulphate, ammonium nitrate, ammonium chloride, urea. Slow release N-fertilizers. Phosphatic fertilizers-feedstock and manufacturing of single. Super-phosphate. Preparation of bone meal and basic slag. Potassic fertilizers: Natural sources of potash, manufacturing of potassium chloride, potassium sulphate and potassium nitrate.	Activity based learning through lab experimentation Power Point Presentations ABL activities Assignments Flip Class/ Seminars One word/ single phrase answer tests	3
Unit 5	Mixed and complex fertilizers-Sources and compatibility preparation of major, secondary and micro nutrient mixtures. Complex fertilizers- Manufacturing of ammonium phosphates, nitro-phosphates and NPK complexes. Fertilizer control order. Fertilizer logistics and marketing. Plant bio-pesticides for ecological agriculture, Bioinsect repellent.	Activity based learning through lab experimentation Power Point Presentations ABL activities Assignments Flip Class/ Seminars One word/ single phrase answer tests	4

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Sampling of fertilizers and pesticides.	Field work	BL2-Understand	2
Practical 2	Pesticides application technology to study about various pesticides appliances.	Field work	BL3-Apply	2
Practical 3	Quick tests for identification of common fertilizers.	Experiments	BL3-Apply	2
Practical 4	Identification of anion and cation in fertilizer.	Experiments	BL3-Apply	2
Practical 5	Calculation of doses of insecticides to be used.	Experiments	BL3-Apply	2
Practical 6	To study and identify various formulations of insecticide available in market.	Experiments	BL3-Apply	2
Practical 7	Estimation of nitrogen in Urea.	Experiments	BL4-Analyze	2
Practical 8	Estimation of water soluble P2 O5 and citrate soluble P2 O5 in single super phosphate.	Experiments	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Vasantharaj David, B and Ramamurthy V. V. (2016). Elements of Economic Entomology. Np Namuratha Publications, Chennai. Vasantharaj David, B. and Aanathakrishnan, T.N. (2006). General and Applied Entomology. Tata McGraw-Hill Publishing House, New Delhi. Srivastava, R. P. and Saxena, R. C. (1989). A text book of Insect toxicology. Himanshu Publications, Udaipur. Sriramulu, S. (1979). Methods of Pesticide analysis. Oxford IBH, New Delhi
Articles	
References Books	Müller, F. (2000). Agrochemicals: Composition, Production, Toxicology, Applications. Wiley Cremlyn, R. J. (1991). Agrochemicals: Preparation and Mode of Action. Wiley–Blackwell.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	1	1	-	-	-	-	-	-	-	3	1	-
CO2	-	2	1	-	2	-	-	-	-	-	2	-	-	3	-
CO3	2	-	2	1	2	-	1	-	-	-	1	1	-	-	2
CO4	-	1	1	-	-	-	1	-	-	-	-	2	-	-	-
CO5	-	1	-	-	-	-	-	-	-	-	2	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Processing Technology of Cereals
Course Code	ELCT-FST-221[T]

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Electives							
Pre-Requisite/s	Fundamentals of Food Technology			**Co-Requisite/s**	Fundamentals of Horticulture			
Course Outcomes & Bloom's Level	**CO1-** Memorize the morphology, composition and nutritive value**(BL1-Remember)** **CO2-** Describe the milling of cereals**(BL2-Understand)** **CO3-** Demonstrate cereal based processed products**(BL3-Apply)** **CO4-** Use the cereal-based by-products**(BL4-Analyze)** **CO5-** Analyses cereal based secondary and tertiary processing**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Present status and future prospects of cereals and millets; Morphology, physico-chemical properties of cereals, major and minor millets; Chemical composition and nutritive value	Activity based learning using different tools, Flipped classes teaching model, Collaborative learning, Socratic method of teaching, Power Point Presentations, ABL activities, Field demonstration of cultivation practices, Assignment, Seminars with open discussions, Group discussions or debate, Quiz	6
Unit 2	Paddy processing and rice milling: Conventional milling, modern milling, milling operations, milling machines, milling efficiency; Quality characteristics influencing final milled product; Parboiling; Rice bran stabilization and its methods	Activity based learning using different tools, Flipped classes teaching model, Collaborative learning, Socratic method of teaching, Power Point Presentations, ABL activities, Field demonstration of cultivation practices, Assignment, Seminars with open discussions, Group discussions or debate, Quiz	6
Unit 3	Wheat milling: Break system, purification system and reduction system; extraction rate and its effect on flour composition; quality characteristics of flour and their suitability for baking	Activity based learning using different tools, Flipped classes teaching model, Collaborative learning, Socratic method of teaching, Power Point Presentations, ABL activities, Field demonstration of cultivation practices, Assignment, Seminars with open discussions, Group discussions or debate, Quiz	6
Unit 4	Corn milling: Dry and wet milling of corn, starch and gluten separation, milling fractions and modified starches; Barley: Malting and milling; Oat/Rye: Processing, milling; Sorghum: Milling, malting, pearling; Millets (Pearl millets, finger millets): Processing of millets for food uses	Activity based learning using different tools, Flipped classes teaching model, Collaborative learning, Socratic method of teaching, Power Point Presentations, ABL activities, Field demonstration of cultivation practices, Assignment, Seminars with open discussions, Group discussions or debate, Quiz	6
Unit 5	Secondary and tertiary products processing of cereals and millets; By-products processing of cereals and millets; Processing of infant foods from cereals and millets; Breakfast cereal foods: Flaked, puffed, expanded, extruded and shredded	Activity based learning using different tools, Flipped classes teaching model, Collaborative learning, Socratic method of teaching, Power Point Presentations, ABL activities, Field demonstration of cultivation practices, Assignment, Seminars with open discussions, Group discussions or debate, Quiz	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Morphological characteristics of cereals	Experiments	BL2-Understand	2
Practical 2	Physical properties of cereals	Experiments	BL2-Understand	2
Practical 3	Chemical properties of cereals	Experiments	BL2-Understand	2
Practical 4	Cooking quality of rice	Experiments	BL3-Apply	2
Practical 5	Conditioning and milling of wheat	Experiments	BL3-Apply	2
Practical 6	Production of sorghum flakes and sorghum malt	Experiments	BL3-Apply	2
Practical 7	Determination of gelatinization temperature	Experiments	BL4-Analyze	2
Practical 8	Processing of value added products from millets	PBL	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Amalendu Chakraverty and R. Paul Singh. 2014. Post Harvest Technology and Food Process Engineering. CRC Press, Boca Raton, FL, USA. 2. Khalil Khan and Peter R. Shewry. 2009. Wheat: Chemistry and Technology, 4th Ed., AACC International, Inc., St. Paul, MN, USA. 3. Colin Wrigley. 2004. Encyclopedia of Grain Science. Academic Press, London, UK. 4. Elaine T. Champagne. 2004. Rice: Chemistry and Technology, 3rd Ed., AACC International, Inc., St. Paul, MN, USA. 5. Amalendu Chakraverty, Arun S. Mujumdar, G.S. Vijaya Raghavan and Hosahalli S. Ramaswamy. 2003. Handbook of Post Harvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices. Marcel Dekker, Inc., NY, USA. 6. Pamela J. White and Lawrence A. Johnson. 2003. Corn: Chemistry and Technology, 2nd Ed., AACC International, Inc., St. Paul, MN, USA. 7. David A.V. Dendy and Bogdan J. Dobraszczyk. 2001. Cereal and Cereal Products: Technology and Chemistry. Springer-Verlag, US.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	1	-	-	2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-
CO4	-	-	1	-	2	-	-	-	-	-	-	-	-	-	-
CO5	1	2	-	1	-	-	-	-	-	-	1	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Processing Technology of Fruits and Vegetables
Course Code	ELCT-FST-311[T]

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Electives							
Pre-Requisite/s	Horticulture			**Co-Requisite/s**	Horticulture			
Course Outcomes & Bloom's Level	**CO1-** State the production, processing status and supply chain of fruits and vegetables **(BL1-Remember)** **CO2-** Explain the basic processing methods of processing and canning **(BL2-Understand)** **CO3-** Use the processing methods for formulation of the products from fruits and vegetables **(BL3-Apply)** **CO4-** Examine the specifications for different processed products formulated by regulatory bodies **(BL4-Analyze)** **CO5-** Judge the Preparation, preservation and machines for manufacturing different processed products **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) SDG8(Decent work and economic growth) SDG12(Responsible consuption and production) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Production and processing scenario of fruits and vegetables in India and world; Scope of fruit and vegetable processing industry in India. Overview of principles and preservation methods of fruits and vegetables; Supply chain of fresh fruits and vegetables.	Activity based learning using different tools, Flipped classes teaching model, Collaborative learning, Socratic method of teaching, Power Point Presentations, ABL activities, Field demonstration of cultivation practices, Assignment, Seminars with open discussions, Group discussions or debate, Quiz	3
Unit 2	Primary processing and pack house handling of fruits and vegetables. Peeling, slicing, cubing, cutting and other size reduction operations for fruits and vegetables. Minimal processing of fruits and vegetables; Blanching operations and equipment. Canning: Definition, processing steps, and equipment, cans and containers, quality assurance and defects in canned products.	Activity based learning using different tools, Flipped classes teaching model, Collaborative learning, Socratic method of teaching, Power Point Presentations, ABL activities, Field demonstration of cultivation practices, Assignment, Seminars with open discussions, Group discussions or debate, Quiz	3
Unit 3	FSSAI specifications and preparation and preservation of juices, squashes, syrups, sherbets, nectars, cordials, etc. Processing and equipment for above products; FSSAI specifications;	Activity based learning using different tools, Flipped classes teaching model, Collaborative learning, Socratic method of teaching, Power Point Presentations, ABL activities, Field demonstration of cultivation practices, Assignment, Seminars with open discussions, Group discussions or debate, Quiz	3
Unit 4	Preparation, preservation and machines for manufacture of crystallized fruits and preserves, jam, jelly and marmalades, candies, Preparation, preservation and machines for manufacture of chutney, pickles, sauce, puree, paste, ketchup; toffee, cheese, lather, dehydrated, wafers and papads, soup powders.	Activity based learning using different tools, Flipped classes teaching model, Collaborative learning, Socratic method of teaching, Power Point Presentations, ABL activities, Field demonstration of cultivation practices, Assignment, Seminars with open discussions, Group discussions or debate, Quiz	3
Unit 5	Production of pectin and vinegar; Commercial processing technology of selected fruits and vegetables for production of various value-added processed products	Activity based learning using different tools, Flipped classes teaching model, Collaborative learning, Socratic method of teaching, Power Point Presentations, ABL activities, Field demonstration of cultivation practices, Assignment, Seminars with open discussions, Group discussions or debate, Quiz	4

M

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	To Primary processing of selected fruits and vegetables.	Experiments	BL2-Understand	2
Practical 2	Preparation of RTS and syrups.	Experiments	BL2-Understand	2
Practical 3	Preparation of dried onion	Experiments	BL3-Apply	2
Practical 4	Preparation of pickles.	Experiments	BL4-Analyze	2
Practical 5	Preparation of pectin.	Experiments	BL4-Analyze	2
Practical 6	Preparation of jelly	Experiments	BL4-Analyze	2
Practical 7	Preparation of marmalade	Experiments	BL4-Analyze	2
Practical 8	Visit to food processing unit	Experiments	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Chavan, U.D. and Patil, J.V. (2013). Industrial Processing of Fruits and Vegetables. Astral International Pvt. Ltd., New Delhi.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	2	-	-	-	-	-	-	-	-	3	1	-
CO2	-	1	1	-	1	-	-	-	-	-	-	-	1	2	-
CO3	2	-	1	1	1	-	1	-	-	-	-	2	-	3	1
CO4	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	-	1	1	2	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Commercial Plant Breeding
Course Code	ELCT-GPB-311[T]

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					1	0	2	3
Course Type	Embedded theory and lab							
Course Category	Discipline Electives							
Pre-Requisite/s	Genetics and Plant Breeding			**Co-Requisite/s**	Genetics and Plant Breeding			
Course Outcomes & Bloom's Level	**CO1-** Describe the breeding techniques for commercial production of seed **(BL1-Remember)** **CO2-** Classify the seed production systems through the breeding techniques **(BL2-Understand)** **CO3-** Demonstrate various methods of Commercial breeding techniques at field and laboratory levels **(BL3-Apply)** **CO4-** Analyse various techniques and the effectiveness of breeding techniques utilized at commercial level. **(BL4-Analyze)** **CO5-** Assess the quality of the seed and Judge the performance of high yielding and resistance varieties of different crops **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG10(Reduced inequalities) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
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 seed production.	Class room Lectures/ Guest lectures, Laboratory/ Field and lab Practicals, Student Seminars/ Presentations, ABL activities, Lab and field Tours/ Demonstrations, Assignments.	3
Unit 2	Genetic purity test of commercial hybrids. Advances in hybrid seed production of maize, rice, sorghum, pearl millet, castor, sunflower, cotton pigeon pea, Brassica etc.	Class room Lectures/ Guest lectures, Laboratory/ Field and lab Practicals, Student Seminars/ Presentations, ABL activities, Lab and field Tours/ Demonstrations, Assignments.	3
Unit 3	Quality seed production of vegetable crops under open and protected environment. Alternative strategies for the development of the line and cultivars: haploid inducer, tissue culture techniques and biotechnological tools.	Class room Lectures/ Guest lectures, Laboratory/ Field and lab Practicals, Student Seminars/ Presentations, ABL activities, Lab and field Tours/ Demonstrations, Assignments.	3
Unit 4	IPR issues in commercial plant breeding: DUS testing and registration of varieties under PPV & FR Act. Variety testing, release and notification systems in India.	Class room Lectures/ Guest lectures, Laboratory/ Field and lab Practicals, Student Seminars/ Presentations, ABL activities, Lab and field Tours/ Demonstrations, Assignments.	3
Unit 5	Principles and techniques of seed production, types of seeds, quality testing in self and cross pollinated crops.	Class room Lectures/ Guest lectures, Laboratory/ Field and lab Practicals, Student Seminars/ Presentations, ABL activities, Lab and field Tours/ Demonstrations, Assignments.	3

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Understanding the difficulties in hybrid seed production, Tools and techniques for optimizing hybrid seed production	Experiments	BL2-Understand	2
Practical 2	Floral biology of self and cross pollinated species, selfing and crossing techniques.	Field work	BL2-Understand	2
Practical 3	Techniques of seed production in self and cross pollinated crops using A/B/R and two line system.	Field work	BL3-Apply	2
Practical 4	Role of pollinators in hybrid seed production	Field work	BL3-Apply	2
Practical 5	Learning techniques in hybrid seed production using male-sterility in field crops.	Field work	BL3-Apply	2
Practical 6	Concept of line its multiplication and purification in hybrid seed production	Field work	BL3-Apply	2
Practical 7	Concept of rouging in seed production plot	Field work	BL3-Apply	2
Practical 8	Sampling and analytical procedures for purity testing and detection of spurious seed.	Field work	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	garwal, R.L. (2015). Seed Technology. Oxford and IBH Publication Co., New Delhi.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	2	2	-	-	-	-	-	-	-	3	1	-
CO2	-	3	2	1	3	-	1	-	-	-	-	1	1	3	-
CO3	3	-	1	2	1	-	-	1	-	-	1	2	-	-	2
CO4	-	3	-	1	-	-	1	-	-	-	1	1	-	1	-
CO5	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Hi-tech. Horticulture
Course Code	ELCT-HORT-221[T]

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Electives							
Pre-Requisite/s	Horticulture			**Co-Requisite/s**	Horticulture			
Course Outcomes & Bloom's Level	**CO1-** Students will be equipped with sufficient theoretical knowledge with practical skills on hi-tech horticulture technology and methods **(BL1-Remember)** **CO2-** Theoretical knowledge about precision farming and various implements used in nursery preparation. **(BL2-Understand)** **CO3-** Study about INM & IPM, IWM, protected cultivation, remote sensing and GIS and DGPS. **(BL3-Apply)** **CO4-** Ability to use techniques and instruments involved in the study of orchard practice equipment **(BL4-Analyze)** **CO5-** Understand the basic practice of nursery preparation and propagation method **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Introduction, importance & scope of hi-tech horticulture in India	Classroom lecture, ABL, Fieldwork, Solution based learning and PBL	6
Unit 2	Micro irrigation systems & its components/pH-based irrigation/ fertigation scheduling, Hi-tech canopy management of horticultural crops, High density orcharding in Mango, guava, papaya, citrus, pineapple etc.	Classroom lecture, ABL, Fieldwork, Solution based learning and PBL	6
Unit 3	Micropropagation of horticultural crops, hi-tech field preparation and planting methods, Protected cultivation.	Classroom lecture, ABL, Fieldwork, Solution based learning and PBL	6
Unit 4	Remote sensing & geographical information system, Differential geopositioning system (DGPS), Component of precision farming & application of precision farming in horticultural crops.	Classroom lecture, ABL, Fieldwork, Solution based learning and PBL	7
Unit 5	Importance of INM in horticulture. Micro irrigation methods, Nursery management in horticultural crops.	Classroom lecture, ABL, Fieldwork, Solution based learning and PBL	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Identification of protected structure	Field work	BL2-Understand	2
Practical 2	Nursery management of horticultural crops	Field work	BL2-Understand	2
Practical 3	Micropropagation in horticulture crops	Field work	BL3-Apply	2
Practical 4	Micro-irrigation system	Field work	BL3-Apply	2
Practical 5	H.D.P. of orchard	Field work	BL3-Apply	2
Practical 6	Canopy management of fruit trees	Field work	BL4-Analyze	2
Practical 7	EC, ph. Based fertilizer scheduling	Field work	BL4-Analyze	2
Practical 8	Tools and equipment's identification and use	Field work	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	More, T.A., Singh, R.B. (2005). Protected cultivation of vegetable crops. Kalyani publication
Articles	
References Books	Prasad, S. and Kumar, U. 1998. Commercial floriculture. Agro Botanica
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	2	-	-	-	-	-	-	-	-	3	1	-
CO2	-	1	1	-	1	-	-	-	-	-	-	-	1	2	-
CO3	2	-	1	1	1	-	1	-	-	-	-	2	-	3	1
CO4	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	-	1	1	2	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Landscaping
Course Code	ELCT-HORT-311[T]

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Define the knowledge on landscape designing**(BL1-Remember)** **CO2-** Explain importance of Software based learning of landscape architecture**(BL2-Understand)** **CO3-** Demonstrate the various methods/ approaches of Bonsai management. **(BL3-Apply)** **CO4-** Examine the methods of various lawn management techniques. **(BL4-Analyze)** **CO5-** Evaluate various software for landscape based on performance and designing **(BL5-Evaluate)** **CO6-** Develop plan or layout of public and private landscape area. **(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG10(Reduced inequalities) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Introductory landscaping 1. History, scope and opportunities in landscape architecture 2. Terminology associated with landscaping Constrain in landscape designing	Class room teaching (Chalk-board), Power Point Presentations, ABL activities, Assignments, Flip Class/ Seminars, Quiz.	3
Unit 2	Elements and Principles of Landscaping/designing 1. Elements of landscaping and landscape designing 2. Principles of landscaping and landscape designing Bio-aesthetic planning: definition, need, planning; landscaping of urban and rural areas, Peri-urban landscaping, Landscaping of schools, public places like bus station, railway station, townships, river banks, hospitals, play grounds, airports, industries, institutions.	Class room teaching (Chalk-board), Power Point Presentations, ABL activities, Assignments, Flip Class/ Seminars, Quiz.	3
Unit 3	Types and Style of garden 1. 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) lawn: establishment and maintenance	Class room teaching (Chalk-board), Power Point Presentations, ABL activities, Assignments, Flip Class/ Seminars, Quiz.	3
Unit 4	Therapeutic and pharmaceutical uses 1. Trees: selection, propagation, planting schemes, canopy management, shrubs and herbaceous, planting scheme, Perennials, Climber and creepers, Annuals: Importance, selection, propagation 2. Other Garden plants: palms, ferns, grasses and cacti succulents. Pot plants: selection, arrangement	Class room teaching (Chalk-board), Power Point Presentations, ABL activities, Assignments, Flip Class/ Seminars, Quiz.	3
Unit 5	CAD- its importance and application 1. History, scope and importance of CAD 2. Advantages and disadvantages of CAD 3. Introduction to AutoCAD and its components 4. Various software used for landscape planning.	Class room teaching (Chalk-board), Power Point Presentations, ABL activities, Assignments, Flip Class/ Seminars, Quiz.	4

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Identification of trees, shrubs, annuals, pot plants	Field work	BL2-Understand	2
Practical 2	Propagation of trees, shrubs and annuals, care and maintenance of plants	Field work	BL2-Understand	2
Practical 3	Identification of tools and implements used in landscape design	Field work	BL3-Apply	2
Practical 4	Training and pruning of plants for special effects	Field work	BL4-Analyze	2
Practical 5	lawn establishment and maintenance	Field work	BL4-Analyze	2
Practical 6	layout of formal gardens, informal gardens, special type of gardens	Field work	BL4-Analyze	2
Practical 7	Designing of conservatory and lathe house	Field work	BL5-Evaluate	2
Practical 8	Use of computers software, visit to important gardens/ parks/ institutes.	Field work	BL6-Create	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Christine, W.Y. (1987). Computer-aided Design: Application to Conceptual Thinking in Landscape Architecture. amazon.com
Articles	
References Books	Nambisan, K.M.P. (1992). Design Elements of Landscape Gardening. Oxford & IBH.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	2	-	-	-	-	-	-	-	-	3	1	-
CO2	-	1	1	-	1	-	-	-	-	-	-	-	1	2	-
CO3	2	-	1	1	1	-	1	-	-	-	-	2	-	3	1
CO4	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	-	1	1	2	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Protected Cultivation
Course Code	ELCT-HORT-321[T]

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Horticulture			**Co-Requisite/s**	Horticulture			
Course Outcomes & Bloom's Level	**CO1-** To list out and remember the importance of Protected cultivation and its scope in India. **(BL1-Remember)** **CO2-** To classify the concept of classifications of protected structures. **(BL2-Understand)** **CO3-** To apply the concept of protected cultivation for major crops. **(BL3-Apply)** **CO4-** To examine the Basics of nursery management under protected structures. **(BL4-Analyze)** **CO5-** To evaluate the utility of growing media and growing condition under protected structures. **(BL5-Evaluate)** **CO6-** To create the budget and design for protected cultivation and structures. **(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Introduction to Protected cultivation Protected cultivation- importance and scope, Status of protected cultivation in India and World	Class room teaching (Chalk-board) Power Point Presentations ABL activities Assignments Flip Class/ Seminars Quiz	6
Unit 2	Construction and types of protected structures Cladding materials involved in greenhouse/ poly house. Greenhouse design, environment control, artificial lights, Automation, Soil preparation and management, Substrate management. Types of benches and containers. Types of protected structure based on site and climate	Class room teaching (Chalk-board) Power Point Presentations ABL activities Assignments Flip Class/ Seminars Quiz	6
Unit 3	Irrigation and propagation under protected structures Irrigation and fertigation management, Propagation and production of quality planting material of horticultural crops	Class room teaching (Chalk-board) Power Point Presentations ABL activities Assignments Flip Class/ Seminars Quiz	6
Unit 4	Greenhouse cultivation of important horticultural crops Greenhouse cultivation of important horticultural crops rose, carnation, chrysanthemum, gerbera, orchid, anthurium, lilium, tulip, tomato, bell pepper, cucumber, strawberry, pot plants, etc.	Class room teaching (Chalk-board) Power Point Presentations ABL activities Assignments Flip Class/ Seminars Quiz	7
Unit 5	Cultivation of economically important crops Cultivation of economically important medicinal and aromatic plants. Offseason production of flowers and vegetables. Insect pest and disease management under protected structures.	Class room teaching (Chalk-board) Power Point Presentations ABL activities Assignments Flip Class/ Seminars Quiz	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Preparation and nursery management under Protected structures	Experiments	BL2-Understand	2
Practical 2	Propagation and nursery management under Protected structures	Experiments	BL3-Apply	2
Practical 3	Bed preparation and planting of crops for productions	Experiments	BL3-Apply	2
Practical 4	Intercultural operations	Experiments	BL4-Analyze	2
Practical 5	Soil EC and pH measurement	Experiments	BL4-Analyze	2
Practical 6	Regulation of irrigation and fertilizers through drip, fogging ad misting	Experiments	BL5-Evaluate	2
Practical 7	Propagation and management of Ornamental and medicinal/Aromatic crops.	Experiments	BL5-Evaluate	2
Practical 8	Visit to Protected structure	Experiments	BL6-Create	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Salone, V.M. and Sharma. A.K. (2012). Greenhouse Technology and Applications. Agrotech Publishers. New Delhi. Prasad S. and Kumar, U. (2012). Greenhouse Management of Horticultural Crops. Second edition. Agrobios. New Delhi.
Articles	
References Books	Hanan, J.J. (1998). Green houses: Advanced Technology for Protected Horticulture. CRC Press, LLC. Florida. Radha Manohar, K. and Igathinathane, C. (2013). Greenhouse Technology and Management. BS Publications.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	2	-	-	-	-	-	-	-	-	3	1	-
CO2	-	1	1	-	1	-	-	-	-	-	-	-	1	2	-
CO3	2	-	1	1	1	-	1	-	-	-	-	2	-	1	1
CO4	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	-	1	1	2	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	2	-	-	-	-	-	-	-	2	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Micro propagation Technologies
Course Code	ELCT– GPB-221[T]

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					1	0	2	3
Course Type	Embedded theory and lab							
Course Category	Discipline Electives							
Pre-Requisite/s	Genetics and Plant breeding			**Co-Requisite/s**	Genetics and Plant breeding			
Course Outcomes & Bloom's Level	**CO1-** To understand terminology and definitions related to micro-propagation **(BL1-Remember)** **CO2-** To acquainted with different micro-propagtion techniques **(BL2-Understand)** **CO3-** To apply the knowledge for micro-propagation of economically valued crops **(BL3-Apply)** **CO4-** To get familiar with the requirements to set up a plant tissue culture laboratory **(BL4-Analyze)** **CO5-** To design strategies for commercial exploration of gained knowledge on micro-propagation technology **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Meaning and concept of in vitro culture and micro-propagation; Historical milestones, advancement and future prospects of micro propagation; totipotency, dedifferentiation. Micro-propagation- Definition, methods, stages of micro-propagation and its significance	ABL activities, Assignment, Class room teaching, PPT presentation, Quiz, Industrial Visit, Report, Poster, Review writing.	6
Unit 2	Tissue culture methodology: Sterilization techniques, synthetic and natural media components, growth regulators, environmental requirement, and genetic control of regeneration.	ABL activities, Assignment, Class room teaching, PPT presentation, Quiz, Industrial Visit, Report, Poster, Review writing.	6
Unit 3	Plant regeneration pathways-Organogenesis and Somatic embryogenesis; Axillary bud prolife ration approach Shoot tip and meristem culture.	ABL activities, Assignment, Class room teaching, PPT presentation, Quiz, Industrial Visit, Report, Poster, Review writing.	6
Unit 4	Organogenesis-Purpose, methods and requirements for organogenesis, indirect and direct organogenesis; Somatic embryogenesis: Procedures and requirements for organogenesis, indirect and direct embryogenesis.	ABL activities, Assignment, Class room teaching, PPT presentation, Quiz, Industrial Visit, Report, Poster, Review writing.	7
Unit 5	Differences between somatic and gametic embryogenesis, Synthetic seed- Concepts, necessity, procedure and requirements for production of synthetic seeds, Production of secondary metabolites, Somaclonal variations, Cryopreservation	ABL activities, Assignment, Class room teaching, PPT presentation, Quiz, Industrial Visit, Report, Poster, Review writing.	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	To understand the different ways of representation of concentration of solutions	Experiments	BL2-Understand	2
Practical 2	To get familiar the preparation of different type of solutions	Experiments	BL2-Understand	2
Practical 3	Preparation of buffers	Experiments	BL3-Apply	2
Practical 4	Estimation of pH	Experiments	BL3-Apply	2
Practical 5	Laboratory organization	Experiments	BL3-Apply	2
Practical 6	Sterilization techniques	Experiments	BL4-Analyze	2
Practical 7	Preparation and sterilization of growth regulators	Experiments	BL4-Analyze	2
Practical 8	Experimentation on determining optimum concentration of growth regulators	Experiments	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Gamborg, O.L. and Phillips, G.C. (1995). Plant Cell Tissue Organ Culture: Fundamental Methods. Springer, Berlin.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	2	2	-	-	-	-	-	-	-	3	1	-
CO2	-	3	2	1	3	-	1	-	-	-	-	1	1	3	-
CO3	3	-	1	2	1	-	-	1	-	-	1	2	-	-	2
CO4	-	3	-	1	-	-	1	-	-	-	1	1	-	1	-
CO5	-	2	5	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Agribusiness and Industrial Management
Course Code	ELP- ABM-401 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s	Ag. Economics			**Co-Requisite/s**	Ag. Extension			
Course Outcomes & Bloom's Level	**CO1-** Students will acquire knowledge about various aspects of agribusiness and also understand the structure and working of an enterprise.**(BL1-Remember)** **CO2-** Utilize the knowledge in the fields of project management and entrepreneurship development.**(BL2-Understand)** **CO3-** Analyze the challenges and problem of agroindustry, examining the quality of product of agroindustry and their role in agriculture.**(BL3-Apply)** **CO4-** Evaluate various policies, strategies and decisions relating to marketing that are developed by agribusiness firms.**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	Structure of Agribusiness- Linkages among sub-sectors of the Agribusiness sector; economic reforms and Indian agriculture; impact of liberalization, privatization and globalization on Agri business sector Emerging trends in production, processing, marketing and exports; policy controls and regulations relating to the industrial sector with specific reference to agro-industries.	Field work	BL2-Understand	20
Module 2	Role of Agribusiness in economy- Role of agriculture in Indian economy; problems and policy changes relating to farm supplies, farm production, agro processing, Evaluation process. agricultural marketing, agricultural finance etc. in the country.	Field work	BL2-Understand	20
Module 3	Financial Management- Introduction to Financial Management, Its meaning and functions, Interface of financial management with other functional areas of a business. Financial Statements and Analysis, Capital Structure, Working Capital Management, Financial planning and Forecasting.	Field work	BL3-Apply	20
Module 4	Quality Management in Agribusiness- Basic concepts of quality management, importance of quality and the role of quality assurance in agribusiness. TQM and business strategy. Quality control process and its relevance. Quality grades and standards	Field work	BL3-Apply	20
Module 5	Agriculture supply chain management- Managing Retail Operations, Managing Retailers' Finances, Merchandise buying and handling, Merchandise Pricing, Logistics, procurement of Food products and Handling Transportation of Food Products.	Field work	BL3-Apply	20
Module 6	Project management and entrepreneurship development- Types of Project, Project lifecycle; Project feasibility; network method; Significance of entrepreneurship in economic development, developing effective business plan, Procedural steps in setting up of an industry.	Field work	BL3-Apply	20
Module 7	Production and operation management-Nature and Scope; Productivity variables and measurement; Product design and development; Quality assurance	Field work	BL4-Analyze	20
Module 8	Agribusiness policy in India- concept and formulation; and new dimensions in Agri business environment and policy; Agricultural price and marketing policies; public distribution system and other policies.	Field work	BL4-Analyze	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41			100	

Part E

Books	Barnard, F.L. (2016). Agribusiness Management. Routledge Publisher United Kingdom. Diwase, S. (2017). Indian Agriculture and Agribusiness Management. KRISHI Resource Management Network, New Delhi. Nuthall, P.L. (2011). Farm Business Management: Analysis of farming system. CABI. Khan, M.Y. & Jain, P.K. (2004). Financial Management: Text, Problems and Cases. Tata McGraw Hill.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	2	2	1	-	3	-	1	-	1	1	2	-
CO3	-	3	3	1	1	3	2	1	2	1	-	1	-	-	2
CO4	-	3	3	1	1	-	-	1	-	1	-	1	-	1	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Industrial Training On Product Development And Marketing
Course Code	ELP- ABM-402 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s	Ag. Economics			**Co-Requisite/s**	Ag. Extension			
Course Outcomes & Bloom's Level	**CO1-** Students will acquire training in the Industrial production and marketing.**(BL1-Remember)** **CO2-** Evaluation of various Industrial products, marketing channel and cost of production.**(BL2-Understand)** **CO3-** Analyze the challenges in cost of production and marketing.**(BL3-Apply)** **CO4-** Evaluate the role of industries and investors.**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	Basic of industrial marketing Reason for understanding the concept of industrial marketing—Attributes of Marketing Strategy—Concept of Industrial Marketing—Definition of Industrial Marketing—Types of Product —Industrial Product—Industrial Process Exchange—Types of Industrial Customers—Commercial Enterprises—Industrial Distributors and Dealers—Original Equipment Manufacturers (OEMs)—Government Customers—Institutions—Cooperative Societies	Experiments	BL2-Understand	20
Module 2	Understanding industrial markets Industrial versus Consumer Markets—Market Structure —Marketing Perspective — Customer Behaviour—Industrial Marketing landscape—Industrial Development in India— Current trends in Indian Industrial market—Elements of Industrial Development Strategy	Experiments	BL2-Understand	20
Module 3	Economic issues in industrial marketing Derived demand —value chain of derived demand—ripple effect of derived demand— derived demand marketing—fluctuating demand—joint demand —stimulating demand—cross-elasticity of demand—effect of cross elasticity of demand on market—pricing policy—inelastic demand—purchasing / buying orientation—purchasing orientation— buying orientation—procurement orientation—supply management orientation —types of purchasing process	Experiments	BL2-Understand	20
Module 4	Industrial buying behavior: Organizational Buying —Features of Organizational Buying—Types of buying Situation— Straight Rebuy—Modified Rebuy—New task—System buy —Buying Center Concept— The Buying Decision Process—Buying Mode—The Sheth Model—The Webster and Wind Mode—Vendor Analysis —Vendor Performance Rating	Field work	BL3-Apply	20
Module 5	Industrial marketing research: Definition—Uses of Industrial Marketing Research —Studying the business trends —New Product Studies—Sales quota determination and DD forecasting—Market potential and market share analysis—Differences in Industrial and Consumer Marketing Research— Industrial Marketing Research Process— The Sampling Plan—Sampling methods — Probability Sampling Methods—Non-probability Sampling Methods	Field work	BL3-Apply	20
Module 6	Product development strategy: Developing product strategy—Product Policy —New Product Development— Define product—Identify market needs—Identify key issues and approaches—Idea Generation —Idea Screening —Concept development & testing—Business Analysis —Product Development—Marketing Testing— Commercialization —Industrial Product Life Cycle — The Introductory Stage—Growth—The Maturity Stage—The Decline Stage—Product Evaluation —Perceptual Mapping	Field work	BL3-Apply	20
Module 7	Pricing in industrial marketing: Pricing Environment —Characteristics of Price—The Pricing Process in Industrial Marketing—Factors affecting industrial pricing decision —Pricing Objectives—Market Skimming —Market Penetration—Product Differentiation —Other pricing objectives — Demand Conditions —Cost Condition — Pricing Policies —Competitive Analysis — Government Regulations —Pricing Strategy —Introductory Stage — Market Skimming Strategy:—Market Penetration Strategy:—Pricing Strategy at Growth stage —Pricing Strategy at Maturity stage—Pricing Strategy at Decline Stage	Field work	BL3-Apply	20
Module 8	Industrial distribution channel: Marketing channels physical distribution—factors affecting the nature of industrial channels—geographic distribution —channel size—characteristics of intermediaries— mixed system—structure of industrial channel—direct channel—indirect channel—types of industrial middlemen/intermediaries—industrial distributors (dealers)—three main/major categories of industrial distributor: —manufacturers' representatives – brokers—value- added reseller—the channel design process—controlling channel conflicts	Field work	BL3-Apply	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41			100	

Part E

Books	Cherunilam, F. (2015). Industrial Marketing Text & Cases. Himalaya Publishing House. Reeder, (1997). Industrial Marketing: Analysis, Planning and Control. Prentice Hall. Mukerjee, H.S. (2008). Industrial Marketing. Excel Books. Ghosh, P. K. (2005). Industrial Marketing. Oxford University Press.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-
CO3	-	3	2	1	-	-	1	1	1	-	1	1	-	-	2
CO4	-	2	3	1	-	-	-	1	-	-	1	1	-	1	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Agricultural Heritage and Agritourism
Course Code	ELP- ABM-403 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Describe the importance Indian agricultural heritage system**(BL1-Remember)** **CO2-** Explain the importance of agritourism**(BL2-Understand)** **CO3-** Demonstrate various ITKs in the field**(BL3-Apply)** **CO4-** Analyse the challenges while initiating agritourism and possible practical solutions**(BL4-Analyze)** **CO5-** Evaluate the role of heritage systems in developing business**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	Globally Important Agricultural Heritage Systems	PBL	BL2-Understand	20
Module 2	Past day agriculture and farmers in society: Indus period, Vedic period and early historic/ Buddhist period	PBL	BL2-Understand	20
Module 3	Crops and its importance and Crop Voyage in India and World	PBL	BL3-Apply	20
Module 4	Plant production and protection through Indigenous Technical Knowledge (ITK)	PBL	BL3-Apply	20
Module 5	Scope of Agricultural heritage in Agritourism	PBL	BL3-Apply	20
Module 6	Visit to ICAR Institute	PBL	BL4-Analyze	20
Module 7	Visit to State Agricultural University	PBL	BL4-Analyze	20
Module 8	Visit to Centre for Agribusiness incubation and entrepreneurship	PBL	BL4-Analyze	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	1. V. Radha Krishna Murthy and M. Sree Rekha, 2019. Agriculture Heritage. B S Publications 2. S. R. Reddy, 2018. Agriculture Heritage. Kalyani Publishers. 3. Y. L. Nene, 2009. Glimpses of the Agricultural Heritage of India. Munshiram Manoharial Publishers 4. Jack Randall, 2012. Agriculture Tourism. Discovery Publishing Pvt. Ltd.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	2	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
CO3	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-
CO4	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Agricultural waste management
Course Code	ELP- AGRON-401 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Introduction with agricultural wastes and their utilization.**(BL1-Remember)** **CO2-** Explain different waste management methods, incorporation of crop residues, composting and Biochar**(BL2-Understand)** **CO3-** Analyze and discuss sustainable development and agriculture**(BL3-Apply)** **CO4-** Investigate the benefits of waste management in farms.**(BL4-Analyze)** **CO5-** Evaluate the performance of Biogas plant**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG6(Clean water and sanitation) SDG8(Decent work and economic growth) SDG13(Climate action)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	Incorporation of Crop Residues into Soil for Nutrient Cycling and Soil Amendment: Incorporation of different plant residues, Testing of soil after crop residue incorporation	Experiments	BL2-Understand	20
Module 2	Livestock and poultry waste management: Manure handling and storage, Solid manure, Field storage manure	Experiments	BL2-Understand	20
Module 3	Vegetable waste management: Composting of different vegetables, Land spreading & Burial process of vegetables	Experiments	BL3-Apply	20
Module 4	Biodegradable Packaging Material (BDPM) as Planting Medium: plant derived biodegradable packaging EFB, tapioca starch and sugar cane bagasse.	Experiments	BL3-Apply	20
Module 5	Conversion of Agriculture Waste into Bio char: Preparation of biochar at different temperature, preparation of biochar from different crops, Testing of Physical chemical and biological properties of Biochar	Experiments	BL3-Apply	20
Module 6	Biochemical conversion Technology-Biogas (BCCT): Biogas technology, Biogas plant types, Microbiology of biogas production, Size and selection of biogas Plant, Biogas Plant –material and method of construction	Experiments	BL4-Analyze	20
Module 7	Odour management in Barns and storage area: Causes of odour, BMPs for Odour Control in Livestock Facilities, BMPs for Odour Control in Manure Storage	Experiments	BL4-Analyze	20
Module 8	Feedlot management: site selection, Liquid system, Soild System, BMPs for runoff control	Experiments	BL4-Analyze	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41	0		100	

Part E

Books	Chakrabarthi, S.K. (2010). Seed Production and Quality Control. Kalyani Publisher, New Delhi.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	-	-	-	-	-	-	-	-	-	-	3	-
CO2	-	1	-	-	-	-	-	-	-	-	-	-	3	1	-
CO3	-	2	1	-	-	-	-	-	-	-	-	-	-	-	3
CO4	-	3	-	3	1	-	-	-	-	-	-	-	2	-	3
CO5	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Commercial Beekeeping
Course Code	ELP- ENT-401 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s	Entomology			**Co-Requisite/s**	Entomology			
Course Outcomes & Bloom's Level	**CO1-** Students will acquire training in the fields of Beekeeping, Pollination and quality Honey production.**(BL1-Remember)** **CO2-** Evaluation of various Beekeeping tools and develop management strategy**(BL2-Understand)** **CO3-** Analyze the challenges of commercial Beekeeping**(BL3-Apply)** **CO4-** Evaluate the role of quality Honey and their effect on farming society**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG2(Zero hunger) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	THE HONEYBEE AND ITS IMPORTANCE (a) Bee Biology and Behaviour (b) The Importance of Beekeeping. (c) Pollination	Field work	BL2-Understand	54
Module 2	MANAGEMENT OF THE HONEYBEE (a) Beekeeping Systems (b) Beekeeping Equipment (c) Making Beekeeping Equipment (d) Apiary Management (e) The Floral Calendar and Beekeeping (f) Bee Stings and Management (g) Hive Inspection (h) Populating the Hive (i) Catching a Swarm (j) Transferring Bees (h) Dividing and Uniting Colonies (i) Feeding of Bees (j) Bee Pests, Predators and Diseases (k) Making Bio-Pesticides	Field work	BL3-Apply	54
Module 3	HIVE PRODUCTS AND PROCESSING: (a) Hive Products (b) Quality Honey Harvesting (c) Processing Honey (d) Bees wax	Field work	BL4-Analyze	54

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40			100	

Part E

Books	Sammataro, D. and Alphonse. (1978). The Beekeeper's Handbook. Oxford & IBH Publishing Company Pvt Ltd., New Delhi. Abrol, D.P. (2010). Beekeeping: a compressive guide to bees and beekeeping. Scientific Publisher, Jodhpur, Rajasthan.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	3	1	1	3	3	1	2	-	1	1	-	-	2
CO4	-	3	3	1	1	-	-	1	-	-	1	1	-	1	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Seed Production Technology
Course Code	ELP- GPB-401 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s	Genetics and Plant Breeding			**Co-Requisite/s**	Genetics and Plant Breeding			
Course Outcomes & Bloom's Level	**CO1-** Students will acquire training in the fields of crop improvement, plant breeding, and quality seed production.**(BL1-Remember)** **CO2-** Evaluation of various seed diversity on the basis of seed morphology, Biochemical nature and reproductive behavior.**(BL2-Understand)** **CO3-** Analyze the challenges of commercial Seed production **(BL3-Apply)** **CO4-** Evaluate the role of quality seed and their effect on farming society**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG2(Zero hunger)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	Selection of seed production area /land: (a) Previous & current year agro-metrological data, (b) soil type, soil sampling & soil profiling. Texture, Nutrition availability, Water holding capacity, Available organic carbon, Selection of crop.	Experiments	BL2-Understand	20
Module 2	Layout preparation /Cultural practices: Net area & gross area calculation, Design of experimentation, isolation distance, field preparation, seed sowing, and calculation of required seeds (seed rate)	Experiments	BL2-Understand	20
Module 3	Agronomical practices: Fertilizer application, irrigation, rouging, weeding, etc.	Field work	BL2-Understand	20
Module 4	Insect, pest & disease management: Identification of disease, diagnosis & procurement & management	Field work	BL4-Analyze	20
Module 5	Crop management: Identification of critical stages for field inspection, 50 % flowering, removal of Off type, plant data observation	Field work	BL3-Apply	20
Module 6	Crop maturity of observation: Observation of characteristics related to plant maturity (leaf characteristics, grain characteristics, BITE test, and laboratory based test).	Field work	BL3-Apply	20
Module 7	Harvesting & threshing: Harvesting techniques, Threshing tech. & equipments/ machines, Seed drying techniques.	Field work	BL3-Apply	20
Module 8	Bagging, packing & storage: Seed treatment (fungal, bacterial, coating & planting) Specific baggage for packaging & prescribed tags (as per seed act 1966) Storage & storage facilities (Gene Bank)	Field work	BL4-Analyze	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41			100	

Part E

Books	Agarwal, R.L. (2012). Seed Technology. Oxford & IBH Publishing Company Pvt. Ltd., New Delhi. Chakrabarthi, S.K. (2010). Seed Production and Quality Control. Kalyani Publisher, New Delhi. Mishra, D.K., Khare, D., Bhale, M.S. and Koutu, G.K. (2011). A Handbook of Seed Certification. Agrobios (India).
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-
CO3	-	3	3	1	1	3	2	1	2	-	1	1	-	-	2
CO4	-	3	3	1	1	-	-	1	-	-	1	1	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Processing of fruits and vegetables for value addition
Course Code	ELP- HORT-403 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Students will acquire training on processed fruits and vegetables product quality.**(BL1-Remember)** **CO2-** Evaluation and maintenance of the processed product quality.**(BL2-Understand)** **CO3-** Analyze the stored products for **(BL3-Apply)** **CO4-** Evaluate the role of food processer for food safety parameters **(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	Studyextractionandpreservationofpulpsandjuices:	Experiments	BL2-Understand	20
Module 2	Preparationofosmoticallydriedproducts,fruitbarandcandy	Experiments	BL2-Understand	20
Module 3	Preparationofjamand jelly	Experiments	BL3-Apply	20
Module 4	Preparationofjamand jelly and Pickles, Chutneys and Fermented Products	Experiments	BL3-Apply	20
Module 5	PreparationofRTS,nectarandsquashfromdifferentkindoffruits.	Experiments	BL3-Apply	20
Module 6	Physico-chemical and sensory quality evaluation of products	Experiments	BL3-Apply	20
Module 7	Planning and execution of a market survey and preparation of processing schedule and formulation of project module based on market information	Experiments	BL3-Apply	20
Module 8	Identification of sources for procurement of raw material, production and quality analysis of fruits and vegetables products at commercial scale.	Experiments	BL3-Apply	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	Rathore, N.S., Mathur, G.K., Chasta, S.S. (2012). Post-Harvest Management and Processing of Fruits and Vegetables. The Energy and Resources Institute.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	1	1	-	-	-	-	-	-	3	-	-	-
CO2	-	2	3	2	2	1	-	-	-	-	-	-	-	3	-
CO3	3	-	2	2	2	2	-	-	-	-	-	-	-	1	2
CO4	-	1	-	1	-	-	-	-	-	-	1	1	1	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Protected Cultivation of High value Horticulture Crops
Course Code	ELP- HORT-405 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s	Horticulture			**Co-Requisite/s**	Horticulture			
Course Outcomes & Bloom's Level	**CO1-** Students prepare field and make proper use of various techniques in them for crop production**(BL1-Remember)** **CO2-** To boost crop production under various adverse conditions. To observe intercultural operations and new technology. **(BL2-Understand)** **CO3-** Analyze the complete cost of cultivation.**(BL3-Apply)** **CO4-** Evaluate the role of protected cultivation, mulching and vertical farming system.**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	Project preparation for establishment of various protected structures (Poly house and net house)	Experiments	BL2-Understand	20
Module 2	Practices in preparatory operations, different types of growing media, soil decontamination techniques in polyhouse	Field work	BL2-Understand	20
Module 3	Preparation of beds under the polyhouse for cultivation of cucumber and tomato	Field work	BL2-Understand	20
Module 4	Hands on training on various intercultural operation under the polyhouse (staking, training and pruning, fertigation)	Field work	BL4-Analyze	20
Module 5	Use/application Low Tunnel Technology for off season cultivation of vegetable crops and flower crops	Field work	BL3-Apply	20
Module 6	Practices of hybrid seed production of vegetables under protected condition.	Field work	BL3-Apply	20
Module 7	Estimation of cost of cultivation for cucumber and tomato under the polyhouse condition	Field work	BL3-Apply	20
Module 8	Village survey to study about the major constant faced by the farmers in adopting protected cultivation in gird region.	Field work	BL4-Analyze	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	Malam, K.V., Malam, V. R. and Kanzaria, D. R. 2024. Hi-Tech Horticulture Parvatha Reddy, P. 2024. Hi-Tech Farming for Enhancing Horticulture Productivity. CRC Press.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	2	2	1	-	3	-	1	1	1	1	2	-
CO3	-	3	3	1	1	3	2	1	2	-	1	1	-	-	2
CO4	-	3	3	1	1	-	-	1	-	-	1	1	-	1	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Agri Warehouse Management
Course Code	ELP-AE-401 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Acquaintance the fundamentals of agricultural warehouse management.**(BL1-Remember)** **CO2-** Familiarize with techniques to store different types of agricultural products.**(BL2-Understand)** **CO3-** Develop the skills in maintaining and organizing inventories.**(BL3-Apply)** **CO4-** Expertise in legal guidelines and safety measures important for agricultural warehouses.**(BL4-Analyze)** **CO5-** Implement more efficient handling and shipping techniques for agricultural products.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG13(Climate action)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module-1	An overview of Agricultural Warehousing.	Field work	BL2-Understand	20
Module-2	Warehouse Design and Layout.	Experiments	BL2-Understand	20
Module-3	The simulation Techniques; examining the most effective techniques for assembling and organising agricultural products under a variety of environmental factors like temperature, humidity, and ventilation.	Experiments	BL3-Apply	20
Module-4	Inventory Management; Preserve a record of inventory and discuss strategies to prevent losses and maintain proper records.	Experiments	BL3-Apply	20
Module-5	Safety procedures and regulations in agricultural warehouse environments.	Experiments	BL3-Apply	20
Module-6	Logistics management, including route planning and transportation scheduling.	PBL	BL3-Apply	20
Module-7	Visit to Local Warehouse.	Field work	BL4-Analyze	20
Module-8	Visit to Innovative and progressive farmer for storage facilities.	Field work	BL4-Analyze	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	Gopal Naik, G. Raghuram, Jothsna Rajan, Manu Bansal, Gopi S. Gopikuttan, Prateek Tawri and Ritwik Singh, Institute of Management, Banglore. Warehouse Manual For Operationalizing of Warehousing (Development & amp; Regulation) Act, 2007 by Warehousing Development and Regulatory Authority.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	2	-	1	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-
CO3	-	1	-	-	-	1	-	-	2	-	-	-	-	-	-
CO4	-	-	-	1	-	-	1	1	-	-	-	-	-	-	-
CO5	-	-	-	-	2	1	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Rural Haat and Market Analysis
Course Code	ELP-AE-402 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s	Fundamentals of Agricultural Economics			**Co-Requisite/s**	Fundamentals of Agricultural Extension Education			
Course Outcomes & Bloom's Level	**CO1-** Students will acquire training in the rural market.**(BL1-Remember)** **CO2-** Evaluation of various rural products, marketing channel and cost of production.**(BL2-Understand)** **CO3-** Analyze the challenges in cost of production and marketing.**(BL3-Apply)** **CO4-** Evaluate the role of rural industries and market infrastructure.**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	Introduction to rural markets	PBL	BL2-Understand	20
Module 2	Rural marketing – concept and scope	PBL	BL2-Understand	20
Module 3	Rural consumers	PBL	BL2-Understand	20
Module 4	Rural vs urban marketing	PBL	BL2-Understand	20
Module 5	Market segmentation	PBL	BL3-Apply	20
Module 6	Product Strategy and Product Mix Decisions	PBL	BL3-Apply	20
Module 7	Product strategies for rural markets	PBL	BL4-Analyze	20
Module 8	Pricing strategy, Distribution,Market infrastructure	PBL	BL4-Analyze	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	1	-	-	-	2	-	2	1	-	-	-	-	-	-
CO2	-	1	-	1	-	2	-	-	-	-	1	-	-	-	-
CO3	-	2	-	-	-	-	-	-	-	-	2	-	-	-	-
CO4	-	-	-	-	-	2	-	-	1	-	1	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Agri-based Software Design
Course Code	ELP-AENG-401 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Gain knowledge of basic Software methods and practices and their appropriate application.**(BL1-Remember)** **CO2-** Describe software layered technology and Process framework.**(BL2-Understand)** **CO3-** Understanding of software requirements, designing an agri based software.**(BL3-Apply)** **CO4-** Understanding of implementation issues such as modularity and coding standards, software testing approaches.**(BL4-Analyze)** **CO5-** Describe software measurement and software risks, of softwareEvolution, Understanding on quality control and how to ensure good quality software.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	Software Quality assurance, Software Metrics, Software Validation,Static and dynamic Analysis, Symbolic Equation. Mutation Analysis, Dynamic Testing, unit Testing, Whitebox and black box testing, Test Case Generation, Integration Testing.	PBL	BL2-Understand	30
Module 2	Bottom-up &Topdown Testing. System Testing, Function Testing,Performance Testing, Acceptance Testing, Installation Testing, theoretical foundation of Testing, Formal verification, Test Tools.	PBL	BL2-Understand	30
Module 3	Software Reliability; Software Complexity.Issues in ProjectManagement - Management Functions, Software Project Management Plan, Software management Structures, Personnel Productivity.	PBL	BL3-Apply	30
Module 4	Software project scheduling and the establishment of relationships among the different tasks.Tasks, dependencies and conflict resolution.Resource management and allocation.	PBL	BL4-Analyze	35
Module 5	Risk assessment and its impact in the planning and scheduling of software projects.	PBL	BL5-Evaluate	35

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	• Roger S. Pressman, Software Engineering – A Practitioner's Approach, Mcgraw-Hill, 2004. Bernd Bruegge and Allen H. Dutoit, Object-Oriented Software Engineering: Using UML, Patterns and Java, 2nd Edition, Prentice Hall, 2003Bernd • Bruegge and Allen H. Dutoit, Object-Oriented Software Engineering: Using UML, Patterns and Java, 2nd Edition, Prentice Hall, 2003.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO3	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
CO4	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Agriculture Kiosk and Rural Development
Course Code	ELP-AEXT-401 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s	Fundamentals of agricultural extension			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Remember the information about NABARD and KIOSK.**(BL1-Remember)** **CO2-** Understand the various advisory expert service of KIOSK for rural area.**(BL2-Understand)** **CO3-** Applying the KIOSK in agriculture and poultry**(BL3-Apply)** **CO4-** Analyzing the different marketing strategies, ups and downs of market.**(BL4-Analyze)** **CO5-** Evaluation of Various rural development programmes for KIOSK development in rural area**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	General information: In this module the students will get details about lands and method need to take to make fertile land, presently available government policies, subsidy rates to crops and pesticides and NABARD rules where it is a National Bank for Agriculture and Rural Development	PBL	BL2-Understand	20
Module 2	Experts Advice: In this module the students will be able to clarify their doubts lively by experts through online video chat and if suppose expert is not available at that time then the that will be directly forwarded to there and they will give the reply to our mail when they see. Live demos are also available to the farmers where they can each and every part in detail. 1. Online video chat 2. Chat info. 3. Live Demos	PBL	BL2-Understand	20
Module 3	Aqua and Poultry information: Here the students will get the details about the Aqua and Poultry farming which includes generation, marketing, exporting and precautions to be taken all these information will be get to Aqua and Poultry farmers. 1. Generation. 2. Marketing. 3. Exporting. 4. Precautions	PBL	BL2-Understand	20
Module 4	Irrigation and Weather information: In this module the farmer will get water resources available in their areas and what steps needs to be taken for irrigation of a particular crop. Four days weather forecasting information is also provided so that the farmer can aware of weather details and they can plan according to it. 1. Water resources. 2. Irrigation 3. Weather forecast	PBL	BL3-Apply	20
Module 5	Agriculture information: Here the information related to the required crop; Seeds, which are to be used, Fertilizers, type of fertilizers to be taken depending on the condition of the crop, type of Precautions to be taken and Time required to cultivate. 1. Crops. 2. Seeds. 3. Pesticides .4. Fertilizers. 5. Precautions	PBL	BL3-Apply	20
Module 6	Market Strategy: Here the students will get the details about the present market trends that means market rates of different crops and seeds and up's and down's in the market from the past 3 months. 1. Market values 2. Ups and down.	PBL	BL4-Analyze	20
Module 7	Connectivity: A sample Idea of placing KIOSK in a state where all villages will be connected through mandal server, all the mandal servers will be connected to district head server and finally all the district servers will be connected to state main server.	PBL	BL4-Analyze	20
Module 8	Rural development e- programmers: e-grama network, promoted by Gramin MahitiParishat (GMP) – an NGO working to establish computer kiosk enterprises in rural area. E-grama offers membership-fee-based access to basic PC-enabled services. A per-family fee allows any person from the member's family to access the kiosk at any time	PBL	BL5-Evaluate	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	Agriculture In India : Policy And Performance by B Sambasiva Rao • Agricultural Problems of India by C B Mamoria • Handbook of Poverty in India: Perspectives, Policies, and Programmes by R. Radhakrishna, Shovan Ray • Exploring Reading Kiosk Concept: Creating Reading Habit among the Citizen by Nurhayati Abdul. • Rural Development principles and policy by Katar Singh and Anil Shisodiya. • Rural Development planning and management by Gullybaba.
Articles	
References Books	Rural Development principles and policy by Katar Singh and Anil Shisodiya. • Textbook of Rural Development Entrepreneurship & Communication Skillby Sagar mondal • Rural development approaches and strategies by Radhika Kapoor. • E- Governance and rural development empirical study by Rajesh Kumar
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
CO3	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Introduction to Indigenous Technical Knowledge
Course Code	ELP-AEXT-402 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s	Fundamentals of indigenous knowledge system			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Identify the concept of Indigenous Technical Knowledge and its importance.**(BL1-Remember)** **CO2-** Explain the need and importance of protecting ITK.**(BL2-Understand)** **CO3-** Illustrate various enactments related to the protection of technical knowledge**(BL3-Apply)** **CO4-** Interpret the concepts of Intellectual property to protect the technical knowledge.**(BL4-Analyze)** **CO5-** Assess the importance of ITK**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG7(Affordable and clean energy) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module-1	Introduction to Indigenous Technical Knowledge: Define ITK , nature and characteristics, scope and importance, kinds characteristics, knowledge vis- a-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge	PBL	BL2-Understand	32
Module-2	Protection of Indigenous Technical Knowledge:The need for protecting traditional knowledge Significance of ITK Protection, value of ITK in global economy, Role of Government to harness ITK.	PBL	BL3-Apply	32
Module-3	Legal framework and ITK: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); The Biological Diversity Act 2002 and Rules 2004,.	PBL	BL4-Analyze	32
Module-4	Indigenous Technical Knowledge and intellectual property: Systems of ITK protection, Legal concepts for the protection of ITK, Patents, Strategies to increase protection of ITK	PBL	BL5-Evaluate	32
Module-5	Traditional Knowledge in Different Sectors: Traditional medicine system, ITK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of ITK	PBL	BL6-Create	32

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Organic Production Technology
Course Code	ELP-AGRON-402 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Students will receive training in the area of organic crop production.**(BL1-Remember)** **CO2-** Enhance the suitability of the crop production through the organic amendments**(BL2-Understand)** **CO3-** Analyse the challenges of crop production and management along with the possible practical solutions**(BL3-Apply)** **CO4-** Evaluate organic farming in terms of profitability and production quality.**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	Applying the principles of organic farming in in the field	Field work	BL2-Understand	20
Module 2	Production and application of vermicompost and others organics amendments	Field work	BL2-Understand	20
Module 3	Enrichment of vermicompost with various amendments (bio-fertilizers, bio-pesticides)	Field work	BL3-Apply	20
Module 4	PrepaOn field practices on Bio-fumigation and soil solarisation processesration and application of Jeevamrit and Bijamrit	Field work	BL3-Apply	20
Module 5	Preparation of design/layout for organic farm management for various agricultural crops along with suitable conversion plan	Field work	BL3-Apply	20
Module 6	On field application of green manuring	Field work	BL3-Apply	20
Module 7	Nutrient and microbial assessment of various organic various amendments and bio-enhancers	Field work	BL4-Analyze	20
Module 8	To know about the documentation and certification processes for organic products	Field work	BL4-Analyze	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	Singh, A.K. (2012). Organic Farming. New India Publishing Agency.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	1	1	-	-	-	-	-	-	-	3	-	-
CO2	-	2	3	2	2	1	-	-	-	-	-	-	-	2	-
CO3	3	-	2	2	2	2	-	-	-	-	-	-	-	1	2
CO4	-	1	-	1	-	-	-	-	-	-	1	1	1	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Commercial Crop Production Technology
Course Code	ELP-AGRON-403 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s	Crop Production Technology			**Co-Requisite/s**	Practical crop production			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance and scope of commercial crop production.**(BL1-Remember)** **CO2-** Explain the knowledge regarding various organic matters and synthetic material for commercial productions**(BL2-Understand)** **CO3-** Demonstrate various agronomical crops under different organic & synthetic products contents**(BL3-Apply)** **CO4-** Analyze the challenges of commercial cultivation, establishment and management along with the possible Practical solutions**(BL4-Analyze)** **CO5-** Evaluate the commercial production of agronomical crop under different practices**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	Applying the principle of commercial crop production	Field work	BL2-Understand	20
Module 2	Preparation of Field layout	Field work	BL2-Understand	20
Module 3	Hands on training on seed treatment and sowing	Field work	BL3-Apply	20
Module 4	Practices for Nutrient management	Field work	BL3-Apply	20
Module 5	Water and Weed management	Field work	BL3-Apply	20
Module 6	Practices for major insect-pests, diseases of crops and their Management	Field work	BL4-Analyze	20
Module 7	Practices for Harvesting of crop	Field work	BL4-Analyze	20
Module 8	Estimation of cost of cultivationand Marketing of produce	Field work	BL5-Evaluate	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	. Shagun, and Jhala, V.S. 2022. Agronomy of Oilseed, Fibre and Sugar Crops. Amiga Press 2. Das, N.R. 2017. Practical Manual on Basic Agronomy (With Theory) 2nd Revised Ed. Scientific Publishers 3. Singh, C. 1983. Modern Techniques of Raising Field Crops. Oxford & IBH 4. U. S. Walia, S.S. Kler, D.S. Singh, D., 1986.ICAR, Science of Agronomy. Scientific Publishers (India) 5. Joshi, M. 2015. Textbook of field crops. PHI Learning 6.Kamburova, V.S. and Kim, S.K. 2018. Fundamentals of Agronomy. Scitus Academics LLC
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	2	1	-	-	-	-	-	-	-	-
CO4	-	-	3	1	1	-	-	-	-	-	-	-	-	-	-
CO5	-	2	-	-	1	-	-	1	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Poultry Production Technology
Course Code	ELP-AHS-401 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s	Livestock and Poultry Production			**Co-Requisite/s**	Livestock and Poultry Production			
Course Outcomes & Bloom's Level	**CO1-** Describe the role of poultry production in the national economy**(BL1-Remember)** **CO2-** Explain and demonstrate important practices at a poultry farm**(BL2-Understand)** **CO3-** Interpret important Indian and exotic breeds of poultry**(BL3-Apply)** **CO4-** Classification of classes of poultry**(BL4-Analyze)** **CO5-** Evaluate livestock and poultry diseases.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	External body parts of poultry	Field work	BL2-Understand	20
Practical 2	Handling and restraining of birds.	Field work	BL2-Understand	20
Practical 3	Identification methods of poultry.	Field work	BL2-Understand	20
Practical 4	Visit to Industrial Poultry Farm.	Field work	BL3-Apply	20
Practical 5	To study breeds of livestock and poultry and daily routine farm operations and farm records.	Field work	BL3-Apply	20
Practical 6	Judging of poultry.	Field work	BL3-Apply	20
Practical 7	Culling of poultry.	Field work	BL3-Apply	20
Practical 8	Planning and layout of housing for different types of poultry farms.	Field work	BL3-Apply	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	Benerjee, G.C. (2019). A Textbook of Animal Husbandry. Oxford. Sastri, N.S.R., Thomas, C.K. and Singh R.A. 2016. Livestock Production and Management. Kalyani Publishers. Singh, R. (2009). Essentials of Animal Production and Management. Kalyani Publishers. ICAR. (2015). A Handbook of Animal Husbandry. ICAR. Verma, D.N. (2005). A Textbook of Livestock Production Management in Tropics. Kalyani Publishers.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	-	-	-	-	-	-	-	-	-	-	3	-
CO2	-	-	1	-	3	-	-	-	-	-	-	-	3	1	-
CO3	-	-	2	3	-	1	-	-	-	-	-	-	-	-	3
CO4	-	-	-	3	-	-	-	-	-	-	-	2	-	-	-
CO5	-	-	1	-	2	-	2	-	-	-	-	1	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Production Technology for Bio-agents and Bio-fertilizer
Course Code	ELP-ENT-402 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s	Entomology			**Co-Requisite/s**	Entomology			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)** **CO5-** Develop skill for evaluation and performance of bio-agents and bio-fertilizers in vitro and field application.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	Introduction, history, Importance and scope of bio-fertilizers and bio-agents.	Experiments	BL2-Understand	20
Module 2	Isolation and identification of fungal bio-control agents i.e. Trichoderma spp, and Beauveriabassiana from rhizosphere	Experiments	BL2-Understand	20
Module 3	Isolation and identification of bacterial bio-control agents i.e. Pseudomonas fluoresces and Bacillus subtilis from soil, Azospirillum from plant roots.	Experiments	BL3-Apply	20
Module 4	Isolation and identification of bio-fertilizer i.e.Rhizobium from root nodules and Azotobacter from soil.	Experiments	BL3-Apply	20
Module 5	Mass production and formulation technology of bio-agent Trichoderma viride and Pseudomonas fluoresces	Field work	BL4-Analyze	20
Module 6	Mass production and formulation technology of bio-fertilizers Rhizobium and Azotobacter spp.	Field work	BL4-Analyze	20
Module 7	Methods of application technology of bio-agents and bio-fertilizer in vitro and field condition	Field work	BL5-Evaluate	20
Module 8	Develop the methods of increase Storage, shelf life, quality control and marketing of bio-agents and bio-fertilizers	Field work	BL5-Evaluate	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	SanthaKumari, P. and Vijayasree, V. (2003). Biological Control of Crop Pests in India. Kalyani Publication. Gaur, A.C. (2006). Biofertilizers in Sustainable Agriculture. Indian Council of Agricultural Research Vasantharaj David, B. and Aanatha krishnan, T.N. (2006). General and Applied Entomology. Tata McGraw-Hill. Metcalf, R. L. and Luckman, W.H. (1994). Introduction to Insect Pest Management- Wiley inter science publishing, NewYork.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	1	1	2	3	1	2	-	1	1	-	-	-	2
CO4	3	3	1	1	-	-	1	-	-	1	1	-	-	1	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Storage Entomology
Course Code	ELP-ENT-403 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Students will acquire training in the fields of Stored protection.**(BL1-Remember)** **CO2-** Evaluation of various Storage damage.**(BL2-Understand)** **CO3-** Analyze the challenges of commercial storage insect pests management.**(BL3-Apply)** **CO4-** Evaluate the role of quality farm product stored protection methods.**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG2(Zero hunger) SDG8(Decent work and economic growth) SDG13(Climate action)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module-1	Identification of stored insect biology	Field work	BL2-Understand	20
Module-2	Understanding biology of field crops insect pest	Experiments	BL3-Apply	20
Module-3	Understanding biology of Pulses insect pest	Experiments	BL3-Apply	20
Module-4	Understanding biology of Oilseeds crops insect pest	Experiments	BL3-Apply	20
Module-5	Understanding biology of fiber crops insect pest	Experiments	BL3-Apply	20
Module-6	Understanding biology of Suger crops insect pest	Experiments	BL3-Apply	20
Module-7	Understanding biology of non insect pest	Experiments	BL3-Apply	20
Module-8	Role of different pests control methods	Field work	BL5-Evaluate	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	Pruthi HS, Singh M. Pests of stored grain and their control. Special number. Indian Journal of Agricultural Science. 1950;18:1-52 Pimentel D. World resources and food losses to pests. In: Gorham JR, editor. Ecology and Management of Food Industry Pests. Arlington, Virginia: Association of Official Analytical Chemists; 1991. pp. 5-11 Atwal AS, Dhaliwal GS. Agricultural Pests of South Asia and their Management. New Delhi, India: Kalyani Publishers; 2008
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	2	-	2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	3	-	7	-	-	-	-	-	-	-	-
CO4	-	-	2	1	-	-	1	3	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Integrated Fish Farming
Course Code	ELP-FSC-401 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s	Fundamentals of fisheries			**Co-Requisite/s**	Fish ecology and aquatic Ecosystem			
Course Outcomes & Bloom's Level	**CO1-** Integrate fish farming with other agricultural activities such as crop and livestock production**(BL2-Understand)** **CO2-** Promote sustainability by utilizing agricultural waste for reducing environmental pollution and recourse consumption **(BL2-Understand)** **CO3-** Apply fish farming to benefit multiple income streams providing financial stability **(BL3-Apply)** **CO4-** Analyze the recycling of nutrients from various within systems**(BL4-Analyze)** **CO5-** Evaluate various inputs design to minimize environmental impact by reducing pollution from the ecosystem **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG12(Responsible consuption and production) SDG14(Life below water) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	Selection of fish seed(spawn) production area /land: (a) Select a culturable fish species for polyculture .An average depth of 6.5 to 10ft depth should be maintained in the case of six species composite fish culture.	Field work	BL2-Understand	20
Module 2	Layoutpreparation/Culturalpractices:Netgross area & water area .calculation,Designofexperimentation,isolationdistance,Pondpreparation,fish seedstocking,and calculationofrequiredfish seeds (seedrate) Pre -stocking practices: Ploughing,Fertilizing the Pond ,Liming , Adding minerals etc.	Field work	BL2-Understand	20
Module 3	Fish farming cum Horticulture : Pond banks provide a suitable place which can be economically used for raising fruit and plants like banana ,papaya and vegetables.	Field work	BL2-Understand	20
Module 4	Fish farming with Livestock: In this practice excreta of Animals (poultry	Field work	BL3-Apply	20
Module 5	Fish cum duck Farming: Pond manuring, Aeration , weed removing and provide supplementary feed.	Field work	BL3-Apply	20
Module 6	Stocking size:Thesurvivaloftheﬁngerlingsintroducedintoaparticularponddependsverymuchontheirsize:biggerthesize greater will be the survival rate and vice versa. The fingerlings stocked should have a size of 10 to 40 gm. Water Quality Management : Regular sampling of Physical and chemical water quality parameters	Field work	BL3-Apply	20
Module 7	Growth Promoter and medicines: Various growth promoter and medicines are being used for the growth and production of fish seed.	Field work	BL4-Analyze	20
Module 8	Post stocking Practice on Feed management: Natural feeding is being Provided for the growth of fish seed and using the Bag feeding method for polyculture species.	Field work	BL4-Analyze	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
CO4	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Seed Testing and Quality Assessment
Course Code	ELP-GPB-402 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Assess the actual planting value of the seed in terms of its germination capacity**(BL1-Remember)** **CO2-** Evaluation of seed quality attributes of the seed lots which have to be offered for sale.**(BL2-Understand)** **CO3-** Analyze the quality maintenance challenges of commercial Seed.**(BL3-Apply)** **CO4-** Evaluate the role of quality seed and their effect on farming society & seed industry.**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG6(Clean water and sanitation)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	Seed sampling techniques	Field work	BL2-Understand	20
Module 2	Physical purity test:	Field work	BL2-Understand	20
Module 3	Germination Test:	Field work	BL3-Apply	20
Module 4	Seed Viability Test:	Field work	BL3-Apply	20
Module 5	Seed Vigour test:	Field work	BL3-Apply	20
Module 6	Electrophoresis test/ Test Weight & Seed Index:	Field work	BL3-Apply	20
Module 7	Seed moisture Test:	Field work	BL3-Apply	20
Module 8	Seed Treatment for quality enhancement:	Field work	BL4-Analyze	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	Agarwal, R.L. (2012). Seed Technology. Oxford & IBH Publishing Company Pvt. Ltd., New Delhi. Chakrabarthi, S.K. (2010). Seed Production and Quality Control. Kalyani Publisher, New Delhi.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	1	1	-	-	-	-	-	-	-	3	-	-
CO2	-	2	3	2	2	1	-	-	-	-	-	-	-	3	-
CO3	3	-	2	2	2	2	-	-	-	-	-	-	-	1	2
CO4	-	1	-	1	-	-	-	-	-	-	1	1	1	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Commercial Horticulture (Vegetable and Spices Crop Production)
Course Code	ELP-HORT-401 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Describe the importance and scope of vegetable and spices cultivation.**(BL1-Remember)** **CO2-** Explain the knowledge regarding various crop productions under commercial Horticultural.**(BL2-Understand)** **CO3-** Demonstrate various vegetable and spices crops.**(BL3-Apply)** **CO4-** Analyse the challenges of cultivation establishment and management along with the possible practical solutions.**(BL4-Analyze)** **CO5-** Evaluate the hybrid seed production of vegetables and spices. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	Project preparation for establishment of various vegetable and spices crops.	PBL	BL2-Understand	20
Module 2	Practices in preparatory operations, different types of growing media, soil decontamination techniques	PBL	BL2-Understand	20
Module 3	Preparation of field for cultivation of brinjal and tomato	PBL	BL2-Understand	20
Module 4	Hands on training of various intercultural operations under the brinjal and tomato cultivation	PBL	BL3-Apply	20
Module 5	Use/application drip irrigation system in vegetable and spices crops.	PBL	BL3-Apply	20
Module 6	Practices of hybrid seed production of vegetables and spices	PBL	BL3-Apply	20
Module 7	Estimation of cost of cultivation for brinjal and tomato.	PBL	BL4-Analyze	20
Module 8	Village survey to study about the major constant faced by the farmers in adopting drip irrigation system in cultivation under gird region	PBL	BL4-Analyze	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	Hazra, P. (2011). Modern Technology in Vegetable Production. New India Publishing Agency, New Delhi. Hazra, P. (2006). Vegetable science. Kalyani Publishers, Ludhiana. Pruthi J.S., (1993). Major Spices of India- Crop Management Postharvest Technology. ICAR, New Delhi. Pruthi, J.S. (2001). Minor Spices and Condiments-Crop Management Post Harvest Technology. ICAR, New Delhi.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	-	-	-	-	-	-	-	-	-	-	3	-
CO2	-	1	-	3	-	-	-	-	-	-	-	-	3	2	-
CO3	-	2	3	-	1	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	2	-	-	-
CO5	-	-	1	-	2	-	2	-	-	-	-	1	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Floriculture and landscaping
Course Code	ELP-HORT-402 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s	Horticulture			**Co-Requisite/s**	Horticulture			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance and scope Floriculture and Landscape designing**(BL1-Remember)** **CO2-** Explain the basic concept of landscape architecture**(BL2-Understand)** **CO3-** Demonstrate various Software for landscape architecture**(BL3-Apply)** **CO4-** Analyse the challenges of value addition of commercial floriculture crops**(BL4-Analyze)** **CO5-** Evaluate the role of value addition and essential oil extraction in floriculture industry**(BL5-Evaluate)** **CO6-** Design landscape layout by utilizing Software and Create value added products from waste.**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	Introduction to Floriculture and Landscaping Objective: • To understand the basic concept of floriculture • To study the present scenario of Ornamental crops and landscape designing	Field work	BL2-Understand	20
Module 2	Identification of Ornamental Crops Objective: • To identify the major ornamental crops in locality • To understand the crop morphology and characters	Field work	BL2-Understand	20
Module 3	Propagation of Ornamental Crops Objective: • To understand the propagation methods for flower crops • To identify the major propagation techniques of ornamental crops in locality	Field work	BL3-Apply	20
Module 4	Landscape design and planning Objective: • To learn about the landscape architecture and planning • To understand the 2D and 3D design concept • To use Software like 5D Planner, Sketchup and AutoCAD for landscape designing	Field work	BL3-Apply	20
Module 5	Specialized Garden design Objective: • To learn about the landscape architecture and planning • To understand the concept of UPH • To use Software like 5D Planner, Sketchup and AutoCAD for landscape designing	Field work	BL3-Apply	20
Module 6	Production of cut/loose flower Objective: • To learn about the package and practices of major flower crops. • To understand the propagation and nursery management techniques of flower crops. • Cost of cultivation of production technology.	Field work	BL3-Apply	20
Module 7	Dry flower production technology of flower crops Objectives: • To learn about the various drying methods • To practice the dry flower products • To analyse the cost of dry flower products	Field work	BL4-Analyze	20
Module 8	Post harvest handling of Flower crops Objective: •To inculcate the knowledge about the preservative technology •To study the post-harvest handling of flower crops •To practice the vase life study of major cut flower	Field work	BL4-Analyze	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	Bose, T. K. and Chowdhury, B. (1991). Tropical Garden Plants in colour. Horticulture and allied publishers, 3D Madhab Chatterjee Street Kolkata. Peter, K.V. (2009). Ornamental plants. New India publishing agency, Pitampura, New Delhi. 24 Bird, R. (2002). Flowering trees and shrubs. Printed in Singapore by Star Standard Industries pvt. Ltd. Chowdhury, B.D. and Jana, B. L. (2014). Flowering Garden trees. Pointer publishers, Jaipur. India. Arora, J.S. (2006). Introductory Ornamental Horticulture. Kalyani Publishers, Ludhiana Randhawa, G.S. and Mukhopadhyay, A. (2004). Floriculture in India. Allied Publishers Pvt. Ltd., New Delhi. Bose, T.K. and Mukherjee, D. (2004). Gardening in India. Oxford & IBH Publishers.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	2	2	1	-	3	-	1	1	1	1	2	-
CO3	-	3	3	1	1	3	2	1	2	-	1	1	-	-	2
CO4	-	3	3	1	1	-	-	1	-	-	1	1	-	1	-
CO5	-	3	3	-	-	-	-	-	-	-	-	-	-	-	1
CO6	-	-	3	1	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Commercial Nursery _____ Horticultural Crops
Course Code	ELP-HORT-404 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s	Horticulture			**Co-Requisite/s**	Horticulture			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance and scope Commercial Nursery in horticultural Crops**(BL1-Remember)** **CO2-** Explain the suitability of Multiplication methods in different horticultural crops**(BL2-Understand)** **CO3-** Demonstrate various plant propagation techniques in the field**(BL3-Apply)** **CO4-** Analyse the challenges of commercial nursery establishment and management along with the possible practical solutions**(BL4-Analyze)** **CO5-** Evaluate the role of PGR and media in mass multiplication of horticultural crops**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module-01	Design/layout of commercial nursery and preparation of nursery beds	Field work	BL2-Understand	20
Module-02	Preparation of various growing medias	Field work	BL2-Understand	20
Module-03	Enrichment of growing medias with various amendments	Field work	BL3-Apply	20
Module-04	Nursery raising of various horticultural crops	Field work	BL3-Apply	20
Module-05	Mass multiplication of various horticultural crops through cuttings	Field work	BL3-Apply	20
Module-06	Hands on practices on layering and stooling	Field work	BL3-Apply	20
Module-07	Hands on practices on various methods of budding and grafting	Field work	BL4-Analyze	20
Module-08	Marketing of nursery plants and seedlings	Field work	BL4-Analyze	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41			100	

Part E

Books	Singh, J. (2012). Basic Horticulture. Kalyani Publishers. New Delhi. Kumar, N. (1997). Introduction to Horticulture. Rajyalakshmi Publications, Nagorcoil, Tamil Nadu. Randhawa, G.S. and Mukhopadhyaya, A. (1994). Floriculture in India. Allied Publishers Pvt. Ltd., New Delhi Chadha, K.L. (2019). Handbook of Horticulture (Vol-I). ICAR, New Delhi.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	2	2	1	-	3	-	1	1	1	1	2	-
CO3	-	3	3	1	1	3	2	1	2	-	1	1	-	-	2
CO4	-	3	3	1	1	-	-	1	-	-	1	1	-	1	-
CO5	-	3	3	-	-	-	-	-	-	-	-	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Organic Vegetable Production
Course Code	ELP-HORT-406 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s	Horticulture			**Co-Requisite/s**	Horticulture			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance and scope of organic vegetable cultivation.**(BL1-Remember)** **CO2-** Explain the knowledge regarding various organic matters for vegetable productions.**(BL2-Understand)** **CO3-** Demonstrate various vegetable crops under different organic contents.**(BL3-Apply)** **CO4-** Analyse the challenges of organic cultivation, establishment and management along with the possible practical solutions.**(BL4-Analyze)** **CO5-** Evaluate the organic production of vegetables under different organic contents.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	Project preparation for establishment of various organic vegetable crops.	Experiments	BL2-Understand	20
Module 2	Practices in preparatory operations and different types of growing media.	Field work	BL2-Understand	20
Module 3	Preparation of field for cultivation of vegetables	Field work	BL2-Understand	20
Module 4	Hands on training of various intercultural operations.	Field work	BL3-Apply	20
Module 5	Use/application of various irrigation systems in vegetable crops.	Field work	BL3-Apply	20
Module 6	Practices for organically plant protection.	Field work	BL3-Apply	20
Module 7	Estimation of cost of cultivation for vegetable production	Field work	BL4-Analyze	20
Module 8	Village survey to study about the major constant faced by the farmers in adopting organic vegetable cultivation under gird region.	Field work	BL4-Analyze	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41			100	

Part E

Books	Hazra, P. (2011). Modern Technology in Vegetable Production. New India Publishing Agency, New Delhi. Dhaliwal, (M.S). 2020. Handbook of Vegetable Crops. Kalyani Publishers.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	2	2	1	-	3	-	1	1	1	1	2	-
CO3	-	3	3	1	1	3	2	1	2	-	1	1	-	-	2
CO4	-	3	3	1	1	-	-	3	-	-	1	1	-	1	-
CO5	-	3	3	-	-	-	-	-	-	-	-	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Hydroponics
Course Code	ELP-HORT-407 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s	Fundamentals of Horticulture			**Co-Requisite/s**	Production technology of vegetables and spices			
Course Outcomes & Bloom's Level	**CO1-** CO-1. Describe the importance and scope Soil-less Cultivation practices and production technology for Exotic horticultural crops**(BL1-Remember)** **CO2-** CO-2. Explain the basic concept of Growing media and Nutrient solution under protected cultivation**(BL2-Understand)** **CO3-** CO-3. Demonstrate various technologies and management practices under Hydroponics**(BL3-Apply)** **CO4-** CO-4. Analyze the challenges of Nutrient management under Hydroponics/protected cultivation**(BL4-Analyze)** **CO5-** CO-5. Evaluate the role of AI technology and marketing strategies under Hydroponic cultivation of horticultural crops**(BL5-Evaluate)** **CO6-** CO-6. Create a model layout plan with proper marketing approaches for exotic horticultural crops under advance hydroponics Schemes**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG8(Decent work and economic growth) SDG12(Responsible consuption and production) SDG13(Climate action)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module-1	Plant Nutrition and its Management in Hydroponics	Field work	BL2-Understand	20
Module-2	Plant Protection in Soil-less practices	Field work	BL3-Apply	20
Module-3	Various Models under hydroponic system	Field work	BL5-Evaluate	20
Module-4	Aquaponics Model and practices	Field work	BL3-Apply	20
Module-5	Aeroponics Model and practices	Field work	BL3-Apply	20
Module-6	Vegetable and Spices Crops production under Hydroponics	Field work	BL4-Analyze	20
Module-7	Ornamental Crops production under Hydroponics	Field work	BL5-Evaluate	20
Module-8	Economics and Government Regulations in Soil-less cultivation	Field work	BL6-Create	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	Hydroponics: The Essential Hydroponics Guide: A Step-By-Step Hydroponic Gardening Guide to Grow Fruit, Vegetables, and Herbs at Home Hydroponics: A Practical Guide for the Soilless Grower (2nd Edition), by Dr. J. Benton Jones Commercial Hydroponics by John Mason
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	-	-	-	2	-	-	-	-	-	-	-	-
CO3	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-
CO4	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Processing, Preservation and Value Addition in OMA Plants
Course Code	ELP-HORT-408 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s	Fundamentals of Horticulture			**Co-Requisite/s**	Post-harvest and value addition of fruits and vegetable			
Course Outcomes & Bloom's Level	**CO1-** Comprehends various processing techniques applicable to ornamental medicinal and aromatic plants.**(BL1-Remember)** **CO2-** Acquire proficiency in preservation methods enabling effective quality assurance and extended shelf life.**(BL2-Understand)** **CO3-** Apply value addition strategies enabling to capitalize on the diverse applications and market opportunities.**(BL3-Apply)** **CO4-** Develop competence in accessing the quality of processed and preserved products**(BL4-Analyze)** **CO5-** Analyze market dynamics with respect to consumer preference.**(BL5-Evaluate)** **CO6-** Creation of preserve, processed and value-added products sustainably**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module-1	Effect of Drying Methods on Aromatic Plant Quality Compare the impact of air-drying, oven-drying, and freeze-drying on the aroma, color, and chemical composition of aromatic plants like lavender or mint.	Experiments	BL2-Understand	20
Module-2	Preservation Techniques for Ornamental Plants Investigate the efficacy of different preservation methods (such as drying, glycerine preservation, and silica gel drying) on maintaining the color and texture of ornamental plants like roses or orchids.	Experiments	BL2-Understand	20
Module-3	Biochemical Analysis of Medicinal Plant Extracts Analyze the biochemical composition of extracts from medicinal plants like ginseng or echinacea using techniques like chromatography and spectrophotometry to determine their medicinal value.	Experiments	BL3-Apply	20
Module-4	Comparative Study of Preservation Methods for Aromatic Herbs Compare traditional preservation methods (e.g., drying, salt curing) with modern techniques (e.g., vacuum sealing, freeze-drying) to determine their impact on the aroma and flavor retention of herbs like basil or thyme.	Experiments	BL3-Apply	20
Module-5	Enhancing Medicinal Plant Properties through Fermentation Study the effects of fermentation on the bioactivity and bioavailability of compounds in medicinal plants such as garlic or aloe vera, exploring changes in chemical composition and potential health benefits.	Experiments	BL4-Analyze	20
Module-6	Value Addition through Herbal Tea Blending Experiment with blending different dried aromatic and medicinal herbs to create unique herbal tea blends, assessing their sensory qualities and potential health benefits through taste tests and chemical analysis.	Experiments	BL4-Analyze	20
Module-7	Preservation Techniques for Fresh-cut Ornamental Flowers Investigate the effectiveness of preservatives, hydration solutions, and storage conditions in prolonging the vase life of fresh-cut ornamental flowers like roses or carnations	Experiments	BL5-Evaluate	20
Module-8	Assessment of Antioxidant Activity in Aromatic Plants Measure the antioxidant activity of aromatic plants such as sage or oregano using assays like DPPH radical scavenging or ORAC (oxygen radical absorbance capacity) to quantify their potential health benefits.	Experiments	BL5-Evaluate	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	Bose, T. K. and Chowdhury, B. 1991.Tropical Garden Plants in colour. Horticulture and allied publishers, 3D Madhab Chatterjee street Kolkata. K.V.Peter.2009.Ornamental plants. New India publishing agency, Pitampura, New Delhi.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO4	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Multimedia and Graphic Designing & Production of Information Materials
Course Code	ELP-JMC-401 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s	fundamentals of computer application			**Co-Requisite/s**	Tools and techniques of information generation and representation			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)** **CO5-** Develop skill for evaluation and performance of bio-agents and bio-fertilizers in vitro and field application.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module-1	Introduction to multimedia, multimedia definition and concepts, need of multimedia, Areas of use, development platform for multimedia, identify multimedia elements text, images, sound, animation and video, multimedia hardware and software requirement, making simple multimedia with power point, text as a component of multimedia, concept of plain and formation text, RTF and HTML text, object linking and embedding concept, fonts- needs and types.	PBL	BL2-Understand	32
Module-2	Sound in Multimedia , Importance of Sound in Multimedia, Sound and its attributes – tone, intensity, frequency, wavelength , pitch etc . Mono v/s Stereo sound , sound channel, effects in sound , analog v/s digital sound, overview of various sound file formats on PC WAVE, MP3, concept of MIDI, software for sound editing and mixing, 3D sound .	PBL	BL3-Apply	32
Module-3	Graphics in Multimedia, importance of graphics in multimedia, vector and raster graphics, image capturing methods, scanner, digital camera etc. Various attributes of images- Size, color, bit depth, resolution etc., Various image file formats- BMP, DIB,EPS, PIC and TIF formats and their features and limitations .	PBL	BL4-Analyze	32
Module-4	Video and animation in multimedia, impact of video in multimedia, basics of videos, analog and digital video, how to use video on PC, brief note on various video standard, PAL, NTSE, different file format and their use in multimedia, MPEG, AVI, MJPG, name of video editing software, basics of animation, types of animation and use of animation, software for creating animations	PBL	BL5-Evaluate	32
Module-5	Application of multimedia and its future, application og multimedia in different industries Education, Entertainment, Journalism etc. Future of Multimedia, Carrier in multimedia production, virtual reality as new technology in multimedia, application of VR, introduction to HMD, Boom cave, introduction to various types authoring tools.	PBL	BL5-Evaluate	32

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	How to use graphic design to sell things, explain things, make things look better, make people laugh, make people cry, and (every once in a while) change the world' by Michael Bierut
Articles	
References Books	The honest guide to creativity and logo design by James martin.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
CO4	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
CO5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Mushroom Cultivation Technology
Course Code	ELP-PP-401 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s	Plant pathology			**Co-Requisite/s**	Plant pathology			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)** **CO5-** Develop skill for evaluation and performance of bio-agents and bio-fertilizers in vitro and field application.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG2(Zero hunger) SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	Introduction to mushrooms -Taxonomical rank -History and Scope of mushroom cultivation - Edible and Poisonous Mushrooms-Vegetative characters	Field work	BL2-Understand	20
Module 2	Identification of common edible, medicinal and poisonous mushroom	Field work	BL2-Understand	20
Module 3	Health benefits of mushrooms, Nutritional and medicinal values of mushrooms. Therapeutic aspects- antitumor effect	Field work	BL2-Understand	20
Module 4	Spawn production - Culture media preparation- production of pure culture, mother spawn preparation	Field work	BL3-Apply	20
Module 5	Sterilization and sanitation of mushroom house, Selection of substrate for mushroom cultivation, Composting technology, mushroom bed preparation	Field work	BL4-Analyze	20
Module 6	Spawning, spawn running, Cultivation technology of oyster, milky and paddy straw mushroom and harvesting.	Field work	BL4-Analyze	20
Module 7	Problems in mushroom cultivation - diseases, pests and nematodes, moulds and their management strategies	Field work	BL5-Evaluate	20
Module 8	Post-harvest technology: Preservation of mushrooms - freezing, dry freezing, drying, canning, quality assurance and entrepreneurship	Field work	BL4-Analyze	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41			100	

Part E

Books	Suman, B.C. and Sharma, V.P. (2007). Mushroom Cultivation in India, Daya Publishing House, New Delhi. Cotter, T. (2014). Organic Mushroom Farming and Mycoremediation: Simple to Advanced and Experimental Techniques for Indoor and Outdoor Cultivation. Chelsea Green Publishing. Chang, S. T. and Hayes, W. A. (1978). The Biology and Cultivation of Edible Mushrooms. Academic Press. New York. 230 P. Chang, S.T. and Miles, P. G. (2004). Mushrooms: Cultivation, Nutritional Value, Medicinal Effect, and Environmental Impact. CRC Press. 480 P. Fletcher, J. T., White, P. F. and Gaze, R. H. (1994). Mushrooms: Pest & Disease Control. 2nd. Ed. Intercept Andover, Hants. Great Britain. 174 P. Krieger, L. C. (2010). The Mushroom Handbook. Sufi Press. 578 P.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	1	1	2	3	1	2	-	1	1	1	-	-	2
CO4	3	3	1	1	-	-	1	-	-	1	1	1	-	1	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Plant Health Diagnosis and Management
Course Code	ELP-PP-402 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)** **CO5-** Develop skill for evaluation and performance of bio-agents and bio-fertilizers in vitro and field application.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module-1	Identification of different plant diseases through regular field visit.	PBL	BL2-Understand	20
Module-2	Study on occurrence of the disease and their relations with the weather parameters. Selected disease will be observed on weekly interval (Standard Meteorological Weeks) and disease scoring will be done. Data handling in excel (Microsoft Office) and correlation matrix analysis study will be carried out. Area under disease progress curve (AUDPC) will be computed. Graph designing.	PBL	BL3-Apply	20
Module-3	Symptomatological studies of plant diseases on natural conditions.	PBL	BL4-Analyze	20
Module-4	Isolation of the plant pathogen. Preparation of the media.	PBL	BL3-Apply	20
Module-5	Steps of Koch Postulates: a) The microorganism or other pathogen must be present in all cases of the disease. b) The pathogen can be isolated from the diseased host and grown in pure culture. c) The pathogen from the pure culture must cause the disease when inoculated into a healthy, susceptible host. The pathogen must be reisolated from the new host and shown to be the same as the originally inoculated pathogen	PBL	BL4-Analyze	20
Module-6	Morphological studies of the pathogens and their preservation in agar slants.	PBL	BL5-Evaluate	20
Module-7	In-vitro management of the pathogen through different plant extracts and chemical pesticides.	PBL	BL5-Evaluate	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	Dube, H. C. (2013). An Introduction to Fungi. 4 th (Ed). Scientific Publishers, Jodhpur, India. Agrios, G.N. (2004). Plant Pathology. (5th Ed.). Elsevier Academic Press. 882p. Alexopoulos, C.J., Mims, C.W. and Blackwell, M. (2014). Introductory Mycology (4th Ed.)Wiley India Pvt Ltd. 833p Ravichandra, N.G. (2013). Fundamentals of Plant Pathology. PHI Learning Pvt Ltd. 639p Walkey, D. G. (1991). Applied Plant Virology (2nd Ed.) Springer, 352
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	1	1	-	-	-	-	-	-	-	3	-	-
CO2	-	2	3	2	2	1	-	-	-	-	-	-	-	3	-
CO3	3	-	2	2	2	2	-	-	-	-	-	-	-	1	2
CO4	-	1	-	1	-	-	-	-	-	-	1	1	1	-	-
CO5	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Seed Pathology
Course Code	ELP-PP-403 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s	Fundamentals of Plant Pathology			**Co-Requisite/s**	Principles of Integrated Pest and Disease Management			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)** **CO5-** Develop skill for evaluation and performance of bio-agents and bio-fertilizers in vitro and field application.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	History and economic importance of seed health in seed industry and plant quarantine – important seed borne and seed transmitted pathogens	PBL	BL2-Understand	20
Module 2	Morphology and anatomy of typical monocotyledonous and dicotyledonous infected seeds	PBL	BL2-Understand	20
Module 3	Localization and mechanism of seed transmission in relation to seed infection, seed to plant transmission of pathogens	PBL	BL3-Apply	20
Module 4	Method for isolation and purification of Seed borne plant pathogens	PBL	BL3-Apply	20
Module 5	Conventional and advanced techniques in the detection and identification of seed-borne fungi, bacteria and viruses.	PBL	BL3-Apply	20
Module 6	Detect the Production of toxic metabolites produced by seed borne pathogens affecting seed quality and its impact on human, animal and plant health	PBL	BL4-Analyze	20
Module 7	Production of disease-free seeds in agricultural and horticultural crops; management of seed borne pathogens	PBL	BL5-Evaluate	20
Module 8	Develop the Integrated Disease Management Strategies for Seed-borne Diseases	PBL	BL5-Evaluate	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	• Agarwal VK and Sinclair JB. 1993. Principles of Seed Pathology. Vols. I & II, CBS Publ., New Delhi. • Hutchins JD and Reeves JE. (Eds.). 1997. Seed Health Testing: Progress Towards the 21st Century. CABI,Wallington. • Paul Neergaard. 1988. Seed Pathology. • McMillan, London. Suryanarayana D. 1978. Seed Pathology. Vikash Publ., New Delhi.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	-	-	-	-	2	-	-	-	-	-	-	-	-
CO2	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-
CO4	-	-	2	1	2	-	-	-	-	-	-	-	-	-	-
CO5	-	-	1	1	2	-	2	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Soil, Plant, Water and Seed Testing
Course Code	ELP-SS-401 [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Lab only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG7(Affordable and clean energy) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	Soil sampling and soil testing procedure:	Field work	BL2-Understand	20
Module 2	Quality enhancement of soil:	Field work	BL2-Understand	20
Module 3	Water sampling and water testing:	Field work	BL3-Apply	20
Module 4	Soil quality enhancement:	Field work	BL3-Apply	20
Module 5	Evaluate of GIS and RS based soil mapping	Field work	BL3-Apply	20
Module 6	Development of soil and plant testing laboratory	Field work	BL4-Analyze	20
Module 7	Development of irrigation water testing laboratory	Field work	BL4-Analyze	20
Module 8	Development of Soil Salinity management center	Field work	BL4-Analyze	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41				

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	-	-	-	-	-	-	-	-	-	-	-	3
CO2	-	1	-	3	-	-	-	-	-	-	-	-	3	1	-
CO3	-	2	3	-	1	-	-	-	-	-	-	-	-	-	3
CO4	-	-	3	-	-	-	-	-	-	-	-	2	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Pests of Crops and Stored Grain and their Management
Course Code	ENT-311 [T]

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Fundamentals of entomology			**Co-Requisite/s**	Insect ecology and morphology			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)** **CO5-** Develop skill for evaluation and performance of bio-agents and bio-fertilizers in vitro and field application.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG10(Reduced inequalities) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	To study about Identification of different types of damage	Field work	BL2-Understand	2
Practical 2	To study about Pests of paddy	Field work	BL2-Understand	2
Practical 3	To study about Identification and study of life cycle and seasonal history of various insect pests attacking vegetable crops and their produce	Field work	BL3-Apply	2
Practical 4	To study about identification of insect pests and Mites associated with stored grain	Field work	BL3-Apply	2
Practical 5	To study about Determination of insect infestation by different methods	Experiments	BL4-Analyze	2
Practical 6	To study about assessment of losses due to insects	Experiments	BL4-Analyze	2
Practical 7	To study about Calculations on the doses of insecticides application technique.	Experiments	BL5-Evaluate	2
Practical 8	To study about Identification of rodents and rodent control operations in godowns.	Field work	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Chaube, H.S and V.S. Pundhir, 2012. Crop Diseases & Their Management. PHI Pvt.Ltd, New Delhi. Rangaswami, G &Mahadevan, K.2001. Diseases of crop plants in India, Prentice Hall of India Pvt.Ltd, New Delhi.
Articles	
References Books	George N. Agrios. 2005. Plant Pathology 5th Edition, Academic Press University of Florida, Gainesville, U.S.A. Singh, R.S.2005. Plant Diseases. Oxford & IBH Publications, New Delhi
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
CO3	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
CO5	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Management of Beneficial Insect
Course Code	ENT-321[T]

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					1	0	1	2
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Entomology			**Co-Requisite/s**	Entomology			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)** **CO5-** Develop skill for evaluation and performance of bio-agents and bio-fertilizers in vitro and field application.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Honey bee species, castes of bees	Field work	BL2-Understand	2
Practical 2	eekeeping appliances and seasonal management, bee enemies and disease.	Field work	BL2-Understand	2
Practical 3	Bee pasturage, bee foraging and communication.	Field work	BL3-Apply	2
Practical 4	Types of silkworm, voltinism and biology of silkworm.	Field work	BL3-Apply	2
Practical 5	Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves.	Field work	BL3-Apply	2
Practical 6	Species of lac insect, host plant identification	Field work	BL4-Analyze	2
Practical 7	Identification of other important pollinators, weed killers and scavengers.	Field work	BL4-Analyze	2
Practical 8	Visit to research and training institutions devoted to beekeeping.	Field work	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Sabu, T. K. (2012). Selected Beneficial and Harmful Insects of Indian Subcontinent. LAP Lambert Academic Publishing. The Xerces Society. (2014). Farming with Native Beneficial Insects: Ecological Pest Control Solutions Kindle Edition. Storey Publishing, LLC. Abrol, D.P. (2010). Bees and Beekeeping in India. Kalyani Publishers, New Delhi, India. Atwal, A.S. (2000). Essentials of Beekeeping and Pollination. Kalyani Publishers, New DelhiLudhiana, India. Ministry of Agriculture and Fisheries. (2018). Beneficial Insects (Classic Reprint). Forgotten Books.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	1	2	-	1	-	-	-	-	-	2	1	-
CO2	-	1	1	2	1	2	2	1	-	-	1	1	1	3	-
CO3	3	-	2	3	2	1	3	2	-	-	2	2	-	-	2
CO4	-	1	-	1	-	-	-	1	-	-	1	1	-	-	-
CO5	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Fundamentals of Plant Breeding
Course Code	GPB- 211[T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Fundamentals of Genetics			**Co-Requisite/s**	Fundamentals of Crop Physiology			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)** **CO5-** Develop skill for evaluation and performance of bio-agents and bio-fertilizers in vitro and field application.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG12(Responsible consuption and production) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Plant kit; Study of germplasm of various crops	PBL	BL2-Understand	2
Practical 2	Hybridization: emasculation and Pollination	PBL	BL2-Understand	2
Practical 3	Study of male sterility system	PBL	BL3-Apply	2
Practical 4	Test of pollen viability.	PBL	BL3-Apply	2
Practical 5	Handing of segregation populations.	PBL	BL4-Analyze	2
Practical 6	Estimation of heterosis, inbreeding depression and heritability.	PBL	BL4-Analyze	2
Practical 7	Methods of calculating mean, range, variance, standard deviation.	PBL	BL5-Evaluate	2
Practical 8	Designs used in plant breeding experiment, analysis of Randomized Block Design	PBL	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Singh, H., Hashmi J. S., & Mousmim S. 2020. Fundamentals of Plant Genetics: Life Sciences and Agriculture. Biotech.
Articles	NA
References Books	
MOOC Courses	
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	1	-	-	-	-	-	-	-	3	1	-
CO2	-	2	-	-	1	-	1	1	-	-	-	1	1	3	-
CO3	3	-	1	1	2	-	1	-	1	-	-	2	-	-	2
CO4	-	1	-	1	-	-	-	1	-	-	-	1	-	1	-
CO5	-	1	-	-	-	-	-	-	-	-	-	-	-	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Principles of Seed Technology
Course Code	GPB- 221[T]

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					1	0	2	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	GPB-221			**Co-Requisite/s**	GPB-221			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)** **CO5-** Develop skill for evaluation and performance of bio-agents and bio-fertilizers in vitro and field application.**(BL5-Evaluate)** **CO6- ()**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Seed production in major cereals: Wheat, Rice, Maize, Sorghum, Bajra and Ragi.	PBL	BL2-Understand	2
Practical 2	Seed production in major pulses: Urd, Mung, Pigeonpea, Lentil, Gram, Field bean, pea.	PBL	BL3-Apply	2
Practical 3	Seed production in major oilseeds: Soybean, Sunflower, Rapeseed, Groundnut and Mustard.	PBL	BL3-Apply	2
Practical 4	Seed production in important vegetable crops.	PBL	BL4-Analyze	2
Practical 5	Seed sampling and testing: Physical purity, germination, viability, etc.	Experiments	BL4-Analyze	2
Practical 6	Seed and seedling vigour test. Genetic purity test: Grow out test and electrophoresis.	Experiments	BL4-Analyze	2
Practical 7	Seed certification: Procedure, Field inspection, Preparation of field inspection report.	Field work	BL6-Create	2
Practical 8	Visit to seed production farms, seed testing laboratories and seed processing plant.	Field work	BL6-Create	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Agarwal, R.L. (2012). Seed Technology. Oxford & IBH Publishing Company Pvt. Ltd., New Delhi.
Articles	
References Books	Ramamoorthy. K., Sivasubramaniam, K. and Kannan, M. (2006). Principles of Seed Certification and Testing. Allied Publishers, New Delhi.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	1	-	-	-	-	-	-	-	3	1	-
CO2	-	2	-	-	1	-	1	1	-	-	-	1	1	2	-
CO3	3	-	1	1	2	-	1	-	1	-	-	2	-	-	1
CO4	-	1	-	1	-	-	-	1	-	-	-	1	-	1	-
CO5	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
CO6	-	2	-	-	-	-	-	-	-	-	1	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Crop Improvement-I (Kharif Crops)
Course Code	GPB-311 [T]

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					1	0	1	2
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Genetics and Plant Breeding			**Co-Requisite/s**	Genetics and Plant Breeding			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)** **CO5-** Develop skill for evaluation and performance of bio-agents and bio-fertilizers in vitro and field application.**(BL5-Evaluate)** **CO6- ()**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG10(Reduced inequalities) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Floral biology, and emasculation in different crop species Rice	Field work	BL2-Understand	2
Practical 2	Floral biology, and emasculation in different crop species Maize	Field work	BL2-Understand	2
Practical 3	Floral biology, and emasculation in different crop species; viz., Sorghum	Field work	BL3-Apply	2
Practical 4	Floral biology, and emasculation in different crop species Pearl millet	Field work	BL3-Apply	2
Practical 5	Floral biology, and emasculation in different crop species Ragi	Field work	BL4-Analyze	2
Practical 6	hybridization techniques in different crop species Rice	Field work	BL4-Analyze	2
Practical 7	hybridization techniques in different crop species Maize	Field work	BL4-Analyze	2
Practical 8	hybridization techniques in different crop species; viz., Sorghum	Field work	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Chopra, V. L. and Prakash, S. (2002). Evolution and Adaptation of Cereal Crops. Oxford & IBH
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	2	2	-	-	-	-	-	-	-	3	1	-
CO2	-	3	2	1	3	-	1	-	-	-	-	1	1	3	-
CO3	3	-	1	2	1	-	-	1	-	-	1	2	-	-	2
CO4	-	3	-	1	-	-	1	-	-	-	1	1	-	1	-
CO5	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Crop Improvement-II (Rabi Crops)
Course Code	GPB-321[T]

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					1	0	1	2
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Genetics and Plant Breeding			**Co-Requisite/s**	Genetics and Plant Breeding			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)** **CO5-** Develop skill for evaluation and performance of bio-agents and bio-fertilizers in vitro and field application.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Floral biology, emasculation and pollination techniques in wheat.	Field work	BL2-Understand	2
Practical 2	Floral biology, emasculation and pollination techniques in chickpea.	Field work	BL2-Understand	2
Practical 3	Floral biology, emasculation and pollination techniques in mustard.	Field work	BL3-Apply	2
Practical 4	Floral biology, emasculation and pollination techniques in sunflower. Floral	Field work	BL3-Apply	2
Practical 5	biology, emasculation and pollination techniques in potato.	Field work	BL3-Apply	2
Practical 6	Floral biology, emasculation and pollination techniques in sugarcane.	Field work	BL4-Analyze	2
Practical 7	Study of field techniques for hybrid seed production.	Field work	BL4-Analyze	2
Practical 8	Estimation of heterosis, inbreeding depression and heritability.	Field work	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Singh, B.D. (2018). Plant Breeding Principles and Methods. Kalyani Publishers. New Delhi. Ram, H. (2019). Crop Breeding and Biotechnology. Kalyani Publishers. New Delhi.
Articles	
References Books	Yadav R.K. (2022). Practical Manual on Crop Improvement-II (Rabi crops). Bhavya Books. Kumar, A., Singh, S.P., Nirala, R.B.P., Singh, P.K. (2018). BAU, Sabour.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	2	2	-	-	-	-	-	-	-	3	1	-
CO2	-	3	2	1	3	-	1	-	-	-	-	1	1	3	-
CO3	3	-	1	2	1	-	-	1	-	-	1	2	-	-	2
CO4	-	3	-	1	-	-	1	-	-	-	1	1	-	1	-
CO5	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Production Technology for Vegetables and Spices
Course Code	HORT- 211[T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					1	0	1	2
Course Type	Embedded theory and field work							
Course Category	Discipline Core							
Pre-Requisite/s	Fundamentals of Horticulture			**Co-Requisite/s**	Fundamentals of Horticulture			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)** **CO5-** Develop skill for evaluation and performance of bio-agents and bio-fertilizers in vitro and field application.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG12(Responsible consuption and production) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
r			
k			

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Identification of vegetables and spice crops and their seeds.	Field work	BL2-Understand	2
Practical 2	To know about the crop morphology and seed identification Nursery raising.	Field work	BL2-Understand	2
Practical 3	Direct seed sowing and transplanting.	Field work	BL3-Apply	2
Practical 4	Fertilizers applications, Harvesting and preparation for market.	Field work	BL3-Apply	2
Practical 5	To learn the fertilizer application methods and calculation.	Field work	BL4-Analyze	2
Practical 6	To understand the various harvesting indices of major vegetable crops	Field work	BL4-Analyze	2
Practical 7	Economics of vegetables and spices cultivation.	Field work	BL4-Analyze	2
Practical 8	To learn about the economical values of various vegetables and spices.	Field work	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Kumar, S., Soni, S., Neetu, and Singh, M. K. 2022. Technology for Vegetable and Spices. Banda University of Agriculture and Technology, Banda.
Articles	NA
References Books	
MOOC Courses	
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	1	2	-	-	-	-	-	-	-	3	-	-
CO2	-	2	2	-	1	-	1	-	-	-	1	-	-	3	-
CO3	1	-	1	2	1	-	2	-	-	-	-	2	-	1	3
CO4	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	-	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Production Technology for Ornamental Crops, MAP and Landscaping
Course Code	HORT- 221[T]

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					1	0	1	2
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Fundamentals of Horticulture			**Co-Requisite/s**	Production Technology for Vegetables and Spices			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)** **CO5-** Develop skill for evaluation and performance of bio-agents and bio-fertilizers in vitro and field application.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Identification of Ornamental and MAP plants.	PBL	BL2-Understand	2
Practical 2	Nursery bed preparation and seed sowing	Field work	BL2-Understand	2
Practical 3	Training and pruning of Ornamental plants	Field work	BL2-Understand	2
Practical 4	Planning and layout of garden.	Field work	BL3-Apply	2
Practical 5	Bed preparation and planting of MAP.	Field work	BL3-Apply	2
Practical 6	Protected structures care and maintenance	Field work	BL4-Analyze	2
Practical 7	Intercultural operations in flowers and MAP	Field work	BL4-Analyze	2
Practical 8	Harvesting and post-harvest handling of cut and loose flowers. Processing of MAP.	Field work	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Lal, L. (2020). Textbook of Production Technology for Ornamental Crops, MAPs & Landscaping. ATPA.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	1	2	-	-	-	-	-	-	-	3	1	-
CO2	-	2	2	-	1	-	1	-	-	-	1	-	-	3	-
CO3	1	-	1	2	1	-	2	-	-	-	-	2	-	-	3
CO4	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	-	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Production Technology for Fruit and Plantation Crops
Course Code	HORT- 222[T]

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					1	0	1	2
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)** **CO5-** Develop skill for evaluation and performance of bio-agents and bio-fertilizers in vitro and field application.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Seed propagation-Scarification and stratification of seeds	PBL	BL2-Understand	2
Practical 2	Propagation methods for fruit and plantation crops	PBL	BL2-Understand	2
Practical 3	Micro-propagation	PBL	BL3-Apply	2
Practical 4	Description and identification of fruit crops	PBL	BL3-Apply	2
Practical 5	Preparation of plant bio regulators and their uses	PBL	BL3-Apply	2
Practical 6	Pests and diseases of Mango, Banana, Citrus	PBL	BL4-Analyze	2
Practical 7	Pests and diseases of Grape, Papaya, guava	PBL	BL4-Analyze	2
Practical 8	Pests and diseases of Apple, Pear, Peach	PBL	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10	0		30	

Part E

Books	Bose, T.K. and Mitra, S.K. (1990). Fruits Tropical and Sub-tropical. Naya Prakashan, Calcutta.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	1	2	-	-	-	-	-	-	-	3	1	-
CO2	-	2	2	-	1	-	1	-	-	-	1	-	1	2	-
CO3	1	-	1	2	1	-	1	-	-	-	-	2	-	3	1
CO4	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	-	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Fundamentals of Horticulture
Course Code	HORT-111[T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					1	0	1	2
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Science and Biology at secondary level			**Co-Requisite/s**	Agriculture at secondary level			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)** **CO5-** Develop skill for evaluation and performance of bio-agents and bio-fertilizers in vitro and field application.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG6(Clean water and sanitation) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Identification of garden tools	Field work	BL2-Understand	2
Practical 2	Identification of horticultural crops	Field work	BL2-Understand	2
Practical 3	Preparation of seed bed/nursery bed	Field work	BL3-Apply	2
Practical 4	Practice of sexual and asexual methods of propagation	Field work	BL3-Apply	2
Practical 5	Layout and planting of orchard	Field work	BL4-Analyze	2
Practical 6	Training and pruning of fruit trees	Field work	BL3-Apply	2
Practical 7	Preparation of potting mixture	Field work	BL4-Analyze	2
Practical 8	Fertilizer application in different crops	Field work	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Singh, J. (2012). Basic Horticulture. Kalyani Publishers. New Delhi. Kumar, N. (1997). Introduction to Horticulture. Rajyalakshmi Publications, Nagorcoil, Tamilnadu. Randhawa, G. S. and Mukhopadhyaya, A. (1994). Floriculture in India. Allied Publishers Pvt. Ltd., New Delhi
Articles	NA
References Books	Chadha, K.L. (2019). Handbook of Horticulture (Vol-I & II). ICAR, New Delhi. Chadha, K. L., Pareek, O. P. and Rethinam, P. (2002). Advances in Horticulture. Malhotra Publishing House, New Delhi.
MOOC Courses	
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	3	1	-
CO2	2	-	-	-	-	-	2	-	-	-	-	-	1	2	-
CO3	2	-	-	1	3	-	3	-	-	-	-	-	-	-	2
CO4	-	1	-	2	-	-	1	-	-	-	-	-	-	-	-
CO5	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Post Harvest Management and Value Addition of Fruit and Vegetables
Course Code	HORT-321[T]

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					1	0	1	2
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Horticulture			**Co-Requisite/s**	Horticulture			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)** **CO5-** Develop skill for evaluation and performance of bio-agents and bio-fertilizers in vitro and field application.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	To study packaging and use of containers for shelf life extension	Experiments	BL2-Understand	2
Practical 2	To study effect of temperature on shelf life and quality of produce.	Experiments	BL2-Understand	2
Practical 3	To study chilling and freezing injury in vegetables and fruits.	Experiments	BL2-Understand	2
Practical 4	To study extraction and preservation of pulps and juices.	Experiments	BL3-Apply	2
Practical 5	To study preparation of osmotically dried products, fruit bar and candy.	Experiments	BL3-Apply	2
Practical 6	To study preparation of jam and jelly.	Experiments	BL3-Apply	2
Practical 7	To prepare RTS, nectar and squash from different kind of fruits.	Experiments	BL3-Apply	2
Practical 8	To prepare different tomato products.	Experiments	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Sudheer, K.P. and Indira, V. (2007). Post-Harvest Management of Horticulture crops. New India Publishing Sharma, S.K. (2010). Postharvest Management and Processing Of Fruits And Vegetables. New India Publishing Agency, Delhi. Sudheer, K. P. And Indira, V. (2007). Postharvest Technology of Horticultural Crops (Vol-7). New India Publishing Agency. Rathore, N.S., Mathur, G. K. and Chasta, S. S. (2012). Post-Harvest Management and Processing Of Fruits And Vegetables. The Energy And Resources Institute. Srivastava, R. P. and Kumar, S. (2017). Fruit Vegetable Preservation. CBS Publishing.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	1	1	-	-	-	-	-	-	-	3	1	-
CO2	-	1	1	-	1	-	-	-	-	-	1	-	1	2	-
CO3	1	-	1	1	2	-	-	-	-	-	-	1	-	1	3
CO4	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
CO5	-	2	2	1	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Disease of field and Horticultural crops and Their Management-1
Course Code	PP-311 [T]

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Plant Pathology			**Co-Requisite/s**	Plant Pathology			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG10(Reduced inequalities) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Identification of different equipment and glassware used in Plant Pathology Laboratory	Field work	BL2-Understand	2
Practical 2	Visit to field for diagnosis of different diseases of field crops	Field work	BL3-Apply	2
Practical 3	Visit to field for diagnosis of different diseases of horticultural crops	Field work	BL3-Apply	2
Practical 4	Preparation of different types of media	Experiments	BL3-Apply	2
Practical 5	Isolation of pathogens associated with plant diseases	Experiments	BL3-Apply	2
Practical 7	Cultural and morphological identification of plant pathogens Histo-pathological studies of diseases.	Experiments	BL3-Apply	2
Practical 7	To study about the management practices of diseases.	Field work	BL4-Analyze	2
Practical 8	Collection and preservation of plant diseased specimens for herbarium.	Field work	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Rangaswami, G. and Mahadevan, K. 2001. Diseases of crop plants in India. Prentice Hall of India Pvt. Ltd, New Delhi.
Articles	
References Books	Agrios, G. N. (2005). Plant Pathology. 5th Edition. Academic Press University of Florida, Gainesville, U.S.A.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	1	-	-	-	-	-	-	2	-	3	1	-
CO2	-	1	1	1	-	-	-	-	-	-	-	-	-	3	-
CO3	3	-	2	2	2	1	2	-	-	-	2	2	-	-	2
CO4	-	2	-	3	1	2	2	-	-	-	2	1	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Principals of integrated Pest and Disease Management
Course Code	PP-312 [T]

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Plant Pathology			**Co-Requisite/s**	Plant Pathology			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)** **CO5-** Develop skill for evaluation and performance of bio-agents and bio-fertilizers in vitro and field application.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) SDG8(Decent work and economic growth) SDG12(Responsible consuption and production) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	To study about Methods of diagnosis and detection of various insect pests, and plant diseases	Field work	BL2-Understand	2
Practical 2	To study about Methods of insect pests and plant disease measurement	Field work	BL2-Understand	2
Practical 3	To study about Assessment of crop yield losses.	Experiments	BL5-Evaluate	2
Practical 4	To study about Calculations based on economics of IPM	Experiments	BL4-Analyze	2
Practical 5	To study about Identification of biocontrol agents, different predators and natural enemies	Field work	BL3-Apply	2
Practical 6	To study about Mass multiplication of Trichogramma sp	Experiments	BL6-Create	2
Practical 7	To study about Identification and nature of damage of important insect pests and diseases and their management	Experiments	BL4-Analyze	2
Practical 8	Awareness campaign at farmers' fields.	Field work	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Pedigo, L. P. (1991). Entomology and pest management, Prentice Hall of India Pvt. Ltd., New Delhi
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	1	-	-	-	-	-	-	-	-	3	1	-
CO2	-	1	2	2	-	-	-	-	-	-	-	-	-	3	-
CO3	3	-	-	1	2	-	-	-	-	1	2	2	-	-	2
CO4	-	2	-	-	-	-	-	-	-	1	1	1	-	-	-
CO5	-	-	1	2	-	-	1	-	-	2	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Disease of field and Horticultural crops and Their Management-II
Course Code	PP-321[T]

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and field work							
Course Category	Discipline Core							
Pre-Requisite/s	Principles of Integrated Pest and Disease Management			**Co-Requisite/s**	Diseases of Field and Horticultural Crops and their Management -I			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
r			
k			

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Identification of different equipment and glassware use in plant Pathology Laboratory	Experiments	BL2-Understand	2
Practical 2	isit to field for diagnosis of different diseases of field crops	Experiments	BL3-Apply	2
Practical 3	Visit to field for diagnosis of different diseases of horticultural crops.	Field work	BL3-Apply	2
Practical 4	Preparation of different types of media.	Experiments	BL3-Apply	2
Practical 5	Isolation of pathogens associated with plant diseases 10. Cultural and morphological identification of plant pathogens	Experiments	BL4-Analyze	2
Practical 6	Histo-pathological studies of diseases.	Experiments	BL4-Analyze	2
Practical 7	To study about the management practices of diseases.	Experiments	BL4-Analyze	2
Practical 8	Collection and preservation of plant diseased specimens for herbarium.	Experiments	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Rangaswami, G. and Mahadevan, K. (2001). Diseases of crop plants in India, Prentice Hall of India Pvt.Ltd, New Delhi.
Articles	
References Books	George, N.A. (2005). Plant Pathology 5th Edition, Academic Press University of Florida, Gainesville, U.S.A.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	1	-	-	-	-	-	-	2	-	2	1	-
CO2	-	1	1	1	-	-	-	-	-	-	-	-	1	3	-
CO3	3	-	2	2	2	1	2	-	-	-	2	-2	-	-	2
CO4	-	2	-	3	1	2	2	-	-	-	2	-1	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Village Attachment
Course Code	RAWE-401

Part A

Year	4th	**Semester**	7th	**Credits**	L	T	P	C
					0	0	8	8
Course Type	Embedded theory and field work							
Course Category	Discipline Core							
Pre-Requisite/s	Agriculture extension			**Co-Requisite/s**	Agriculture extension			
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)** **CO5-** Develop skill for evaluation and performance of bio-agents and bio-fertilizers in vitro and field application.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
r			
k			

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module-1	Survey of Village	Field work	BL4-Analyze	16
Module-2	Agronomical Interventions	Field work	BL3-Apply	16
Module-3	Plant Protection Interventions:	Field work	BL3-Apply	16
Module-4	Soil Improvement Interventions:	Field work	BL3-Apply	16
Module-5	Fruit and Vegetable production interventions	Field work	BL3-Apply	16
Module-6	Food Processing and Storage interventions	Field work	BL3-Apply	16
Module-7	Animal Production Interventions	Field work	BL3-Apply	16
Module-8	Extension and Transfer of Technology activities	Field work	BL5-Evaluate	16

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	41				
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41			100	

Part E

Books	ICAR. (2016). Student READY: Rural Entrepreneurship Awareness Development Yojana. Krishi Anusandhan Bhawan-II, New Delhi
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	3	1	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-
CO3	-	3	2	1	-	-	1	1	1	-	1	1	-	-	2
CO4	-	2	3	1	-	-	-	1	-	-	1	1	-	1	-
CO5	-	2	2	-	-	-	-	-	-	-	-	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Unit Attachment
Course Code	RAWE-402

Part A

Year	4th	**Semester**	7th	**Credits**	L	T	P	C
					0	0	6	6
Course Type	Embedded theory and field work							
Course Category	Discipline Core							
Pre-Requisite/s	Agriculture extension			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG8(Decent work and economic growth) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
r			
k			

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	. Identification of Agricultural problems of the village and training needs of the farmers.	PBL		
Practical 2	Conducting method demonstrations of improved practices.	Field work	BL2-Understand	20
Practical 3	Organization of short duration farmers training, campus, field visits and agricultural exhibitions.	Field work	BL3-Apply	20
Practical 4	Study of the on-going extension programmes in the villages.	Field work	BL4-Analyze	20
Practical 5	Arrange farmers meeting to discuss Agricultural aspects.	Field work	BL4-Analyze	20
Practical 6	Visit to village institutions and study their role in development programmes and extension activities.	Field work	BL5-Evaluate	20
Practical 7	Documentation of success stories.	Field work	BL5-Evaluate	20
Practical 8	Reporting the Village Attachment activities.	Field work	BL6-Create	20

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	41				
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41			100	

Part E

Books	Ojha, P.K., Mishra, D., Gupta, B.K., Verma, A.P. and Mishra B.P. (2022). Mannual, Rural Agricultural Work Experience (RAWE) Programme. Banda University of Agriculture and Technology, Banda. RWEP (2004), Rural Work Experience Programme, Revised Manual, Agricultural College, GKVK, UAS, Bangalore.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	2	2	1	-	3	-	1	1	1	1	2	-
CO3	-	3	3	1	1	3	2	1	2	-	1	1	-	-	2
CO4	-	3	3	1	1	-	-	1	-	-	1	1	-	1	-
CO5	-	3	3	-	-	-	-	-	-	-	-	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Agro- Industrial attachment
Course Code	RAWE-403

Part A

Year	4th	**Semester**	7th	**Credits**	L	T	P	C
					0	0	4	4
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s	Agriculture extension			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Identification of plant clinics and agro-industries in the localities.	PBL		
Practical 2	Management of plant clinics and agro-industries in the localities	Field work	BL2-Understand	20
Practical 3	Learning the working of the plant clinics and agro-industries.	Field work	BL3-Apply	20
Practical 4	Day to day operations of plant clinics and agro-industries.	Field work	BL4-Analyze	20
Practical 5	Handling Day to day problems at plant clinics and agro-industries.	Field work	BL5-Evaluate	20
Practical 6	Association of farmers with the plant clinics and agro-industries.	Field work	BL5-Evaluate	20
Practical 7	Development of entrepreneurship in plant clinics and agro-industries.	Field work	BL5-Evaluate	20
Practical 8	Documentation of success stories.	Field work	BL5-Evaluate	30

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	41				
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41			100	

Part E

Books	Waller, J., Ritchie, B., Holderness, M. (1997). Plant Clinic Handbook. CABI Publishing. Das, G., Biswas, A., Bisht, D., Saha, N., Yasmin, S., Priyadarshinee, S. and Sardar, K. (2022). A manual on Rural Agriculture Work Experience and Agro Industrial Attachment. Notion Press.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	2	2	1	-	3	-	1	1	1	1	2	-
CO3	-	3	3	1	1	3	2	1	2	-	1	1	-	-	2
CO4	-	3	3	1	1	-	-	1	-	-	1	1	-	1	-
CO5	-	3	3	-	-	-	-	-	-	-	-	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Plant Clinic Attachment
Course Code	RAWE-404

Part A

Year	4th	**Semester**	7th	**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s	Agriculture extension			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Plant Clinic Attachment	Field work	BL3-Apply	32

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	41				
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41			100	

Part E

Books	ICAR. (2016). Student READY: Rural Entrepreneurship Awareness Development Yojana. Krishi Anusandhan Bhawan-II, New Delhi
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	2	2	1	-	3	-	1	1	1	1	2	-
CO3	-	3	3	1	1	3	2	1	2	-	1	1	-	-	2
CO4	-	3	3	1	1	-	-	1	-	-	1	1	-	1	-
CO5	-	3	3	-	-	-	-	-	-	-	-	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Problematic Soils and their Management
Course Code	SS- 221[T]

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Fundamentals of Soil Science			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)** **CO5-** Develop skill for evaluation and performance of bio-agents and bio-fertilizers in vitro and field application.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41	50		50	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0		0	

Part E

Books	Das, D.K. (2019). Problematic Soils & Their Management. Kalyani Publishers.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	1	-	-	2	-	-	-	-	-	3	1	-
CO2	-	1	1	-	-	-	1	-	-	-	-	1	1	2	-
CO3	2	2	2	1	2	-	2	-	-	-	-	2	-	-	1
CO4	-	-	-	2	-	-	-	-	-	-	-	1	-	1	-
CO5	-	1	1	-	-	-	-	-	-	-	-	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Manures, Fertilizers and Soil Fertility Management
Course Code	SS-311 [T]

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Fundamentals of Soil science			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)** **CO5-** Develop skill for evaluation and performance of bio-agents and bio-fertilizers in vitro and field application.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Introduction of analytical instruments and their principles, calibration and applications, Colorimetry and flame photometry.	Experiments	BL2-Understand	2
Practical 2	Estimation of soil organic carbon	Experiments	BL3-Apply	2
Practical 3	Estimation of alkaline hydrolysable N in soils.	Experiments	BL4-Analyze	2
Practical 4	Estimation of soil extractable P in soils	Experiments	BL5-Evaluate	2
Practical 5	Estimation of exchangeable K; Ca and Mg in soils.	Experiments	BL4-Analyze	2
Practical 6	Estimation of soil extractable S in soils	Experiments	BL5-Evaluate	2
Practical 7	Estimation of DTPA extractable Zn in soils.	Experiments	BL5-Evaluate	2
Practical 8	Estimation of N in plants.	Experiments	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Gupta, P.K. (1999) Hand book of Soil, Fertilizer and Manure. Agro Botanica, Bikaner Singh,S.S.2011.Soil Fertility andNutrient Management.3rd Edn. Kalyani Publishers.New Delhi
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
CO4	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BSc_HonsAgriculture

Title of the Course	Statistical Methods
Course Code	STAT-221[T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					1	0	1	2
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Statistics at secondary level			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Describe the importance scope and limitations of bio-agents and bio-fertilizers**(BL1-Remember)** **CO2-** Explain the different types of bio-fertilizers and bio-agents and their mechanism of action**(BL2-Understand)** **CO3-** Demonstrate the procedure for Isolation, identification and purification of different bio-agents and bio-fertilizers**(BL3-Apply)** **CO4-** Explore the various methods of mass multiplication and formulation of bio-agents and bio-fertilizers**(BL4-Analyze)** **CO5-** Develop skill for evaluation and performance of bio-agents and bio-fertilizers in vitro and field application.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG8(Decent work and economic growth) SDG12(Responsible consuption and production) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Construction of frequency distribution	Experiments	BL2-Understand	2
Practical 2	Calculation of measures of central tendency from row and grouped data	Experiments	BL2-Understand	2
Practical 3	Calculation of dispersion from row and grouped data	Experiments	BL3-Apply	2
Practical 4	Examples of probability	Experiments	BL3-Apply	2
Practical 5	Calculate correlation and interpret the results	Experiments	BL4-Analyze	2
Practical 6	Calculate regression and interpret the results	Experiments	BL4-Analyze	2
Practical 7	Examples of Testing of Hypothesis	Experiments	BL4-Analyze	2
Practical 8	Calculate Experimental Design	Experiments	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Gupta, S.P. 2010. Statistical Methods. E. Gayathiri.
Articles	NA
References Books	
MOOC Courses	
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	3	-	-	-	-	-	-	-	-	-	3	1	-
CO2	-	3	1	-	3	-	-	-	-	-	-	-	1	3	-
CO3	3	-	3	-	-	-	1	-	-	-	-	-	-	-	2
CO4	-	3	2	-	-	-	-	-	-	-	-	2	-	-	-
CO5	-	2	-	-	2	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Agronomy

Title of the Course	Modern Concepts in Crop Production
Course Code	AGRON-501[T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Agronomy, meteorology, plant physiology, organic farming			**Co-Requisite/s**	Agronomy, IFS models			
Course Outcomes & Bloom's Level	**CO1-** Crop production techniques and crop growth in relation to environment**(BL1-Remember)** **CO2-** Zero and minimum tillage: their basics and application**(BL2-Understand)** **CO3-** Precision agriculture and Precision farming, their concepts and application**(BL3-Apply)** **CO4-** Biotic and a biotic stresses; concept of ideal plant type**(BL4-Analyze)** **CO5-** Basics and application crop production under protective agriculture**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	Crop growth analysis in relation to environment; geoecological zones of India.	Brain storming, Guided learning, Cooperative Learning Strategies	12
Unit-2	Quantitative agro-biological principles and inverse yield nitrogen law; Mitscherlich yield equation, its interpretation and applicability; Baule unit.	Brain storming, Guided learning, Cooperative Learning Strategies Lab work	13
Unit-3	Effect of lodging in cereals; physiology of grain yield in cereals; optimization of plant population and planting geometry in relation to different resources, concept of ideal plant type and crop modeling for desired crop yield.	Guided learning, Cooperative Learning Strategies, Lab work, Fieldwork and outdoor learning	13
Unit-4	Scientific principles of crop production; crop response production functions; concept of soil plant relations; yield and environmental stress, use of growth hormones and regulators for better adaptation in stressed condition.	Cooperative Learning Strategies, Lab work, Fieldwork and outdoor learning Problem-based learning	13
Unit-5	IFS, organic farming, and resource conservation technology including modern concept of tillage; dry farming;determining the nutrient needs for yield potentiality of crop plants, concept of balance nutrition and INM; precision agriculture. Soil less cultivation, Aeroponic, Hydroponic, Robotic and terrace farming. Use of GIS, GPS and remote Presentation, ABL test, End term examination sensing, precision farming and protected agriculture.	Lab work, Fieldwork and outdoor learning Problem-based learning ,Discussions and Presentation, ABL	13

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Unti-1	1. Determination of CEC and AEC of soils, 2. Analysis of equilibrium soil solution for pH, EC, Eh by the use of Eh-pH meter and conductivity meter, 3. Determination of point of zero-charge and associated surface charge characteristics by the serial potentiometric titration method, 4. Potentiometric and conductometric titration of soil humic and fulvic acids, (E4/E6) ratio of soil humic and fulvic acids by visible spectrophotometric Adsorption-desorption of phosphate/sulphate by soil using simple adsorption isotherm, Construction of adsorption envelope of soils by using phosphate/fluoride/sulphate and ascertaining the mechanism of the ligand exchange process involved, Determination of titratable acidity of an acid soil by BaCl2-TEA method, Determination of lime requirement of an acid soil by buffer method, Determination of gypsum requirement of an alkali soil.	Experiments	BL2-Understand	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41	50		50	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	Reddy, S. R. (2000). Principles of Crop Production. Kalyani Publication.
Articles	Prasad, R. and Power, J.F. (1997). Soil Fertility Management for Sustainable Agriculture. CRC Press.
References Books	Balasubramaniyan, P. and Palaniappan S. P. (2001). Principles and Practices of Agronomy. Agrobios.
MOOC Courses	
Videos	Arya, R.N. (2009). Principle of Crop Production and Crops. Concept Publishing Company Private Limited

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	1	2	-	-	-	-	-	-	-	-	3	1	-
CO2	-	-	2	-	-	-	-	-	-	2	-	-	1	2	-
CO3	-	-	-	3	-	1	-	-	-	-	-	-	-	-	2
CO4	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
CO5	-	-	-	-	1	-	-	2	-	2	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Agronomy

Title of the Course	Principles and Practices of Soil Fertility and Nutrient Management
Course Code	AGRON-502[T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Agronomy, basic soil science			**Co-Requisite/s**	Agronomy, Scientific management of crop nutrients and soil.			
Course Outcomes & Bloom's Level	**CO1-** To gain basic knowledge of soil fertility and productivity **(BL1-Remember)** **CO2-** To study Importance or Significance of soil macronutrient and micronutrients **(BL2-Understand)** **CO3-** To Assess and develop importance of soil physical and chemical properties **(BL3-Apply)** **CO4-** To study about soil pollution and mitigation process **(BL4-Analyze)** **CO5-** To study about soil pollution and mitigation process **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG13(Climate action)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Soil fertility and productivity - factors affecting; features of good soil management; problems of supply and availability of nutrients; relation between nutrient supply and crop growth; organic farming - basic concepts and definitions.	Brain storming, Guided learning, Cooperative Learning Strategies	6
Unit 2	Criteria of essentiality of nutrients; Essential plant nutrients - their functions, nutrient deficiency symptoms; transformation and dynamics of major plant nutrients.	Brain storming, , Critical incidents, Fieldwork and outdoor learning Activity based learning using different tools Flipped classes teaching model Collaborative learning Socratic method of teaching. Power Point Presentations. ABL activities Field demonstration of cropping and farming systems, ===== Assignment Quiz Seminars with open discussions Group discussions or debate	6
Unit 3	Preparation and use of farmyard manure, compost, green manures, vermin-compost, bio-fertilizers and other organic concentrates their composition, availability and crop responses; recycling of organic wastes and residue management. Soil less cultivation.	Brain storming, Critical incidents, Fieldwork and outdoor learning	6
Unit 4	Commercial fertilizers; composition, relative fertilizer value and cost; crop response to different nutrients, residual effects and fertilizer use efficiency; agronomic, chemical and physiological, fertilizer mixtures and grades; methods of increasing fertilizer use efficiency; nutrient interactions.	Brain storming, Guided Questioning Fieldwork and outdoor learning, Talks and presentations	7
Unit 5	Time and methods of manures and fertilizers application; foliar application and its concept; relative performance of organic and inorganic nutrients; economics of fertilizer use; integrated nutrient management; use of vermicompost and residue wastes in crops.	Brain storming, Stimulus activities Fieldwork and outdoor learning,	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	1. Determination of soil pH	PBL		2
Practical 2	2. Determination of soil EC	PBL		2
Practical 3	3. Determination of soil organic C	PBL		2
Practical 4	4. Determination of available N, P, K and S of soil	PBL		2
Practical 5	5. Determination of total N, P, K and S of soil	PBL		2
Practical 6	6. Determination of total N, P, K, S in plant	PBL		2
Practical 7	7. Computation of optimum and economic yield	PBL		2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10	0		0	

Part E

Books	Brady ,N.C. and Weil, R,R. (2002). The Nature and Properties of Soils. 13th Ed. Pearson Education. Das, D.K. (2021) Introductory Soil Science. Generic
Articles	
References Books	Yawalkar, K.S., Agrawal, J.P. and Bokde, S. (2000). Manures and Fertilizers. Agri-Horti Publ. Havlin, J.L., Beaton, J.D., Tisdale, S.L. and Nelson, W.L. (2006). Soil Fertility and Fertilizers. 7th Ed. Prentice Hall.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	-	-	-	-	-	3	-	-	-	-	3	1	-
CO2	-	-	-	-	-	-	-	3	-	-	-	-	1	2	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	2
CO4	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Agronomy

Title of the Course	Principles and Practices of Water Management
Course Code	AGRON-504 [T]

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Know the different irrigation projects, importance of water for crop production and different water resources of world and India **(BL1-Remember)** **CO2-** Water absorption, movement in soil and plant and stress condition of the crop **(BL2-Understand)** **CO3-** The principles involved in estimating water requirement, various methods of irrigation scheduling and approaches**(BL3-Apply)** **CO4-** Water management in crop and cropping systems and economize the water and known quality of water and its management **(BL4-Analyze)** **CO5-** Understand the effect of excess water on plant growth, drainage requirements of crop, layout and special irrigability of lands**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG2(Zero hunger) SDG8(Decent work and economic growth) SDG14(Life below water) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Water and its role in plants; water resources of India, major irrigation projects, extent of area and crops irrigated in India and different states.	Brain storming, Guided learning, Cooperative Learning Strategies	6
Unit-2	Soil water movement in soil and plants; transpiration; soil-water-plant relationships; water absorption by plants; plant response to water stress, crop plant adaptation to moisture stress condition.	Brain storming, Guided learning, Cooperative Learning Strategies Lab work	6
Unit-3	Soil, plant and meteorological factors determining water needs of crops; scheduling, depth and methods of irrigation; micro-irrigation system; ferti-gation management of water in controlled environments and poly-houses.	Guided learning, Cooperative Learning Strategies, Lab work, Fieldwork and outdoor learning	6
Unit-4	Water management of the crops and cropping systems; quality of irrigation water and management of saline water for irrigation; water use efficiency.	Cooperative Learning Strategies, Lab work, Fieldwork and outdoor learning Problem-based learning	8
Unit-5	Excess of soil water and plant growth; water management in problem soils; drainage requirement of crops and methods of field drainage, their layout and spacing.	Lab work, Fieldwork and outdoor learning Problem-based learning ,Discussions and Presentation, ABL	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	1. Measurement of soil water potential by using tensiometer, and pressure plate and membrane apparatus	Field work		2
Practical 2	2. Soil-moisture characteristics curves	Experiments		2
Practical 3	3. Water flow measurements using different devices	Case Study		2
Practical 4	4. Determination of irrigation requirements	Experiments		2
Practical 5	5. Calculation of irrigation efficiency	Field work		2
Practical 6	6. Determination of infiltration rate	Experiments		2
Practical 7	7. Determination of saturated/unsaturated hydraulic conductivity	Field work		2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10	0		0	

Part E

Books	1. Paliwal KV. 1972. Irrigation with Saline Water. IARI Monograph, New Delhi
Articles	
References Books	2. Panda SC. 2003. Principles and Practices of Water Management. Agrobios. 3. Reddy SR. 2000. Principles of Crop Production. Kalyani. 4. Singh Pratap&Maliwal PL. 2005. Technologies for Food Security and SustainableAgriculture. Agrotech Publ.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	2	-	-	-	-	-	-	-	-	-	2	-
CO3	-	-	-	-	-	-	-	1	-	-	-	-	-	2	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Agronomy

Title of the Course	Agronomy of Major Cereals and Pulses
Course Code	AGRON-506 [T]

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Agronomy of Major Cereals and Pulses			**Co-Requisite/s**	Agronomy of Major Cereals and Pulses			
Course Outcomes & Bloom's Level	**CO1-** Describe the basic concepts and principles of production technology and postharvest handling and processing and seed production technology of different cereals and pulses. **(BL1-Remember)** **CO2-** Compare the different cultivation practices, seed production and processing technologies with their economic viability and sustainability.**(BL2-Understand)** **CO3-** Utilize various principles and concepts of crop production to enhance productivity and maximise the return per unit area and time.**(BL3-Apply)** **CO4-** Analyse the impact of various intercultural operation on yield, quality and storage in different cereals and pulses.**(BL4-Analyze)** **CO5-** Assess the sustainability of various crop production technologies for commercial crop production and quality seed production with better cost benefit ratio.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	Origin and history, area and production, classification, improved varieties, adaptability, climate, soil, water and cultural requirements, nutrition, quality components, handling and processing of the produce for maximum production of Rabi cereals.	Brain storming, Guided learning, Cooperative Learning Strategies	7
Unit-2	Origin and history, area and production, classification, improved varieties, adaptability, climate, soil, water and cultural requirements, nutrition, quality components, handling and processing of the produce for maximum production of Kharif cereals.	Brain storming, Guided learning, Cooperative Learning Strategies Lab work	6
Unit-3	Origin and history, area and production, classification, improved varieties, adaptability, climate, soil, water and cultural requirements, nutrition, quality components, handling and processing of the produce for maximum production of Rabi pulses.	Guided learning, Cooperative Learning Strategies, Lab work, Fieldwork and outdoor learning	6
Unit-4	Origin and history, area and production, classification, improved varieties, adaptability, climate, soil, water and cultural requirements, nutrition, quality components, handling and processing of the produce for maximum production of Kharif pulses	Cooperative Learning Strategies, Lab work, Fieldwork and outdoor learning Problem-based learning	7
Unit-5	Seed production technology of cereals and pulse crops, cost of cultivation analysis in different crops.	Fieldwork and outdoor learning	6

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical-1	Phenological studies at different growth stages of crop	Field work	BL2-Understand	2
Practical-2	Estimation of crop yield on the basis of yield attributes	Field work	BL2-Understand	2
Practical-3	Formulation of cropping schemes for various farm sizes and calculation of cropping and rotational intensities	Field work	BL3-Apply	2
Practical-4	Working out growth indices (CGR, RGR, NAR, LAI, LAD, LAR, LWR, SLA, SLW etc)	Field work	BL3-Apply	2
Practical-5	Assessment of land use and yield advantage (Rotational intensity, Cropping intensity, Diversity Index, Sustainable Yield Index Crop	Field work	BL4-Analyze	2
Practical-6	Equivalent Yield, Land Equivalent ration, Aggressiveness, Relative Crowding Coefficient, Competition Ratio and ATER etc)	Field work	BL4-Analyze	2
Practical-7	Estimation of protein content in pulses	Experiments	BL5-Evaluate	2
Practical-8	Judging of physiological maturity in different crops	Field work	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10	0		0	

Part E

Books	Das, N.R. (2007) Introduction to crops of India, Scientific Publ.Prashad, R. (2002) A textbook of Field crop production, ICAR
Articles	Hunsigi G and Krishna KR. 1998. Science of Field Crop Production. Oxford & IBH.
References Books	Khare D and Bhale MS. 2000. Seed Technology. Scientific Publ.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	3	-	-	-	-	-	-	3	1	-
CO2	-	-	-	-	-	2	-	3	-	-	-	-	1	2	-
CO3	-	-	-	-	-	-	2	-	-	3	-	-	-	-	2
CO4	-	-	-	3	-	-	-	2	-	-	-	-	-	3	-
CO5	-	-	-	-	-	-	2	-	3	-	-	-	3	1	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Agronomy

Title of the Course	Agronomy of Oilseed Fibre And Sugar Crops
Course Code	AGRON-507 [T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	basic knowledge of crops, basic soil science			**Co-Requisite/s**	climate and Nutrients			
Course Outcomes & Bloom's Level	**CO1-** Acquire the knowledge about the origin, geographical distribution, economic importance, Soil and climatic requirements, varieties, cultural practices and yield of oilseed crops (Rabi and kharif), fibre crop and sugar crop. **(BL1-Remember)** **CO2-** Acquire the knowledge about the constraints of oilseed crops (Rabi and kharif), fibre crop and sugar crop production. **(BL2-Understand)** **CO3-** Able to identify the different improved varieties of oilseed crops (Rabi and kharif), fibre crop and sugar crop and its associated weeds, disease and pest **(BL3-Apply)** **CO4-** Utilized the theoretical and practical knowledge of production technology to maximise the production of oilseed crops (Rabi and kharif), fibre crop and sugar crop. **(BL4-Analyze)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Rabi oilseeds – Rapeseed and mustard, Linseed and Niger	Brain storming, Guided learning, Cooperative Learning Strategies	6
Unit 2	Kharif oilseeds - Groundnut, Sesame, Castor, Sunflower, Soybean and Safflower	Brain storming, Guided learning, Fieldwork and outdoor learning, Lab work	6
Unit 3	Fiber crops - Cotton, Jute, Ramie and Mesta.	Guided learning, Cooperative Learning Strategies, Lab work, Fieldwork and outdoor learning	6
Unit 4	Sugar crops – Sugar-beet and Sugarcane	Brainstorming , Cooperative Learning Strategies, Lab work, Fieldwork and outdoor learning Problem-based learning	7
Unit 5	Economic considerations in CA, adoption and constraints, CA: The future of agriculture	Brainstorming, Problem-based learning ,Discussions and Presentation, ABL	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 1	Survey and surveillance	Experiments	BL2-Understand	2
Module 2	Collection of Soil and Root Samples	Experiments	BL2-Understand	2
Module 3	Extraction of Nematodes from Soil Samples	Experiments	BL3-Apply	3
Module 4	Extraction of Nematode from Plant Material	Experiments	BL3-Apply	2
Module 5	Handling and Use of Microscopes	Experiments	BL4-Analyze	2
Module 6	Counting and Picking of Nematodes	Experiments	BL4-Analyze	3
Module 7	Preparation of Fixatives and their Recipes/Compositions	Field work	BL5-Evaluate	2
Module 8	Morphology of a Typical Plant Parasitic Nematode	Experiments	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10	0		0	

Part E

Books	Shagun, and Jhala, V.S. (2022). Agronomy of Oilseed, Fibre and Sugar Crops. Amiga Press. Das, N.R. (2017). Practical Manual on Basic Agronomy (With Theory) 2nd Revised Ed. Scientific Publishers. Singh, C. (1983). Modern Techniques of Raising Field Crops. Oxford & IBH. Walia, S.S., Kler, D.S., and Singh, D. (1986). ICAR, Science of Agronomy. Scientific Publishers (India). Joshi, M. (2015). Textbook of field crops. PHI Learning. Kamburova, V.S. and Kim, S.K. (2018). Fundamentals of Agronomy. Scitus Academics LLC.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	1	1	-	-	2	2	-	-	-	-	1	-	2
CO2	1	2	1	-	2	-	2	2	-	1	-	-	-	1	-
CO3	1	-	1	-	1	-	-	-	1	-	-	-	-	1	2
CO4	1	-	2	-	1	-	2	-	2	-	-	-	3	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1

Syllabus-2023-2024

MSc_Agriculture-Agronomy

Title of the Course	Cropping System and Sustainable Agriculture
Course Code	AGRON-511 [T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	crop cultivation			**Co-Requisite/s**	meteorology, soil science			
Course Outcomes & Bloom's Level	**CO1-** Identify the different Cropping systems, farming system and cropping pattern with their respective M.P. as well as north part of India, for sustainable resource management. **(BL1-Remember)** **CO2-** Describe the basic concepts of different competition relations between farming and cropping system component on above and below ground interactions and allelopathic effects. **(BL2-Understand)** **CO3-** Demonstrate various IFS model and sustainability approaches. **(BL3-Apply)** **CO4-** Analyse the opportunities and challenges in farming system for sustainable management of natural resources **(BL4-Analyze)** **CO5-** Assess the economic feasibility of different farming system component viz. cropping system, crop diversification, organic farming etc **(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG2(Zero hunger) SDG3(Good health and well-being) SDG11(Sustainable cities and economies) SDG13(Climate action)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Cropping systems: definition, indices and its importance; physical resources, soil and water management in cropping systems; assessment of land use.	Brain storming, Guided learning, Cooperative Learning Strategies, Fieldwork and outdoor learning	5
Unit 2	Concept of sustainability in cropping systems and farming systems, scope and objectives; production potential under monoculture cropping, multiple cropping, alley cropping, sequential cropping and intercropping, mechanism of yield advantage in intercropping systems	Brain storming, Guided learning, Cooperative Learning Strategies, Fieldwork and outdoor learning	5
Unit 3	Above and below ground interactions and allelopathic effects; competition relations; multi-storied cropping and yield stability in intercropping, role of non-monetary inputs and low cost technologies; research need on sustainable agriculture.	Guided learning, Cooperative Learning Strategies, Lab work, Fieldwork and outdoor learning	5
Unit 4	Crop diversification for sustainability; role of organic matter in maintenance of soil fertility; crop residue management; fertilizer use efficiency and concept of fertilizer use in intensive cropping system. Advanced nutritional tools for big data analysis and interpretation.	Cooperative Learning Strategies, Lab work, Fieldwork and outdoor learning Problem-based learning	5
Unit 5	Plant ideotypes for drylands; plant growth regulators and their role in sustainability.	Lab work, Fieldwork and outdoor learning Problem-based learning ,Discussions and Presentation, ABL	6
Unit 6	Artificial Intelligence- Concept and application.	Brain storming, Guided learning, Cooperative Learning Strategies	6

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41	50		50	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	Panda, S.C. (2017). Cropping Systems and Sustainable Agriculture. Agrobios (India) Panda, S.C. (2018). Cropping and Farming Systems. Agrobios. Palaniappan, S.P., and Sivaraman, K. (1996). Cropping Systems in the Tropics; Principles and Management. New Age. Panda, S.C. (2003). Cropping and Farming Systems. Agrobios. Reddy, S.R. (2000). Principles of Crop Production. Kalyani. Sankaran, S., and Mudaliar, T.V.S. (1997). Principles of Agronomy. The Bangalore Printing & Publ. Co. Singh, S.S. (2006). Principles and Practices of Agronomy. Kalyani. Tisdale, S.L., Nelson, W.L., Beaton, J.D. and Havlin, J.L. (1997). Soil Fertility and Fertilizers. Prentice Hall.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	-	-	2	-	-	1	-	-	-	-	1	-	2
CO2	1	-	-	1	-	2	-	1	-	1	-	-	2	1	-
CO3	1	-	-	-	3	-	1	-	-	-	-	-	-	2	-
CO4	-	1	-	-	-	1	-	1	-	3	-	-	2	-	1
CO5	1	-	-	2	-	-	2	-	-	3	-	-	1	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Agronomy

Title of the Course	Dryland Farming and Watershed Management
Course Code	AGRON-512 [T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	fundamentals of agronomy and soil science			**Co-Requisite/s**	crop cultivation and pattern			
Course Outcomes & Bloom's Level	**CO1-** Discuss the fundamental knowledge of mapping arid and semi-arid regions **(BL1-Remember)** **CO2-** Understand the skills required for integrated dry farming technologies **(BL2-Understand)** **CO3-** Apply the knowledge on soil and moisture conservation approaches and contingent crop plan to evade risk in dry farming. **(BL3-Apply)** **CO4-** Analyse the types of droughts, characterization of environment for water availability **(BL4-Analyze)** **CO5-** Assess practical knowledge on rain water harvesting techniques and watershed management principles. **(BL5-Evaluate)** **CO6-** Develop the IFS model for dry farming region **(BL6-Create)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG12(Responsible consuption and production) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Definition, concept and characteristics of dry land farming; dry land versus rainfed farming; significance and dimensions of dry land farming in Indian agriculture.	Brain storming, Guided learning, Cooperative Learning Strategies	6
Unit 2	Soil and climatic parameters with special emphasis on rainfall characteristics; constraints limiting crop production in dry land areas; types of drought, characterization of environment for water availability; crop planning for erratic and aberrant weather conditions.	Brain storming, Guided learning, Cooperative Learning Strategies, Fieldwork and outdoor learning	6
Unit 3	Stress physiology and resistance to drought, adaptation of crop plants to drought, drought management strategies; preparation of appropriate crop plans for dry land areas; mid contingent plan for aberrant weather conditions.	Guided learning, Cooperative Learning Strategies, Fieldwork and outdoor learning	7
Unit 4	Tillage, tilth, frequency and depth of cultivation, compaction in soil tillage; concept of conservation tillage; tillage in relation to weed control and moisture conservation; techniques and practices of soil moisture conservation (use of mulches, kinds, effectiveness and economics); antitranspirants; soil and crop management techniques, seeding and efficient fertilizer use	Cooperative Learning Strategies, Fieldwork and outdoor learning Problem-based learning	6
Unit 5	Concept of watershed resource management, problems, approach and components.	Fieldwork and outdoor learning Problem-based learning ,Discussions and Presentation, ABL	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	1. Method of Seed Priming Determination of moisture content of germination of important dryland crops	Experiments		2
Practical 2	2. Determination of Relative Water Content and Saturation Deficit of Leaf Moisture stress effects and recovery behaviour of important crops Estimation of Potential ET by Thornthwaite method	Experiments		2
Practical 3	3. Estimation of Reference ET by Penman Monteith Method Classification of climate by Thornthwaite method (based on moisture index, humidity index and aridity index)	Experiments		2
Practical 4	4. Classification of climate by Koppen Method Estimation of water balance by Thornthwaite method	Experiments		2
Practical 5	5. Estimation of water balance by FAO method Assessment of drought	Experiments		2
Practical 6	6. Estimation of length of growing period	Experiments		2
Practical 7	7. Estimation of probability of rain and crop planning for different drought condition	Field work		2
Practical 8	8. Spray of anti-transpirants and their effect on crops Water use efficiency	Experiments		2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10	0		0	

Part E

Books	Reddy, T.Y. (2018). Dryland Agriculture Principles and Practices, Kalyani publishers Das, N.R. (2007). Tillage and Crop Production. Scientific Publ. Dhopte, A.M. (2002). Agrotechnology for Dryland Farming. Scientific Publ. Dhruv Narayan, V.V. (2002). Soil and Water Conservation Research in India. ICAR. Gupta, U.S. (Ed.). (1995). Production and Improvements of Crops for Drylands. Oxford & IBH. Katyal, J.C. and Farrington, J. (1995). Research for Rainfed Farming. CRIDA.
Articles	
References Books	Rao, S.C. and Ryan, J. (2007). Challenges and Strategies of Dryland Agriculture. Scientific Publ. Singh, P. and Maliwal, P.L. (2005). Technologies for Food Security and Sustainable Agriculture. Agrotech Publ. Company. Singh, R.P. (1988). Improved Agronomic Practices for Dryland Crops. CRIDA. Singh, R.P. (2005). Sustainable Development of Dryland Agriculture in India. Scientific Publ. Singh, S.D. (1998). Arid Land Irrigation and Ecological Management. Scientific Publ. Venkateshwarlu, J. (2004). Rainfed Agriculture in India. Research and Development Scenario. ICAR.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	1	-	-	2	-	-	3	-	1	-	-	3
CO2	1	-	-	2	-	-	2	-	-	-	-	-	-	1	-
CO3	1	-	-	3	-	-	-	-	2	-	-	1	-	2	-
CO4	-	1	2	-	-	-	-	2	-	-	-	1	-	-	2
CO5	1	-	-	-	2	-	-	-	1	-	-	1	-	-	3
CO6	1	-	1	-	-	-	2	-	-	-	-	-	1	-	-

Syllabus-2023-2024

MSc_Agriculture-Genetics_and_Plant_Breeding

Title of the Course	Principles of Genetics
Course Code	GPB-501[T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Basics of Genetics			**Co-Requisite/s**	Basics of Biotechnology			
Course Outcomes & Bloom's Level	**CO1-** Define the fundamental concepts and theories of genetics. **(BL1-Remember)** **CO2-** Describe the nature and structure of genetic material. **(BL2-Understand)** **CO3-** Conceptualize molecular genetics and hands on lab tools and techniques **(BL3-Apply)** **CO4-** Apply the concepts of biochemistry and biotechnology for development of transgenic. **(BL4-Analyze)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG8(Decent work and economic growth) SDG15(Life on land) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Beginning of genetics; Cell structure and Cell cycle, cell division, early concepts theory of inheritance. Nature and structure of chromosome.	Thematic teaching, Classroom lecture, Experimentation, Guided questioning	6
Unit 2	Multiple alleles, Gene interactions, Sex determination, differentiation and sexlinkage, Sex-influenced and sex-limited traits, Linkage-detection and estimation, crossing over and recombination. Genetic mapping in eukaryotes, Somatic cell genetics and Extra chromosomal inheritance.	Thematic teaching, Classroom lecture, Experimentation, Guided questioning	6
Unit 3	Population Genetics; Mendelian population, Random mating population, Frequencies of genes and genotypes-Causes of change and Hardy-Weinberg equilibrium.	Thematic teaching, Classroom lecture, Experimentation, Guided questioning	6
Unit 4	Structural and numerical changes in chromosomes; Nature, structure and replication of the genetic material, Organization of DNA in chromosomes, Genetic code, Protein biosynthesis. Genetic fine structure analysis, Allelic complementation, Split genes, Transposable genetic elements, Overlapping genes, Pseudogenes, Oncogenes and Gene families and clusters.	Thematic teaching, Classroom lecture, Experimentation, Guided questioning	6
Unit 5	Regulation of gene activity in prokaryotes; Molecular mechanisms of mutation, repair and suppression, Bacterial plasmids, insertion (IS) and transposable (Tn) elements, Transcription in eukaryotes and prokaryotes. RNA editing and Gene regulation in eukaryotes. Epigenetic inheritance.	Thematic teaching, Classroom lecture, Experimentation, Guided questioning	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Laboratory exercises in probability and chi-square	PBL	BL2-Understand	2
Practical 2	Demonstration of genetic principles using laboratory organisms.	Experiments	BL2-Understand	2
Practical 3	Chromosome mapping using three point test cross; Tetrad analysis.	Experiments	BL2-Understand	2
Practical 4	Induction and detection of mutations through genetic tests.	Experiments	BL3-Apply	2
Practical 5	DNA extraction and PCR amplification -Electrophoresis basic principles and running of amplified DNA.	Experiments	BL3-Apply	2
Practical 6	Extraction of proteins and isozymes use of Agrobacterium mediated method and Biolistic gun.	Experiments	BL4-Analyze	2
Practical 7	Practical demonstrations - Detection of transgenes in the exposed plant material.	Experiments	BL4-Analyze	2
Practical 8	Visit to transgenic glasshouse and learning the practical considerations.	Experiments	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10			0	

Part E

Books	Gardner, E.J. and Snustad, D.P. (1991). Principles of Genetics. John Wiley &Sons. Klug, W.S. and Cummings, M.R. (2003). Concepts of Genetics. Peterson Edu. Lewin, B. (2008). Genes IX. Jones & Bartlett Publ. Russell, P.J. (1998). Genetics. The Benzamin.Cummings Publ. Co. Snustad, D.P. and Simmons, M.J. (2006). Genetics. 4th Ed. John Wiley & Sons. Strickberger, M,W. (2005). Genetics (III Ed). Prentice Hall, New Delhi, India Tamarin, R.H. (1999). Principles of Genetics. Wm. C. Brown Publs. Uppal, S., Yadav, R., Subhadra. and Saharan, R.P. (2005). Practical Manual onBasic and Applied Genetics. Dept. of Genetics, CCS HAU Hisar.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	1	-
CO2	-	-	1	-	-	-	-	-	-	-	-	-	1	2	-
CO3	-	-	-	-	-	-	2	-	-	-	-	-	-	-	2
CO4	-	-	2	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Genetics_and_Plant_Breeding

Title of the Course	Principles of Plant Breeding
Course Code	GPB-502[T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Plant Morphology			**Co-Requisite/s**	Fundamentals of Plant Breeding			
Course Outcomes & Bloom's Level	**CO1-** Define the basic concept of crop improvement and genetic variation. **(BL1-Remember)** **CO2-** Describe the various breeding methods, their drawbacks and significance. **(BL2-Understand)** **CO3-** Demonstrate the skill on emasculation, pollination and hybridization. **(BL3-Apply)** **CO4-** Differentiate the inbred lines and hybrids, composite and synthetic varieties. **(BL4-Analyze)** **CO5-** Problems based on heritability, genetic advances and genetic variations and the role of heterosis, inbreeding depression, heritability and genetic advances in plant breeding. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG12(Responsible consuption and production) SDG15(Life on land) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-I	History of Plant Breeding (Pre and post-Mendelian era); Objectives of plant breeding, characteristics improved by plant breeding; Patterns of Evolution in Crop Plants- Centres of Origin-biodiversity and its significance. Plant genetic recourses and its conservation.	Field work, Thematic teaching, Classroom leacture, Experimentation, Guided questioning	6
Unit-II	Genetic basis of breeding self- and cross - pollinated crops including mating systems and response to selection - nature of variability, components of variation; Heritability and genetic advance, genotype environment interaction.	Field work, Thematic teaching, Classroom leacture, Experimentation, Guided questioning	6
Unit-III	Self-incompatibility and male sterility in crop plants and their commercial exploitation. General and specific combining ability; Types of gene actions and implications in plant breeding; Plant introduction and utilization.	Field work, Thematic teaching, Classroom leacture, Experimentation, Guided questioning	6
Unit-IV	Pure line theory, pure line selection and mass selection methods; Line breeding, pedigree, bulk, backcross, single seed descent and multiline method; Population breeding in self-pollinated crops (diallel selective mating approach), Stability model analysis.	Field work, Thematic teaching, Classroom leacture, Experimentation, Guided questioning	6
Unit-V	Breeding methods in cross pollinated crops; Population breeding-mass selection and ear-to-row methods; S1 and S2 progeny testing, progeny selection schemes, recurrent selection schemes for intra and inter population improvement and development of synthetics and composites; Hybrid breeding - genetical and physiological basis of heterosis and inbreeding, production of inbreds, breeding approaches for improvement of inbreds, predicting hybrid performance; seed production of hybrid and their parent varieties/inbreds.	Field work, Thematic teaching, Classroom leacture, Experimentation, Guided questioning	6
Unit-VI	Breeding methods in asexually/clonally propagated crops, clonal selection apomixes, clonal selection. Self-incompatibility and male sterility in crop plants and their commercial exploitation; Concept of plant ideotype and its role in crop improvement; Transgressive breeding.	Field work, Thematic teaching, Classroom leacture, Experimentation, Guided questioning	6
Unit-VII	Breeding methods in asexually propagated crops- clonal selection and hybridization. Wide hybridization; Polyploidy in relation to plant breeding. Mutation breeding- methods and uses. Breeding for important biotic and abiotic stresses. Biotechnological tools-DNA markers and marker assisted selection.	Field work, Thematic teaching, Classroom leacture, Experimentation, Guided questioning	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical-1	Floral biology in self and cross pollinated species, selfing and crossing techniques.	Experiments	BL2-Understand	2
Practical -2	Selection methods in segregating populations and evaluation of breeding material	Experiments	BL3-Apply	2
Practical-3	Analysis of variance (ANOVA)	Experiments	BL4-Analyze	2
Practical-4	Estimation of heritability and genetic advance	Experiments	BL5-Evaluate	2
Practical-5	Maintenance of experimental records;	Field work		2
Practical-6	Learning techniques in hybrid seed production using male-sterility in field crops.	Field work	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Allard, R. W. (1999). Principles of plant breeding. John Wiley & Sons. Chopra, V. L., & Chopra, V. L. (2001). Breeding Field Crops: Theory and Practice. Oxford and IBH Publishing Company. Chopra, V.L. (2004). Plant Breeding. Oxford & IBH. Gupta, S.K. (2005). Practical Plant Breeding. Agribios. Pohlman, J.M.&Bothakur, D.N. (1972). Breeding Asian Field Crops. Oxford& IBH. Singh, P. (2006). Essentials of Plant Breeding. Kalyani Publication House. Singh, S. & Pawar, I. S. (2006). Genetic Bases and Methods of Plant Breeding. CBS.
Articles	
References Books	Roy, D. (2003). Plant Breeding, Analysis and Exploitation of Variation.Narosa Publication House. Sharma, J.R. (2001). Principles and Practice of Plant Breeding. TataMcGraw-Hill. Simmonds, N.W. (1990). Principles of Crop Improvement. English Language Book Society. Singh, B.D. (2006). Plant Breeding. Kalyani Publication House. Singh, P. (2002). Objective Genetics and Plant Breeding. Kalyani Publication House.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	2	-	-	-	-	-	-	-	3	1	-
CO2	-	-	2	-	-	-	-	-	-	-	-	-	1	2	-
CO3	-	-	-	-	3	-	-	-	-	-	-	-	-	-	2
CO4	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Genetics_and_Plant_Breeding

Title of the Course	Fundamentals Of Quantitative Genetics
Course Code	GPB-503[T]

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Basic of Quantitative Genetics			**Co-Requisite/s**	Basics of statistical model			
Course Outcomes & Bloom's Level	**CO1-** Develop foundational understanding of quantitative genetics and basis of complex traits.**(BL1-Remember)** **CO2-** Explore breeding strategies and selection methods**(BL2-Understand)** **CO3-** Apply statistical methods for analyzing quantitative traits.**(BL4-Analyze)** **CO4-** Aanlyze different variable of a population and advanced biometric model with the help of statistical packages**(BL5-Evaluate)** **CO5-** Develop a statistical model to assess the divergence of mapping population**(BL6-Create)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth) SDG13(Climate action) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Architecture of chromosome in prokaryotes and eukaryotes; Chromonemata, chromosome matrix, chromomeres, centromere, secondary constriction and telomere; Artificial chromosome construction and its uses; Special types of chromosomes.	Co-operative learning, Brainstorming, Critical Reading & Writing, Field Work & outdoor learning	6
Unit 2	Chromosomal theory of inheritance Cell Cycle and cell division mitosis and meiosis; Differences, significance and deviations Synapsis, structure and function of synaptonemal complex and spindle apparatus, anaphase movement of chromosomes and crossing over-mechanisms and theories of crossing over- recombination models, cytological basis, - Variation in chromosome structure: Evolutionary significance - Introduction to techniques for karyotyping; Chromosome banding and painting - in situ hybridization and various applications.	Co-operative learning, Brainstorming, Critical Reading & Writing, Field Work & outdoor learning	6
Unit 3	Structural and Numerical variations of chromosomes and their implications- Symbols and terminologies for chromosome numbers - euploidy -haploids, diploids and polyploids; Utilization of aneuploids in gene location - Variation in chromosome behaviour - somatic segregation and chimeras endomitosis and somatic reduction; Evolutionary significance of chromosomal aberrations - balanced lethals and chromosome complexes.	Co-operative learning, Brainstorming, Critical Reading & Writing, Field Work & outdoor learning	6
Unit 4	Inter-varietal chromosome substitutions; Polyploidy and role of polyploids in crop breeding; Evolutionary advantages of autopolyploids and allopolyploids - Role of aneuploids in basic and applied aspects of crop breeding, their maintenance and utilization in gene mapping and gene blocks transfer Alien addition and substitution lines creation and utilization; Apomixis - Evolutionary and genetic problems in crops with apomixes.	Co-operative learning, Brainstorming, Critical Reading & Writing, Field Work & outdoor learning	6
Unit 5	Reversion of autopolyploids to diploids; Genome mapping in polyploids Interspecific hybridization and allopolyploids; Synthesis of new crops (wheat, triticale and brassica) Hybrids between species with same chromosome number, alien translocations, Hybrids between species with different chromosome number; Gene transfer using amphidiploids Bridge species. Fertilization barriers in crop plants at pre-and post-fertilization levels- In-vitro techniques to overcome the fertilization barriers in crops; Chromosome manipulations in wide hybridization; case studies Production and use of haploids, dihaploids and doubled haploids in genetics and breeding.	Co-operative learning, Brainstorming, Critical Reading & Writing, Field Work & outdoor learning	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Patterns of Evolution in Crop Plants	Experiments	BL2-Understand	2
Practical 2	Mating systems and response to selection	Field work	BL3-Apply	2
Practical 3	Self-incompatibility and male sterility in crop plants.	Field work	BL3-Apply	2
Practical 4	Population breeding in self-pollinated	Field work	BL3-Apply	2
Practical 5	Breeding approaches for improvement of inbreds	Field work	BL3-Apply	2
Practical 6	Special breeding techniques- Mutation breeding rights	Field work	BL4-Analyze	2
Practical 7	Plant breeder's rights and regulations for plant variety protection and farmers	Experiments	BL5-Evaluate	4

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10			30	

Part E

Books	Falconer, D. S. and Mackay, T. F.C. (1995). Introduction to Quantitative Genetics. Longman. Singh, P. (2016). Quantitative Genetics. Kalyani Publishers.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	1	-
CO2	-	-	-	2	-	-	-	-	-	-	-	-	1	2	-
CO3	-	-	-	-	-	-	2	-	-	-	-	-	-	-	2
CO4	-	-	-	-	2	-	-	1	-	-	-	-	-	-	-
CO5	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Genetics_and_Plant_Breeding

Title of the Course	Varietal Development And Maintenance Breeding
Course Code	GPB-504[T]

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					1	0	1	2
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Fundamental concepts crop breeding.			**Co-Requisite/s**	DUS Characterization Technique.			
Course Outcomes & Bloom's Level	**CO1-** Define the fundamental concepts and theories of crop breeding. **(BL1-Remember)** **CO2-** Describe the nature and structure of crop breeding practices. **(BL2-Understand)** **CO3-** Conceptualize crop breeding exercises and hands on lab tools and techniques **(BL3-Apply)** **CO4-** Apply the concepts of crop breeding for development of transgenic.**(BL4-Analyze)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth) SDG12(Responsible consuption and production) SDG15(Life on land) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Wheat: Origin, evolution, mode of reproduction, chromosome number; Genetics – cytogenetics and genome relationship; Breeding objectives: yield, quality characters, biotic and abiotic stress resistance, etc., breeding approaches, introgression of alien gene(s) (if required), biotic and abiotic stress resistance, heterosis breeding, released varieties, examples of MAS used for improvement. Oats: Origin, evolution, mode of reproduction, chromosome number; Genetics – cytogenetics and genome relationship; Breeding objectives: yield, quality characters, biotic and abiotic stress resistance, etc., breeding approaches, introgression of alien gene(s) (if required), biotic and abiotic stress resistance, released varieties, examples of MAS used for improvement. Barley: Origin, evolution, center of origin, mode of reproduction, chromosome number; Genetics – cytogenetics and genome relationship; Breeding objectives: yield, quality characters, biotic and abiotic stress resistance, etc., breeding approaches, introgression of alien gene(s) (if required), biotic and abiotic stress resistance, released varieties, examples of MAS used for improvement.	ABL, Field Base & Outdoor Learning, Stimulus activity, Project Work	6
Unit 2	Chickpea: Origin, evolution mode of reproduction, chromosome number; Genetics – cytogenetics and genome relationship; Breeding objectives: yield, quality characters, biotic and abiotic stress resistance, etc., breeding approaches, introgression of alien gene(s) (if required), biotic and abiotic stress resistance, released varieties, examples of MAS used for improvement. Other pulses: Lentil, field pea, Rajma, Horse gram: Origin, evolution, mode of reproduction, chromosome number; Genetics. cytogenetics and genome relationship; Breeding objectives: yield, quality characters, biotic and abiotic stress resistance, etc., breeding approaches, introgression of alien gene(s) (if required), biotic and abiotic stress resistance, heterosis breeding, released varieties, examples of MAS used for improvement. Interspecific crosses attempted and its implications, reasons for failure, ways of overcoming them.	ABL, Field Base & Outdoor Learning, Stimulus activity, Project Work	6
Unit 3	Rapeseed and Mustard: Origin, evolution, mode of reproduction, chromosome number; Genetics – cytogenetics and genome relationship; Breeding objectives; yield, quality characters, biotic and abiotic stress resistance, etc., breeding approaches, introgression of alien gene(s) (if required), biotic and abiotic stress resistance, heterosis breeding, released varieties, examples of MAS used for improvement, Oil quality, Improvement for oil quality. Sunflower, Safflower: Origin, mode of reproduction, chromosome number; Genetics, cytogenetics and genome relationship; Breeding objectives: yield, quality characters, biotic and abiotic stress resistance, etc., breeding approaches, introgression of alien gene(s) (if required), biotic and abiotic stress resistance, heterosis breeding, released varieties, examples of MAS used for improvement.	ABL, Field Base & Outdoor Learning, Stimulus activity, Project Work	6
Unit 4	Mesta and minor fibre crops: Origin, mode of reproduction, chromosome number; Genetics–cytogenetics and genome relationship; Breeding objectives: yield, quality characters, biotic and abiotic stress resistance, etc., breeding approaches, introgression of alien gene(s) (if required), biotic and abiotic stress resistance, released varieties, examples of MAS used for improvement. Forage crops: Origin, evolution mode of reproduction, chromosome number; Genetics–cytogenetics and genome relationship; Breeding objectives: yield, quality characters, biotic and abiotic stress resistance, etc., breeding approaches, introgression of alien gene(s) (if required), biotic and abiotic stress resistance.	ABL, Field Base & Outdoor Learning, Stimulus activity, Project Work	6
Unit 5	Seed spices: Origin, evolution, mode of reproduction, chromosome number; Genetics–cytogenetics and genome relationship; Breeding objectives: yield, quality characters, biotic and abiotic stress resistance, etc., breeding approaches, introgression of alien gene(s) (if required), biotic and abiotic stress resistance, scope of heterosis breeding, released varieties, examples of MAS used for crop improvement.	ABL, Field Base & Outdoor Learning, Stimulus activity, Project Work	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Floral biology, emasculation and pollination techniques in wheat, oats, barley, chickpea, rajma, rapeseed mustard, sunflower;	Field work	BL2-Understand	2
Practical 2	Study of range of variation for yield and yield components;	Field work	BL2-Understand	2
Practical 3	Study of segregating populations in cereal, pulses and oilseed crops;	Field work	BL3-Apply	2
Practical 4	Use of descriptors for cataloguing; Learning on the crosses between different species;	Field work	BL3-Apply	2
Practical 5	Trait based screening for stress resistance;	Field work	BL3-Apply	2
Practical 6	Learning on the Standard Evaluation System (SES) and descriptors;	Field work	BL4-Analyze	2
Practical 7	Use of software for database management and retrieval.	Field work	BL4-Analyze	4

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Bahl, P.N., and Salimath, P.M. (1996). Genetics, Cytogenetics and Breeding of Crop Plants. Vol. I. Pulses and Oilseeds. Oxford & IBH. Gupta, S.K. (2012). Technological Innovations in Major World Oil crops. Vol. I. Springer, USA. Gupta, S.K. (2012). Technological Innovations in Major World Oil crops. Vol. II. Springer, USA. Gupta, S.K. (2016). Breeding of Oilseed Crops for Sustainable Production. Academic Press, USA. Kannaiyan, S., Uthamasamy, S., Theodore, R.K. and Palaniswamy, S. (2002). New Dimensions and Approaches for Sustainable Agriculture. Directorate of Extension Education, TNAU, Coimbatore. Parthasarathy, V.A. (2017). Spices and Plantation Crops Vol.1 (Part A) Breeding of Breeding and Genetics. John Wiley & Sons.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	1	-
CO2	-	-	3	-	-	-	-	-	-	-	-	-	1	2	-
CO3	-	-	-	-	2	-	-	-	-	-	-	-	-	-	2
CO4	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Genetics_and_Plant_Breeding

Title of the Course	Principles of Cytogenetics
Course Code	GPB-505[T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Fundamentals of Genetics			**Co-Requisite/s**	Chromosomal Structure and Function			
Course Outcomes & Bloom's Level	**CO1-** Describe the morphological and biochemical architecture of eukaryotes & prokaryotes along with the molecular mechanism of cell cycle and cell division. **(BL1-Remember)** **CO2-** Understand the evolutionary significance of chromosome aberrations and illustrate karyotype, ideogram and banding pattern **(BL2-Understand)** **CO3-** Utilization of polyploids, aneuploids and apomixes in various aspects of crop breeding, their maintenance and utilization in gene mapping and gene blocks transfer. **(BL3-Apply)** **CO4-** Analyse fertilization barriers at pre-and post-fertilization levels, chromosome manipulations in wide hybridization and In-vitro techniques to overcome. **(BL4-Analyze)** **CO5-** CO-5 Evaluate the synthesis of new crops (wheat, triticale and brassica) and gene transfer using bridge species. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG2(Zero hunger) SDG4(Quality education) SDG13(Climate action) SDG15(Life on land) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-I	Architecture of chromosome in prokaryotes and eukaryotes; Chromonemata, chromosome matrix, chromomeres, centromere, secondary constriction and telomere; Artificial chromosome construction and its uses; Special types of chromosomes.	Thematic teaching, Classroom lecture, Experimentation, Guided questioning	6
Unit-II	Chromosomal theory of inheritance Cell Cycle and cell division mitosis and meiosis; Differences, significance and deviations Synapsis, structure and function of synaptonemal complex and spindle apparatus, anaphase movement of chromosomes and crossing over-mechanisms and theories of crossing over- recombination models, cytological basis, - Variation in chromosome structure: Evolutionary significance - Introduction to techniques for karyotyping; Chromosome banding and painting - in situ hybridization and various applications.	Thematic teaching, Classroom lecture, Experimentation, Guided questioning	6
Unit-III	Structural and Numerical variations of chromosomes and their implications- Symbols and terminologies for chromosome numbers - euploidy -haploids, diploids and polyploids; Utilization of aneuploids in gene location - Variation in chromosome behaviour - somatic segregation and chimeras endomitosis and somatic reduction; Evolutionary significance of chromosomal aberrations - balanced lethals and chromosome complexes.	Thematic teaching, Classroom lecture, Experimentation, Guided questioning	6
Unit-IV	Inter-varietal chromosome substitutions; Polyploidy and role of polyploids in crop breeding; Evolutionary advantages of autopolyploids and allopolyploids - Role of aneuploids in basic and applied aspects of crop breeding, their maintenance and utilization in gene mapping and gene blocks transfer Alien addition and substitution lines creation and utilization; Apomixis - Evolutionary and genetic problems in crops with apomixes.	Thematic teaching, Classroom lecture, Experimentation, Guided questioning	6
Unit-V	Reversion of autopolyploids to diploids; Genome mapping in polyploids Interspecific hybridization and allopolyploids; Synthesis of new crops (wheat, triticale and brassica) Hybrids between species with same chromosome number, alien translocations, Hybrids between species with different chromosome number; Gene transfer using amphidiploids Bridge species. Fertilization barriers in crop plants at pre-and post-fertilization levels- In-vitro techniques to overcome the fertilization barriers in crops; Chromosome manipulations in wide hybridization; case studies Production and use of haploids, dihaploids and doubled haploids in genetics and breeding.	Thematic teaching, Classroom lecture, Experimentation, Guided questioning	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical-1	Learning the cytogenetics laboratory, various chemicals to be used for fixation, dehydration, embedding, staining, cleaning etc.	Experiments	BL2-Understand	2
Practical-2	Microscopy: various types of microscopes - Observing sections of specimen using Electron microscope.	Experiments	BL2-Understand	2
Practical-3	Studies on the course of mitosis and meiosis in crops.	Experiments	BL3-Apply	2
Practical-4	Using micrometers and studying the pollen grain size in various crops.	Experiments	BL3-Apply	2
Practical-5	Various methods of staining and preparation of temporary and permanent slides - Pollen germination in vivo and in vitro.	Experiments	BL4-Analyze	2
Practical-6	Identification of polyploids in different crops - Induction and identification of haploids; Anther culture and Ovule culture.	Experiments	BL5-Evaluate	2
Practical-7	Morphological observations on aneuploids- Cytogenetic analysis of interspecific and intergeneric crosses.	Experiments	BL4-Analyze	2
Practical-8	Fluorescent in situ hybridization (FISH)- Genome in-situ hybridization GISH.	Experiments	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Becker, K. and Hardin. 2004. The World of Cell. 5th Ed. Pearson Education Carroll, M. (1989). Organelles. The Guilford Press. Charles, B. (1993). Discussions in Cytogenetics. Prentice Hall. Darlington, C.D and La Cour, L.F. (1969). The Handling of Chromosomes. Georger Allen & Unwin Ltd. Elgin, S.C.R. (1995). Chromatin Structure and Gene Expression. IRL Press. Gray, P. (1954).The Mirotomist'sFormulatory Guide. The Blakiston Co. Gupta, P.K. and Tsuchiya, T. (1991). Chromosome Engineering in Plants:Genetics, Breeding and Evolution. Part A. Elsevier. Gupta, P.K. (2000). Cytogenetics. Rastogi Publications Johannson, D.A. (1975). Plant Microtechnique. McGraw Hill. Sharma, A.K.& Sharma, A. (1988). Chromosome Techniques: Theory and Practice. Butterworth.
Articles	
References Books	Karp, G. (1996). Cell and Molecular Biology: Concepts and Experiments.John Wiley & Sons. Khush, G.S. (1973). Cytogenetics of Aneuploids. Academic Press. Sumner, A.T. (1982). Chromosome Banding. Unwin Hyman Publications Swanson, C.P. (1960). Cytology and Cytogenetics. Macmillan & Co.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	-	-	-	-	-	-	-	-	-	-	3	1	-
CO2	2	-	-	-	-	-	-	-	-	-	-	-	1	2	-
CO3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2
CO4	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Genetics_and_Plant_Breeding

Title of the Course	Molecular Breeding and Bioinformatics
Course Code	GPB-506[T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Fundamentals of Breeding			**Co-Requisite/s**	Basics of Biotechnology			
Course Outcomes & Bloom's Level	**CO1-** Study the structure and function of cell and cell cycle **(BL1-Remember)** **CO2-** Understand the principles of bioenergetics and the history of molecular genetics. **(BL2-Understand)** **CO3-** Examine the structure and function of genetic material and its regulation and Central Dogma of life **(BL3-Apply)** **CO4-** Mechanism of recombinant DNA technology and gene amplification. **(BL4-Analyze)** **CO5-** Conceptualize the mechanism of unregulated cell cycle (cancer ancell aging). **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG2(Zero hunger) SDG8(Decent work and economic growth) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Ultrastructure of the cell; Differences between eukaryotic and prokaryotic cells, macromolecules; Structure and function of cell wall, nuclear membrane and plasma membrane; Cellular Organelles nucleus, plastidschloro/chromoplast, mitochondria endoplasmic reticulum, Golgi complex, lysosomes, peroxisomes.	T1 Class room teaching(chalk-board) Power Point Presentations T2 ABL activities Assignments Flip Class/ Seminars Quiz	6
Unit 2	Bioenergetics; Ultra structure and function of mitochondria and biological membranes; Chloroplast and other photosynthetic organelles; Interphase nucleus- Structure and chemical composition; Cell division and physiology of cell division.	T1 Class room teaching(chalk-board) Power Point Presentations T2 ABL activities Assignments Flip Class/ Seminars Quiz	6
Unit 3	Historical background of molecular genetics; Genetic material in organisms; Structure and properties of nucleic acid, DNA transcription and its regulation Transcription factors and their role; Genetic code, regulation of protein synthesis in prokaryotes and eukaryotes ribosomes, t-RNAs and translational factors.	T1 Class room teaching(chalk-board) Power Point Presentations T2 ABL activities Assignments Flip Class/ Seminars Quiz	6
Unit 4	Transposable elements; Mechanisms of recombination in prokaryote; DNA organization in eukaryotic chromosomes DNA content variation, types of DNA sequences Unique and repetitive sequences; organelle genomes; Gene amplification and its significance; Proteomics and protein-protein interaction; Signal transduction; Genes in development; Cancer and cell aging.	T1 Class room teaching(chalk-board) Power Point Presentations T2 ABL activities Assignments Flip Class/ Seminars Quiz	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Morphological and Gram staining of natural bacteria.	Experiments	BL2-Understand	2
Practical 2	Cultivation of bacteria in synthetic medium.	Experiments	BL2-Understand	2
Practical 3	Determination of growth rate and doubling time of bacterial cells in culture.	Experiments	BL3-Apply	2
Practical 4	Demonstration of bacteriophage by plaque assay method.	Experiments	BL3-Apply	2
Practical 5	Determination of soluble protein content in a bacterial culture.	Experiments	BL3-Apply	2
Practical 6	Isolation, purification and raising clonal population of a bacterium.	Experiments	BL4-Analyze	2
Practical 7	Biological assay of bacteriophage and determination of phage population in lysate	Experiments	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Bruce, A. (2004). Essential Cell Biology. Garland. Karp, G. (2004). Cell and Molecular Biology: Concepts and Experiments. John Wiley. Klug, W.S. & Cummings, M.R. (2003). Concepts of Genetics. Scot, Foreman &Co. Lewin, B. (2008). IX Genes. John Wiley & Sons Lodish, H, Berk, A. & Zipursky, S.L. (2004). Molecular Cell Biology. 5th Ed. WH Freeman. Nelson, D.L. & Cox, M.M. (2005). Principles of Biochemistry. WH Freeman & Co. Russell, P.J. (1996). Essential Genetics. Blackwell Scientific Publ. Schleif, R. (1986). Genetics and Molecular Biology. Addison-Wesley Publ. Co.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	1	-	-	-	-	3	-	-
CO2	-	-	1	-	-	-	-	-	-	-	-	-	1	3	-
CO3	-	2	-	-	-	-	2	-	-	-	-	-	-	-	2
CO4	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	1	-	-	-	1	2	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Genetics_and_Plant_Breeding

Title of the Course	Crop Breeding-II(Rabi Crop)
Course Code	GPB-512[T]

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Basic principles of genetics			**Co-Requisite/s**	Knowledge of various breeding techniques			
Course Outcomes & Bloom's Level	**CO1-** Define the fundamental concepts and theories of crop breeding. **(BL1-Remember)** **CO2-** Describe the nature and structure of crop breeding practices. **(BL2-Understand)** **CO3-** Conceptualize crop breeding exercises and hands on lab tools and techniques **(BL3-Apply)** **CO4-** Apply the concepts of crop breeding for development of transgenic.**(BL4-Analyze)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Wheat: Origin, evolution, mode of reproduction, chromosome number; Genetics – cytogenetics and genome relationship; Breeding objectives: yield, quality characters, biotic and abiotic stress resistance, etc., breeding approaches, introgression of alien gene(s) (if required), biotic and abiotic stress resistance, heterosis breeding, released varieties, examples of MAS used for improvement. Oats: Origin, evolution, mode of reproduction, chromosome number; Genetics – cytogenetics and genome relationship; Breeding objectives: yield, quality characters, biotic and abiotic stress resistance, etc., breeding approaches, introgression of alien gene(s) (if required), biotic and abiotic stress resistance, released varieties, examples of MAS used for improvement. Barley: Origin, evolution, center of origin, mode of reproduction, chromosome number; Genetics – cytogenetics and genome relationship; Breeding objectives: yield, quality characters, biotic and abiotic stress resistance, etc., breeding approaches, introgression of alien gene(s) (if required), biotic and abiotic stress resistance, released varieties, examples of MAS used for improvement.	PBL, Field Work & Outdoor Learning, Classroom Lecture, Classroom Lecture	6
Unit 2	Chickpea: Origin, evolution mode of reproduction, chromosome number; Genetics – cytogenetics and genome relationship; Breeding objectives: yield, quality characters, biotic and abiotic stress resistance, etc., breeding approaches, introgression of alien gene(s) (if required), biotic and abiotic stress resistance, released varieties, examples of MAS used for improvement. Other pulses: Lentil, field pea, Rajma, Horse gram: Origin, evolution, mode of reproduction, chromosome number; Genetics. cytogenetics and genome relationship; Breeding objectives: yield, quality characters, biotic and abiotic stress resistance, etc., breeding approaches, introgression of alien gene(s) (if required), biotic and abiotic stress resistance, heterosis breeding, released varieties, examples of MAS used for improvement. Interspecific crosses attempted and its implications, reasons for failure, ways of overcoming them.	PBL, Field Work & Outdoor Learning, Classroom Lecture, Classroom Lecture	6
Unit 3	Rapeseed and Mustard: Origin, evolution, mode of reproduction, chromosome number; Genetics – cytogenetics and genome relationship; Breeding objectives; yield, quality characters, biotic and abiotic stress resistance, etc., breeding approaches, introgression of alien gene(s) (if required), biotic and abiotic stress resistance, heterosis breeding, released varieties, examples of MAS used for improvement, Oil quality, Improvement for oil quality. Sunflower, Safflower: Origin, mode of reproduction, chromosome number; Genetics, cytogenetics and genome relationship; Breeding objectives: yield, quality characters, biotic and abiotic stress resistance, etc., breeding approaches, introgression of alien gene(s) (if required), biotic and abiotic stress resistance, heterosis breeding, released varieties, examples of MAS used for improvement.	PBL, Field Work & Outdoor Learning, Classroom Lecture, Classroom Lecture	6
Unit 4	Mesta and minor fibre crops: Origin, mode of reproduction, chromosome number; Genetics–cytogenetics and genome relationship; Breeding objectives: yield, quality characters, biotic and abiotic stress resistance, etc., breeding approaches, introgression of alien gene(s) (if required), biotic and abiotic stress resistance, released varieties, examples of MAS used for improvement. Forage crops: Origin, evolution mode of reproduction, chromosome number; Genetics–cytogenetics and genome relationship; Breeding objectives: yield, quality characters, biotic and abiotic stress resistance, etc., breeding approaches, introgression of alien gene(s) (if required), biotic and abiotic stress resistance.	PBL, Field Work & Outdoor Learning, Classroom Lecture, Classroom Lecture	6
Unit 5	Seed spices: Origin, evolution, mode of reproduction, chromosome number; Genetics–cytogenetics and genome relationship; Breeding objectives: yield, quality characters, biotic and abiotic stress resistance, etc., breeding approaches, introgression of alien gene(s) (if required), biotic and abiotic stress resistance, scope of heterosis breeding, released varieties, examples of MAS used for crop improvement.	PBL, Field Work & Outdoor Learning, Classroom Lecture, Classroom Lecture	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Floral biology, emasculation and pollination techniques in wheat, oats, barley, chickpea, rajma, rapeseed mustard, sunflower;	Field work	BL2-Understand	2
Practical 2	Study of range of variation for yield and yield components;	Field work	BL2-Understand	2
Practical 3	Study of segregating populations in cereal, pulses and oilseed crops;	Field work	BL3-Apply	2
Practical 4	Use of descriptors for cataloguing; Learning on the crosses between different species;	Field work	BL3-Apply	2
Practical 5	Trait based screening for stress resistance;	Field work	BL3-Apply	2
Practical 6	Learning on the Standard Evaluation System (SES) and descriptors;	Field work	BL4-Analyze	2
Practical 7	Use of software for database management and retrieval.	Field work	BL4-Analyze	4

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Bahl, P.N., and Salimath, P.M. (1996). Genetics, Cytogenetics and Breeding of Crop Plants. Vol. I. Pulses and Oilseeds. Oxford & IBH. Gupta, S.K. (2012). Technological Innovations in Major World Oil crops. Vol. I. Springer, USA. Gupta, S.K. (2012). Technological Innovations in Major World Oil crops. Vol. II. Springer, USA. Gupta, S.K. (2016). Breeding of Oilseed Crops for Sustainable Production. Academic Press, USA. Kannaiyan, S., Uthamasamy, S., Theodore, R.K. and Palaniswamy, S. (2002). New Dimensions and Approaches for Sustainable Agriculture. Directorate of Extension Education, TNAU, Coimbatore. Parthasarathy, V.A. (2017). Spices and Plantation Crops Vol.1 (Part A) Breeding of Breeding and Genetics. John Wiley & Sons.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	1	-
CO2	-	-	3	-	-	-	-	-	-	-	-	-	1	2	-
CO3	-	-	-	-	2	-	-	-	-	-	-	-	-	-	2
CO4	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Genetics_and_Plant_Breeding

Title of the Course	Breeding for Stress Resistance and Climate Change
Course Code	GPB-516[T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Fundamental of Plant Breeding			**Co-Requisite/s**	Basics of Biotechnology			
Course Outcomes & Bloom's Level	**CO1-** Define the fundamental concepts and theories of stress resistance and climate change. **(BL1-Remember)** **CO2-** Describe the nature and structure of breeding for stress resistance and climate change. **(BL2-Understand)** **CO3-** Conceptualize stress resistance management and hands on lab tools and techniques **(BL3-Apply)** **CO4-** Apply the concepts of breeding for stress resistance and climate change.**(BL4-Analyze)** **CO5-** Problems based on breeding strategies for stress resistance and climate change.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Concept and impact of climatic change; Importance of plant breeding with special reference to biotic and abiotic stress resistance; Classification of biotic stresses – major pests and diseases of economically important crops.	Class room lecture, PBL, Field work,Herberia development	6
Unit 2	Concepts of resistance to insect and pathogen resistance; Analysis and inheritance of resistance variation; Host defence responses to pathogen invasions- Biochemical and molecular mechanisms; Acquired and induced immunity and systemic acquired resistance (SAR); Host-pathogen interaction, gene-for-gene hypothesis, molecular evidence for its operation and exceptions; Concept of signal transduction and other host-defence mechanisms against viruses and bacteria.	Class room lecture, PBL, Field work,Herberia development	6
Unit 3	Types and genetic mechanisms of resistance to biotic stresses –Horizontal and vertical resistance in crop plants; Quantitative resistance/ adult plant resistance and slow rusting resistance; Classical and molecular breeding methods - Measuring plant resistance using plant fitness; Behavioural, physiological and insect gain studies; Phenotypic screening methods for major pests and diseases; Recording of observations; Correlating the observations using marker data – Gene pyramiding methods and their implications. Classification of abiotic stresses - Stress inducing factors, moisture stress/ drought and water logging and submergence; Acidity, salinity/ alkalinity/ sodicity; High/ low temperature, wind, etc.; Stress due to soil factors and mineral toxicity; Physiological and Phenological responses; Emphasis of abiotic stresses in developing breeding methodologies.	Class room lecture, PBL, Field work,Herberia development	6
Unit 4	Genetics of abiotic stress resistance; Genes and genomics in breeding cultivars suitable to low water regimes and water logging and submergence, high and low/ freezing temperatures; Utilizing MAS procedures for identifying resistant types in important crops like rice, sorghum, wheat, cotton, etc.; Breeding for resistance to stresses caused by toxicity, deficiency and pollutants/ contaminants in soil, water and environment.	Class room lecture, PBL, Field work,Herberia development	6
Unit 5	Use of crop wild relatives as a source of resistance to biotic and abiotic factors in major field crops; Transgenics in management of biotic and abiotic stresses, use of toxins, protease inhibitors, lectins, chitinases and Bt for diseases and insect pest management.	Class room lecture, PBL, Field work,Herberia development	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Understanding the climatological parameters and predisposal of biotic and abiotic stress factors- ways of combating them for diseases caused by fungi and bacteria;	Field work	BL2-Understand	2
Practical 2	Symptoms and data recording; use of MAS procedures;	Field work	BL2-Understand	2
Practical 3	Phenotypic screening techniques for sucking pests and chewing pests – Traits to be observed at plant and insect level;	Field work	BL3-Apply	2
Practical 4	Phenotypic screening techniques for nematodes and borers; Ways of combating them;	Field work	BL3-Apply	2
Practical 5	Evaluating the available populations like RIL, NIL, etc. for pest resistance;	Field work	BL4-Analyze	2
Practical 6	Use of standard MAS procedures. Breeding strategies - Weeds – ecological, environmental impacts on the crops;	Field work	BL4-Analyze	2
Practical 7	Breeding for herbicide resistance;	Field work	BL3-Apply	2
Practical 8	Screening crops for drought and flood resistance; factors to be considered and breeding strategies;	Field work	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	Blum, A. (1988). Plant Breeding for Stress Environments. CRC Press. Christiansen, M.N. and Lewis, C.F. (1982). Breeding Plants for Less Favourable Environments. Wiley International. Fritz, R.S., and Simms, E.L. (Eds.). (1992). Plant Resistance to Herbivores and Pathogens: Ecology, Evolution and Genetics. The University of Chicago Press. Li, P.H. and Sakai, A. (1987). Plant Cold Hardiness. Liss, New York Springer Luginpill, P. (1969). Developing Resistant Plants - The Ideal Method of Controlling Insects. USDA, ARS, Washington DC. Maxwell, F.G. and Jennings, P.R. (Eds.). (1980). Breeding Plants Resistant to Insects. John Wiley & Sons. Wiley-Blackwell. Roberto, F. (2018). Plant Breeding for Biotic and Abiotic Stress Tolerance. Springer. Russel, G.E. (1978). Plant Breeding for Pest and Disease Resistance. Butterworths. Sakai, A. and Larcher, W. (1987). Frost Survival in Plants. Springer-Verlag.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	2	-	-	-	-	-	-	-	3	2	-
CO2	-	3	2	-	-	-	-	-	-	-	-	-	-	3	1
CO3	1	-	-	-	3	-	-	-	-	-	-	-	-	-	1
CO4	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
CO5	-	2	-	-	-	1	-	1	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Horticulture_Vegetable_Science

Title of the Course	Postharvest Management of Horticulture Produce
Course Code	PHM-501[T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** State structure, nature and importance of horticultural produce **(BL1-Remember)** **CO2-** Describe regulation of ripening by use of chemicals and growth regulators**(BL2-Understand)** **CO3-** Operate pre and Postharvest treatments for extending storage life/ vase life**(BL3-Apply)** **CO4-** Examine standards and specifications for fresh produce**(BL4-Analyze)** **CO5-** Judge handling system and marketing of horticultural crops**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
1	Importance and scope History, Importance and scope of Postharvest technology of horticultural produce. Nature and structure of horticultural produce. Pre and Postharvest losses and their causes.	Guided learning Fieldwork and outdoor learning Cooperative Learning Strategies Brainstorming Problem-based learning	2
2	Regulation of ripening Climacteric and non-climacteric fruits. Regulation of ripening by use of chemicals and growth regulators. Control of sprouting, rooting and discoloration in vegetables.	Guided learning Fieldwork and outdoor learning Cooperative Learning Strategies Brainstorming Problem-based learning	2
3	Treatments for extending shelf life Maturity indices for harvest. Harvesting and harvesting tools. Curing in roots and tubers. Pre-package Operation: Pre-cooling, washing,sorting, grading of horticultural perishables for local markets andexport. Postharvest handling of spices, plantation crops, medicinaland aromatic plants. Equipment for washing, sizing, grading.	Guided learning Fieldwork and outdoor learning Cooperative Learning Strategies Brainstorming Problem-based learning	2
4	Handling system and marketing of horticultural crops Pre and Postharvest treatments for extending storage life/ vase life. VHT, irradiation treatment, skin coating, de-greening, etc. Pre-packaging, Packaging techniques for local market and export. Standards and specifications for fresh produce	Guided learning Fieldwork and outdoor learning Cooperative Learning Strategies Brainstorming Problem-based learning	2
5	Handling system and marketing of horticultural crops Postharvest handling system for horticulture crops of regional importance. Principles of transport, modes of transportation, types of vehicles and transit requirements for different horticultural produce. Marketing: Factors influencing marketing of perishable crops, marketing systems and organizations.	Guided learning Fieldwork and outdoor learning Cooperative Learning Strategies Brainstorming Problem-based learning	2

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Study of maturity indices for harvest of fruits, vegetables, spices and plantation crops;	PBL		
Practical 2	Protective skin coating with wax emulsion and pre and Postharvest treatment with fungicides and chemicals	PBL		
Practical 3	Pre-packaging of perishables	PBL		
Practical-4	Extension of vase life of cut flowers by use of chemicals and growth regulators;	PBL		
Practical-5	Control of sprouting of potato and onion by using growth regulators	PBL		
Practical-6	Study of effect of pre-cooling on shelf-life and quality of fresh fruits, vegetables and flowers;	PBL		

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41	50		50	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0	0	0	0

Part E

Books	1. Bhattacharjee SK and Dee LC. 2005. Postharvest technology of flowers and ornamental plants. Pointer publishers, Jaipur. 2. Chattopadhyay SK. 2007. Handling, transportation and storage of fruit and vegetables. GeneTech books, New Delhi 3. FAO. 2007. Handing and Preservation of Fruits and Vegetables by Combined methods for Rural Areas-Technical Manual. FAO Agr.Ser.Bull., 149. 4. Kader AA. 1992. Postharvest technology of horticultural crops. 2nd ed university of California. 5. Paliyath G, Murr DP, Handa AK and Lurie S. 2008. Postharvest Biology and Technology of Fruits, Vegetables and Flowers, Wiley-Blackwell, ISBN: 9780813804088. 6. Pruthi JS. 2001 (Reprint). Major spices of India crop management and Postharvest technology. ICAR, New Delhi 7. Stawley J Kays. 1998. Postharvest physiology of perishable plant products. CBS publishers. 8. Sudheer KP, Indira V. 2007. Postharvest Technology of Horticultural Crops, Peter K.V. (Ed.), New India Publishing Agency, ISBN 9788189422431. 9. Sunil Pareek (Ed.) 2016. Postharvest Ripening Physiology of Crops, CRC Press, ISBN 9781498703802. 10. Thompson AK. (Ed.) 2014. Fruit and Vegetables: Harvesting, Handling and Storage (Vol. 1 & 2) Blackwell Publishing Ltd, Oxford, UK. ISBN: 9781118654040.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
CO2	2	-	2	-	2	-	2	-	-	-	-	2	-	-	-
CO3	-	1	-	-	1	1	1	-	-	-	-	1	-	-	-
CO4	1	-	1	-	-	1	-	-	1	-	-	-	-	-	-
CO5	1	1	1	-	-	-	1	-	1	-	-	1	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Agronomy

Title of the Course	Soil Fertility and Fertilizer Use
Course Code	SOILS-502 [T]

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Soil fertility and fertilizer use			**Co-Requisite/s**	Soil fertility and fertilizer use			
Course Outcomes & Bloom's Level	**CO1-** Describe essential plant nutrients, its functions and deficiency symptoms. **(BL1-Remember)** **CO2-** Discuss sources, forms, roles and transformation of nitrogen in soil. **(BL2-Understand)** **CO3-** Demonstrate the methods of fertilizer recommendation and application **(BL3-Apply)** **CO4-** Analyse the role of phosphatic fertilizer,behavior and their management **(BL4-Analyze)** **CO5-** Justify the significance for presence of potassium and sulphur in soil. **(BL5-Evaluate)** **CO6-** Justify the significance for presence of potassium and sulphur in soil. **(BL6-Create)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	Soil fertility and soil productivity; nutrient sources fertilizers and manures; essential plant nutrients - functions and deficiency symptoms.	Brain storming, Guided learning, Cooperative Learning Strategies	5
Unit-2	Soil and fertilizer nitrogen sources, forms, immobilization and mineralization, nitrification, denitrification; biological nitrogen fixation - types, mechanism, microorganisms and factors affecting; nitrogenous fertilizers and their fate in soils; management of fertilizer nitrogen in lowland and upland conditions for high fertilizer use efficiency.	Brain storming, Guided learning, Cooperative Learning Strategies Lab work	5
Unit-3	Soil and fertilizer phosphorus - forms, immobilization, mineralization, reactions in acid and alkali soils; factors affecting phosphorus availability in soils; phosphatic fertilizers - behavior in soils and management under field conditions.	Guided learning, Cooperative Learning Strategies, Lab work,	5
Unit-4	Potassium - forms, equilibrium in soils and its agricultural significance; mechanism of potassium fixation; management of potassium fertilizers under field conditions. Sulphur - source, forms, fertilizers and their behavior in soils; calcium and magnesium factors affecting their availability in soils; management of sulphur, calcium and magnesium fertilizers.	Cooperative Learning Strategies, Lab work, Fieldwork and outdoor learning Problem-based learning	5
Unit-5	Micronutrients critical limits in soils and plants; factors affecting their availability and correction of their deficiencies in plants; role of chelates in nutrient availability. Common soil test methods for fertilizer recommendations; quantity intensity relationships; soil test crop response correlations and response functions.	Lab work, Fieldwork and outdoor learning Problem-based learning ,Discussions and Presentation, ABL	6
Unit-6	Fertilizer use efficiency; blanket fertilizer recommendations usefulness and limitations; site-specific nutrient management; plant need based nutrient management; integrated nutrient management. Soil fertility evaluation - biological methods, soil, plant and tissue tests; soil quality in relation to sustainable agriculture.	Brainstorming, Fieldwork and outdoor learning, Critical incidents	6

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Principles of colorimetric	Experiments	BL2-Understand	2
Practical 2	Flame-photometry and atomic absorption spectroscopy	Experiments	BL3-Apply	2
Practical 3	Chemical analysis of soil for total and available nutrients	Experiments	BL3-Apply	2
Practical 4	Analysis of plants for essential elements	Experiments	BL3-Apply	2
Practical 5	Study of PH	Field work	BL4-Analyze	2
Practical 6	Study of EC	Experiments	BL5-Evaluate	2
Practical 7	Study of N, P and K	Experiments	BL6-Create	2
Practical 8	Study of gypsum	Experiments	BL6-Create	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10	0		0	

Part E

Books	Brady, N. C. and Weil, R. R. (2002). The Nature and Properties of Soils. 13th Ed. Pearson Edu.Kabata, P. A. and Pendias, H. (1992). Trace Elements in Soils and Plants. CRC Press. Kannaiyan, S., Kumar, K. and Govindarajan, K. (2004). Biofertilizers Technology. Scientific Publ.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	-	-	-	-	-	-	-	-	-	-	3	1	-
CO2	-	1	-	-	-	-	-	-	-	-	-	-	1	2	-
CO3	-	-	-	1	-	-	-	-	-	-	-	-	-	-	2
CO4	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Agronomy

Title of the Course	Soil Chemistry
Course Code	SOILS-503[T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Agronomy, lab knowledge and soil concepts			**Co-Requisite/s**	Agronomy			
Course Outcomes & Bloom's Level	**CO1-** Understand the chemical (elemental) composition of the earth's crust, soils, rocks, and minerals and Learn the basics of chemical kinetics and its application in soil chemistry. **(BL1-Remember)** **CO2-** Analyze the properties of soil colloids, including inorganic and organic colloids and understand the origin of charge in soil colloids and the concept of zero point charge (ZPC) **(BL2-Understand)** **CO3-** Understand ion exchange processes in soil, focusing on cation exchange theories based on the law of mass action (Kerr-Vanselow, Gapon equations, hysteresis, Jenny's concept)**(BL3-Apply)** **CO4-** Learn about the quantity/intensity (Q/I) relationship and the concepts of step and constant-rate K. Understand the management aspects related to soil chemistry and nutrient fixation.**(BL4-Analyze)** **CO5-** Study the chemistry of acid soils, including active and potential acidity and lime potential and the geochemistry of micronutrients and environmental soil chemistry**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG7(Affordable and clean energy) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	organic matter - fractionation of soil organic matter and different fractions, clay-organic interactions. Elements of equilibrium thermodynamics, chemical equilibria, electrochemistry and chemical kinetics. Experimental methods to study ion exchange phenomena and practical implications in plant nutrition.	Brain storming, Guided learning, Cooperative Learning Strategies	6
Unit-2	Soil colloids: inorganic and organic colloids - origin of charge, concept of Point of Zero Charge (PZC) and its dependence on variable-charge soil components, surface charge characteristics of soils; diffuse double layer theories of soil colloids, zeta potential, stability, coagulation/flocculation and peptization of soil colloids; electrometric properties of soil colloids; sorption properties of soil colloids	Brain storming, Lab work , Critical incidents, Fieldwork and outdoor learning	6
Unit-3	Ion exchange processes in soil; cation exchange- theories based on law of mass action (Kerr- concept), adsorption isotherms, donnan-membrane equilibrium concept, clay-membrane electrodes and ionic activity measurement, thermodynamics, statistical mechanics; anion and ligand exchange innersphere and outer-sphere surface complex formation, fixation of oxyanions, hysteresis in sorption-desorption of oxy-anions and anions, shift of PZC on ligand exchange, AEC, CEC;	Brain storming, Lab work , Fieldwork and outdoor learning	6
Unit-4	Potassium, phosphate and ammonium fixation in soils covering specific and non-specific sorption; precipitation-dissolution equilibria; step and constant-rate K; management aspects	Brain storming,lab work, Fieldwork and outdoor learning, Talks and presentations	7
Unit-5	Chemistry of acid soils; active and potential acidity; lime potential, chemistry of acid soils; sub-soil acidity Chemistry of salt-affected soils and amendments; soil pH, ECe, ESP, SAR and important relations; soil management and amendments. Chemistry and electrochemistry of submerged soils.	Brain storming, Critical incidents, lab work, Talks and presentations	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Unti-1	1. Determination of CEC and AEC of soils, 2. Analysis of equilibrium soil solution for pH, EC, Eh by the use of Eh-pH meter and conductivity meter, 3. Determination of point of zero-charge and associated surface charge characteristics by the serial potentiometric titration method, 4. Potentiometric and conductometric titration of soil humic and fulvic acids, (E4/E6) ratio of soil humic and fulvic acids by visible spectrophotometric Adsorption-desorption of phosphate/sulphate by soil using simple adsorption isotherm, Construction of adsorption envelope of soils by using phosphate/fluoride/sulphate and ascertaining the mechanism of the ligand exchange process involved, Determination of titratable acidity of an acid soil by BaCl2-TEA method, Determination of lime requirement of an acid soil by buffer method, Determination of gypsum requirement of an alkali soil.	Experiments	BL2-Understand	2
Unti-2	1. Determination of CEC and AEC of soils, 2. Analysis of equilibrium soil solution for pH, EC, Eh by the use of Eh-pH meter and conductivity meter, 3. Determination of point of zero-charge and associated surface charge characteristics by the serial potentiometric titration method, 4. Potentiometric and conductometric titration of soil humic and fulvic acids, (E4/E6) ratio of soil humic and fulvic acids by visible spectrophotometric Adsorption-desorption of phosphate/sulphate by soil using simple adsorption isotherm, Construction of adsorption envelope of soils by using phosphate/fluoride/sulphate and ascertaining the mechanism of the ligand exchange process involved, Determination of titratable acidity of an acid soil by BaCl2-TEA method, Determination of lime requirement of an acid soil by buffer method, Determination of gypsum requirement of an alkali soil.	Field work	BL2-Understand	2
Unti-3	1. Determination of CEC and AEC of soils, 2. Analysis of equilibrium soil solution for pH, EC, Eh by the use of Eh-pH meter and conductivity meter, 3. Determination of point of zero-charge and associated surface charge characteristics by the serial potentiometric titration method, 4. Potentiometric and conductometric titration of soil humic and fulvic acids, (E4/E6) ratio of soil humic and fulvic acids by visible spectrophotometric Adsorption-desorption of phosphate/sulphate by soil using simple adsorption isotherm, Construction of adsorption envelope of soils by using phosphate/fluoride/sulphate and ascertaining the mechanism of the ligand exchange process involved, Determination of titratable acidity of an acid soil by BaCl2-TEA method, Determination of lime requirement of an acid soil by buffer method, Determination of gypsum requirement of an alkali soil.	Field work	BL3-Apply	2
Unti-4	1. Determination of CEC and AEC of soils, 2. Analysis of equilibrium soil solution for pH, EC, Eh by the use of Eh-pH meter and conductivity meter, 3. Determination of point of zero-charge and associated surface charge characteristics by the serial potentiometric titration method, 4. Potentiometric and conductometric titration of soil humic and fulvic acids, (E4/E6) ratio of soil humic and fulvic acids by visible spectrophotometric Adsorption-desorption of phosphate/sulphate by soil using simple adsorption isotherm, Construction of adsorption envelope of soils by using phosphate/fluoride/sulphate and ascertaining the mechanism of the ligand exchange process involved, Determination of titratable acidity of an acid soil by BaCl2-TEA method, Determination of lime requirement of an acid soil by buffer method, Determination of gypsum requirement of an alkali soil. 1. Determination of CEC and AEC of soils, 2. Analysis of equilibrium soil solution for pH, EC, Eh by the use of Eh-pH meter and conductivity meter, 3. Determination of point of zero-charge and associated surface charge characteristics by the serial potentiometric titration method, 4. Potentiometric and conductometric titration of soil humic and fulvic acids, (E4/E6) ratio of soil humic and fulvic acids by visible spectrophotometric Adsorption-desorption of phosphate/sulphate by soil using simple adsorption isotherm, Construction of adsorption envelope of soils by using phosphate/fluoride/sulphate and ascertaining the mechanism of the ligand exchange process involved, Determination of titratable acidity of an acid soil by BaCl2-TEA method, Determination of lime requirement of an acid soil by buffer method, Determination of gypsum requirement of an alkali soil.	Field work	BL3-Apply	2
Unti-5	1. Determination of CEC and AEC of soils, 2. Analysis of equilibrium soil solution for pH, EC, Eh by the use of Eh-pH meter and conductivity meter, 3. Determination of point of zero-charge and associated surface charge characteristics by the serial potentiometric titration method, 4. Potentiometric and conductometric titration of soil humic and fulvic acids, (E4/E6) ratio of soil humic and fulvic acids by visible spectrophotometric Adsorption-desorption of phosphate/sulphate by soil using simple adsorption isotherm, Construction of adsorption envelope of soils by using phosphate/fluoride/sulphate and ascertaining the mechanism of the ligand exchange process involved, Determination of titratable acidity of an acid soil by BaCl2-TEA method, Determination of lime requirement of an acid soil by buffer method, Determination of gypsum requirement of an alkali soil.	Experiments	BL3-Apply	2
Unti-6	1. Determination of CEC and AEC of soils, 2. Analysis of equilibrium soil solution for pH, EC, Eh by the use of Eh-pH meter and conductivity meter, 3. Determination of point of zero-charge and associated surface charge characteristics by the serial potentiometric titration method, 4. Potentiometric and conductometric titration of soil humic and fulvic acids, (E4/E6) ratio of soil humic and fulvic acids by visible spectrophotometric Adsorption-desorption of phosphate/sulphate by soil using simple adsorption isotherm, Construction of adsorption envelope of soils by using phosphate/fluoride/sulphate and ascertaining the mechanism of the ligand exchange process involved, Determination of titratable acidity of an acid soil by BaCl2-TEA method, Determination of lime requirement of an acid soil by buffer method, Determination of gypsum requirement of an alkali soil.	Experiments	BL4-Analyze	2
Unti-7	1. Determination of CEC and AEC of soils, 2. Analysis of equilibrium soil solution for pH, EC, Eh by the use of Eh-pH meter and conductivity meter, 3. Determination of point of zero-charge and associated surface charge characteristics by the serial potentiometric titration method, 4. Potentiometric and conductometric titration of soil humic and fulvic acids, (E4/E6) ratio of soil humic and fulvic acids by visible spectrophotometric Adsorption-desorption of phosphate/sulphate by soil using simple adsorption isotherm, Construction of adsorption envelope of soils by using phosphate/fluoride/sulphate and ascertaining the mechanism of the ligand exchange process involved, Determination of titratable acidity of an acid soil by BaCl2-TEA method, Determination of lime requirement of an acid soil by buffer method, Determination of gypsum requirement of an alkali soil.	Field work	BL4-Analyze	2
Unti-8	1. Determination of CEC and AEC of soils, 2. Analysis of equilibrium soil solution for pH, EC, Eh by the use of Eh-pH meter and conductivity meter, 3. Determination of point of zero-charge and associated surface charge characteristics by the serial potentiometric titration method, 4. Potentiometric and conductometric titration of soil humic and fulvic acids, (E4/E6) ratio of soil humic and fulvic acids by visible spectrophotometric Adsorption-desorption of phosphate/sulphate by soil using simple adsorption isotherm, Construction of adsorption envelope of soils by using phosphate/fluoride/sulphate and ascertaining the mechanism of the ligand exchange process involved, Determination of titratable acidity of an acid soil by BaCl2-TEA method, Determination of lime requirement of an acid soil by buffer method, Determination of gypsum requirement of an alkali soil.	Field work	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10	0		0	

Part E

Books	Bear, R. E. (1964). Chemistry of the Soil. Oxford and IBH.
Articles	Bolt, G. H. & Bruggenwert, M. G. M. (1978). Soil Chemistry. Elsevier.
References Books	Stevenson, F. J. (1994). Humus Chemistry. 2nd Ed. John Wiley & Sons.
MOOC Courses	
Videos	Van, O. H. (1977). Introduction to Clay Colloid Chemistry. John Wiley & Sons.

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	-	-	-	-	-	-	-	-	-	-	3	1	-
CO2	-	1	-	-	-	-	-	-	-	-	-	-	1	2	-
CO3	-	-	-	1	-	-	-	-	-	-	-	-	-	-	2
CO4	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Genetics_and_Plant_Breeding

Title of the Course	Seed Production Principles and Techniques in Field Crops
Course Code	SST-503[T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Seed Technology Fundamentals			**Co-Requisite/s**	Entomology Basics			
Course Outcomes & Bloom's Level	**CO1-** Understand about role of pollinator in quality seed production **(BL1-Remember)** **CO2-** Describe the concept of IPM during seed production and storage **(BL2-Understand)** **CO3-** Understand the classes of pesticides and its use during production and storage of seed **(BL3-Apply)** **CO4-** Conceptualize the detection and loss estimation due to pests in seed storage. **(BL4-Analyze)** **CO5-** Learning about Process of fumigation and its effect **(BL5-Evaluate)** **CO6-** Learning about Process of safe seed storage **(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Principles of seed entomology; pollinator insects, insect pests and their classification based on mode of infestation etc.	Cooperative, Interpretive Trails, Critical reading and Writing, ABL	6
Unit 2	Principles of insect pollination, role of pollinators in seed production. Augmenting quality seed production through honeybee pollination incrucifers and forage legumes. Plant protection measures in bee pollinated crops. Management of pollinators for hybrid seed production.	Cooperative, Interpretive Trails, Critical reading and Writing, ABL	6
Unit 3	Major insect pests of principal crops and their management practices. Methods of insect pest control. Classes of pesticides, their handling and safe use on seed crops.	Cooperative, Interpretive Trails, Critical reading and Writing, ABL	6
Unit 4	Storage insect pests infecting seeds, their development and economic importance. Storage losses due to pests, control of storage pests, management of storage insects pests, mites and rodents, seed sampling and loss estimation.	Cooperative, Interpretive Trails, Critical reading and Writing, ABL	6
Unit 5	Principles of fumigation and their use, effect of different fumigants; preservatives and seed protectants on seed quality; Type of storage structures domestic and commercial.	Cooperative, Interpretive Trails, Critical reading and Writing, ABL	8

M

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Collection and identification of insect-pollinators, collection and identification of important pests of stored seeds.	Field work	BL2-Understand	2
Practical 2	Detection and estimation of pest infestation vis- a- vis loss of seed quality	Field work	BL3-Apply	2
Practical 3	Safe handing and use of fumigants and insecticides.	Field work	BL3-Apply	2
Practical 4	Safety measures in fumigating and disinfecting , exposure period, aeration etc. the storage structures.	Field work	BL4-Analyze	2
Practical 5	Plant protection equipments, their operation and maintenance.	Field work	BL5-Evaluate	2
Practical 6	Pesticides, its dose determination, preparation of solution and its application.	Field work	BL6-Create	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	19	0			

Part E

Books	Agarwal, N.A., & Girish, G.K. (1977). An Introduction to Action Programme to Regress on Farm Storage Losses in India. FAO/NORAD Seminar on Farm Storage Grain in India, Nov. 29-Dec. 8, 1977. Anderson, J.A. & Aleock, A.W. (1954). Storage of Cereal Grain & theirProducts. American Assoc. Cereal Chemists, St. Pauls, Minn. Cottong, R.T. (1963). Insect Pests of Stored Grain and Grain Products. Burgess Publ. Co., Minneopolis, Minn., USA. Monro, (1969). Manual of Fumigation for Insect Control. FAO Rome Agril. Studies No. 79. Subramanyam, B. & Hagstrum, D.W. (1995). Interrelated Management of Insects in Stored Products. Marcel Dekker.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	3	-	-	-	-	-	-	-	-	3	1	-
CO2	-	-	-	-	-	1	-	-	-	-	-	-	1	2	-
CO3	-	-	-	-	-	-	2	-	-	-	-	-	-	-	2
CO4	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
CO5	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Genetics_and_Plant_Breeding

Title of the Course	Post Harvest Handeling and Storage of Seeds
Course Code	SST-508[T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Seed Technology			**Co-Requisite/s**	Maintenance breeding			
Course Outcomes & Bloom's Level	**CO1-** Define the basic mechanism involved in seed processing.**(BL1-Remember)** **CO2-** Understanding on fundamental aspects of storage techniques and quality management practices.**(BL2-Understand)** **CO3-** Conceptualize the advanced research on seed developmental biology.**(BL3-Apply)** **CO4-** Examine the process of seed deterioration**(BL4-Analyze)** **CO5-** Acquire the skill on seed handling and storage methods on commercial basis.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	Seed processing – objectives and principles; processing sequence – threshing, shelling, ginning, extraction methods; drying – principles and methods; seed cleaning, grading, upgrading – methods – machineries and equipment – scalper, pre-cleaner, cleaner cum grader, specific gravity separator, indented cylinder, disc separator, spiral separator, velvet separator, magnetic separator, electronic colour sorter – working principles and functions.	ABL, Field Base and outdoor learning, Project work	7
Unit-2	Online seed processing – elevators and conveyers – processing plant – specifications, design and layout; mechanical injury – causes and detection – management.	ABL, Field Base and outdoor learning, Project work	6
Unit-3	Seed treatment – methods – pre and mid storage seed treatments, seed treating formulations and equipments; packaging materials – types – bagging and labeling; seed blending – principle and methods.	ABL, Field Base and outdoor learning, Project work	6
Unit-4	Seed storage – purpose and importance – factors affecting storage, optimum condition for storage of different seeds; storage principles – Harrington's thumb rule – concepts and significance of moisture equilibrium – maintenance of safe seed moisture – physical, physiological, biochemical and molecular changes during seed storage – storage behavior of orthodox and recalcitrant seeds – prediction of viability – viability nomograph.	ABL, Field Base and outdoor learning, Project work	6
Unit-5	Methods of seed storage – modified atmospheric storage – ultra dry storage – vacuum storage – cryopreservation – germplasm storage – gene banks – NBPGR, IPGRI and National seed storage laboratory; seed storage godown – structure – maintenance – sanitation.	ABL, Field Base and outdoor learning, Project work	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical -1	Seed extraction – wet and dry methods.	Experiments	BL5-Evaluate	2
Practical -2	Seed processing sequence for different crops	Experiments	BL5-Evaluate	2
Practical -3	Design of processing plant – equipments – estimation of processing efficiency	Experiments	BL5-Evaluate	2
Practical -4	Seed drying methods – principle and methods	Experiments	BL5-Evaluate	2
Practical -5	Practicing seed grading – upgrading techniques	Experiments	BL5-Evaluate	2
Practical -6	Pre-storage seed treatments – protectants – antioxidants – halogens	Experiments	BL5-Evaluate	2
Practical -7	Practicing seed blending methods	Experiments	BL5-Evaluate	2
Practical -8	Seed storage godown – sanitation, fumigation – visit to seed storage godown and cold storage unit	Experiments	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
80	31	50		30	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
20	10				

Part E

Books	1. Barton LV. 1961. Seed Preservation and Longevity, (Vol. 1). Leonard Hill, London. 2. Gregg BR, Law AG, Virdi SS and Balis JS. 1970. Seed Processing. Avion printers, New Delhi. 3. Gupta D. 2009. Seeds: their conservation principles and practices. Sathish serial publishing house. New Delhi.
Articles	
References Books	4. Justice OL and Bass LN. 1978. Principles and Practices of Seed Storage. Agriculture Hand Book No. 506, Castle House Publication Ltd., Washington. 5. Kulkarni GN. 2011. Principles of Seed Technology. Kalyani Publishers, New Delhi. 6. Maiti RK, Sarkar NC and Singh VP. 2006. Principles of Post Harvest Seed Physiology and Technology. Agrobios, Jodhpur, Rajasthan. 7. Padmavathi S, Prakash M, Ezhil Kumar S, Sathiyanarayanan G and Kamaraj A. 2012. A Text book of Seed Science and Technology, New India Publishing Agency, New Delhi. 8. Sen S and Ghosh N. 2010. Seed Science and Technology. Kalyani Publishers, New Delhi. 9. Singhal NC. 2010. Seed Science and Technology. Kalyani Publishers, New Delhi.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	2	-	-	-	1	-	-	-	-	-	-	-	-
CO3	-	2	-	-	-	-	1	-	-	-	-	-	-	-	-
CO4	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	2	-	-	2	1	1	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Horticulture_Vegetable_Science

Title of the Course	Princinples of Vegetable Breeding
Course Code	VSC-504[T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Describe principles and practices adopted for breeding of vegetable crops.**(BL1-Remember)** **CO2-** Describe principles and practices adopted for breeding of vegetable crops.**(BL2-Understand)** **CO3-** Identify constructive approaches in hybrid seed production.**(BL3-Apply)** **CO4-** Apply advance techniques of breeding in vegetable crops.**(BL4-Analyze)** **CO5-** Use basic biometric genetics in computation of various parameters.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Unit – 1	UNIT-I Importance and history- Importance, history and evolutionary aspects of vegetable breeding and its variation from cereal crop breeding.	Cooperative Learning Strategies Brainstorming Stimulus activities Fieldwork and outdoor learning	2
Unit-2	UNIT-II Selection procedures- Techniques of selfing and crossing; Breeding systems and methods; Selection procedures and hybridization; Genetic architecture; Breeding for biotic stress (diseases, insect pests and nematode), abiotic stress (temperature, moisture and salt) resistance and quality improvement; Breeding for water use efficiency (WUE) and nutrients use efficiency (NUE).	Cooperative Learning Strategies Brainstorming Stimulus activities Fieldwork and outdoor learning	2
Unit – 3	UNIT-III Heterosis breeding- Types, mechanisms and basis of heterosis, facilitating mechanisms like male sterility, self-incompatibility and sex forms.	Cooperative Learning Strategies Brainstorming Stimulus activities Fieldwork and outdoor learning	2
Unit – 4	UNIT-IV Mutation and Polyploidy breeding; Improvement of asexually propagated vegetable crops and vegetables suitable for protected environment.	Cooperative Learning Strategies Brainstorming Stimulus activities Fieldwork and outdoor learning	2
Unit – 5	UNIT-V Ideotype breeding- Ideotype breeding; varietal release procedure; DUS testing in vegetable crops; Application of In-vitro and molecular techniques in vegetable improvement.	Cooperative Learning Strategies Brainstorming Stimulus activities Fieldwork and outdoor learning	2

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Practical 1	Floral biology and pollination behaviour of different vegetables	PBL		
Practical 2	Techniques of selfing and crossing of different vegetables, viz., Cole crops, okra, cucurbits, tomato, eggplant, hot pepper, etc.;	PBL		
Practical 3	Breeding system and handling of filial generations of different vegetables;	PBL		
Practical 4	Exposure to biotechnological lab practices	PBL		
Practical 5	Visit to breeding farms	PBL		

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41	50		50	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
30	15				

Part E

Books	1. Kalloo G. 1988. Vegetable breeding (Vol. I, II, III). CRC Press, Fl, USA. 2. Kole CR. 2007. Genome mapping and molecular breeding in plants-vegetables. Springer, USA. 3. Peter KVand Pradeep Kumar T. 1998. Genetics and breeding of vegetables. ICAR, New Delhi, p. 488. 4. Prohens J and Nuez F. 2007. Handbook of plant breeding-vegetables (Vol I and II). Springer, USA. 5. Singh BD. 2007. Plant breeding- principles and methods (8th edn.). Kalyani Publishers, New Delhi. 6. Singh Ram J. 2007. Genetic resources, chromosome engineering, and crop improvement-vegetable crops (Vol. 3). CRC Press, Fl, USA.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	-	-	2	-	-	2	-	-	-	-	2	-	-	-
CO3	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-
CO4	1	-	-	-	-	-	1	-	-	-	-	1	-	-	-
CO5	1	-	-	1	-	-	1	-	-	-	-	1	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Horticulture_Vegetable_Science

Title of the Course	Masters Seminar
Course Code	VSC-591

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					0	0	1	1
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Demonstrate a sound knowledge of selected seminar topic.**(BL1-Remember)** **CO2-** Identify the problem, formulate a solution, and implement it.**(BL2-Understand)** **CO3-** Engage in dialogue with individuals and the larger community.**(BL3-Apply)** **CO4-** Provide solutions for challenging issues in the field**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
Practical		ABL activities Field demonstration of cultivation practices, Assignment Unannounced test Seminars with open discussions Group discussions or debate Quiz	2

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Seminar	A seminar or presentation held as a requirement for a Master's degree program. It enables students to apply theoretical knowledge research findings, delving deeper into a particular issue within their field of study.	Seminar	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	41	0		0	

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	1	-	1	-	-	-	3	-	2	-	-	-
CO4	-	-	-	-	-	1	-	-	-	1	-	1	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Horticulture_Vegetable_Science

Title of the Course	Masters Research
Course Code	VSC-599

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					0	0	7	7
Course Type	Project							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level								
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MSc_Agriculture-Horticulture_Vegetable_Science

Title of the Course	Masters Research
Course Code	VSC-599

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					0	0	15	15
Course Type	Project							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level								
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-