

Integral University, Lucknow
Integral Institute of Agricultural Science and Technology
Evaluation Scheme of Undergraduate program
B. Sc. (Hons.) Agriculture
w.e.f. 2018-19

Semester - I

Course Code	Subject	Periods Per h/week/sem			Evaluation Scheme Theory Mid sem			Evaluation Scheme Practical Examination					End sem Theory Exam	Subject total	Credit	Total Credit Points
		L	T	P	CT	TA	Total	Sessional			End sem exam	Sub Total (sessional + exam)				
								CT	TA	Total						
HT113	Fundamentals of Horticulture	1	0	2	10	10	20	5	5	10	20	50	50	100	1:0:1	2
AG115	Fundamentals of Plant Biochemistry and Biotechnology	2	0	2	10	10	20	5	5	10	20	50	50	100	2:0:1	3
AG116	Fundamentals of Soil Science	2	0	2	10	10	20	5	5	10	20	50	50	100	2:0:1	3
AG117	Introduction to Forestry	1	0	2	10	10	20	5	5	10	20	50	50	100	1:0:1	2
LN107	Comprehension & Communication Skills in English	1	0	2	10	10	20	5	5	10	20	50	50	100	1:0:1	2
AG118	Fundamentals of Agronomy	3	0	2	10	10	20	5	5	10	20	50	50	100	3:0:1	4
AG119	Introductory Biology*	1	0	2	10	10	20	5	5	10	20	50	50	100	1:0:1	2
MT132	Elementary Mathematics*	2	0	0	10	10	20	-	-	-	-	20	80	100	2:0:0	2
AG120	Agricultural Heritage*	1	0	0	10	10	20	-	-	-	-	20	80	100	1:0:0	1
ED101	Rural Sociology & Educational Psychology	2	0	0	10	10	20	-	-	-	-	20	80	100	2:0:0	2
BM125	Human Values & Ethics in Agriculture (Non -Gradial)	1	0	0	10	10	20	-	-	-	-	20	80	100	1:0:0	1
AG121	NSS**	0	0	4	-	-	-	5	5	10	20	20	80	100	0:0:2**	2**
	TOTAL	17		18												22+2**

*Remedial Course ** Non Gradial

B. Sc. (Hons.) Agriculture
SEMESTER-I
Syllabus: Fundamentals of Horticulture
Paper Code: HT113
w.e.f. Session 2018-19

2(1+1)

Theory

Unit 1.

Horticulture - Its definition and branches, importance and scope; horticultural and botanical classification; climate and soil for horticultural crops

Unit 2.

Plant propagation-methods and propagating structures; Seed dormancy, Seed germination, principles of orchard establishment; Principles and methods of training and pruning

Unit 3.

Juvenility and flower bud differentiation; unfruitfulness; pollination, pollinizers and pollinators; fertilization and parthenocarpy, Vegetative parthenocarpy

Unit 4.

Medicinal and aromatic plants; importance of plant bio-regulators in horticulture. Irrigation – methods, Fertilizer application in horticultural crops

Practical

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

Suggested Reading:

- Prasad and Kumar, 2014. *Principles of Horticulture* 2nd Edn. Agrobios (India).
- Neeraj Pratap Singh, 2005. *Basic concepts of Fruit Science* 1st Edn. IBDC Publishers.
- Gardner/Bardford/Hooker, J.R.. *Fundamentals of Fruit Production*. Mac Graw Hill Book Co., New York.
- Edmond,J.B, Sen,T.L, Andrews, F.S and Halfacre R.G. New Edition *Fundamentals of Horticulture*. Tata Mc Graw Hill Publishing Co., New Delhi
- Kumar, N., 1990. *Introduction to Horticulture*. Rajyalakshmi publications, Nagarcoil, Tamilnadu
- Jitendra Singh, Latest Edition. *Basic Horticulture*. Kalyani Publishers, Hyderabad.
- Chadha,K.L.(ICAR), *Handbook of Horticulture*. ICAR, New Delhi
- Kausal Kumar Misra and Rajesh Kumar, 2014. *Fundamentals of Horticulture*. Biotech Books.

B. Sc. (Hons.) Agriculture
SEMESTER-I
Syllabus: Fundamentals of Plant Biochemistry and Biotechnology
Paper Code: AG115
w.e.f. Session 2018-19

3(2+1)

Theory

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.

Unit 2.

Lipid: Importance and classification; Structures and properties of fatty acids; storage lipids and membrane lipids. Proteins: Importance of proteins and classification; Structures, titration and zwitterions nature of amino acids; Structural organization of proteins. Enzymes: General properties; Classification; Mechanism of action; Michaelis & Menten and Line Weaver Burk equation & plots; Introduction to allosteric enzymes.

Unit 3.

Nucleic acids: Importance and classification; Structure of Nucleotides, A, B & Z DNA; RNA: Types and Secondary & Tertiary structure. Metabolism of carbohydrates: Glycolysis, TCA cycle, Glyoxylate cycle, Electron transport chain. Metabolism of lipids: Beta oxidation, Biosynthesis of fatty acids.

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; Micro-propagation 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;

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.

Practical

Preparation of solution, pH & buffers, Qualitative tests of carbohydrates and amino acids. Quantitative estimation of glucose/ proteins. Titration methods for estimation of amino acids/lipids, Effect of pH, temperature and substrate concentration on enzyme action, Paper chromatography/ TLC demonstration for separation of amino acids/ Monosaccharides. Sterilization techniques. Composition of various tissue culture media and preparation of stock solutions for MS nutrient medium. Callus induction from various explants. Micro-propagation, hardening and acclimatization. Demonstration on isolation of DNA. Demonstration of gel electrophoresis techniques and DNA finger printing.

Suggested Readings

- Rajan Katoch (2018) *Fundamentals Of Plant Biochemistry and Biotechnology*, Kalyani Publishers
- Goodwin, TW & Mercer EI. Latest Ed. *Introduction to Plant Biochemistry. 2nd Ed.* Oxford, New York. Pergaman Press
- Berg JM, Tymoczko JL, & Stryer L. *Biochemistry*. 5th Ed. W.H. Freeman & Co.
- Com EE & Stumpf PK. 2010. *Outlines of Biochemistry*. John Wiley Publications.

B. Sc. (Hons.) Agriculture
SEMESTER-I
Syllabus: Fundamentals of Soil Science
Paper Code: AG116
w.e.f. Session 2018-19

3(2+1)

Theory

Unit 1.

Soil as a natural body, Pedological and edaphological concepts of soil; Soil genesis: soil forming rocks and minerals; weathering, processes and factors of soil formation

Unit 2.

Soil Profile, components of soil; Soil physical properties: soil-texture, structure, density and porosity, soil colour, consistence and plasticity; Elementary knowledge of soil taxonomy classification and soils of India

Unit 3.

Soil water retention, movement and availability; Soil air, composition, gaseous exchange, problem and plant growth, Soil temperature; source, amount and flow of heat in soil; effect on plant growth, Soil reaction-pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability

Unit 4.

Soil colloids inorganic and organic; silicate clays: constitution and properties; sources of charge; ion exchange, cation exchange capacity, base saturation; soil organic matter: composition, properties and its influence on soil properties

Unit 5.

Humic substances - nature and properties; soil organisms: macro and micro organisms, their beneficial and harmful effects; Soil pollution - behaviour of pesticides and inorganic contaminants, prevention and mitigation of soil pollution.

Practical

Study of soil profile in field. Study of soil sampling tools, collection of representative soil sample, its processing and storage. Study of soil forming rocks and minerals. Determination of soil density, moisture content and porosity. Determination of soil texture by feel and Bouyoucos Methods. Studies of capillary rise phenomenon of water in soil column and water movement in soil. Determination of soil pH and electrical conductivity. Determination of cation exchange capacity of soil. Study of soil map. Determination of soil colour. Demonstration of heat transfer in soil. Estimation of organic matter content of soil.

Suggested Readings

- Indian Society of Soil Science. 1998. *Fundamentals of Soil Science*. IARI, New Delhi
- Hillel D. 1982. *Introduction to Soil Physics*. Academic Press, London
- Brady Nyle C and Ray R Well, 2014. *Nature and properties of soils*. Pearson Education Inc., New Delhi
- Das DK. 2011. *Introductory Soil Science*. Third Revised Edition, Kalyani Publishers.
- Open Access Books - Soil Science | InTechOpen
<https://www.intechopen.com/books/subject/soil-science/books/all/1/list>

B. Sc. (Hons.) Agriculture
SEMESTER-I
Syllabus: Introduction to Forestry
Paper Code: AG117
w.e.f. Session 2018-19

2(1+1)

Theory

Unit1.

Introduction – definitions of basic terms related to forestry, objectives of silviculture, forest classification, salient features of Indian Forest Policies. Forest regeneration, Natural regeneration - natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers; Artificial regeneration – objectives, choice between natural and artificial regeneration, essential preliminary considerations

Unit 2.

Crown classification. Tending operations – weeding, cleaning, thinning – mechanical, ordinary, crown and advance thinning. Forest mensuration – objectives, diameter measurement, instruments used in diameter measurement

Unit 3.

Non instrumental methods of height measurement - shadow and single pole method; Instrumental methods of height measurement – geometric and trigonometric principles, instruments used in height measurement; tree stem form, form factor, form quotient, measurement of volume of felled and standing trees, age determination of trees

Unit 4.

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

Practical

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

Suggested Readings

- Beazley, M. Latest Edn. *The International Book of Forest*. London
- Khanna, L.S. *Principles and Practice of Silviculture*. Khanna Bandhu, New Delhi.
- Persson, R. *World Forest Resources*. Periodical Experts, New Delhi
- Champion, H, G and Seth, S.K. *Forest types of India, a revised survey of forest types of India*, GOI Press, New Delhi, 404p.
- Westoby, J. *Introduction to World Forestry*. Wiley, 240p.
- <https://icar.org.in/files/mFort.pdf>

B. Sc. (Hons.) Agriculture
SEMESTER-I
Syllabus: Comprehension & Communication Skills in English
Paper Code: LN107
w.e.f. Session 2018-19

2 (1+1)

Theory

Unit 1.

War Minus Shooting- The sporting Spirit. A Dilemma- A layman looks at science Raymond B. Fosdick.
You and Your English – Spoken English and broken English G.B. Shaw.

Unit 2.

Reading Comprehension, Vocabulary- Antonym, Synonym, Homophones, Homonyms, often confused words. Exercises to Help the students in the enrichment of vocabulary based on TOEFL and other competitive examinations.

Unit 3.

Functional grammar: Articles, Prepositions, Verb, Subject verb Agreement, Transformation, Synthesis, Direct and Indirect Narration. Written Skills: Paragraph writing, Precise writing, Report writing and Proposal writing.

Unit 4.

The Style: Importance of professional writing. Preparation of Curriculum Vitae and Job applications. Synopsis Writing. Interviews: kinds, Importance and process

Practical

Listening Comprehension: Listening to short talks lectures, speeches (scientific, commercial and general in nature). Oral Communication: Phonetics, stress and intonation, Conversation practice. Conversation: rate of speech, clarity of voice, speaking and Listening, politeness & Reading skills: reading dialogues, rapid reading, intensive reading, improving reading skills. Mock Interviews: testing initiative, team spirit, leadership, intellectual ability. Group Discussions.

Suggested Readings

1. Written and Spoken Communication in English, University Press (India) Pvt. Ltd.
2. Business Communication techniques and methods, by Om P. Juneja and Aarati Mujumdar, Orient BlackSwan Pvt. Ltd.
3. Strengthen your English, M. P. Bhaskaran, D. Horsburgh, Oxford University Press.
4. A Handbook of Standard English and Indian Usage-Vocabulary and Grammar, J. Sethi, Prentice Hall of India Pvt. Ltd.

B. Sc. (Hons.) Agriculture
SEMESTER-I
Syllabus: Fundamentals of Agronomy
Paper Code: AG118
w.e.f. Session 2018-19

4(3+1)

Theory

Unit 1.

Agronomy and its scope, seeds and sowing, tillage and tith, crop density and geometry, Crop nutrition, manures and fertilizers, nutrient use efficiency, water resources, soil-plant-water relationship, crop water requirement, Water use efficiency

Unit 2.

Irrigation- scheduling criteria and methods, quality of irrigation water, logging. Weeds- importance, classification, crop weed competition, concepts of weed management-principles and methods, Herbicides- classification, selectivity and resistance, allelopathy

Unit 3.

Growth and development of crops, Difference between growth and Development, factors affecting growth and development, plant ideotypes

Unit 4.

Crop rotation and its principles, adaptation and distribution of crops, Crop management technologies in problematic areas, harvesting and threshing of crops

Practical

Identification of crops, seeds, fertilizers, pesticides and tillage implements, study of agro-climatic zones of India, Identification of weeds in crops, Methods of herbicide and fertilizer application, Study of yield contributing characters and yield estimation, Seed germination and viability test, Numerical exercises on fertilizer requirement, plant population, herbicides and water requirement, Use of tillage implements- reversible plough, one way plough, harrow, leveler, seed drill, Study of soil moisture measuring devices, Measurement of field capacity, bulk density and infiltration rate, Measurement of irrigation water.

Suggested Readings

- Reddy Yellamanda T and Shankar Reddy G H. New Edn. *Principles of Agronomy*. Kalyani Publishers Ludhiana.
- Gupta O P. *Scientific Weed Management in the Tropics and Sub- Tropics*. Today and Tomorrow's Printers and Publishers. New Delhi.
- Arnon L. *Crop Production in Dry Regions*. Leonard Hill Publishing Co. London.
- Yawalkar K S and Agarwal J P. *Manures and Fertilizers*. Agricultural Horticultural Publishing House, Nagpur.
- Balasubrananiyan P & Palaniappan SP. 2015. *Principles and Practices of Agronomy*. Agrobios
- Reddy SR. *Principles of Agronomy*. Kalyani Publishers.

B. Sc. (Hons.) Agriculture
SEMESTER-I
Syllabus: Introductory Biology
Paper Code: AG119
w.e.f. Session 2018-19

2(1+1)

Theory

Unit 1.

Introduction to the living world, diversity and characteristics of life, origin of life

Unit 2.

Evolution and Eugenics. Binomial nomenclature and classification Cell and cell division

Unit 3.

Morphology of flowering plants. Seed and seed germination. Plant systematic- viz; Brassicaceae, Fabaceae and Poaceae. Role of animals in agriculture

Practical

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

Suggested Readings:

- Biology: The Essentials 2017. by Mariëlle Hoefnagels McGraw-Hill Publishers
- Life: An Introduction to Biology by George Gaylord Simpson and William S. Beck, Longman Higher Education Publishers
- Biology: Life on Earth with Physiology by Audesirk/Audesirk/Byers, Pearson Publishers

B. Sc. (Hons.) Agriculture
SEMESTER-I
Syllabus: Elementary Mathematics
Paper Code: MT119
w.e.f. Session 2018-19

2(2+0)

Theory

Unit 1.

Straight lines : Distance formula, section formula (internal and external division), Change of axes (only origin changed), Equation of co-ordinate axes, Equation of lines parallel to axes, Slope-intercept form of equation of line, Slope-point form of equation of line, Two point form of equation of line, Intercept form of equation of line, Normal form of equation of line, General form of equation of line,

Unit 2.

Point of intersection of two st. lines, Angles between two st. lines, Parallel lines, Perpendicular lines, Angle of bisectors between two lines, Area of triangle and quadrilateral. Circle: Equation of circle whose centre and radius is known, General equation of a circle, Equation of circle passing through three given points, Equation of circle whose diameters is line joining two points (x_1, y_1) & (x_2, y_2) , Tangent and Normal to a given circle at given point (Simple problems), Condition of tangency of a line $y = mx + c$ to the given circle $x^2 + y^2 = a^2$.

Unit 3.

Differential Calculus Definition of function, limit and continuity, Simple problems on limit, Simple problems on continuity, Differentiation of x^n , e^x , $\sin x$ & $\cos x$ from first principle, Derivatives of sum, difference, product and quotient of two functions, Differentiation of functions of functions (Simple problem based on it), Logarithmic differentiation (Simple problem based on it), Differentiation by substitution method and simple problems based on it, Differentiation of Inverse Trigonometric functions. Maxima and Minima of the functions of the form $y=f(x)$ (Simple problems based on it).

Unit 4.

Integral Calculus : Integration of simple functions, Integration of Product of two functions, Integration by substitution method, Definite Integral (simple problems based on it), Area under simple well-known curves (simple problems based on it). Matrices and Determinants: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order, Properties of determinants up to 3rd order and their evaluation.

Suggested Readings:

- Rastogi SK. 2017 *Biomathematics*. Krishna Prakashan Media Pvt. Ltd.
- Grewal B S. New Edition *Higher Engineering Mathematics*. Khanna Publishers Delhi.
- Narayan Shanti. *A Text Book of Vector*. S. Chand and Co. Ltd. New Delhi.
- Narayan Shanti. *Differential Calculus*. S. Chand and Co. Ltd. New Delhi.
- Narayan Shanti. *Integral Calculus*. S. Chand and Co. Ltd. New Delhi.

B. Sc. (Hons.) Agriculture
SEMESTER-I
Syllabus: Agricultural Heritage
Paper Code: AG120
w.e.f. Session 2018-19

1(1+0)

Theory

Unit 1.

Introduction of Indian agricultural heritage; Ancient agricultural practices, Relevance of heritage to present day agriculture

Unit 2.

Past and present status of agriculture and farmers in society; Journey of Indian agriculture and its development from past to modern era; Plant production and protection through indigenous traditional knowledge; Crop voyage in India and world

Unit 3.

Agriculture scope; Importance of agriculture and agricultural resources available in India; Crop significance and classifications

Unit 4.

National agriculture setup in India; Current scenario of Indian agriculture; Indian agricultural concerns and future prospects.

Suggested Readings

- Reddy Yellamanda T and Shankar Reddy G H. 2017. Principles of Agronomy. Kalyani Publishers Ludhiana.
- Gupta O P. Scientific Weed Management in the Tropics and Sub- Tropics. Today and Tomorrows Printers and Publishers. New Delhi.
- Arnon L.. Crop Production in Dry Regions. Leonard Hill Publishing Co. London.
- Yawalkar K S and Agarwal J P. New Eds Manures and Fertilizers. Agricultural Horticultural Publishing House, Nagpur.

B. Sc. (Hons.) Agriculture
SEMESTER-I
Syllabus: Rural Sociology & Educational Psychology
Paper Code: ED101
w.e.f. Session 2018-19

2(2+0)

Unit 1.

Sociology and Rural sociology: Definition and scope, its significance in agriculture extension, Social Ecology, Rural society,

Unit 2.

Social Groups, Social Stratification, Culture concept, Social Institution, Social Change & Development.

Unit 3.

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

Suggested Readings

- Mertens, M.D. (2014), *Research and evaluation in education and psychology*. Sage publication.
- Mazur, J.E. (2017) *Learning and behaviour*. Prentice Hall, New Delhi.
- Klausmier, H.J.. *Educational psychology*. Harper and Row, New York.
- Dubious, N.F.. *Educational psychology and instructional decisions*. Dorsey press

B. Sc. (Hons.) Agriculture
SEMESTER-I
Syllabus: NSS/NCC/Physical Education & Yoga Practices
Paper Code: AG121
w.e.f. Session 2018-19

2 (0+2)

Practical: Course aims at evoking social consciousness among students through various activities viz., working together, constructive and creative social work, to be skilful in executing democratic leadership, developing skill in programme development to be able for self employment, reducing gap between educated and uneducated, increasing awareness and desire to help sections of society, History, objectives, principles, symbol, badge; regular programmes under NSS, organizational structure of NSS, code of conduct for NSS volunteers, points to be considered by NSS volunteers awareness about health. Concept of regular activities, special camping, day camps, basis of adoption of village/slums, conducting survey, analyzing guiding financial patterns of scheme, youth programme/ schemes of GOI, coordination with different agencies and maintenance of diary, Definition, profile, categories, issues and challenges of youth; and opportunities for youth who is agent of the social change, Mapping of community stakeholders, designing the message as per problems and their culture; identifying methods of mobilization involving youth-adult partnership, Indian history and culture, role of youth in nation building, conflict resolution and peace-building, Indian tradition of volunteerism, its need, importance, motivation and constraints; shramdan as part of volunteerism, Basic features of constitution of India, fundamental rights and duties, human rights, consumer awareness and rights and rights to information, Concept of family, community (PRIs and other community based organizations) and society.

B. Sc. (Hons.) Agriculture
SEMESTER-I
Syllabus: Human Values & Ethics in Agriculture (Non-Gradial)
Paper Code: BM125
w.e.f. Session 2018-19

1(1+0)

Theory

Unit 1.

Values and Ethics-An Introduction. Goal and Mission of Life. Vision of Life.

Unit 2.

Principles and Philosophy. Self Exploration. Self Awareness. Self Satisfaction. Decision Making. Motivation. Sensitivity. Success. Selfless Service.

Unit 3.

Case Study of Ethical Lives. Positive Spirit. Body, Mind and Soul. Attachment and Detachment. Spirituality Quotient. Examination

Suggested Readings

- Gaur RR, Sangal R & Bagaria GP. 2011. *A Foundation Course in Human Values and Professional Ethics*. Excel Books.
- Mathur SS. 2017. *Education for Values, Environment and Human Rights*. RSA International.
- Sharma RA. 2011. *Human Values and Education -Axiology, Inculcation and Research*. R. Lall Book Depot.
- Srivastava S. 2011. *Human Values and Professional Ethics*. S K Kataria & Sons.
- Tripathi A.N. 2017. *Human Values*. New Age International (P) Ltd Publishers.