

CURRICULA LAY-OUT FOR B. Sc. Ag. (Hons.) DEGREE

Level	S-1 (July-December)		S-2 (January-June)	
	Course (T,P)	Cr.hrs (T+P)	Course (T,P)	Cr.hrs (T+P)
Level-1	Agron 101,102	2+2	Agron 121,122	2+2
	SoilSc 101,102	2+2	Hort 121, 122	2+2
	FMech 101,102	2+2	Biochem 121,122	2+2
	Chem 101,102	3+2	AgStat 121,122	3+2
	AgEcon 101	3+0	RSoc 121	2+0
	Optional (one):		Elective (any one):	2+2
	English 101 (2+0)		AHusb 121,122 (2+2)	
	----- (2+0)		CompSc 121,122 (2+2)	
	Total (Excluding optional)	12+8	----- (2+2)	
			Optional (one):	
		English 101 (2+0)		
		----- (2+0)		
		Total (Excluding optional)	13+10	
Level-2	Agron 201, 202	2+2	Entom 221,222	3+2
	SoilSc 201, 202	3+2	PPath 221, 222	3+2
	Hort 201, 202	2+2	GPB 221, 222	2+2
	CBot 201, 202	3+2	AgExt 221, 222	3+2
	Biochem 201, 202	3+2	AgChem 221,222	2+2
	Total	13+10	Total	13+10
LEVEL-3	Hort 301, 302	3+2	Agron 321, 322	3+2
	GPB 301, 302	3+2	SoilSc 321, 322	3+2
	AgExt 301, 302	2+2	Entom 321, 322	3+2
	AgChem 301, 302	3+2	PPath 321, 322	3+2
	AgroF 301, 302	3+2	CBot 321, 322	2+2
	Total	14+10	Total	14+10
Level-4	Entom 401, 402	3+2	Agron 421, 422	3+2
	PPath 401, 402	3+2	SoilSc 421, 422	3+2
	CBot 401, 402	3+2	Hort 421, 422	3+2
	AgExt 401, 402	3+2	GPB 421, 422	3+2
	Elective (any one):	2+2	Elective (any one):	2+2
	Biotech 401,402(2+2)		Biotech 401, 402 (2+2)	
	EnvSc 401, 402 (2+2)		EnvSc 401,402 (2+2)	
	---- 401,402/etc(2+2)		----- 401, 402/etc (2+2)	
Total	14+10	Total	14+10	

Agron (12+10) = 22	PPath (9+6) = 15	AgChem (5+4) = 9
SoilSc (11+8) = 19	CBot (8+6) = 14	Biochem (5+4) = 9
Hort (10+8) = 18	GPB (8+6) = 14	AgroF (3+2) = 5
Entom (9+6) = 15	AgExt (8+6) = 14	Others (19+12) = 31
Total credit hrs (Theor. +Prac)		: 107+78 = 185
Total no. of courses (Theor.+Prac)		: 41+39 = 80

* Modified from the originally submitted one, and approved in the 141st Academic Council meeting held on 17th and 24th January, 2002 and approved by the syndicate in its 252nd meeting held on 23.3.2002.

Summary information on types of courses and credit requirement for B.Sc.Ag. (Hons) degree in the semester (cf. course lay-out)

Types of courses		Credits	Levels & semesters the credits to be earned from
(I)	Compulsory	173	All 4 levels (S-1, S-2)
(II)	Elective	12	Level – 1 (S-2) & Level – 4 (S-1, S-2)
(III)	Optional	4	Level – 1 (S-1, S-2)
Total earned credit requirement (Excluding optional) = 185			

Types of courses–compulsory/elective/optional to be offered by different departments at different levels (year) and semesters for B.Sc.Ag. (Hons) degree in the semester system from July 2002

Sl.	Course No. and Title	Credit	Contact hrs/wk	Available at	
				Level	Semester
1.	Department of Agronomy				
	<u>Compulsory:</u>				
	Agron 101: Fundamentals of Agronomy-Theory	2 cr	2hrs	L-1	S-1
	Agron 102: Introductory Agronomic Practices	2 cr	3 hrs	"	"
	Agron 121: Seed Science and Technology-Theory	2 cr	2 hrs	L-1	S-2
	Agron 122: Seed Science & Technology-Practical	2 cr	3 hrs	"	"
	Agron 201: Weed Science-Theory	2 cr	2 hrs	L-2	S-1
	Agron 202: Practical Weed Science-Practical	2 cr	3 hrs	"	"
	Agron 321 : Crop Husbandry-Theory	3 cr	3 hrs	L-3	S-2
	Agron 322 : Crop Husbandry-Practical	2 cr	3 hrs	"	"
	Agron 421 : Crop Production & Farm Management-Theory	3 cr	3 hrs	L-4	S-2
	Agron 422 : Crop Production & Farm Management-Practical	2 cr	3 hrs	"	"
	<u>Elective:</u>				
	Agron 401: Introductory Cropping System	2 cr	2hrs	L-4	S-1
	Agron 402: Practical Introductory Cropping System	2 cr	3 hrs	"	"
	Agron 423: Forage Crops and Pasture Management	2 cr	2 hrs	L-4	S-2
	Agron 424: Practical Forage and Pasture Crops	2 cr	3 hrs	"	"
2.	Department of Soil Science				
	<u>Compulsory:</u>				
	Soil Sc 101: Introductory Soil Science-Theory	2 cr	2 hrs	L-1	S-1
	Soil Sc 102: Soil Science-Practical – 1	2 cr	3 hrs	"	"
	Soil Sc 201: Soil Survey, Classification & Conservation- Theory	3 cr	3 hrs	L-2	S-1
	Soil Sc 202: Soil Science-Practical – 2	2 cr	3 hrs	"	"
	Soil Sc 321 : Soil Physics & Soil Chemistry- Theory	3 cr	3 hrs	L-3	S-2
	Soil Sc 322: Soil Science- Practical – 3	2 cr	3 hrs	"	"
	Soil Sc 421: Soil Microbiology & Soil Fertility-Theory	3 cr	3 hrs	L-4	S-2
	Soil Sc 422: Soil Science-Practical – 4	2 cr	3 hrs	"	"
	<u>Elective:</u>	-	-	-	-
	Soil Sc 401: Soil Biology-Theory	2 cr	2 hrs	L-4	S-1
	Soil Sc 402: Soil Pollution-Theory	2 cr	2 hrs	L-4	S-1
3.	Department of Entomology				
	<u>Compulsory:</u>				
	Entom 221: Fundamentals of Entomology-Theory	3 cr	3 hrs	L-2	S-2
	Entom 222: Fundamentals of Entomology-Practical	2 cr	3 hrs	"	"
	Entom 321: Insect Ecology & Pest Management-Theory	3 cr	3 hrs	L-3	S-2
	Entom 322: Insect Ecology & Pest Management-Practical	2 cr	3 hrs	"	"
	Entom 401: Economic Entomology-Theory	3 cr	3 hrs	L-4	S-1
	Entom 402: Economic Entomology-Practical	2 cr	3 hrs	"	"
	<u>Elective:</u> Not available				
4.	Department of Horticulture				
	<u>Compulsory:</u>				
	Hort 121: Fundamental of Horticulture-Theory	2 cr	2 hrs	L-1	S-2
	Hort 122: Fundamental of Horticulture-Practical	2 cr	3 hrs	"	"
	Hort 201: Ornamental Horticulture & Plantation Crops-Theory	2 cr	2 hrs	L-2	S-1
	Hort 202: Ornamental Horticulture & Plantation Crops-Practical	2 cr	3 hrs	"	"
	Hort 301: Vegetables & Spice Crops-Theory	3 cr	3 hrs	L-3	S-1
	Hort 302: Vegetables & Spice Crops-Practical	2 cr	3 hrs	"	"
	Hort 421: Pomology-Theory	3 cr	3 hrs	L-4	S-2
	Hort 422: Pomology-Practical	2 cr	3 hrs	"	"
	<u>Elective:</u>				
	Hort. 401: Post harvest management of Hort Crops-Theory	2 cr	2 hrs	L-4	S-1
	Hort. 402: Postharvest Management of Horticulture Crops-Practical	2 cr	3 hrs	"	"
	Hort. 403: Commercial Horticulture-Theory	2 cr	2 hrs	L-4	S-2
	Hort. 404: Commercial Horticulture-Practical	2 cr	3 hrs	"	"
5.	Department of Plant Pathology				

Sl.	Course No. and Title	Credit	Contact hrs/wk	Available at	
				Level	Semester
	Compulsory:				
	PPath 221: Fundamentals of Plant Pathology-Theory	3 cr	3 hrs	L-2	S-2
	PPath 222:Plant Pathology-Practical 1	2 cr	3 hrs	"	"
	PPath 321: Principles of Plant Pathology & Diseases of Field Crops-Theory	3 cr	3 hrs	L-3	S-2
	PPath 322: Plant Pathology-Practical 2	2 cr	3 hrs	"	"
	PPath 401 : Diseases of fruits, Vegetables, Cash Crops, Agro-forest trees and Seed Pathology-Theory	3 cr	3 hrs	L-4	S-1
	PPath 402: Plant Pathology-Practical 3	2 cr	3 hrs	"	"
	Elective:				
	PPath 404: Plant Disease Management-Practical	2 cr	3 hrs	L-4	S-1
	PPath 422: Plant Disease Clinic-Practical	2 cr	3 hrs	L-4	S-2
6.	Department of Crop Botany				
	Compulsory:				
	CBot 201: Plant Morphology, Embriology and Taxonomy & Embryology-Theory	3 cr	3 hrs	L-2	S-1
	CBot 202: Plant Morphology, Embriology and Taxonomy & Embryology-Practical	2 cr	3 hrs	"	"
	CBot 321: Plant Physiology & Ecology (I)-Theory	2 cr	2 hrs	L-3	S-2
	CBot 322 Plant Physiology & Ecology (I)- Practical	2 cr	3 hrs	"	"
	CBot 401: Plant Physiology and Ecology (II)-Theory	3 cr	3 hrs	L-4	S-1
	CBot 402: Plant Physiology and Ecology (II)- Practical	2 cr	3 hrs	"	"
	Elective:				
	CBot 421: Crop Physiology-Theory	2 cr	2 hrs	L-4	S-2
	CBot 422: Crop Physiology-Practical	2 cr	3 hrs	"	"
	CBot 423: Plant Biodiversity & Conservation-Theory	2 cr	2 hrs	L-4	S-2
	CBot 424 : Plant Biodiversity & Conservation-Practical	2 cr	3 hrs	"	"
7.	Department of Genetics & Plant Breeding				
	Compulsory:				
	GPB 221: Cytology-Theory	2 cr	2 hrs	L-2	S-2
	GPB 222: Cytology-Practical	2 cr	3 hrs	"	"
	GPB 301: Genetics and Cytogenetics-Theory	3 cr	3 hrs	L-3	S-1
	GPB 302: Genetics-Practical	2 cr	3 hrs	"	"
	GPB 421: Plant Breeding-Theory	3 cr	3 hrs	L-4	S-2
	GPB 422: Plant Breeding-Practical	2 cr	3 hrs	"	"
	Elective:				
	GPB 401: Biotechnology and Genetic Engineering-Theory	2 cr	2 hrs	L-4	S-1
	GPB 402: Biotechnology and Genetic Engineering-Practical	2 cr	3 hrs	"	"
	GPB 423: Special Plant Breeding – Theory	2 cr	2 hrs	L-4	S-2
	GPB 424: Special Plant Breeding – Practical	2 cr	3 hrs	"	"
8.	Department of Agricultural Extension Education				
	Compulsory:				
	AgExt 221: Fundamentals of Extension, Leadership and Motivatio Theory	3 cr	3 hrs	L-2	S-2
	AgExt 222: Extension Teaching Methods and Aids-Practical	2 cr	3 hrs	"	"
	AgExt 301: Extension Communication and Group Approaches-Theory	2 cr	2 hrs	L-3	S-1
	AgExt 302: Data Collection, Processing and Report Writing-Practical	2 cr	3 hrs	"	"
	AgExt 401: Extension Organization Management-Theory	3 cr	3 hrs	L-4	S-1
	AgExt 402: Extension Programme Planning and Outreach Programme-Practical	2 cr	3 hrs	"	"
	Elective:				
	AgExt 403: Extension for Sustainable Agricultural Development–Theory	2 cr	2 hrs	L-4	S-1
	AgExt 404: Extension for Sustainable Agricultural Development–Practical	2 cr	3 hrs	"	"
	AgExt 421: Community Participation-Theory	2 cr	2 hrs	L-4	S-2
	AgExt 422: Community Participation – Practical	2 cr	3 hrs	"	"

Sl.	Course No. and Title	Credit	Contact hrs/wk	Available at	
				Level	Semester
9.	Department of Agricultural Chemistry				
	Compulsory:				
	AgChem 221: Nuclear and Agro-industrial Chemistry – Theory	2 cr	2 hrs	L-2	S-2
	AgChem 222: Nuclear and Agro-industrial Chemistry- Practical	2 cr	3 hrs	"	"
	AgChem 301: Plant Nutrition, Pesticide and Environmental Chemistry –Theory	3 cr	3 hrs	L-3	S-1
	AgChem 302: Plant Nutrition, Pesticide and Environmental Chemistry – Practical	2 cr	3 hrs	"	"
	Elective:				
	AgChem 401: Bioenergy – Principles & Practices – Theory	2 cr	2 hrs	L-4	S-1
	AgChem 402: Bioenergy – Principles and Practices – Practical	2 cr	3 hrs	"	"
	AgChem 421: Micro nutrients in agriculture –Theory	2 cr	2 hrs	L-4	S-2
	AgChem 422: Micro nutrients in Agriculture- Practical	2 cr	3 hrs	"	"
10.	Department of Biochemistry				
	Compulsory:				
	Biochem 121: Chemistry of Biomolecules-Theory	2 cr	2 hrs	L-1	S-2
	Biochem 122: Chemistry of Biomolecules-Practical	2 cr	3 hrs	"	"
	Biochem 201: Metabolism and Human Nutrition-Theory	3 cr	3 hrs	L-2	S-1
	Biochem 202: Metabolism and Human Nutrition-Practical	2 cr	3 hrs	"	"
	Elective:				
	Biochem 401: Fundamentals of Molecular Biochemistry & Biotechnology-Theory	2 cr	2 hrs	L-4	S-1
	Biochem 402: Fundamentals of Plant Biochemistry-Practical	2 cr	3 hrs	"	"
11.	Department of Chemistry				
	Compulsory:				
	Chem 101: Chemistry – Theory	3 cr	3 hrs	L-1	S-1
	Chem 102: Chemistry – Practical	2 cr	3 hrs	"	"
12.	Department of Agroforestry				
	Compulsory:				
	AgroF 301: Principles of Agroforestry – Theory	3 cr	3 hrs	L-3	S-1
	AgroF 302: Principles of Agroforestry – Practical	2 cr	3 hrs	"	"
	Elective: Not available	-	-	-	-
13.	Department of Language				
	Optional:				
	Lang 101: English Language	2 cr	2 hrs	L-1	S-1,2
14.	Department of Agricultural Economics				
	Compulsory:				
	AgEcon 101: Agricultural Economics	3 cr	3 hrs	L-1	S-1
15.	Department of Rural Sociology				
	Compulsory:				
	RSoc 121: Rural Sociology	2 cr	2 hrs	L-1	S-2
16.	Department Agricultural Statistics				
	Compulsory:				
	AgStat 121: Agricultural Statistics- Theory	3 cr	3 hrs	L-1	S-2
	AgStat 122: Agricultural Statistics – Practical	2 cr	3 hrs	"	"
17.	Department of Farm Power & Machinery				
	Compulsory:				
	FMech 101: Farm Mechanics – Theory	2 cr	2 hrs	L-1	S-1
	FMech 102: Farm Mechanics – Practical	2 cr	3 hrs	"	"
18.	Department of Animal Science				
	Elective:				
	AS 121: Animal Science – Theory	2 cr	2 hrs	L-1	S-2
	AS 122: Animal Science – Practical	2 cr	3 hrs	"	"
19.	Department of Biotechnology				
	Elective:				
	Biotech 401: Theory (cf. GPB: 401)	2 cr	2 hrs	L-4	S-1,2
	Biotech 402: Practical (cf. GPB: 402)	2 cr	3 hrs	"	"

Sl.	Course No. and Title	Credit	Contact hrs/wk	Available at	
				Level	Semester
20.	Department of Environmental Science				
	Elective:				
	EnvSc 401: Theory (Not available)	2 cr	2 hrs	L-4	S-1, 2
	EnvSc 402 : Practical (Not available)	2 cr	3 hrs	"	"
21.	Department of Computer Science & Mathematics				
	Elective:				
	CompSc 121: Theory (Not available)	2 cr	2 hrs	L-1	S-2
	CompSc 122: Practical (Not available)	2 cr	3 hrs	"	"

SYLLABUS FOR B.SC. AG. (Hons.) DEGREE

DEPARTMENT OF AGRONOMY

Types of courses available for B.Sc.Ag. (Hons.) degree in the semester system

Course No. and Title	Credit	Contact hrs/wk	Available at	
			Level	Semester
Compulsory:				
AGRON 111: Fundamentals of Agronomy-Theory	2 cr	2hrs	L-1	S-1
AGRON 112: Introductory Agronomic Practices-P	2 cr	3 hrs	"	"
AGRON 121: Seed Science and Technology-Theory	2 cr	2 hrs	L-1	S-2
AGRON 122: Seed Science & Technology-Practical	2 cr	3 hrs	"	"
AGRON 211: Weed Science-Theory	2 cr	2 hrs	L-2	S-1
AGRON 212: Weed Science-Practical	2 cr	3 hrs	"	"
AGRON 321 : Crop Husbandry-Theory	3 cr	3 hrs	L-3	S-2
AGRON 322 : Crop Husbandry-Practical	2 cr	3 hrs	"	"
AGRON 421 : Crop Production & Farm Management-T	3 cr	3 hrs	L-4	S-2
AGRON 422 : Crop Production & Farm Management-Practical	2 cr	3 hrs	"	"
Elective:				
AGRON 411: Introductory Cropping Systems—Theory	2 cr	2hrs	L-4	S-1
AGRON 412: Introductory Cropping Systems-Practical	2 cr	3 hrs	"	"
AGRON 423: Forage Crops and Pasture Management-T	2 cr	2 hrs	L-4	S-2
AGRON 424: Forage Crops and Pasture Crops- Practical	2 cr	3 hrs	"	"

Level-3, Semester-2

AGRON 321: Crop Husbandry-Theory, 3 Credits, 3 hrs/wk

Crop Growth Factors: Factors affecting growth, development and yield of crops.

Water Management: Water use efficiency under irrigated farming. Water management in dry land farming. Irrigation scheduling.

Fertilizer Management: Balanced fertilization. Fertilizer management in relation to varietal characteristics, growth phases, cropping systems and irrigation.

Organic Matter Management: Maintenance and replenishment of organic matter in soil. Concept of organic farming.

Management of Stress: Moisture, drought and flood; cold, heat, salinity and alkalinity stress and their management for crop production.

Production Technology of Crops: Origin, climate and soil requirements, characteristics of species and cultivars, cultivation practices, post-harvest operations and cost of production of the following crops:

Cereal crops: Rice, wheat, maize, barley and millets.

Sugar crops: Sugarcane and sugarbeet.

Pulse crops: Lentil, mungbean, grasspea, pea, chickpea, pigeonpea and blackgram.

Narcotic crops: Tobacco.

Green manuring crops: *Dhaincha*, sunnhemp and cowpea.

AGRON 322: Crop Husbandry-Practical, 2 Credits, 3 hrs/wk

1. Study of plant density on the growth and yield of a crop grown in students' plot.
2. Preparation of nurseries for raising seedlings of rice and tobacco.

3. Practising different methods of planting sugarcane.
4. Practising irrigation scheduling for a crop.
5. Raising a green manure crop and its incorporation in the soil.
6. Evaluation of the effect of different moisture stresses on the growth and yield of a crop grown in pot.
7. Computation of production cost of crops included in Course No. Agron. 321

Text and Reference Books

- Arakeri, H.R. and Donahue, R. 1988. Conservation and Water Management, Oxford and IBH Pub. Co. Pvt. Ltd. Calcutta, Bombay and New Delhi, India.
- Kipps, M.S. 1978. Production of Field Crops. 6th Edition. Tata McGraw-Hill Publishing Company Ltd. New Delhi, India.
- Martin, J.H.; Leonard, W.H. and Stamp, D.L. 1976. Principles of Field Crop Production. 3rd Edition, McMillan Pub. Co. Inc., New York.
- Mudaliar, V.I.S. 1984. Principles of Agronomy. 5th Edition. The Bangalore Printing and Publishing Co., Ltd. Mysore Road, Bangalore 18, India.
- Seizwo, M. 1967. Crop Science in Rice. Theory of Yield Determination and its application. Fuji Pub. Co. Tokyo.
- Shyte, R.O. 1980. Crop Production Environment. Faber and Faber Ltd. 24, Russel Square, London, W.C.I.
- Thakur, C. 1979. Scientific Crop Production. Volume 1 and II. 3rd Edition. Metropolitan Book Co. Ltd. I. Netaji Subhash Maeg, New Delhi 11002, India.
- Yawalkar, K.S.; Agarwal, J.P. and Bokde, S. 1981. Manures and Fertilizers. Agri-Horticulture Publication House, Nagpur-440010, India.

DEPARTMENT OF SOIL SCIENCE

Types of courses available for B.Sc.Ag. (Hons.) degree in the semester system

Course No. and Titles	Credit	Contact hrs/wk	Available at	
			Level	Semester
Compulsory:				
SS 111: Introductory Soil Science-Theory	2 cr	2 hrs	L-1	S-1
SS 112: Introductory Soil Science-Practical	2 cr	3 hrs	"	"
SS 211: Soil Survey, Classification & Conservation-Theory	3 cr	3 hrs	L-2	S-1
SS 212: Soil Survey, Classification & Conservation- Practical	2 cr	3 hrs	"	"
SS 321 : Soil Physics & Soil Chemistry- Theory	3 cr	3 hrs	L-3	S-2
SS 322: Soil Physics & Soil Chemistry – Practical	2 cr	3 hrs	"	"
SS 421: Soil Microbiology & Soil Fertility-Theory	3 cr	3 hrs	L-4	S-2
SS 422: Soil Microbiology & Soil Fertility - Practical-4	2 cr	3 hrs	"	"
Elective:				
SS 411: Soil Biology-Theory	2 cr	2 hrs	L-4	S-1
SS 412: Soil Biology –Practical	2 cr	2 hrs	"	"
SS 423: Soil Pollution –Theory	2 cr	2 hrs	L-4	S-2
SS 424: Soil Pollution-Practical	2 cr	2 hrs	"	"

Level-3, Semester-2

SS 321: Soil Physics and Soil Chemistry- Theory, 3 Credits, 3 hrs/wk

[Soil water

Hydrologic cycle, soil water constants, soil water potentials

Methods of measuring soil moisture

Water movement – infiltration, hydraulic conductivity

Evapotranspiration (ET)- factors affecting ET and methods of measuring ET

Soil temperature

Thermal properties of soils

Heat flow equation

Management of soil temperature

Soil consistency

Forms of soil consistency, swelling, shrinkage

Tillage and puddling

Plough pan - formation, effects on soils and crops

Mechanical analysis

Principle and methods

Stokes' law

Soil colloids

Classification and properties of soil colloids
Types and properties of oxides and hydroxides of Fe, Al and Mn

Silicate clays

Classification and basic structures of clays
Characteristics of kaolinite, mica, smectite, vermiculite, chlorite and interstratified minerals

Ion exchange

Development of charges in soil colloids
Cation exchange, anion exchange, base saturation
Mechanism of nutrient uptake by plants

SOIL ACIDITY AND LIMING

Types and causes of soil acidity
Buffering capacity of soils
Soil pH and nutrient availability
Liming - liming materials, effects on soil properties, mechanism of pH change

SUBMERGED SOILS

Characteristics of submerged soils
Electrochemical changes in submerged soils
Formation of nitrous oxides and methane gases
Soil solution – composition and importance

SS 322: Soil Physics and Soil Chemistry- Practical-3, 2 Credits, 3 hrs/wk

1. Determination of soil water by gravimetric method
2. Determination of maximum water holding capacity of soil
3. Determination of soil moisture content at field capacity
4. Determination of soil water by tensiometer method
5. Determination of soil water infiltration by double ring infiltrometer method
6. Determination of hydraulic conductivity of saturated soil by constant head method
7. Determination of cation exchange capacity of soil by sodium saturation method
1. Determination of soil pH by glass electrode pH meter
2. Determination of lime requirement of soil
3. Particle size analysis of soil by hydrometer method

Text and Reference Books

Brady N.C. 1996. The Nature and Properties of Soils. Macmillan Pub. Co. Inc., New York.
Dixon, J.B. and Wood S.B. 1989. Minerals in Soil Environments 2nd Edition. Soil Sci. Soc. Amer., Madison, Wis., USA
Hanks, R.J. and Ashcroft, F.L. 1980. Applied Soil Physics. Springer-Verlag, Berlin
Hillel, D. 1980. Fundamental of Soil Physics. Fundamentals of Soil Physics. Acad. Press, New York, USA.
Greenland, D.J. and Hayes, M.H.B. 1981. The Chemistry of Soil Processes. John Wiley & Sons Ltd., New York.
Lindsay, W.L. 1979. Chemical Equilibria in Soils. John Wiley & Sons Ltd., New York.
Marshall, C.E. 1964. The Physical Chemistry and Mineralogy of Soils, John Wiley, New York.
Michael A.M. 1978. Irrigation – Theory and Practice, Vikas Publishing House Pvt. Ltd. New Delhi.
Ponnamperuma F.N. 1972. Advances in Agronomy, Vol.24. Amer. Soc. Agron., Inc. Pub., Wis., USA.
Clute, A. (Ed.). 1986. Methods of Soil Analysis, Part 1. Amer. Soc. Agron., Inc. Pub. Madison, Wis., USA.

DEPARTMENT OF ENTOMOLOGY**Types of courses available for B.Sc.Ag. (Hons.) degree in the semester system**

Course No. and Title	Credit	Contact hrs/wk	Available at	
			Level	Semester
Compulsory:				
ENTOM 221: Fundamentals of Entomology (Theory)	3 cr	3 hrs	L-2	S-2
ENTOM 222: Fundamentals of Entomology (Practical)	2 cr	3 hrs	"	"
ENTOM 321: Insect Ecology & Pest Management (Theory)	3 cr	3 hrs	L-3	S-2
ENTOM 322: Insect Ecology & Pest Management(Practical)	2 cr	3 hrs	"	"
ENTOM 411: Economic Entomology (Theory)	3 cr	3 hrs	L-4	S-1
ENTOM 412: Economic Entomology (Practical)	2 cr	3 hrs	"	"
Elective: (Not available)	-	-	-	-

Level-3, Semester-2

ENTOM 321: Insect Ecology and Pest Management- Theory, 3 credits, 3 hrs/wk

A. Insect Ecology

Insect population: Ecological niche and habitats, agroecosystem, population dynamics. Influence of environmental factors on insect population. Growth forms of insect populations. Insect demography.

Insect polymorphism: Clonal, phase and social polymorphism. Adaptation of polymorphic insects in agroecosystem.

Monitoring and forecasting: Survey, field based and fixed position monitoring, pest migration, forecasting system of pest attack.

Population estimation and crop loss assessment: Aggregation pattern, types of pest damage, sampling, methods of population estimation, methods of crop yield loss assessment.

B. Pest Management

Pest management strategy: Concept of pest and pest management. Economic threshold, Economic injury level and General equilibrium position. Principles of insect pest management.

Methods of pest management: Conventional methods- Cultural, Mechanical, Physical, Legal and Chemical methods. Biotechnological methods- Biocontrol, Botanical control, Host plant resistance, Insect sterility technique, Insect growth regulators. Behavioural control- Attractants, Repellants, Antifeedants and Pheromones.

Integrated pest management (IPM): Prospects and limitations of IPM. Development and implementation of IPM.

ENTOM 322: Insect Ecology and Pest Management- Practical, 2 credits, 3 hrs/wk

1. Study of commonly used pesticides for controlling insects, mites and rodents.
2. Formulation of pesticides and computation of doses
3. Precautionary measures to be taken during handling and using pesticides.
4. Plant protection equipments- their operation and maintenance.
5. Uses of commonly used traps and poison baits.
6. Measurement of insect population density with absolute and relative methods.
7. Techniques of crop yield loss assessment in pest infested fields.

Text and Reference Books

Andrewartha, H.G. and Birch, L.C. 1970. The distribution and abundance of animals. The University of Chicago Press Ltd., London.

Dent, D. 1991. Insect pest management. CAB International.

Kilgore, W.W. and Douthett, R.H. 1967. Pest Control- Biological, physical and selected chemical methods. Academic Press, New York.

Metcalf, R.L. and Luckmann, W.H. 1994. Introduction to insect pest management. John Wiley and Sons, New York.

Atwal, A.S. 1976. Agricultural pests of India and Southeast Asia. Kalyani Publ., New Delhi.

Burges, H.D. 1981. Microbial control of pests and plant diseases 1970-1980. Academic Press, New York.

Evans, J.W. 1987. Insect pest and their control. Soni Reprints Agency, Delhi.

Hossain, M. 2001. Smannita Kitpatanga Babathtapana (in Bengali). Bangla Academy, Dhaka.

Huffaker, C.B. and Gutierrez, A.P. 1999. Ecological Entomology. John Wiley and Sons., Inc.

Huffaker, C.B. and Messenger, P.S. 1990. Theory and practice of biological control. Academic Press, New York.

Ishaaya, I. 1998. Insecticides with novel modes of action. Narosa Pub., India.

Mani, M.S. 1990. General Entomology. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

O'Brien, R.D. 1967. Insecticides action and metabolism. Academic Press, New York.

Pimentel, D. 1993. CRC handbook of pest management in agriculture (Vols II and III). CRC Press, India.

Price, P.W. 1984. Insect ecology. John Wiley and Sons, New York, Chichester, Brisbane, Toronto, Singapore.

Sathe, T. V. 2001. Insect pest predators. Daya Publ., India

Saxena, A. B. 2000. Biological control of insects. Anmol Publ., India.

Saxena, A. B. 2000. Ecology of insects. Anmol Publ., India.

Speight, M. R., Hunter, M.D. and Watt, A. D. 1999. Ecology of insects. Concepts and applications. Blackwell Science.

Upadhyay, R.K. 1998. Integrated pest and disease management. APH, India.

Van Emden, H. F. 1989. Pest control. Edward Arnold, London.

DEPARTMENT OF HORTICULTURE

Types of courses available for B.Sc.Ag. (Hons.) degree in the semester system

Course No. and Title	Credit	Contact hrs/wk	Available at	
			Level	Semester
Compulsory:				
HORT 121: Fundamentals of Horticulture-Theory	2 cr	2 hrs	L-1	S-2
HORT 122: Fundamentals of Horticulture- Practical	2 cr	3 hrs	"	"
HORT 211: Ornamental Horticulture & Plantation Crops-Theory	2 cr	2 hrs	L-2	S-1
HORT 212: Ornamental Horticulture & Plantation Crops- Practical	2 cr	3 hrs	"	"
HORT 311: Vegetables & Spice Crops- Theory	3 cr	3 hrs	L-3	S-1
HORT 312: Vegetables & Spice Crops- Practical	2 cr	3 hrs	"	"
HORT 421: Pomology- Theory	3 cr	3 hrs	L-4	S-2
HORT 422: Pomology- Practical	2 cr	3 hrs	"	"
Elective:				
HORT 411: Postharvest management of Horticultural Crops-Theory	2 cr	2 hrs	L-4	S-1
HORT 412: Postharvest Management of Horticultural Crops-Practical	2 cr	3 hrs	"	"
HORT 423: Commercial Horticulture- Theory	2 cr	2 hrs	L-4	S-2
HORT 424: Commercial Horticulture- Practical	2 cr	3 hrs	"	"

Level- 3, Semester-1

HORT 311: Vegetable and Spice Crops- Theory, 3 Credits, 3 hrs/wk

- Vegetables and spices in Bangladesh:** Background, status of production and export, importance in human nutrition and economy.
- Classification and morphology of vegetable and spice crops :** Origin, distribution, classification, morphology and growth habit.
- Soil and climatic factors in vegetable production:** Influence of soil, temperature, light, air and water on physiology, vegetative growth, flowering, yield and quality of vegetables.
- Vegetable seeds :** Present situation of production, import and supply, classes, quality, techniques of production, factors influencing quality during production and storage.
- Vegetable farming :** Kitchen and commercial garden; organic farming, polytunnel production; inter-multiple-relay cropping, crop rotation.
- Production technology of vegetables:** Technology of production and storage of fresh vegetables: cabbage, cauliflower, potato, tomato, brinjal, sweet potato, carrot, sweet gourd, pointed gourd, cucumber, watermelon, aroids, leafy vegetables and mushroom.
- Production and processing of spices:** Production, processing and storage of onion, garlic, chilli, ginger, turmeric, coriander and black pepper.

HORT 312: Vegetable and Spice Crops- Practical, 2 Credits, 3 hrs/wk

- Identification of important vegetable and spice plants, plant parts and their planting materials.
- Methods of planting vegetable and spice crops.
- Studies on morphological features of important vegetable and spice crops.
- Identification of important cultivated varieties of tomato, potato, brinjal and sweet potato.
- Estimation of cost of production and economic returns of tomato, cabbage, onion and potato.
- Studies on quality of vegetable seeds.
- Demonstration and report writing on homestead and commercial production of vegetables in a neighboring village.
- Extraction of bottlegourd, tomato and brinjal seeds.
- Studies on techniques of staking, trellising, artificial pollination and poly-tunnel making for vegetable production.
- Estimation of seed rate and fertilizer dose for vegetable production.
- Making of a crop calendar for vegetable and spice crops
- Raising of vegetable and spice crops in plots and report writing.

Text and Reference Books

- Anonymous. 1995. Winter Vegetables and Spices Production. Hort. Res. & Dev. Project, FAO/UNDP, DAE/BADC, Dhaka.
- Bose, T.K. and M.G. Som. 1990. Vegetable Crops in India. Naya Prokash, Calcutta.
- D.K. Salunkhe, B.B. Desai and N.R. Bhat. 1987. Vegetable and Flower Seed Production. Agricole Pub. Academy, New Delhi.
- Hussain, M.M. 1995. Seed Production and Storage Technology. Meer Intiaz Hossain, Dhaka.

- Pruthi, J.S. 1986. Spices and Condiments. National Book Trust, New Delhi.
- Purseglove, J.W., E.G. Brown, C.L. Green and S.R.J. Robbins. 1981. Spices, Vol I & II. Longman Group UK Ltd., London.
- Rashid, M.A. and D.P. Singh. 2000. A Manual on Vegetable Seed Production in Bangladesh. AVRDC-USAID-Bangladesh Project, BARI, Joydebpur.
- Rashid, M.M. 1999. Shabji Biggyan. 2nd ed., Rashid Pub. House, Dhaka.
- S.L. Katyal and K.L. Chadha. 1996. Vegetable Growing in India. Oxford & IBH Pub. Co. Pvt. Ltd. New Delhi.
- Sanmugavelu, K.G. 1989. Production Technology of Vegetable Crops. Oxford & IBH Pub. Co. Pvt. Ltd., New Delhi.
- Sharfuddin, A.F.M. and M.A. Siddique. 1985. Shabji Biggan. Hasina Akter Beauty, Mymensingh.
- Hoque, M.M. 1995. Training Manual: Summer and All-season Vegetable and Spice Production. Hort. Res. & Dev. Project, DAE/BADC, Dhaka. 130 p
- Hoque, MM. 1995. Training Manual: Winter Vegetables and Spices Production. Hort. Res. & Dev. Project, DAE/BADC, Dhaka. 284p.
- Hossain, M.I. 1996. Seed and Seed Technology. School of Agri. & Rural Dev., Bangladesh Open Univ. , Gazipur. 63p.
- Rashid and Singh. 2000. A Manual on Vegetable Seed Production in Bangladesh. AVRDC-USAID-Bangladesh Project, Hort. Res. Centre, BARI, Gazipur. 119p.
- Pruthi, J.S. 1986. Spices and Condiments. National Book Trust, New Delhi.
- Rashid, M.M. 1999. Shabji Biggyan. 2nd. ed., Rashid Pub. House, Dhaka.

DEPARTMENT OF PLANT PATHOLOGY

Types of courses available for B.Sc.Ag. (Hons.) degree in the semester system

Course No. and Title	Credit	Contact hrs/wk	Available at	
			Level	Semester
Compulsory:				
PPATH 221: Fundamentals of Plant Pathology- Theory	3 cr	3 hrs	L-2	S-2
PPATH 222: Fundamentals of Plant Pathology- Practical	2 cr	3 hrs	"	"
PPATH 321: Principles of Plant Pathology & Diseases of Field Crops-Theory	3 cr	3 hrs	L-3	S-2
PPATH 322: Principles of Plant Pathology & Diseases of Field Crops -Practical	2 cr	3 hrs	"	"
PPATH 411: Diseases of fruits, Vegetables, Cash Crops, Agro-forest Trees and Seed Pathology-Theory	3 cr	3 hrs	L-4	S-1
PPATH 412: Diseases of fruits, Vegetables, Cash Crops, Agro-forest Trees and Seed Pathology- Practical	2 cr	3 hrs	"	"
Elective:				
PPATH 421: Plant Disease Management- Theory	2 cr	3 hrs	L-4	S-2
PPATH 422: Plant Disease Clinic- Practical	2 cr	3 hrs	"	"

Level-3, Semester-2

PPATH 321: Principles of Plant Pathology and Diseases of Field Crops-Theory, 3 Credits, 3 hrs/wk

Pathogenesis: Parasitism and Pathogenicity, chain of events in disease developments. Enzymes and toxins in disease development, pathogenic effects on physiological functions of plants.

Dissemination of plant pathogens: Importance, factors and mechanisms.

Disease Development, Predisposition.

Epidemiology and Forecasting of Plant Diseases.

Methods of plant disease control: Cultural, Legislative, Chemicals, Host resistance, Biological, Integrated approach-concepts, components and economics, disease forecasting.

Disease of Crops:

Cereals: Rice, Wheat, Maize, Barley and Millets.

Fibres : Jute and Cotton.

Pulses : Pea, Gram, Lentil, Blackgram, Mungbean, Grasspea and Pigeonpea.

Oilseeds: Mustard, Groundnut, Sesame, Soybean and Sunflower.

Sugar Crop: Sugarcane.

PPATH 322: Principles of Plant Pathology and Diseases of Field Crops -Practical, 2 Credits, 3 hrs/wk **Field & Laboratory studies of plant diseases**

- a) Detailed study (symptoms, preparation of slides and identification of pathogens) of the followings:
 - i. Brown spot, Blast & BLB of Rice.

- ii. Stem rot, Black band & Anthracnose of Jute.
 - iii. Leaf blight, leaf rust, Foot rot & Loose smut of Wheat and Covered smut of Barley.
 - iv. Tikka, Leaf rust & collar rot of Groundnut.
 - v. Root-Knot diseases.
 - vi. Cercospora leaf spot of Blackgram & Mungbean.
 - vii. Alternaria blight of Mustard.
- b). Brief study (symptoms aided by permanent slides of the pathogen) of the followings:
- i. BLB. Stem rot, Bakanae, False smut, NBS, Sheath blight, Sheath rot, Leaf scald, Ufra, BLS, Grassy stunt, yellow dwarf and Tungro of rice.
 - ii. Leaf spot, Soft rot & Mosaic of Jute
 - iii. Angular leaf spot & Ball rot of cotton
 - iv. Foot and root rot, mosaic, rust, wilts & blights of pulses and oilseed crops.
 - v. Smut, Wilt, White leaf, Pineapple disease and Red rot of Sugarcane.
- Demonstration of Koch's postulates by using Fungi, Bacteria, Nematodes and viruses.

Text and Reference Books

- Agrios, G. N. 1969. Plant Pathology. Academic Press, New York.
- Alexopoulos, C. J. and E. S. beneke. 1962. Laboratory Manual for Introductory Mycology, Bargees Publishing Co.
- Ashrafuzzaman, M. H. 1976. 1st ed. Laboratory Manual of Plant Pathology. Department of Plant Pathology, BAU, Ashrafuzzaman, M. H. 1976. A Lecture Guide to Crop Diseases. 1st ed. Department of Plant Pathology. BAU.
- Funder, S. 1968. Practical Mycology, Hafner Publishing Co.
- Mehrotra, R. S. 1980. Plant Pathology. Tata McGraw Hill Publishing Co.
- Rangaswami, G. 1972. Diseases of Crop Plants in India. Prentice Hall of India Private Ltd.
- Singh, R. S. 1973. Plant Diseases, 3rd ed. Oxford. & IBH Publishing Co.
- Singh, R. S. 1978. Introduction to Principles of Plant Pathology. 2nd edition. Oxford & IBH Publishing Co. Delhi.
- Wheeler, B. E. J. 1969. An Introduction to Plant Diseases, John Wiley and Sons Ltd.
- Rangaswami, G. 1962. Bacterial Plant Diseases in India. Bombay. Asia Publishing House.
- Schaad, N. W. 1980. Laboratory Guide for Identification of Plant Pathogenic Bacteria, Bacteriological Committee of American Phytopathological Society, St. Paul, Minnesota.
- Barnett, R. I. 1960. Illustrated Genera of Imperfect Fungi. Burgess Publishing Co.
- Carter, W. 1962. Insects in Relation to Plant Diseases. McGraw Hill Book Company.
- Leech, J. G. 1940. Insects Transmission of Plant Diseases. McGraw Hill Book. Co.
- Frobisher, M. 1953. Fundamentals of Microbiology. Fifth edition, London, Saunders.
- S. H. OU. 1972. Rice Diseases. C. M. I. Kew Surrey, England.
- Van der Plank, J. E. 1963. Plant diseases. Epidemics & control. Academic Press, New York. London.
- Van der Plank, J. E. 1968. Diseases Resistance in plants, Academic Press, New York. London.

DEPARTMENT OF CROP BOTANY

Types of courses available for B.Sc.Ag. (Hons.) degree in the semester system

Course No. and Titles	Credit	Contact hrs/wk	Available at	
			Level	Semester
Compulsory:				
CBOT 211: Plant Morphology, Embryology and Taxonomy-Theory	3 cr	3 hrs	L-2	S-1
CBOT 212: Plant Morphology, Embryology and Taxonomy-Practical	2 cr	3 hrs	"	"
CBOT 321: Plant Physiology & Ecology(I)-Theory	2 cr	2 hrs	L-3	S-2
CBOT 322: Plant Physiology & Ecology(I)-Practical	2 cr	3 hrs	"	"
CBOT 411: Plant Physiology and Ecology(II)-Theory	3 cr	3 hrs	L-4	S-1
CBOT 412: Plant Physiology and Ecology(II)-Practical	2 cr	3 hrs	"	"
Elective:				
CBOT 421: Crop Physiology-Theory	2 cr	2 hrs	L-4	S-2
CBOT 422: Crop Physiology-Practical	2 cr	3 hrs	"	"
CBOT 423: Plant Biodiversity & Conservation-Theory	2 cr	2 hrs	L-4	S-2
CBOT 424: Plant Biodiversity & Conservation- Practical	2 cr	3 hrs	"	"

Level-3, Semester-2

CBOT 321: Plant Physiology and Ecology (I)- Theory, 2 Credits, 2 hrs/wk

A. PLANT PHYSIOLOGY:

Plant water relationship: Concept and measurement of water potential, absorption mechanisms, path of absorption and water movement, factors affecting absorption, theories of ascent of sap, water loss phenomenon in leaf and other plant parts, mechanisms of opening and closing of stomata, stomatal conductance, factors affecting evapotranspiration and its significance in crop production.

Photosynthesis: Photosynthetic apparatus, light and dark reactions, photosynthetic pathways and their significance, factors essential for photosynthesis, photosynthesis-transpiration compromise.

Respiration: Types, mechanisms, importance, relationship of carbohydrate metabolism to other compounds, factors affecting respiration, controlling measures for photorespiration, relationship between respiration and growth.

B. PLANT ECOLOGY:

Climate and weather: Concept, classification of climates with their influence on crop.

Agro-climatological parameters: Concept, fundamentals of ecology, ecological factors- biotic, abiotic and edaphic; light- quality, quantity and duration, effects on vegetation, solar radiation and light environment; temperature- minimal, optimal and maximal temperature for different categories of plants, night and day temperature, and adaptation to temperature, modification; water- significance, cycles, forms of water and precipitation, causes and effects of droughts, dry-wind, dust, storms and hails on crop production; wind- effect on vegetation, wind profiles, modification of wind environment.

Adaptation of plants to water: Hydrophytes, xerophytes, mesophytes, halophytes, heliophytes and sciophytes.

CBOT 322: Plant Physiology and Ecology (I)- Practical, 2 Credits, 3 hrs/wk

- Experiments to demonstrate- osmosis, plasmolysis, transpiration and ascent of sap.
- Measurement of water potential in plant tissues.
- Study of distribution and abundance of stomata in different types of leaves.
- Study of anatomical structures of leaves in C₃, C₄ and CAM plants.
- Experiments to demonstrate photosynthesis and respiration.
- Experiments on plant pigments: separation, quantification and stability index.
- Study of adaptive features of different ecological plant types e.g. mesophytes, xerophytes, hydrophytes, halophytes, heliophytes and sciophytes.
- Field visit to different agro-ecological zones (AEZ) of Bangladesh.

Text and Reference Books

Chang, J.H. 1971. Climate and agriculture. Aldine Pub., Chicago.

Datta, S.C. 1994. Plant physiology. Wiley Eastern Ltd., Calcutta, India.

Hans, M. 1984. Class experiments in plant physiology. George Allen & Unwin Pub. Ltd., London.

Jackson, I.J. 1982. Climate, water and agriculture in tropics. Longman, London.

Mohr, H. and Schopfer, P. 1994. Plant physiology. Springer, Berlin.

Pundey, S.N. and Sinha, B.K. 1972. Plant physiology. Vikas Publishing House Pvt. Ltd., New Delhi.

Rosenberg, N.J. 1985. Microclimate: The biological environment. John Wiley, New York.

Rosenberg, N.J.; Blad, B.L. and Verma, S.B. 1983. Microclimate: The biological environment. John Wiley, New York.

Salisbury, F.B. and Ross, C.W. 1986. Plant physiology. Wadworth Pub., USA.

DEPARTMENT OF GENETICS AND PLANT BREEDING

Types of courses available for B.Sc.Ag. (Hons.) degree in the semester system

Course No. and Title	Credit	Contact hrs/wk	Available at	
			Level	Semester
Compulsory:				
GPB 221: Cytology-Theory	2 cr	2 hrs	L-2	S-2
GPB 222: Cytology-Practical	2 cr	3 hrs	"	"
GPB 311: Genetics and Cytogenetics –Theory	3 cr	3 hrs	L-3	S-1
GPB 312: Genetics –Practical	2 cr	3 hrs	"	"
GPB 421: Plant Breeding –Theory	3 cr	3 hrs	L-4	S-2
GPB 422: Plant Breeding –Practical	2 cr	3 hrs	"	"
Elective:				
GPB 411: Plant Biotechnology and Genetic Engineering –T	2 cr	2 hrs	L-4	S-1
GPB 412: Plant Biotechnology and Genetic Engineering –P	2 cr	3 hrs	"	"
GPB 423: Special Plant Breeding – Theory	2 cr	2 hrs	L-4	S-2

GPB 424: Special Plant Breeding – Practical	2 cr	3 hrs	"	"
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Level-3, Semester-1

GPB 311: Genetics and Cytogenetics – Theory, 3 Credits, 3 hrs/wk

GENETICS (2 HRS/WK)

1. **INTRODUCTION:** HISTORICAL BACKGROUND, DEVELOPMENT AND SCOPE OF GENETICS.
2. **Physical basis of heredity:** Chromosome theory of inheritance; experimental evidence to prove that genes are situated on chromosomes.
3. **Mendel's laws of inheritance:** Mendel and his experiments; Law of segregation and independent assortment.
4. **Modifications of Mendel's monohybrid and dihybrid F₂ phenotypic ratios:** Modifications due to allelic and non-allelic gene interaction.
5. **Linkage and crossing over:** Concept; Mechanism and theories of crossing over; Significance of crossing over; Genetic map using three –point test cross progeny.
6. **Multiple alleles:** Test of allelism; Inheritance of multiple alleles; and Pseudoalleles.
7. **Quantitative inheritance:** Multiple factor hypothesis; Comparison of multiple factor inheritance with Mendelian inheritance.
8. **Gene:** Classical and modern concept; Evidence of DNA as genetic material; Molecular structure of DNA and its replication; Function of gene in protein synthesis.
9. **Sex determination and sex related inheritance:** Mechanism of sex determination; Sex - linked genes in plants and animals; Sex - limited and sex influenced characters.
10. **Mutation:** Classification of mutation; Types of mutagenes and their effects; Detection of mutation; Mechanism and significance of gene mutation.
11. **Extra-nuclear inheritance:** Features and types of extranuclear inheritance; maternal inheritance and its significance.

Cytogenetics (1 hr/wk)

12. Chemical organisation of chromosomes.
13. Structural changes of chromosomes, their meiotic behaviour and cytogenetic consequences.
14. Numerical changes of chromosomes, their meiotic behaviour and cytogenetic consequences.
15. Genome and individual chromosome identification using autoradiography, microspectrophotometry, banding and *in situ* hybridization.
16. Cytogenetics of wheat in relation to:
 - a) Origin and distribution of the polyploid wheats and related species.
 - b) Genomic relationship of the phylogenetically related species.

GPB: 312 Genetics - Practical, 2 Credits, 3 hrs/wk

1. **Introduction to practical genetics:** Demonstration and maintenance of parents, F₁ and F₂ generation plants in the Genetics and Plant Breeding experimental farm.
2. **Problems on monohybrid cross:** Complete dominance, partial dominance and co-dominance.
3. **Problems on dihybrid cross:** Complete dominance, partial dominance and co-dominance.
4. **Problems on trihybrid cross:** Complete dominance.
5. **Problems on gene interaction:** Non-epistatic and epistatic gene interaction.
6. **Problems on Chi-square test. :** Collecting F₂ data from GPB experimental farm to perform Chi-square test for goodness of fit to Mendelian and Non Mendelian ratios.
7. **Problems on linkage and crossing over:** Using two and three-point test cross:
8. **Problems on quantitative inheritance:** Collection of data from genetic populations such as P₁, P₂, F₁ and F₂ to study quantitative inheritance.

Text and Reference Books

- Gupta P.K. 1987. Genetics 2nd ed. Rastogi Publication Meerut, India.
- Gupta, P.K. 1995. Cytogenetics. 1st. ed. Rastogi, India.
- Strickberger, M.W. 1990. Genetics. 3rd ed. Macmillan Publishing Co. New York.
- Verma, P.S. and V.K. Agarwal, 1998. Genetics. 8th ed. S. Chand and Co. Ltd. New Delhi.
- Brown, W.V. 1972. A Text Book of Cytogenetics. C.V. Mosby Pub. , St. Loise, USA.
- Burns, G.W. 1980. The Science of Genetics, 4th ed. Macmillan Publishing Co. Inc, New York.
- Evan, L. T. and Peacock, W. J. 1981(ed). Wheat science- today and tomorrow. Cambridge University Press, Cambridge, London.
- Gupta, A. K. 1977(ed). Proceedings of the 1st National Seminar on Genetics and Wheat Improvement. Ludhiana, February, 22-23. 1977. Oxford & IBH Pub. Co. New Delhi.

Gurdev, S. K. 1973. Cytogenetics of Aneuploids. Academic Press, Inc. New York.
 Reitz, L. P. And Quaisenberry, K. S. (ed.) 1967. Wheat and Wheat Improvement. American Society of Agronomy, Madison, Wisconsin.
 Riley, H. P. 1967. Introduction to Genetics and Cytogenetics. Hafner Pub. Co. Inc. New York.
 Sharma, A. 1991. Chromosomes. Oxford & IBH Pub. Co. New Delhi.
 Sharma, A. K. and Sharma, A. 1980. Chromosome Technique- theory and practice 3rd ed. Butterworthes, London.
 Singh, B.D. 2001. Fundamentals of Genetics. 3rd. Ed. Kalyain Publisher, New Delhi-110002, India.
 Sinnott, E.W. ; Dunn, L. C. And Dobzhansky, T. 1973. Principles of Genetics McGraw-Hill Book Company, INC 5th edition.
 Stansfield, W. D. 1991. Schaum's Outline of Theory and Problems of Genetics. McGraw-Hill, INC. 3 rd edition.
 Swanson, C. P. 1965. Cytology and Cytogenetics. McMillan and Co. Ltd. London
 Swanson, C.P. ; Merz, Y. And Young, W.J. 1987. Cytogenetics. Prentice Hall press. London.

DEPARTMENT OF AGRICULTURAL EXTENSION EDUCATION

Types of courses available for B.Sc.Ag. (Hons.) degree in the semester system

Course No. and Titles	Credit	Contact hrs/wk	Available at	
			Level	Semester
Compulsory:				
AGEXT 221: Fundamentals of Extension, Leadership and Motivation-Theory	3 cr	3 hrs	L-2	S-2
AGEXT 222: Extension Teaching Methods and Aids-Practical	2 cr	3 hrs	"	"
AGEXT 311: Extension Communication and Group Approaches-Theory	2 cr	2 hrs	L-3	S-1
AGEXT 312: Data Collection, Processing and Report Writing-Practical	2 cr	3 hrs	"	"
AGEXT 411: Extension Organization Management-Theory	3 cr	3 hrs	L-4	S-1
AGEXT 412: Extension Programme Planning and Outreach Programme-Practical	2 cr	3 hrs	"	"
Elective:				
AGEXT 413: Extension for Sustainable Agricultural Development Theory	2 cr	2 hrs	L-4	S-1
AGEXT 414: Extension for Sustainable Agriculture Development – Practical	2 cr	3 hrs	"	"
AGEXT 421: Community Participation-Theory	2 cr	2 hrs	L-4	S-2
AGEXT 422: Community Participation-Practical	2 cr	3 hrs	"	"

Level-3, Semester-1

AGEXT 311: Extension Communication and Group Approaches-Theory, 2 Credits, 2 hrs/wk

1. **Communication process** : Concept of communication and communication process; importance of communication in extension work; functions of communication.
2. **Models of communication process** : Different models of communication and their elements; feedback in communication process.
3. **Communication noise and fidelity** : Concept of noise in communication process; reasons for noise in communication; ways of overcoming noise; concept of communication fidelity.
4. **Diffusion process** : Concepts of innovation and diffusion; elements of diffusion process; characteristics of innovation; consequences of innovations.
5. **Innovation-decision process** : Description of innovation-decision process; different types of innovation-decision; decision-making process of farmers relating to use of an innovation; barriers of diffusion of innovations.
6. **Adopter categories** : Concept of innovativeness; adopter categories; and characteristics of adopter categories
7. **System approach** : Concept and components of a system; difference between system and management; needs of a system in extension work.
8. **Knowledge system** : Concept of knowledge system; difference sources of knowledge system in extension work; selection of the best alternative system in existing situation
9. **Approaches to extension work** : Meaning of extension approaches; different approaches of extension work and their critical analysis.
10. **Partnership programme in extension** : Concept of partnership; salient features of partnership programmes; ways of sharing strengths and resources; different types of partnership programmes; justification of different collaboration programmes among GOs, NGOs & private sectors.

11. **People's participation in agricultural extension programmes** : Concept of 'people's participation' in extension programme; positive and negative factors of people's participation; major criteria of securing people's participation in extension programmes; examples showing evidences of people's participation in the programmes of GOs and NGOs.
12. **Group dynamics** : Concept of group and importance of group dynamics; internal and external forces acting in a group; principles of working with groups and their mobilization; roles of member in a group.
13. **Working with group** : Principles of working with a group; advantages and limitations in working with groups; skills of working with a group; skills necessary for forming a new group.
14. **Target group** : Concept of target group; characteristic features of extension target groups; criteria for selecting a target group; basis for segmentation of adult target groups.

AGEXT 312: Data Collection, Processing and Report Writing-Practical, 2 Credits, 3 hrs/wk

1. **Instruments of data collection** : Preparation of different types of interview schedule/questionnaire – structured, semi-structured and non-structured.
2. **Methods of data collection**: Practising case study, survey and selected PRA technique — Transect walk, time line, Venn diagram and seasonal maps.
3. **Data processing and analysis**: Transferring data from interview schedule/questionnaire; categorization and tabulation of data. Types of data analysis; carrying out appropriate descriptive and inferential statistical analyses.
4. **Preparation and presentation of report**: Organizing data for presentation; presentation and evaluation of a survey report.

Text and Reference Books

- DAE. 1985. *Agricultural Extension Manual* (The Training and Visit System). Department of Agricultural Extension. Ministry of Agriculture. Govt. of the People's Republic of Bangladesh.
- Kamath, M.C. (editor) 1961. *Extension Education in Community Development*. Directorate of Extension. New Delhi:Ministry of Food and Agriculture, Govt. of India.
- Kashem, M.A. 1992. *Samprasaran Bigyan* . Dhaka : The Bangladesh Packing Press.
- Ray, G.L., 1996. *Extension Communication and Management*. 3rd edn. Calcutta: Naya Prokash .
- Samanta R.K. (ed). 1990. *Development Communication for Agriculture*. New Delhi:B.R. Publishing Corporation.
- Wentling, T. 1993. *Planning for Effective Training*. Rome: FAO of the UN.

DEPARTMENT OF AGRICULTURAL CHEMISTRY

Types of courses available for B.Sc.Ag. (Hons.) degree in the semester system

Course No. and Titles	Credit	Contact hrs/wk	Available at	
			Level	Semester
Compulsory:				
ACHEM 221: Nuclear and Agro-industrial Chemistry –Theory	2 cr	2 hrs	L-2	S-2
ACHEM 222: Nuclear and Agro-industrial Chemistry – Practical	2 cr	3 hrs	"	"
ACHEM 311: Plant Nutrition, Pesticide and Environmental Chemistry – Theory	3 cr	3 hrs	L-3	S-1
ACHEM 312: Plant Nutrition, Pesticide and Environmental Chemistry – Practical	2 cr	3 hrs	"	"
Elective:				
ACHEM 411: Bioenergy – Principles & Practices – Theory	2 cr	2 hrs	L-4	S-1
ACHEM 412: Bioenergy – Principles and Practices –P	2 cr	3 hrs	"	"
ACHEM 421: Micronutrients in Agriculture-Theory	2 cr	2 hrs	L-4	S-2
ACHEM 422: Micronutrients in Agriculture-Practical	2 cr	3 hrs	"	"

Level-3, Semester-1

ACHEM 311: Plant Nutrition, Pesticide and Environmental Chemistry- Theory, 3 Credits, 3 hrs/wk.

Colloids and Plant Nutrition : Colloids: Classification, properties and role in plant nutrition. History, classification, role and principal form of essential and beneficial nutrient elements, movement of nutrients from soils to roots, nutrient uptake (contact exchange and CO₂ theory) processes, antagonistic and synergistic interactions of nutrient ions in soil-plant system, adsorption isotherms.

Chemistry of Pesticides : Preparation/ manufacture, properties, mode of action and uses of commonly used pesticides. Natural organic compounds, organochlorinated hydrocarbons, organophosphorus and

organocarbamate insecticides commonly used in Bangladesh. Synthetic pyrethroids, synthetic fungicides and herbicides, compatibility of pesticides with agrochemicals, pesticides and health hazards, reactions of pesticides in soil and plants, pesticide ordinance and rules.

Pesticide Formulations: Chemistry and utilization of auxiliary materials for insecticide, fungicide and herbicide formulations. Dust, wettable powder, granule, emulsifiable concentrates fumigant, aerosol and micro-encapsulation.

Instrumental Methods of Analysis: Laws related to spectrophotometry, colorimetry and spectrophotometry, flame emission and atomic absorption spectrophotometry, mass spectroscopy, fluorimetry, differential thermal analysis (DTA) and chromatography.

Environmental Chemistry: Concepts and components of environment, sources of toxic substances, their routes and metabolism and biochemical effect. Chemical and photochemical reactions in the atmosphere, inorganic and organic pollutants with their effect on plants, bioaccumulation and biotransformation of chemicals in aquatic environment.

Bio-energy: Concept, scope and importance, energy from agrowaste, generation of bio-gas and utilization of effluents, energy in sewage-sludge and fuels, heat recovery from composting solid-organic manure, the potential for fuel and/ or fertilizers. Hazardous wastes: their characteristics, industrial application and impact on environment.

ACHEM 312: Plant Nutrition, Pesticide and Environmental Chemistry- Practical, 2 Credits, 3 hrs/wk

1. Sampling: Principles, time, frequency and procedures for obtaining soil, plant and fertilizer samples, errors in sampling.
2. Analytical techniques: Analytical techniques of titrimetry, colorimetry, flame emission, atomic absorption spectrophotometry and chromatography.
3. Plant analysis for different nutrient elements (N, P, K, S, Ca, Mg, B, Zn, Cu, Fe and Mo).
4. Radio tracer techniques.
5. Techniques of pesticide formulation and residue analysis.
6. Generation of bio-energy from wastes

Text and Reference Books

- Chopra, L.S. and Kanwar, J. S. 1980. Analytical Agricultural Chemistry. Kalyani Publishers, Ludhiana, New Delhi. India.
- Fageria, N.K.; Baligar, V.C. and Jones, C.A. 1991. Growth and Mineral Nutrition of Field Crops, Marcel Dekker, Inc, New York.
- Green, M.B. ; Hartley, G.S. and West, T.F. 1987. Chemicals for Crop Improvement and Pest Management. 3rd edn. Pergamon Press. New York.
- Jeffery, G.H.; Bassett, J.; Mendham, J. and Denney, R.C. 1989. Vogel's Textbook of Quantitative Chemical Analysis. Longman Scientific and Technical, Longman Group UK Ltd. England.
- Manahan, S.E. 1984. Environmental Chemistry. 4th edn. Brooks/Cole Publishing Company, Monterey, California.
- Page, A.L.; Miller, R.H. and Keeney, D.R. (eds.). 1982. Methods of Soil Analysis, Part-2. Chemical and Microbiological Properties. 2nd edn. American Society of Agronomy, Inc. Madison, Wisconsin, USA.
- Ramulu, U.S.S. 1985. Chemistry of Insecticides and Fungicides. Oxford and IBH Pub. New Delhi India.
- Ambasht, R.S. and Ambasht, P.K. 1999. Environment and Pollution. 3rd edn. CBS Publishers and Distributors, New Delhi-110002, India.
- Goel, R.K. and Gupta R.K. 1980. Pesticide Formulations and Agrobased Chemicals Food and Paper Products. SIRI. Delhi.
- Goteberg.1984. World Conference on Bioenergy, held on June 18-21, 1984, Sweden.
- Hassall, K.A. 1990. The Biochemistry and Uses of Pesticides. 2nd edn. ELBS/Macmillan Press Ltd. Hampshire.
- Jackson, A.R.W. and Jackson, J.M. 1996. Environmental Science. Longman Group Ltd. Harlow, England.
- Jackson, M.L. 1973. Soil Chemical Analysis. Prentice-Hall of India Private Limited, New Delhi, India.
- Metcalf. R.L. 1978. Advances in Pest Control Research. Inter-science Publishers Inc., New York.
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- Skoog, D.A.; West, D.M. and Holler, F.J. 1990. Analytical Chemistry-An Introduction. 5th edn. Harcourt Brace Jovanovich College Publishers, Orlando, Florida 32887, USA.
- Tandon, H.L.S. (ed.) 1995. Methods of Analysis of Soils, Plants, Waters and Fertilizers. Fertilizers Development and Consultation Organization, New Delhi, India.
- USDA Agricultural Research. 2002. Bioenergy Today. USA.
- Valkenburg, W.V.(ed.) 1972. Pesticide Formulations. Marcel Dekker Inc. New York.
- Westerman, R.L. (ed.). 1990. Soil Testing and Plant Analysis, 3rd edn. Soil Science Society of America, Inc. Madison, Wisconsin, USA
- Willard, H.H.; Merritt, Jr, L.L. and Dean, J.A. 1977. Instrumental Methods of Analysis. 5th edn. Litton Educational Publishing, Inc., New York, USA.

DEPARTMENT OF AGROFORESTRY

Level-3, Semester-1

AGROF 311: Principles of Agroforestry- Theory, 3 Credits, 3 hrs/wk

Introduction: Concept, scope and benefits of agroforestry, present status of forest resources in Bangladesh; possible improvement of present land use system through sustainable agroforestry practices.

Classification of agroforestry systems: Components and structures of agroforestry and social forestry systems, their classification and interlinkages with other farming systems.

Agroforestry species and their compatibility: Woody (trees and shrubs) and non-woody (annual crops) species suitable for agroforestry systems, characteristics of agroforestry species; species compatibility and adaptability in different agroecological zones with special reference to salinity, drought, marshy and degraded lands.

Agroforestry management techniques: Various regeneration systems and nursery management, plantation and replanting systems, development of wastelands and establishment of trees through agroforestry systems, management of trees and other components.

Tree-crop interaction, soil fertility and productivity in agroforestry: Concepts and types of tree-crop interaction, resource sharing and minimizing competition for maximum production and economic return; soil and water conservation, land reclamation and byproduct processing, utilization and nutrient recycling in agroforestry.

Agroforestry production Techniques: Introduction to agrisilvicultural, silvopastoral, agrosilvopastoral and multistoried tree production techniques, hill cultivation-SALT practice and its different models.

Agroforest products-their uses and economics of agroforestry systems: Harvesting of fuel, fodder, timber and crops; processing and preservation of agroforest products; marketing systems, economic analysis of agroforestry systems using PRA techniques.

AGROF 312: Principles of Agroforestry-Practical, 2 Credits, 3 hrs/wk

Identification of MPTS and their plant parts.

Demonstration on tree crop interactions and their combined productivity.

Preparation of nursery for raising saplings of different trees.

Plantation under different systems, shoot and root management of trees and shrubs under agroforestry systems.

Study of roots spread and root mass of trees in crop fields.

Determination of growth and biomass yield of trees and other components.

D & D planning, data collection and economic analysis of agroforestry systems.

Field visit to Madhupur sal forest area to observe agroforestry, social forestry and forestry activities and preparation of reports individually.

Text and Reference Books

Bandyopadhyay, A.K. 1997. A text book of Agroforestry with Applications. Vikas Pub. House Pvt. Ltd. New Delhi.

Chundawat, B.S. and S.K. Gautam. 1993. Textbook of Agroforestry. Oxford and IBH Pub. Co., New Delhi.

Dwivedi, A.P. 1992. Agroforestry-Principles and Practices. Oxford and IBH Pub. Co., New Delhi.

Jha, L.K. 1995. Advances in Agroforestry. APH Publishing Corporation, New Delhi.

Nair, P.K.P. 1993. An Introduction to Agroforestry. ICRAF, Nairobi.

Alam, M.K.; F.U. Ahmed and S.M.R. Amin (eds.). 1997. Agroforestry: Bangladesh Perspective. APAN, NAWG and BARC., Dhaka.

Haque, M.A. (ed.) 1996. Agroforestry in Bangladesh. VFFP, BAU, Mymensingh and SDC. Dhaka.

Huxley, P.A. 1999. Tropical Agroforestry. Blackwell Sciences.

Khan, M.S. and M.K. Alam. 1996. Homestead Flora of Bangladesh. BARC, IDRC, SDC, Dhaka.

Ong, C.K. and P.A. Huxley. 1999. Tree-crop Interactions: A Physiological Approach. CABI Publishing.

Young, A. 2000. Agroforestry for Soil Management. 2nd Edition, CABI Publishing.