

SYLLABUS: Course outline

B.Sc. Agriculture

Batch 2014 onwards



Punjab Technical University

Semester First

Hrs. : 24

| Course Code | Course Title | Load Allocation | | | Marks Distribution | | Total | Credits |
|-------------|--|-----------------|---|---|--------------------|----------|-------|---------|
| | | L | T | P | Internal | External | | |
| BSAG-101 | Agronomy-I | 2 | - | - | 20 | 30 | 50 | 2 |
| BSAG-102 | Agro meteorology-I | 3 | - | - | 40 | 60 | 100 | 3 |
| BSAG-103 | Biochemistry | 3 | - | - | 40 | 60 | 100 | 3 |
| BSAG-104 | Soil Science-I | 3 | - | - | 40 | 60 | 100 | 3 |
| BSAG-105 | Horticulture-I | 3 | - | - | 40 | 60 | 100 | 3 |
| BSAG-106a | Mathematics-I * | 3 | - | - | 40 | 60 | 100 | 3 |
| BSAG-106b | Biology -I** | 3 | - | - | 40 | 60 | 100 | 3 |
| BSAG-107 | Communicative English | 2 | - | - | 20 | 30 | 50 | 2 |
| BSAG-108 | Introductory Plant Science (Practical) | | | 2 | 20 | 30 | 50 | 1 |
| BSAG-109 | Agro meteorology-I (Practical) | - | - | 2 | 20 | 30 | 50 | 1 |
| BSAG-110 | Biochemistry (Practical) | - | - | 2 | 20 | 30 | 50 | 1 |
| BSAG-111 | Soil Science-I (Practical) | - | - | 2 | 20 | 30 | 50 | 1 |
| BSAG-112 | Horticulture-I (Practical) | - | - | 2 | 20 | 30 | 50 | 1 |
| TOTAL | | | | | 340 | 510 | 850 | 24 |

□ *Practical will consist of two hours means two hour session of practical

□ *Optional subject for students who had studied Medical in 10+2

□ ** Optional subject for students who had studied Non-Medical in 10+2

PAPER BSAG101: AGRONOMY I

Credit: 2

SECTION - A

Evolution of agriculture, from tools through ages, classification of crops, their geographical distribution and factors responsible, impact of Agriculture on trade and industrial development, crop production and yield in the state as compared to that of other states (and countries).

SECTION - B

Agronomy as a science and its relationship with other sciences; Germination, maturity harvesting and storage of crop plants; Tillage principles, requirement for minimum tillage, seed bed preparation, characteristics of good seed beds, methods of sowing and their suitability under different conditions. Seedling practices in relation to kind of seed, time of sowing, soil moisture, etc. Tillage practices for different soil types and crops.

SECTION - C

Weed characteristics, dissemination, competition for growth factors and losses caused by them. Common methods of weed control.

SECTION - D

Maintenance of soil fertility and soil productivity, green manuring, crop rotation, multiple cropping, mixed cropping, relay cropping and dry-farming.

BOOKS RECOMMENDED

1. *Principles of Crop Husbandry* by Ayres.
2. *Principles of Agronomy* by Pearson.
3. *Hand Books of Agriculture* by I. C. A. R.
4. *Agricultural Resources* by A.S.Atwal and H.S.Mavi.
5. Package of Practices for Crops of Punjab -Kharif/Rabi,Punjab Agricultural University Ludhiana.
6. *Punjab Plants, Check-List* by M. Sharma

PAPER BSAG 102: AGRO-CLIMATOLOGY

Credit: 3

SECTION - A

The earth and its Atmosphere: Environmental factors in agriculture; Elements and factors of climate; Latitudinal and seasonal distribution of temperature and precipitation; Weather forecasting, basic parameters.

SECTION - B

Agro-climatology: Definition and scope; the role of climate in soil and natural vegetation and livestock distribution with practical examples.

SECTION -C

Impact of climatological factors in crop and livestock distribution in India: Effects of weather on sowing, growth, maturity and harvesting of crops, cropping pattern.

SECTION - D

Weather hazards, their occurrence and impact on agriculture, climate classifications in India and Punjab: Climates of the world & their agricultural potentials, with special reference to India.

BOOKS RECOMMENDED

1. *The Earth and its Atmosphere* by D. R. Bates.
2. *Introduction to Climatology for the Tropics* by J. D. Yeade.
3. *General Climatology* by Critbbfierd & Hewarda.
4. *Agriculture Meteorology* by H. S. Mavi.
5. *Fundamentals of Agro Meteorology*: G.S Mahi
6. *Agro Meteorology* : S R Reddy

PAPER BSAG 103: Biochemistry

Credit: 3

SECTION - A

Importance of Plant cell. Biomolecules-structure, function and properties. Amino acids ,proteins and their quality.

SECTION - B

Enzymes - classification, factors affecting activity, immobilization and other industrial applications. Vitamins, & minerals and hormones Lipids - their industrial applications. Biodiesel.Carbohydrates and nucleic acids.

SECTION - C

Bioenergetics. Metabolism - basic concepts,Glycolysis, Citric acid cycle, pentose phosphate pathway, oxidative phosphorylation and fatty acid oxidation. General reactions of amino acid degradation. Biosynthesis- carbohydrates, lipids, proteins and nucleic acids.

SECTION -D

Metabolic regulation. Secondary metabolites - terpenoids, alkaloids, phenolics and their applications in food and pharmaceutical industries.

BOOKS RECOMMENDED

1. *Outlines of Bio-Chemistry* -Conn, E. E. & Stumpf, P. K
2. *Elementary Biochemistry* -S. Merits
3. *Essentials of Biological Chemistry* -Fairly & Kilgour

PAPER BSAG 104: Soil Science-I

Credit: 3

SECTION - A

Concept of land: soil and soil science; Composition of earth crust and its relationship with soils; Rocks and minerals; Weathering. Soil forming factors and processes; Soil profile; Soil colour; Elementary knowledge of taxonomic classification of soils; Soils of Punjab and India; Soil physical properties.

SECTION - B

Soil texture: textural classes; Soil structure- classification, soil aggregation and significance, soil consistency, soil crusting, bulk density and particle density of soils and porosity, their significance and manipulation.

SECTION - C

Soil water: retention and potentials, soil moisture constants, movement of soil water- infiltration, percolation, permeability, drainage and methods of determination of soil moisture, thermal properties of soil, soil temperature, soil air composition, gaseous exchange, influence of soil temperature and air on plant growth.

SECTION -D

Soil colloids: properties, nature, types and significance; Sources of charges in clay minerals; Introduction to Salinity and alkalinity , Ion exchange, CEC; AEC - factors affecting and adsorption of ions; Soil organic matter decomposition, mineralization, humus; Carbon cycle, C: N ratio; Soil organisms and their beneficial and harmful roles.

BOOKS RECOMMENDED

1. Pedology : J L Sehgal
2. Nature and properties of soil: Nyle C. Brady & Ray R. Well
3. Handbook of Agricultural Sciences- S.S. Singh

PAPER BSAG 105: Horticulture-I

Credit: 3

SECTION - A

Definition, importance and divisions of horticulture. Climatic zones, area and production of different fruit crops; Selection of site, fencing and wind break. Planting systems, high density planting, planning and establishment .

SECTION - B

Propagation methods: conventional and non-conventional. Methods of training and pruning. Use of growth regulators in fruit production.

SECTION - C

Fundamentals for cultivation of horticultural crops, Package of practices for the cultivation of major fruits -mango, citrus, grapes, guava, apple, litchi and papaya.

SECTION - D

Package of practices for the cultivation of Minor fruits - pineapple, pomegranate, ber, fig, loquat, Banana , phalsa, pear, plum, peaches.

Books Recommended

- 1). Fundamentals of Plant propagation: Hartmann
- 2). Fruits: Ranjit singh
- 3). Basic Horticulture: Jatinder Singh
- 4). Fruit Production (vol. 1 and 2): T.K Bose
- 5) Package of practices for fruit crops- PAU Ludhiana
- 6) Handbook of Agricultural Sciences- S.S. Singh

PAPER BSAG 106a: Mathematics-I**Credit: 3****SECTION - A**

Mensuration: Mensuration of rectangles, easy examples of garden paths, cost of planting trees and fencing gardens. Area of right angled triangles area and height of isosceles and equilateral triangles, area of triangles in terms of sides, rent of field. Area of parallelograms, rhombus, quadrilateral and trapezoid. Volumes of cubes & cylinders Regular polygons with emphasis on hexagon and octagon. Simple cases of similar figures. Circumference and area of circles. Circular rings. Cost of fencing circular fields and paths.

(N. B. Easy numerical examples bearing on Science of agriculture only to be set. Proofs of formulae not required.)

SECTION -B

Algebra: Solution of quadratic equations and of those reducible to quadratic equation. (One variable). Theory of quadratic equations. Relation between roots and co-efficients.

Algebra: Series: nth terms sum to n terms of an A. P. and G. P. nth term of an H. P. (excluding means and problems on numbers etc.). Permutation and combinations : simple problems only. (Proofs of formulae not required). Binomial theorem, statement for any index: Expansion particular term coefficient of n, summation of simple infinite series evaluation cube root etc. correct to a certain place of decimal.

SECTION -C

Co-ordinate Geometry:

- (1) The point-distance and section formulae area of a triangle.
- (2) The straight line equation in the following standard forms:

$$x = a, \quad y = b, y = mx, y = mx + c, \frac{x}{a} + \frac{y}{b} = 1$$

$$y - y_1 = m(x - x_1), y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

Reduction of equation $ax+by+c=0$: to (a) slope $x \cos \theta + y \sin \theta = p$ (b) intercept form (c) perpendicular form (only method of reduction and not proof); point of intersection and, concurrence, Angle of intersection of lines $y = m_1x + c_1, y = m_2x + c_2$, and equations of line (a) parallel and (b) perpendicular to a given line and passing through a given point.

SECTION -D

The circle- equation when (i) centre and radius given. (ii) Passes through three points (iii) extremities of a diameter given; the equation $x^2+y^2+2gx+2fy+c=0$ represents circle, center and radius, equations of the tangents and normal at any point of circle (only use formula no proof).

BOOKS RECOMMENDED

1. *Algebra* by D. C. Kapoor & Gurbax Singh
2. *Algebra* by T. N. Nagpal & K. K. Gupta.
3. *Comprehensive Calculus* by R. S. Dehiya.
4. *New Style Calculus* for T. D. C. - I.
5. *New Style Co-ordinator Geometry* by R. K. Sondhi
6. *Trigonometry* by Jiwan
7. *Mensuration* by Pic Point.

PAPER BSAG 106b: Biology-I

Credit: 3

SECTION - A

Classification and introduction to different groups of the plant kingdom, a general outline of the studies of an angiosperm, Life cycle of a flowering plant; annuals, biennials and perennials.

SECTION - B

Morphology: Seed structure of seeds of: Gram, Castor, Maize, and process of germination.

Roots: External characters and functions, types of root systems and their bearing on agriculture practices. Modifications of roots and their significance.

Stem: External characters and functions, buds and their types, spines and ordinary branches, branching systems; stem as an organ of vegetative propagation, modification of stem.

Leaf: Parts of a typical leaf and their functions; simple and compound leaves and their functions, venation and modifications of leaves; uses of leaves.

Inflorescence: Elementary knowledge of simple and special types of inflorescences.

Flower: Structure and functions of floral parts, modifications, nectaries, floral diagram, floral formulae and vertical section of a flower, structure of the thalamus and insertion of the floral appendages on the thalamus, placentation.

Pollination: Pollination mechanism, agencies responsible (Anemophily and Entomophily) for pollination, contrivances for cross pollination.

Fertilization: Fertilization and seed formation. Structure of Orthotropous, and Anatropous ovule, Embryo in *Capsella* only.

Reproduction in Plants: Vegetative, and sexual reproduction their merits and demerits. Natural and Artificial methods.

Fruits: Elementary knowledge of fruits, dispersal of seeds and fruits with examples from Punjab.

SECTION -C

Anatomy: An elementary account of the various tissues and their functions, internal structure of a stem (Dicot and Monocot), root and leaf.

SECTION -D

Classification: Diagnostic characters (floral) and economic importance of following families.

Cruciferae: *Brassica, Raphanus*; Malvaceae: *Gossypium, Hibiscus*; Rutaceae: *Citrus*; Rosaceae: *Rose, Pyrus*; . Leguminosae: *Pisum, Cassia, Acacia, Albizzia*; Cucurbitaceae: *Momordica, Luffa*; Compositae: *Helianthus*; Solanaceae: *Solanum, Capsicum, Petunia*; Graminaeae: *Avena, Triticum, Oryza*

BOOKS RECOMMENDED

1. *Text Book of Botany* (Latest Ed.) -L. D. Dutta
2. *Text Book of Botany Part - I* - R.D.Vidarthi:
3. *Introduction of Botany* -Widge & Bhatia

BSAG-107
Communicative English

Credit: 2

Section A (Reading)

The prescribed reading textbook for students will be S. P. Dhanavel English and Communication Skills for Students of Science and Engineering (with audio CD), Orient Blackswan. They will go through the reading texts themselves with the help of a dictionary or word power as given at the end. As they progress from one reading to another they should learn to read fast with greater degree of understanding of both concrete and abstract topics. While taking up the textbook lessons in the classroom, the teacher shall ensure that students can do the following:

- i. Identify the significant points and conclusions as given in the text.
- ii. Handle large texts (even outside the prescribed book) with overall comprehension of the links between arguments and the finer distinction between stated and implied meanings.
- iii. Generally read the stance or the point of view of the writer and present it in the form of a summary
- iv. Use the vocabulary learnt in the lessons (especially given in „word power“) productively in various writing tasks as suggested at the end of each lesson.
- v. Profitably use the grammatical items as discussed at the end of each lesson while producing language for communication.

Besides the textbook, the teacher must insist that students extend their reading by taking up additional texts of their own choice.

Section B (Writing)

In addition to the various exercises given at the end of each lesson of Dhanavel’s book, the teacher shall use Anne Laws Writing Skills, Orient Blackswan to teach the language and conventions of writing. The students must learn the language that expresses various cognitive functions that are frequently used in writing. With the help of the teacher who will give them adequate practice, the students should be able to:

- i. Convey information on concrete or abstract topics with clarity and precision.
- ii. Write about objects or events with appropriate detail in both descriptive and narrative form.
- iii. Explain ideas and build up arguments with adequate support in a convincing manner.
- iv. Use language with some degree of flexibility in consideration to the reader.
- v. Produce effectively such forms of professional writing as business letter, emails, notes, memos, reports summaries etc.

While teaching, the teacher must inculcate in students the habit of revising their writing. The teacher can also use and recommend the relevant sections of the following books for developing writing skills in students.

BOOKS RECOMMENDED

1. Vandana R Singh, The Written Word, Oxford University Press, New Delhi
2. KK Ramchandran, et al Business Communication, Macmillan, New Delhi
3. Swati Samantaray, Business Communication and Communicative English, Sultan Chand, New Delhi.

4. S.P. Dhanavel English and Communication Skills for Students of Science and Engineering (with audio CD).

BSAG-108

Introductory Plant Science (Practical)

Credit: 1

1. Study of the form and structure of seeds, stems, leaves and buds of important field and garden crops.
2. Study of the structure of flower and main types of inflorescences.
3. Study of the fruits dispersal of Agricultural importance.
4. Microscopic examination of slides: roots, stem and leaf sections.
5. Study of the characters of the important plants covered in the theory.

BSAG-109

Agro meteorology-I (Practical)

Credit:1

Practical: Site selection for Agrometeorological Observatory. Project on setting up, recording and maintenance of instruments in a meteorological observatory. Measurement of temperature, rainfall, evaporation, atmospheric pressure, sunshine duration, solar radiation, wind direction, wind speed and relative humidity. Study of weather forecasting and synoptic charts. Processing, presentation and interpretation of climatic data in relation to crops.

BSAG-110

Biochemistry (Practical)

Credit:1

Practical:

Quantitative tests for carbohydrates, lipids. proteins and amino acids. Paper electrophoresis. Chromatography-paper, TLC, GLC. Extraction of oil from oil seeds. Acid value, Iodine value, Saponification value. Quantitative determination of phenols, sugars, proteins, nucleic acids and enzyme activity(amylase).

BSAG-111
Soil Science-I (Practical)

Credit:1

Practical: Determination of bulk density and particle density. Identification of rocks and minerals , Aggregate size analysis. Soil moisture determination. Soil moisture constants- field capacity, infiltration rate, water holding capacity, soil mechanical analysis. Analytical chemistry- basic concepts, techniques and calculations, collection and processing of soil samples for analysis of organic carbon, pH, EC, available N, P, K and S. Study of a soil profile.

BSAG-112
Horticulture-I (Practical)

Credit:1

Practical: Horticultural tools and their uses. Containers and potting mixtures. Plant and seed propagation, scarification, and stratification. Layout and planting systems. Methods of pruning and training. Training of ber, grape and pomegranate. Pruning of ber, grape, phalsa, fig, apple, pear, peach. Identification of important species and varieties of fruits. Micro Irrigation methods. Methods of fertilizer application. Preparation of growth regulators, powder, solution and lanolin paste for propagation. Application of growth regulators for improving fruit set, fruit size, quality, delaying and hastening ripening. Layout and designs of green house and zero energy structures for protected cultivation, Visit to local commercial orchards.