Institute of Education and Research
Science Education
University of the Punjab, Lahore

Course Outline

Programme	BSSEd	Course Code	SE-306	Credit Hours	3
Course Title	**Botany-II (Plant Systematic and Anatomy and development theory)**				

Course Introduction

The course is organized to provide an introduction to plant taxonomy, history of classification, introduction to nomenclature and International Code. It also includes morphological Study of plant families, anatomical study of cell wall and the Internal Structure (Tissues) of the Plant Body.

Learning Outcomes

On the completion of the course, the students will:

1. Learn the history of Plant systematics and its role in classification
2. Make use of this knowledge for the identification and grouping of different plant.

	Course Content	Assignments/Readings
Week 1	**Unit-1: Introduction to Plant Systematics** 1.1 Aims 1.2 Objectives	Surprise Quiz/Lawrence, G.H.M. (2007). Taxonomy of Vascular Plants.
	1.3 Importance **Unit-2: Classification** 2.1 History of Artificial System	Preparation of notes/ Lawrence, G.H.M. (2007). Taxonomy of Vascular Plants.
Week 2	2.2 History of Natural System 2.3 History of polygenetic System	Long Question test/ Lawrence, G.H.M. (2007). Taxonomy of Vascular Plants.
	2.3 Takhtajan's System of Classification	Quiz/ Lawrence, G.H.M. (2007). Taxonomy of Vascular Plants.
Week 3	**Unit-3: Nomenclature:** 3.1 Introduction 3.2 Importance of Latin names and Binomial nomenclature	Preparation of notes/ Lawrence, G.H.M. (2007). Taxonomy of Vascular Plants.

	3.3 Introduction to International code of botanical Nomenclature 3.4 St. louis code	Long Question test/ Lawrence, G.H.M. (2007). Taxonomy of Vascular Plants.
Week 4	**Unit-4: Morphology** 4.1 Morphological characters of root, stem and leaf,	Surprise Quiz/Lawrence, G.H.M. (2007). Taxonomy of Vascular Plants
	4.2 Inflorescence 4.3 Flower	Long Question test/ Lawrence, G.H.M. (2007). Taxonomy of Vascular Plants.
Week 5	4.4 Placentation 4.5 Fruit types	Preparation of notes/ Lawrence, G.H.M. (2007). Taxonomy of Vascular Plants.
	Unit-5: Diagnostic Characters 5.1 Economic Importance and distribution patterns of Ranuculaceae	Quiz/ Lawrence, G.H.M. (2007). Taxonomy of Vascular Plants.
Week 6	5.2 Economic Importance and distribution patterns of Brassicaceae 5.3 Economic Importance and distribution patterns of Fabaceae	Long Question test/ Lawrence, G.H.M. (2007). Taxonomy of Vascular Plants.
	5.4 Economic Importance and distribution patterns of Rosaceae 5.6 Economic Importance and distribution patterns of Euphorbiaceae	Preparation of notes/ Lawrence, G.H.M. (2007). Taxonomy of Vascular Plants.
Week 7	5.7 Economic Importance and distribution patterns of Solanaceae 5.8 Economic Importance and distribution patterns of Lamiaceae	Quiz/ Panday, B.P. (2004). A Text Book of Botany (Anglosperms),
	5.9 Economic Importance and distribution patterns of Apiaceae	Quiz/ Panday, B.P. (2004). A Text Book of Botany (Anglosperms),
	5.10 Economic Importance and distribution patterns of Asteraceae	Written Test/ Panday, B.P. (2004). A Text Book of Botany (Anglosperms),

Week 8	5.11 Economic Importance and distribution patterns of Liliaceae 5.12 Economic Importance and distribution patterns of Poaceae	Quiz/ Panday, B.P. (2004). A Text Book of Botany (Anglosperms),
Week 9	**Unit-6: Anatomy** 6.1 Cell wall	Long Question/ Raymond, F. and Eichhorn, S.E. (2005). Esau's Plant Anatomy
	6.2 Simple tissues	Written Assignment/ Raymond, F. and Eichhorn, S.E. (2005). Esau's Plant Anatomy
Week 10	6.3 Epidermis	Quiz/ Raymond, F. and Eichhorn, S.E. (2005). Esau's Plant Anatomy
	6.4 Complex tissues	Long Question/ Raymond, F. and Eichhorn, S.E. (2005). Esau's Plant Anatomy
Week 11	6.5 Meristem	Written Assignment/ Raymond, F. and Eichhorn, S.E. (2005). Esau's Plant Anatomy
	Unit-07: Developmental Embryology 7.1 Capsella bursa-pastoris	Quiz/ Maheshawari, P. (1971). Embryology of Angiosperms
Week 12	7.2 Structure of Anther	Quiz/ Maheshawari, P. (1971). Embryology of Angiosperms
	7.3 Microsporogenesis	Long Question/ Maheshawari, P. (1971). Embryology of Angiosperms
Week 13	7.4 Microgametophyte	Quiz/ Maheshawari, P. (1971). Embryology of Angiosperms
		Written assignment/ Maheshawari, P. (1971). Embryology of Angiosperms
	7.5 Structure of Ovule	Long Question/ Maheshawari, P. (1971). Embryology of Angiosperms

Week 14	7.6 Megasporogenesis	Written assignment/ Maheshawari, P. (1971). Embryology of Angiosperms
Week 15	7.7 megagemetophyte	Written assignment/ Maheshawari, P. (1971). Embryology of Angiosperms
	7.8 Endosperm formation	Quiz/ Maheshawari, P. (1971). Embryology of Angiosperms
Week 16	Revision	
	Revision	

Textbooks and Reading Material

1. Raven, P.H ., Even, R.E. and Eichhom, S.E. (2010). Biology of Plants. W.H. Freeman and Company Worth Publisher.
2. Stuessy, T.F. (2009). Plant Taxonomy. Columbia University Press. USA.
3. Lawrence, G.H.M. (2007). Taxonomy of Vascular Plants. (2nd Ed.). MacMillan and Co. New York.
4. Raymond, F. and Eichhorn, S.E. (2005). Esau's Plant Anatomy. Meristerms cells and tissue of the plant body, (3rd Ed.) John Wiley and Sons & Sons Inc.
5. Panday, B.P. (2004). A Text Book of Botany (Anglosperms), S. Chand & Co. New Delhi.
6. Moore, R.C ., Clark, W.D. and Vodopich, D.S. (2003). Botany. McGraw Hill Company, U.S.A.
7. Mauseth, J. D. (1998). An Introduction to Plant Biology: Multimedia Enhanced. Jones and Bartlett Publisher. UK.
8. Fahn, A. (1990). Plant Anatomy. Pergamon Press Oxford.
9. Maheshawari, P. (1971). Embryology of Angiosperms. McGraw Hill. New York.
10. Esau,K. (1960). Anatomy of Seed Plants. John Wiley and Sons, New York

Teaching Learning Strategies

1. Lecture Method
2. Inquiry Method
3. Demonstration Method
4. Project Method

Assignments: Types and Number with Calendar
1. Quiz 2. Presentation 3. Written Test 4. Class discussion
Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Department of Science Education
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Course Outline

Programme	BS Science Education	**Course Code**	SE-306A	**Credit Hours**	04
Course Title	Mathematics B-II [Mechanics (II)]				

Course Introduction

Mathematics B-II Mechanics (II) course is designed to build upon the foundational principles of mechanics introduced in earlier courses. Students will explore advanced topics in kinematics and kinetics, including the motion of particles and rigid bodies in two and three dimensions. Through a combination of theoretical explanations, practical examples, and problem-solving exercises, students will develop a deeper understanding of the mathematical principles governing mechanical systems.

Learning Outcomes

On the completion of the course, the students will:

1. Describe kinematics kinetics with rectilinear motion of particle and its component.
2. Explain simple harmonic motion with its different types.
3. Illustrate phenomenon of Centre of mass and gravity with mathematical equations.
4. Discuss central forces and planetary motions with laws.

Course Content

Week 1	**Unit -1: Kinematics**
	1.1 Conic section and quadratic equations
Week 2	1.2 Uniform rectilinear motion, uniformly accelerated rectilinear motion
	1.3 Curvilinear motion of particle, rectangular components of velocity and acceleration
	1.4 Tangential and normal components
	1.5 Radial and transverse components
Week 4	1.6 Tangents and normal, pedal equations, parametric representations of curve
	Unit-2: Kinetics
Week 5	2.1 Work, power, kinetic energy, conservative force fields
	2.2 Conservation of energy, impulse, torque

Week 6	2.3 Conservation of linear ad angular momentum
	2.4 Non-conservative forces
Week 7	**Unit-3: Simple Harmonic Motion** 3.1 The simple harmonic oscillator, amplitude, period, frequency,
	3.2 Resonance and energy
Week 8	3.3 The damped harmonic oscillator, over damped, critically damped and under damped
	3.4 Motion, forces vibrations
Week 9	**MID- TERM EXAM**
Week 10	**PRESENTATIONS**
Week 11	**Unit-4: Central Forces and Planetary Motion**
	4.1 Central force fields, equations of motion, potential energy, orbits
Week 12	4.2 Kepler's laws of planetary motion
	4.3 Apsides and apsidal angles for nearly circular orbits
Week 13	4.4 Motion in an inverse square field
	QUIZZ
Week 14	**Unit-5: Centre of Mass and Gravity**
	5.1 Discrete and continuous systems, density of rigid and elastic bodies
Week 15	5.2 Centroid: Discrete and continuous systems, solid region, region bounded by planes
	5.3 Semicircular regions, sphere, hemisphere, cylinder and cone.
Week 16	**FINAL- TERM EXAM**

Textbooks and Reading Material

1. Anand, D.K., & Cunnif, P.F. (1984). Statics and Dynamics. Allyn and Becon,
2. Ferdinand, P.B., & Johnston, E.R. (1997). Statics and Dynamics.Mc-Graw Hill Book Company, I
3. Fowles, G.R., & Cassiday, G.L. (2005). Analytical Mechanics (7th ed.). Thomson Brook Cole
4. Jafferson, B., & Beasdsworth, T. (2001). Introducing Mechanics. Oxford University Press.
5. Spiegel, M.R. (1997). Theoretical Mechanics. Mc Graw Hill Book Company

Teaching Learning Strategies

- Lecture Method
- Collaborative Method

- Problem-Solving Approaches
- Demonstration Method
- Project Method
- Connecting mathematics to real world context
- Discussion

Assignments: Types and Number with Calendar

- Class presentation, Quizzes.
- Ist assignment before mid-term exam.
- 2nd assignment after mid-term exam

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.It will be a written test.
2.	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester.It will be a written test.