INVERTIS
UNIVERSITY BAREILLY
Established by Govt. of U.P. u/s 2(f) of UGC Act, 1956 vide U.P. Act 22 of 2010.

Scheme of Instruction & Syllabi

of

Integrated B.Sc.B.Ed. (PCM)

(Effective from Session 2023-24)

Faculty of Education
Invertis University, Bareilly
Invertis Village,
Bareilly – Lucknow Road, NH – 24,
Bareilly (U. P) - 243123
India

18/7/23

18/7/23

SEMESTER I

S. No.	Course Code	Course Title	Course Type	Course Classification	L	T	P	Int.	Ext.	Total	Credit
1	BEB106	BASICS OF INORGANIC CHEMISTRY I	CORE	THEORY	3	1	0	30	70	100	4
2	BEB107	MATRIX THEORY AND GEOMETRY	CORE	THEORY	3	1	0	30	70	100	4
3	BEB108	MECHANICS AND THERMODYNAMICS	CORE	THEORY	3	1	0	30	70	100	4
4	BEB151	CHEMISTRY LAB I	CORE	PRACTICAL	0	0	2	10	15	25	1
5	BEB152	PHYSICS LAB I	CORE	PRACTICAL	0	0	2	10	15	25	1
6	BED101	BASICS OF EDUCATION	CORE	THEORY	3	1	0	30	70	100	4
7	BED102	LANGUAGE AND COMMUNICATION	CORE	THEORY	2	0	0	15	35	50	2
8	BED103	HISTORY OF EDUCATION	CORE	THEORY	3	1	0	30	70	100	4
TOTAL					**17**	**5**	**4**	**185**	**415**	**600**	**24**

SEMESTER II

S. No.	Course Code	Course Title	Course Type	Course Classification	L	T	P	Int.	Ext.	Total	Credit
1	BEB206	BASICS OF ORGANIC CHEMISTRY I	CORE	THEORY	3	1	0	30	70	100	4
2	BEB207	CALCULUS	CORE	THEORY	3	1	0	30	70	100	4
3	BEB208	WAVE OPTICS AND ELECTROMAGNETISM	CORE	THEORY	3	1	0	30	70	100	4
4	BEB251	CHEMISTRY LAB II	CORE	PRACTICAL	0	0	2	10	15	25	1
5	BEB252	PHYSICS LAB II	CORE	PRACTICAL	0	0	2	10	15	25	1
6	BED201	PHILOSOPHICAL AND SOCIOLOGICAL FOUNDATIONS OF EDUCATION	CORE	THEORY	3	1	0	30	70	100	4
7	BED202	PSYCHOLOGICAL FOUNDATIONS OF EDUCATION	CORE	THEORY	3	1	0	30	70	100	4
8	BED203	READING AND REFLECTING ON TEXT	CORE	THEORY	2	0	0	15	35	50	2
9	BED251	PSYCHOLOGY PRACTICAL	CORE	PRACTICAL	0	0	2	15	35	50	2
10	BED252	SCOUTS AND GUIDES CAMP	CORE	PRACTICAL	0	0	2	15	35	50	2
TOTAL					**17**	**5**	**8**	**215**	**485**	**700**	**28**

18/7/23

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Scheme of Instruction & Syllabi

of

Integrated B.Sc.B.Ed. (ZBC)

(Effective from Session 2023-24)

Faculty of Education
Invertis University, Bareilly
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Bareilly (U. P) - 243123
India

18/7/23 18/7/23 18-7-23

SEMESTER I

S. No.	Course Code	Course Title	Course Type	Course Classification	L	T	P	Int.	Ext.	Total	Credit
1	BEB106	BASICS OF INORGANIC CHEMISTRY I	CORE	THEORY	3	1	0	30	70	100	4
2	BEB109	NON-CHORDATA AND CELL BIOLOGY	CORE	THEORY	3	1	0	30	70	100	4
3	BEB110	DIVERSITY OF VIRUSES, BACTERIA, ALGAE, LICHENS AND FUNGI	CORE	THEORY	3	1	0	30	70	100	4
4	BEB151	CHEMISTRY LAB I	CORE	PRACTICAL	0	0	2	10	15	25	1
5	BEB153	LIFE SCIENCE LAB I	CORE	PRACTICAL	0	0	2	10	15	25	1
6	BED101	BASICS OF EDUCATION	CORE	THEORY	3	1	0	30	70	100	4
7	BED102	LANGUAGE AND COMMUNICATION	CORE	THEORY	2	0	0	15	35	50	2
8	BED103	HISTORY OF EDUCATION	CORE	THEORY	3	1	0	30	70	100	4
TOTAL					**17**	**5**	**4**	**185**	**415**	**600**	**24**

SEMESTER II

S. No.	Course Code	Course Title	Course Type	Course Classification	L	T	P	Int.	Ext.	Total	Credit
1	BEB206	BASICS OF ORGANIC CHEMISTRY I	CORE	THEORY	3	1	0	30	70	100	4
2	BEB209	EVOLUTION, DEVELOPMENTAL BIOLOGY AND ENVIRONMENTAL BIOLOGY	CORE	THEORY	3	1	0	30	70	100	4
3	BEB210	DIVERSITY OF BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS AND ANGIOSPERMS	CORE	THEORY	3	1	0	30	70	100	4
4	BEB251	CHEMISTRY LAB II	CORE	PRACTICAL	0	0	2	10	15	25	1
5	BEB253	LIFE SCIENCE LAB II	CORE	PRACTICAL	0	0	2	10	15	25	1
6	BED201	PHILOSOPHICAL AND SOCIOLOGICAL FOUNDATIONS OF EDUCATION	CORE	THEORY	3	1	0	30	70	100	4
7	BED202	PSYCHOLOGICAL FOUNDATIONS OF EDUCATION	CORE	THEORY	3	1	0	30	70	100	4
8	BED203	READING AND REFLECTING ON TEXT	CORE	THEORY	2	0	0	15	35	50	2
9	BED251	PSYCHOLOGY PRACTICAL	CORE	PRACTICAL	0	0	2	15	35	50	2
10	BED252	SCOUTS AND GUIDES CAMP	CORE	PRACTICAL	0	0	2	15	35	50	2
TOTAL					**17**	**5**	**8**	**215**	**485**	**700**	**28**

18-7-23

INVERTIS
UNIVERSITY BAREILLY

SEMESTER - I

BASICS OF INORGANIC CHEMISTRY I	
Course Code: BEB106	**Credit:** 04 (L-3, T-1, P-0)
Contact Hours: 60	**MM:** 100 (Int.: 30 + Ext.: 70)

Course Outline

Unit I: Atomic Structure

- Bohr's atomic model: Bohr's Theory as applied to hydrogen atom and its limitations
- de Broglie's concept of dual nature of matter: de Broglie's wave equation
- Confirmation of quantization of angular momentum (Bohr's theory) by de Broglie's concept
- Pauli's exclusion Principle
- Hund's rule of maximum multiplicity; rule of stability of half - filled and completely filled orbitals
- Aufbau's Principle. (n+1) rule and its limitations
- Electronic configuration of elements up to Atomic No. 30
- Time independent Schrödinger's wave equation (without application and solution detail) and Significance of ψ and ψ2

Unit II: Periodic properties

- Modern IUPAC periodic table and classification of elements in the table;
- Modern IUPAC periodic table and classification of elements in the table;
- Effective nuclear charge and its calculation using Slater's rules;
- Atomic radii, Ionic radii and Pauling's method for determining univalent ionic radii; Electronegativity,
- Ionization energy, Electron affinity and factors influencing these properties; Group trends and periodic trends of these properties with reference to s, p and d-block elements.
- Secondary periodicity; Inert pair effect

Unit III: Acids and bases

- Brönsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases,
- Lewis acid-base concept, classification of Lewis acids and bases,
- Lux-Flood concept and solvent system concept.
- Hard and soft acids and bases (HSAB concept), applications of HSAB process.

Unit IV: Chemical Bonding-II

- Different types of Chemical Bonds; Ionic bond, Covalent bond, Co- ordinate bond, Failure of octet rule,
- Valence Bond Theory: sigma (σ) and Pi (□) bonds
- Dipole moment and its applications; Fajan' s Rules and its application.
- Hydrogen Bonding
- Salient features of Molecular Orbital Theory, Characteristics of □ - molecular orbitals; Comparison of (i) bonding and antibonding molecular orbitals (ii) sigma and pi molecular orbitals (iii) Bond order
- Comparison between VBT and MOT.

- VSEPR Theory - assumptions and postulates of VSEPR Theory:
- Shapes of molecules and ions; Hybridization: salient features and rules of hybridization; different types of hybridization.

Unit V: Chemistry of s block elements

- Introduction and General Characteristics; Group IA: H, Li, Na, K, Rb, Cs, Fr (Alkali metals);
- Group IIA: Be, Mg, Ca, Sr, Ba, Ra (Alkaline earth metals); Comparison between alkaline earth metals and alkali metals;
- Magnesium acting as a bridge between groups IIA and IIB elements.

Suggested Reading:

1. Douglas, B.E. & McDaniel, D.H. Concepts & Models of Inorganic Chemistry Oxford, 1970.
2. Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications, 1962.
3. Atkin, P. Shriver & Atkins' Inorganic Chemistry 5th Ed. Oxford University Press (2010).
4. Satya Prakash, G. D. Tuli, S. K. Basu & R. D. Madan. Advanced Inorganic Chemistry Vol. I & II. S Chand & Sons
5. Wahid U. Malik, G. D. Tuli, R. D. Selected Topics in Inorganic Chemistry. Madan, S. Chand.
6. Cotton, Wilkinson & Gaus. Basic Inorganic Chemistry. John - Wiley.
7. Cotton F. Albert. Advanced Inorganic Chemistry. John - Wiley.
8. J. D. Lee Blackwell. Concise Inorganic Chemistry
9. Huheey, E. A. Keiter, R. Keiter , O. K. Medhi. Inorganic Chemistry: Principles of Structure & Reactivity. Pearson Publications
10. Fundamental Concepts of Inorganic Chemistry by A. K. Das, CBS Publishers & Distributors Pvt Ltd.

MATRIX THEORY AND GEOMETRY	
Course Code: BEB107	**Credit:** 04 (L-3, T-1, P-0)
Contact Hours: 60	**MM:** 100 (Int.: 30 + Ext.: 70)

Course Outline

Unit I: MATRIX

- Introduction of matrix, types of matrix, Rank of a matrix
- Elementary transformations, Echelon and normal forms, Inverse of a matrix by elementary transformations.
- Characteristic equation, Eigen values and eigen vectors of a matrix, Cayley-Hamilton's theorem and its use in finding inverse of a matrix
- Application of matrices to solve a system of linear (both homogeneous and non-homogeneous) equations, Consistency and general solution.

Unit II: GEOMETRY

- General equation of second degree, Tracing of conics, System of conics, Confocal conics, Polar equation of a conic and its properties.
- Three dimensional systems of co-ordinates, Projection and direction cosines, Plane, Straight line, Sphere, cone and cylinder.

Suggested Reading:

1. H. K. Dass, Higher Engineering Mathematics. S.Chand Publications.
2. B. S. Grewal, Engineering Mathematics. Khanna Publication.
3. Deepak Chatterjee. Analytic Solid Geometry. Prentice Hall of India New Delhi.
4. Roger Fenn, Geometry, Springer India Pvt. Ltd New Delhi.

MECHANICS AND THERMODYNAMICS	
Course Code: BEB108	**Credit:** 04 (L-3, T-1, P-0)
Contact Hours: 60	**MM:** 100 (Int.: 30 + Ext.: 70)

Course Outline

Part A (Mechanics)

Unit I: Dynamics of a System of Particles

- Review of historical development of mechanics up to Newton. Background, statement and critical analysis of Newton's axioms of motion. Dynamics of a system of particles, centre of mass motion, and conservation laws & their deductions. Rotating frames of reference, general derivation of origin of pseudo forces (Coriolis & centrifugal) in rotating frame, and effects of Coriolis force.

Unit II: Dynamics of a Rigid Body

- Angular momentum, Torque, Rotational energy and the inertia tensor. Rotational inertia for simple bodies (ring, disk, rod, solid and hollow sphere, solid and hollow cylinder, rectangular lamina). The combined translational and rotational motion of a rigid body on horizontal and inclined planes. Elasticity, relations between elastic constants, bending of beam and torsion of cylinder.

Part B (Thermodynamics)

Unit III: 0^{th} & 1^{st} Law of Thermodynamics

- State functions and terminology of thermodynamics. Zeroth law and temperature. First law, internal energy, heat and work done. Work done in various thermodynamical processes. Enthalpy, relation between CP and CV. Carnot's engine, efficiency and Carnot's theorem. Efficiency of internal combustion engines (Otto and diesel).

Unit IV: 2nd & 3rd Law of Thermodynamics

- Different statements of second law, Clausius inequality, entropy and its physical significance. Entropy changes in various thermodynamical processes. Third law of thermodynamics and unattainability of absolute zero. Thermodynamical potentials, Maxwell's relations, conditions for feasibility of a process and equilibrium of a system. Clausius- Clapeyron equation, Joule-Thompson effect.

Suggested Reading:

PART A

1. Charles Kittel, Walter D. Knight, Malvin A. Ruderman, Carl A. Helmholz, Burton J. Moyer, "Mechanics (In SIUnits): Berkeley Physics Course Vol 1", McGraw Hill, 2017, 2e
2. Richard P. Feynman, Robert B. Leighton, Matthew Sands, "The Feynman Lectures on Physics - Vol. 1",Pearson Education Limited, 2012
3. Hugh D. Young and Roger A. Freedman, "Sears & Zemansky's University Physics with Modern Physics",Pearson Education Limited, 2017, 14e
4. D.S. Mathur, P.S. Hemne, "Mechanics", S. Chand Publishing, 1981, 3e

PART B

1. M.W. Zemansky, R. Dittman, “Heat and Thermodynamics”, McGraw Hill, 1997, 7e
2. F.W. Sears, G.L. Salinger, “Thermodynamics, Kinetic theory & Statistical thermodynamics”, Narosa PublishingHouse, 1998
3. Enrico Fermi, “Thermodynamics”, Dover Publications, 1956
4. S. Garg, R. Bansal, C. Ghosh, “Thermal Physics”, McGraw Hill, 2012, 2e
5. Meghnad Saha, B.N. Srivastava, “A Treatise on Heat”, Indian Press, 1973, 5e

Suggestive Digital Platforms / Web Links

1. MIT Open Learning - Massachusetts Institute of Technology, https://openlearning.mit.edu/
2. National Programme on Technology Enhanced Learning (NPTEL), https://www.youtube.com/user/nptelhrd
3. Uttar Pradesh Higher Education Digital Library, http://heecontent.upsdc.gov.in/SearchContent.aspx
4. Swayam Prabha - DTH Channel, https://www.swayamprabha.gov.in/index.php/program/current_he/8

Suggested Equivalent Online Courses

1. Swayam - Government of India, https://swayam.gov.in/explorer?category=Physics
2. National Programme on Technology Enhanced Learning (NPTEL), https://nptel.ac.in/course.html
3. Coursera, https://www.coursera.org/browse/physical-science-and-engineering/physics-and-astronomy
4. edX, https://www.edx.org/course/subject/physics
5. MIT Open Course Ware - Massachusetts Institute of Technology, https://ocw.mit.edu/courses/physics/

NON-CHORDATA AND CELL BIOLOGY	
Course Code: BEB109	**Credit:** 04 (L-3, T-1, P-0)
Contact Hours: 60	**MM:** 100 (Int.: 30 + Ext.: 70)

Course Outline

Unit I: Lower Non-Chordates

- **Phylum Protozoa:** General characters and classification up to classes; Locomotory Organelles and locomotion in Protozoa.
- **Phylum Porifera:** General characters and classification up to classes; Canal System in *Sycon*
- **Phylum Cnidaria:** General characters and classification up to classes; Polymorphism in Hydrozoa
- **Phylum Platyhelminthes:** General characters and classification up to classes; Life history of *Taenia solium*
- **Phylum Nematoda:** General characters and classification up to classes; Life history of *Ascaris lumbricoides* and its parasitic adaptations

Unit II: Higher Non-Chordates

- **Phylum Annelida:** General characters and classification up to classes; Metamerism in Annelida
- **Phylum Arthropoda:** General characters and classification up to classes; Vision in Arthropoda, Metamorphosis in insects
- **Phylum Mollusca:** General characters and classification up to classes; Torsion in gastropods
- **Phylum Echinodermata:** General characters and classification up to classes; Water-vascular system in Asteroidea.

Unit III: The Cell

- Overview of prokaryotic and eukaryotic cells.
- Structure and function of plasma membrane
- Introduction to endomembrane system (endoplasmic reticulum, Golgi complex, lysosome), peroxisome
- Introduction to cytoskeleton and their role in cellular movements
- Structure and functions of mitochondria

Unit IV: Organization of Cell

- Nuclear envelope, nucleolus and biogenesis of ribosome
- Interphase chromatin and its compaction into metaphase chromosome
- Introduction to polytene and lampbrush chromosomes

Suggested Reading:

1. Text book of Zoology, Volume–I: Invertebrates – Parker & Haswell (Eds. A. J. Marshall & W. D. Williams) (ELBS Macmillan)
2. Modern Text Book of Invertebrates- R.L. Kotpal (Rastogi Publ.)
3. The World of Cell – W. M. Becker, L. J. Kleinsmith, J. Hardin
4. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.

DIVERSITY OF VIRUSES, BACTERIA, ALGAE, LICHENS & FUNGI	
Course Code: BEB110	**Credit:** 04 (L-3, T-1, P-0)
Contact Hours: 60	**MM:** 100 (Int.: 30 + Ext.: 70)

Course Outline

Unit I: Viruses

- Classification and general characters of viruses
- Symptoms of virus infection in plants
- Transmission of plant viruses
- Biology of a plant virus (tobacco mosaic virus)
- Structure and multiplication of bacteriophages
- Structure and multiplication of viroids and prions,
- Viruses and Medicines.

Unit II: Bacteria

- Classification and general properties of bacteria
- Bacterial genome and plasmids
- Nutrition and multiplication of bactreia
- Variability in bacteria - mutation, staining; economic importance.

Unit III: Algae

- Classification, General characters and Range of thallus organization of algal groups
- Ultrastructure of eukaryotic algal cell and cyanobacterial cell,
- Economic importance of algae.
- Characteristics features and life cycles of the following:
    1. *Chlamydomonas*
    2. *Navicula*
    3. *Vaucheria*
    4. *Ectocarpus*
    5. *Polysiphonia*

Unit IV: Fungi

- Classification, and general characters of different fungal groups
- Characteristic features (in brief) and life history of :
    1. *Phytophthora*
    2. *Rhizopus*
    3. *Saccharomyces*
    4. *Puccinia*
    5. *Alternaria*.

Unit V: Lichens

- Classification, thallus organization, reproduction, physiology and role in environmental pollution.

Suggested Reading:

1. An Introduction to Fungi: by Webster J (1985) Cambridge University Press, UK
2. Brock Biology of Microorganism: by Madigan, Mordinko and Parker (2000) Prentice Hall Publication
3. Introduction to Plant Viruses: by Mandahar CI (1978) Chand & Co, New Delhi
4. An Introduction to the Algae: by Morris I (1986) Cambridge University Press, UK
5. An Introduction of Lichens: Bhatnagar, S. and Moitra, A. (1996): New Age International Limited, New Delhi.
6. Introduction of Algae Taxonomy, Oliver and Boyd. (2004): London. Gifford, E.M. and Foster, A.

CHEMISTRY LAB I	
Course Code: BEB151	**Credit:** 01 (L-0, T-0, P-2)
Contact Hours: 30	**MM:** 25 (Int.: 10 + Ext.: 15)

LIST OF EXPERIMENTS

- (i) Method of preparation of standard solutions of titrants
- (ii) Estimation of carbonate and hydroxide present together in a mixture
- (iii) Estimation of carbonate and bicarbonate present together in a mixture
- (iv) Estimation of Fe (II) and oxalic acid using standardized $KMnO_4$ solution.
- (v) Estimation of Fe (II) with $K_2Cr_20_7$ using potassium ferricynide as external indicator.

Note: Experiments may be added/deleted subject to availability of time and facilities

Suggested Reading:

1. An Advanced Course in Practical Chemistry by A. K. Nad, B. Mahapatra and A. Ghoshal, New Central Book Agency (P) Ltd.
2. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson, 2009.
3. University Hand Book of Undergraduate Chemistry Experiments, edited by Mukherjee, G. N., University of Calcutta.

PHYSICS LAB I	
Course Code: BEB152	**Credit:** 01 (L-0, T-0, P-2)
Contact Hours: 30	**MM:** 25 (Int.: 10 + Ext.: 15)

LIST OF EXPERIMENTS

List of experiments (Perform Any Eight)

1. To determine the height of a tower with a sextant.
2. To determine the wavelength of monochromatic light by Newton's ring.
3. To determine the focal length of two lenses by nodal slide and locate the position of cardinal points.
4. To determine the Moment of Inertia of a Flywheel.
5. To determine the coefficient of viscosity of water by capillary flow method (Poiseuille's method).
6. To determine the surface tension of a liquid by Jager's method.
7. To determine the modulus of rigidity by horizontal apparatus.
8. To determine the modulus of rigidity by vertical apparatus.
9. To determine g by Bar Pendulum.
10. To determine g by Katter's Pendulum.

Note: Experiments may be added/deleted subject to availability of time and facilities

Suggested Reading:

1. Geeta Sanon, B. Sc. Practical Physics, 1stEdn. (2007), R. Chand & Co
2. B. L. Worsnop and H. T. Flint, Advanced Practical Physics, Asia Publishing House, New Delhi
3. Indu Prakash and Ramakrishna, A Text Book of Practical Physics Vol 1 &Vol 2, Kitab Mahal, New Delhi
4. D. P. Khandelwal, A Laboratory Manual of Physics for Undergraduate Classes, Vani Publication House, New Delhi

LIFE SCIENCE LAB I	
Course Code: BEB153	**Credit:** 01 (L-0, T-0, P-2)
Contact Hours: 30	**MM:** 25 (Int.: 10 + Ext.: 15)

LIST OF PRACTICALS

Practicals (Zoology):

1. **Study of the following specimens:**
   Amoeba, Euglena, Plasmodium, Paramecium, Sycon, Hyalonema, and *Euplectella, Obelia, Physalia, Aurelia, Tubipora, Taenia solium,* Male and female *Ascaris lumbricoides, Aphrodite, Nereis, Pheretima, Hirudinaria, Palaemon, Cancer, Limulus, Palamnaeus, Scolopendru, Periplaneta, Chiton, Dentalium, Pila, Unio, Loligo, Sepia, Octopus, Pentaceros, Ophiura, Echinus, Cucumaria* and *Antedon.*

2. **Study of transverse sections/chart of the following:**
   Sycon (as an example of Parazoa to show its structure, spicules and canal system), *Hydra* (as an example of diploblastic animal), *Fasciola* (as an example of triploblastic acoelomate animal), *Ascaris* (as an example of triploblastic pseudocoelomate animal), *Hirudinaria (*as an example of triploblastic schizocoelomate animal).

3. **Temporary/Permanent mounting of given material**
4. An "animal album" containing photographs, cutouts, with appropriate write up about the above-mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.
5. Study of cell by prepared slides and temporary mount (Cheek epithelium)

Practicals (Botany):

1. Study of vegetative Structure: *Nostoc*, *Chlamydomonas* (electron micrographs), *Oedogonium*, *Vaucheria*, *Sargassum* and *Polysiphonia* through temporary preparations.
2. *Puccinia*: Herbarium specimèns of Black Stem Rust of Wheat and infected Barberry leaves; section/tease mounts of spores.
3. *Agaricus*: Specimens of button stage and full-grown mushroom; Sectioning of gills of *Agaricus*.
4. Lichens: Study of growth forms of lichens (crustose, foliose and fruticose)

Suggested Reading:

1. Ruppert and Barnes, R.D. (2006). *Invertebrate Zoology,* VIII Edition. Holt Saunders International Edition.
2. Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, (2002). *The Invertebrates: A New Synthesis,* Edition, Blackwell Science
3. Practical Botany B. P Pandey.
4. Practical Botany, Vol. I, II, III by H.N. Srivastava, Pradeep Publications, India.

BASICS OF EDUCATION	
Course Code: BED101	**Credit:** 04 (L-3, T-1, P-0)
Contact Hours: 60	**MM:** 100 (Int.: 30 + Ext.: 70)

Course Outline

Unit I: Meaning and Concept of Education

- Meaning of Education: Etymological Meaning; Narrow and Broader Meaning
- Education as Process and Product
- Meaning of Education according to Indian & Western Thinkers
- Analytical Concept of Education
- Education as: Natural or Social Process
- Normative and Cognitive Aspects of Education

Unit II: Processes, Modes and Goals of Education

- Education as an: Activity or a Process
- Educational Processes: Training, Instruction and Learning by Experience, Understanding of Principles, Logical and Critical Thinking
- Modes of Education: Informal, Formal and Non-Formal Education
- Bases of Educational Goals
- Nature of Educational Goals

Unit III: Teacher and Learner

- Teaching as a Professional Activity
- Teacher and Curriculum; Teacher and Society
- Teacher Autonomy: Meaning and Characteristics
- Child as a Learner
- Socialization and Learning
- Learner Autonomy: Meaning and Characteristics
- Individual Autonomy and Collective Responsibility

Unit IV: Knowledge and Education

- Understanding Knowledge: Meaning and Definitions
- Ways of Knowing
- Forms of Knowledge
- Facets of Knowledge
- Distinction between ‘Body of Knowledge’ and ‘construction of knowledge’
- Process of Knowledge Construction

Suggested Reading:

1. Aurobindo. S. 1990. On Education. Aurobindo Ashram, Pondicherry.
2. Dewey, J. 1916. Democracy and Education, The Macmillan Company, New York.
3. Dewey, J. 2010. Essays in Experimental Logic, Aakar Books, Delhi.
4. Esch, E. 1996. Promoting learner autonomy: Criteria for the selection of appropriate methods. In R. Pemberton, S.L. Edward, & H.D. Pierson (Eds.), Taking Control: Autonomy in Language Learning (pp. 34-38). Hong Kong University Press, Hong Kong.
5. Fosnot, C.T. 2005. Constructivism: Theory, Perspectives and Practice. Columbia University Press.
6. Good, C.V. (Ed.) 1973. Dictionary of Education (3rd edition). McGraw Hill, Michigan.
7. Iida, A. 2009. Teacher Autonomy and Professional Teacher Development: Exploring the Necessities for Developing Teacher Autonomy in EFL Japanese Contexts. Asian EFL Journal, vol. 35, article 3.
8. Kriplani, K. 1980. Rabindranath Tagore: A Biography, Viswabharathi, Shantiniketan.
9. Krishnamurthi, J. 1994. Education and the Significance of Life. Krishnamurthi Foundation, India.
10. Mani, R.S. 1996. Educational Ideas and Ideals of Gandhi and Tagore (A Comparative Study). New Book Society of India, New Delhi.
11. National Council of Educational Research and Training. 2005. National Curriculum Framework, NCERT, New Delhi.
12. NCERT (2014). Basics in Education. Available at: https://ncert.nic.in/division/der/pdf/basic_in_education.pdf
13. Ravi, S.S. (2021). Philosophical and Sociological Bases of Education, Prentice Hall Indi, New Delhi.
14. Tobin, Kenneth. 1993. The Practice of Constructivism in Science Education. Lawrence Erlbaum Associates, Hillsdale, NJ.

LANGUAGE AND COMMUNICATION	
Course Code: BED102	**Credit:** 02 (L-2, T-0, P-0)
Contact Hours: 30	**MM:** 50 (Int.: 15 + Ext.: 35)

Course Outline

Unit I: Introduction

- Meaning and Concept of Communication
- Theories of Communication
- Types and Modes of Communication
- Effective Communication and Barriers in Communication
- Verbal and Non-Verbal Communication
- Intra-personal, Inter-personal and Group communication

Unit II: Listening and Speaking Skills

- Meaning of Listening
- Art of Good Listening
- Types of Listening
- Listening Skills: Deep Listening, Full Listening, Critical Listening, Therapeutic Listening
- Speaking Skills: Dialogue, Group Discussion, Interview, Public Speech, Role Play/ Extempore Presentations

Unit III: Reading and Writing Skills

- Reading Skills: Close Reading, Comprehension, Analysis and Interpretation, Summary Paraphrasing, Translation (From Indian Language to English and Vice-Versa)
- Writing Skills: Making Notes, Documenting, Report Writing, Writing Letters (Job Applications, CV and Resume), Academic Writing, Writing a Proposal

Suggested Reading:

1. Delhi University. (2008). Business English, Pearson Education, India.
2. Department of English, Delhi University (2006). Fluency in English - Part II, Oxford University Press, India.
3. Kumar, S.P. (2012). Language, Literature and Creativity, Orient Blackswan Pvt. Ltd., New Delhi.
4. Mishra, G., Kaul, R, & Biswas, B. (2016). Language Through Literature, Primus Books, New Delhi.

HISTORY OF EDUCATION	
Course Code: BED103	**Credit:** 04 (L-3, T-1, P-0)
Contact Hours: 60	**MM:** 100 (Int.: 30 + Ext.: 70)

Course Outline

Unit I: Education During Ancient and Medieval Period

- Characteristics of education of Vedic and Buddhist era with special reference to aims, curriculum, methods, teacher – taught relations, discipline, and educational institutions
- Characteristics of education of Islamic era with special reference to aims, curriculum, methods, teacher – taught relations, educational institutions, and discipline

Unit II: Education During British Period

- Major recommendations of:
  - Macaulay's Minute-1835
  - Wood's Dispatch-1854
  - Hunter Commission-1882
  - Sadler Commission 1917
  - Hartog Committee 1929
  - Sargent Plan-1944
- Gokhle's Bill and Wardha Scheme of Education
- National Education Movement- 1920-22

Unit III: Main Commissions, Committees and Programmes on Education in Independent India

- Recommendations on teacher education, primary education, secondary education, higher education, and vocational Education of the following:
  - University Education commission- 1948-49
  - Secondary Education commission-1952-53
  - Education Commission-1964-66
  - National Policy on Education- 1986 & Revised NPE – 1992
  - NCF 2005 and Draft NCFSE 2023
  - National Knowledge Commission Report 2007
  - National Education Policy- 2020
  - National Programmes on Education: SSA (2000), RTE Act 2009, RMSA (2009)

Unit IV: Contemporary Issues in Education

- Quality, equity, equality, and accessibility in education with special reference to gender, language, region, and caste
- Liberalization, privatization, and globalization
- Vocationalisation and multidisciplinary approach in education
- Sustainable development goals (SDGs) and education
- Education for socio-economically disadvantaged groups
- Education and nationalism

Suggested Reading:

1. Altekar, A.S. (1934). Education in ancient India. Varanasi: The Indian Book shop.
2. Ghosh, S.C. (1989. Educational policy in India since Warren Hastings. Calcutta: Naya Prakashan.
3. Jaffar, S.M. (1936). Education in Muslim India, Lahore.
4. Kumar, K. (1991). The political agenda of education. Delhi: Sage.
5. Law, N.N. (1916). Promotion of learning in India. London.
6. Mukherjee, R.K. (1960). Ancient Indian education. Delhi: Motilal Banarasi Das.
7. Nurrullah, S., & Naik, J.P. (1951). A student's history of education in India. Bombay: MacMillan
8. MHRD (2020). National Educational Policy-2020. New Delhi: MHRD.
9. Chauhan, C.P.S. (1990). Higher education in India. New Delhi: Ashish Publishing House.
10. Dash, M. (2004). Education in India: Problems and perspectives. New Delhi: Atlantic Publishers.
11. Ghosh, S.C. (2009). The history of education in Modern India. New Delhi: Blackswan Publication.
12. Graves, N. (1990). Teaching for international understanding, peace and human rights. Paris: UNESCO.
13. Joshi, K.L. (1977). Problems of higher education in India. Bombay: Popular Prakashan.
14. Kumar, K. (2005): Political agenda of education: A study of colonialist and national Ideas. New Delhi: Sage Publication.
15. Mathur, V.S. (1970). Crucial problems in Indian education. New Delhi: Arya Book Depot.
16. Ministry of Education (1978). Report of the education commission 1964-66. New Delhi: Govt. of India.
17. Mohanty, J. (1987). Education in India. New Delhi: Deep and Deep Publications.
18. Mukerji, S.N. (1965). Education in India-today and tomorrow. Baroda: Acharya Book Depot.
19. Pathania, A. (2009). Primary education in India: Programmes and schemes. Shimla: J.M.D. Publication.
20. Rama Jois, M. (1998). Human rights and Indian values. New Delhi: NCTE

INVERTIS
UNIVERSITY BAREILLY

SEMESTER - II

BASICS OF ORGANIC CHEMISTRY I	
Course Code: BEB206	**Credit:** 04 (L-3, T-1, P-0)
Contact Hours: 60	**MM:** 100 (Int.: 30 + Ext.: 70)

Course Outline

Unit I: Bonding and Mechanism of Organic reactions

- Hybridizations, Bond lengths and bond angles, bond energy; Localized and delocalized chemical bond, vander Waals interactions, resonance, hyperconjugation, aromaticity, inductive and other field effects, hydrogen bonding
- Curved arrow notations, drawing electron movement with arrows, half-headed and double-headed arrow, homolytic and heterolytic bond breaking, Reactive intermediates- carbocations, carbanions, free radicals and carbenes. Electrophiles and Nucleophiles. Types of organic reactions.

Unit II: Stereochemistry

- Concept of isomerism, types of isomerism, optical isomerism, elements of symmetry, molecular chirality, optical activity, enantiomers, diastereomers, meso compounds and racemization.
- Relative and absolute configurations, sequence rules, D & L, R & S systems of nomenclature. Geometric isomerism- Nomenclature E and Z system.
- Conformation, conformational analysis of ethane, propane and n-butane.
- Conformations of cyclohexanes, axial and equatorial bonds.
- Newman projection and Saw horse formulae, Fischer and Flying wedge formulae

Unit III: Alkanes, Alkenes and Alkynes

- IUPAC nomenclature, sources, methods of preparation, physical properties.
- Chemical reactions of alkanes, alkenes and alkynes and their mechanism

Unit IV: Cycloalkanes, Cycloalkenes and Dienes

- Nomenclature, Methods of formation, conformation and chemical reactions of cycloalkanes, cycloalkenes and Dienes.
- Nomenclature and classification of dienes: isolated conjugated and cumulated dienes. Structure of allenes and butadiene, methods of formation, polymerization. Chemical reactions-1, 2 and 1, 4 additions, Diels-Alder reaction.

Unit V: Arenes and Aromaticity

- Nomenclature of benzene derivatives. Structure of benzene - molecular formula and Kekule structure.
- Stability and carbon-carbon bond lengths of benzene, resonance structure and MO picture. Concept of aromaticity, Huckel rule, aromatic ions.
- Mechanisms of SN1 & SN2 reaction, E1 & E2 reaction (elementary treatment) of aliphatic hydrocarbon. Saytzeff & Hofmann elimination. Nucleophilic and electrophilic aromatic substitution. Energy profile diagrams. Activating and deactivating substituents. orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Methods of formation and chemical reactions of alkylbenzenes

Suggested Reading:

1. Organic Chemistry, L. G. Wade Jr. Prentice Hall.
2. Fundamentals of Organic Chemistry Solomons and Fryle, John Wilev.
3. Organic Chemistry, Vol. I, II and III S. M. Mukherji, S. P. Singh and R. P. Kapoor.
4. Organic Chemistry: Morrison and Boyd, Prentice Hall of India Pvt. Ltd. New Delhi.
5. Organic Chemistry, Arun Bahl & B. S. Bahl, S. Chand & Co. New Delhi.
6. Nasipuri, D. Stereochemistry of Organic Compounds, Wiley Eastern Limited.
7. Eames, J., Peach, J. M. Stereochemistry at a Glance, Blackwell Publishing, 2003.
8. Robinson, M. J. T., Stereochemistry, Oxford Chemistry Primer, Oxford University Press, 2005.

CALCULUS	
Course Code: BEB207	**Credit:** 04 (L-3, T-1, P-0)
Contact Hours: 60	**MM:** 100 (Int.: 30 + Ext.: 70)

Course Outline

Unit I: Differential Calculus

- Limit (ε-δ definition), Continuity, Discontinuity, properties of continuous functions. Differentiability, Successive differentiation and Leibnitz's theorem. Expansion of functions (in Taylor's and Maclaurin's series), Indeterminate forms, Partial differentiation and Euler's theorem. Maxima and Minima (for functions of two variables), Tangents and normal.

Unit II: Integral Calculus

- Reduction formulae, Beta and Gamma functions. Quadrature, Rectification, Volumes and surfaces of solids of revolution Double and triple integrals, Change of order of integration

Unit III: Vector differentiation

- Velocity, Acceleration of a particle moving on a space curve. Scalar point function, vector point function, Gradient, velocity potential, divergence and curl of a vector and their physical interpretations.

Unit IV: Vector Integration

- Line, surface and volume integrals, Statement and problems of Green's, Stoke's and Gauss divergence theorems (without proof).

Suggested Reading:

1. Gorakh Prasad, Differential Calculus, Pothishala Pvt. Ltd. Allahabad, 2000.
2. Gorakh Prasad, Integral Calculus, Pothishala Pvt. Ltd. Allahabad, 2000.
3. Shanti Narayan, A Text Book of Vector Calculus, S. Chand & Company, New Delhi.
4. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 1999.

WAVE OPTICS AND ELECTROMAGNETISM	
Course Code: BEB208	**Credit:** 04 (L-3, T-1, P-0)
Contact Hours: 60	**MM:** 100 (Int.: 30 + Ext.: 70)

Course Outline

Unit I: Interference

- Introduction and Methods of interference: Division of amplitude and division of wave front
- Phase change on reflection
- Interference in thin films: Parallel film, wedge-shaped films
- Newton's rings: measurement of wavelength and refractive index

Unit II: Diffraction

- Introduction of diffraction
- Types of diffraction
- Difference between interference and diffraction
- Difference between Fresnel and Fraunhoffer diffraction
- Diffraction due to (i) a single slit, (ii) double slit and (iii) N-slits (plane transmission grating)

Unit III: Polarization

- Phenomenon of double refraction
- Uni-axial & bi-axial crystals
- Ordinary & extra ordinary rays
- Quarter wave plate & half wave plate
- Analysis of plane
- Circularly & elliptically polarized light

Unit IV: Electromagnetic Induction

- Faraday's law; Lenz's law
- Self and mutual induction,
- Energy stored in magnetic field

Unit V: Electromagnetic theory

- Maxwell's equations: proof & physical significance
- Plane electromagnetic waves,
- Displacement current and equation of continuity
- Electromagnetic wave propagation: plane wave in free space, plane waves in good conductors
- Poynting theorem and Poynting vector

Suggested Reading (Text Books):

1. Francis Arthur Jenkins and Harvey Elliott White, Fundamentals of Optics McGraw-Hill, 1976
2. Eugene Hecht and A. R. Ganesan, Optics, Pearson Education, 2002
3. Brijlal & Subhramanyam, Optics, S. Chand Publications, 2011
4. Edward M. Purcell, Electricity and Magnetism, (McGraw-Hill Education, 1986)
5. David J. Griffiths, Introduction to Electrodynamics, 3rd Edn, (Benjamin Cummings, 1998).
6. K.K. Tiwari, Electricity and Magnetism S. Chand Publication

Suggested Reading (Reference Books):

1. Abdul Al-Azzawi , Light and Optics: Principles and Practices, CRC Press, 2007
2. A. K. Ghatak & K. Thyagarajan , Contemporary Optics, Plenum Press,1978
3. Arthur F. Kip, Fundamentals of Electricity and Magnetism , (McGraw-Hill, 1968)
4. J. H. Fewkes & John Yarwood, Electricity and Magnetism, Vol.-I (Oxford Univ. Press, 1991).
5. D. C. Tayal, Electricity and Magnetism. (Himalaya Publishing House,1988).

EVOLUTION, DEVELOPMENTAL BIOLOGY AND ENVIRONMENTAL BIOLOGY	
Course Code: BEB209	**Credit:** 04 (L-3, T-1, P-0)
Contact Hours: 60	**MM:** 100 (Int.: 30 + Ext.: 70)

Course Outline

Unit I: Concept and mechanism of evolution

- Basic concept of Evolution, Origin of life, evidences of evolution
- Theories of evolution: Lamarckism/ Neo- Lamarckism, Darwinism/ Neo
- Darwinism, Mutation theory and Modern synthetic theory.
- Organic variations, Isolating Mechanisms of evolution
- Natural selection (Example: Industrial melanism), Types of natural selection (Directional, Stabilizing, Disruptive).
- Artificial selection, Basic idea of Speciation

Unit II: Developmental Biology

- Gametogenesis: Spermatogenesis and oogenesis w.r.t. mammals, vitellogenesis in Birds,
- Fertilization: external (amphibians), internal (mammals), blocks to polyspermy
- Early development of frog and humans (structure of mature egg and its membranes, patterns of cleavage, fate map, up to formation of gastrula).
- Implantation of embryo in humans, Formation of human placenta and its functions
- Metamorphosis and its hormonal regulation.
- Medical implications of developmental biology: Infertility –Diagnosing Infertility, and IVF

Unit III: Environment

- Environment: structure and functions, Components of Environment
- Ecosystem - Definition and types (Pond, grassland and Forest Ecosystem)
- Food chain, food web and ecological pyramids, Energy flow in an ecosystem, Lindeman law of energy transfer

Unit IV: Biodiversity and Environmental ethics

- Biodiversity, hot spots of biodiversity and threats for biodiversity
- Conservation of biodiversity: National parks, Sanctuaries, Biosphere reserve
- Natural resources: Mineral, water and forest, their significance and conservation
- Pollution: Air, water and noise pollution and their control
- Global Environmental issues: Acid rain, greenhouse effect, ozone depletion and global warming

Suggested Reading:

1. Evolutionary Biology – D. J. Futuyama (Sinauer Associates Inc.)
2. Evolution – M. W. Strickberger (CBS Pub.)
3. An introduction of Embryology – B. I. Balinsky (Sunders Int.)
4. Developmental Biology – S. Gilbert (Sinauer)
5. Fundamentals of Ecology – E. P. Odum (Saunders)
6. Ecology: Principles and Applications – J. L. Chapman & M. J. Reiss (Cambridge Univ. Pr.)
7. Biodiversity – E. O. Wilson (National Academic Press)
8. Environmental Science – G. T. Miller (Brookes Kole)

DIVERSITY OF BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS & ANGIOSPERMS	
Course Code: BEB210	**Credit:** 04 (L-3, T-1, P-0)
Contact Hours: 60	**MM:** 100 (Int.: 30 + Ext.: 70)

Course Outline

Unit I: Bryophytes

- Classification and general characters of bryophytes
- Gametophytic and sporophytic organization of:
  1. *Sphagnum*
  2. *Anthoceros*
  3. *Riccia*

Unit II: Pteridophytes

- General features, classification, stellar system and its evolution
- Study of characteristic features of following:
  1. *Lycopodium*
  2. *Rhynia.*
  3. *Marsilea*

Unit III: Gymnosperms

- General characters, classification. Comparative study of morphology, anatomy, development of vegetative and reproductive parts in Cycas and
  - *Pinus*

Unit IV: Angiosperms

- Identification, nomenclature, classification:(Bentham and Hooker), primitive and advanced features, salient features of the International Code of Botanical Nomenclature; diagnostic features (with reference to local flora)
- Economic importance of Ranunculaceae, Malvaceae, Brassicaceae, Papilionaceae, Caesalpinaceae, Solanaceae, Asteraceae, Euphorbiaceae, Poaceae and Liliaceae

Suggested Reading:

1. A text book of Botany Vol-I. S.K. Panday and P.S.Trivedi. Vikas Publishing House, New Delhi.
2. An Introduction to Pteridophytes. A. Rashid, II edition. Vikas Publishing House, New Delhi, India
3. Angiosperm Taxonomy by Lawrance, G.H.M. (1951). The Macmillan Compnay New York
4. Angiosperm Taxonomy by Pandey, B.P. (1999). S. Chand and Company, Pvt. Ltd., New Delhi
5. Angiosperm Taxonomy by Singh, V. and Jain, D.K. (1981). Deep and Deep Publications
6. An Introduction to Taxonomy of Angiosperms by Shukla, P. &Misra, S.C. (1991). Vikas Publishing House, Pvt. Ltd. (576, Masjid Road, Jangpura, New Delhi-110014.

CHEMISTRY LAB II	
Course Code: BEB251	**Credit:** 01 (L-0, T-0, P-2)
Contact Hours: 30	**MM:** 25 (Int.: 10 + Ext.: 15)

LIST OF EXPERIMENTS

- (i) To determine the viscosity of a given liquid at room temperature by using Ostwald's viscometer.
- (ii) To determine the strength of given solution pH metrically.
- (iii) Detection of special elements (N, S, Cl, Br) by Lassaigne's test.
- (iv) Detection of functional groups: PhOH, –COOH, –C=O, –CHO, Ar–NH_2, Ar–NO_2, –$CONH_2$
- (v) Identification of a Pure Organic Compound by chemical test(s): Solid compounds:
  oxalic acid, tartaric acid, citric acid, succinic acid, resorcinol, urea, glucose, cane sugar, benzoic acid and salicylic acid.
- (vi) Determination of boiling point:
  Determination of boiling point of common organic liquid compounds e.g. ethanol, cyclohexane, chloroform, ethyl methyl ketone, cyclohexanone, acetylacetone, anisole, crotonaldehyde, mesityl oxide, etc. [Boiling point of the chosen organic compounds should preferably be less than 160° C].
  Note: Experiments may be added/deleted subject to availability of time and facilities.

Suggested Reading:

1. An Advanced Course in Practical Chemistry by A. K. Nad, B. Mahapatra and A. Ghoshal, New Central Book Agency (P) Ltd.
2. Standard Methods of Chemical Analysis, W. W. Scott, The Technical Press.
3. Experimental Organic Chemistry, Vol.I and II, P. R. Singh, D. S. Gupta and K. S. Bajpai, Tata McGraw Hill.
4. Laboratory Manual in Organic Chemistry, R. K. Bansal, Wiley Eastern.
5. Bhattacharyya, R. C, A Manual of Practical Chemistry.
6. Mann, F. G. & Saunders, B. C. Practical Organic Chemistry, Pearson Education (2009).
7. Furniss, B. S., Hannaford, A.J., Smith, P. W. G., Tatchell, A. R. Practical Organic Chemistry, 5th Ed., Pearson (2012).
8. Practical Workbook Chemistry (Honours), UGBS, Chemistry, University of Calcutta, 2015

PHYSICS LAB II	
Course Code: BEB252	**Credit:** 01 (L-0, T-0, P-2)
Contact Hours: 30	**MM:** 25 (Int.: 10 + Ext.: 15)

LIST OF EXPERIMENTS

Each student has to perform eight experiments, selecting a minimum of three experiments from each of the following group:

1. Charging and discharging in RC and LCR Circuits.
2. Study of V-I characteristics of a forward and reverse biased p-n junction diode.
3. Study of voltage regulation characteristics of zener diode.
4. A.C. Bridges.
5. Half wave and full wave rectifiers.
6. Characteristics of a transistor in CE, CB and CC configurations.
7. To determine the wavelength of monochromatic light with the help of Fresnel_s biprism.
8. To determine the specific rotation of cane sugar solution using polarimeter.
9. To determine the Modulus of Rigidity of a Wire by Maxwell_s needle.
10. To determine the Elastic Constants of a Wire by Searle_s method.
11. To study the Motion of a Spring and calculate (a) Spring Constant (b) Value of g, and (c) Modulus of Rigidity

Suggested Reading:

1. Geeta Sanon, BSc Practical Physics, 1stEdn. (2007), R. Chand & Co.
2. 2. B. L. Worsnop and H. T. Flint, Advanced Practical Physics, Asia Publishing House, New Delhi. 3. Indu Prakash and Ramakrishna, A Text Book of Practical Physics, Kitab Mahal, New Delhi.

LIFE SCIENCE LAB II	
Course Code: BEB253	**Credit:** 01 (L-0, T-0, P-2)
Contact Hours: 30	**MM:** 25 (Int.: 10 + Ext.: 15)

LIST OF PRACTICALS

Practicals (Zoology):

1. Use of pH meter for estimation of pH in water and soil samples
2. Study of micro-organism of water and soil samples
3. Determination of dissolved O2, free CO2 of water.
4. Zoo-plankton count by standard methods
5. Report on Environmental audit Local Biodiversity Record (in group/individual of a particular area) – at least two records of faunal diversity along with ecological notes and photographic documentations in two seasons should be done. For example: butterfly community or bird community of a particular area.
6. General discussion, distinguishing characters and classification of respective Phylum should be taken into consideration.

Practicals (Botany):

7. *Marchantia*- morphology of thallus, w.m. rhizoids and scales, vs. thallus through gemma cup, w.m. gemmae (all temporary slides), v.s. antheridiophore, archegoniophore.
8. *Selaginella*- morphology, w.m. leaf with ligule, T.S. of stem; w.m. strobilus, w.m. microsporophyll and megasporophyll.
9. *Cycas*-T.S of coralloid root, T.S. of rachis vs. leaflet.
10. *Pinus*- T.S. of needle and stem.
11. Study of vegetative and floral characters of the following families (description, v.s. of flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system oclassification):
    Ranunculaceae, Brassicaceae, Myrtaceae Apiaceae, Asteraceae, Solanaceae Rosaceae, Euphorbiaceae, Liliaceae, Poaceae
12. **Field work assessment Submission of field study report on any two of the following**
    a. Ecosystem and its biodiversity assessment. (Any suitable ecosystem) (Various diversity indices with explanation must be presented)
    b. Estuarine bheri/freshwater fish farm (species cultured/reared, whether exotic/ornamental fishes are cultured, viability of the farm, cost benefit accounts, impact on local people and prospect in the specific area)

Suggested Reading:

1. Odum and Barrett : Fundamentals of Ecology, 5th Edition
2. Pawlowski : Physicochemical Methods for Water and Wastewater Treatment, 1st Edition
3. Practical Botany B. P Pandey.
4. Practical Botany, Vol. I, II, III by H.N. Srivastava, Pradeep Publications,

PHILOSOPHICAL AND SOCIOLOGICAL FOUNDATIONS OF EDUCATION	
Course Code: BED201	**Credit:** 04 (L-3, T-1, P-0)
Contact Hours: 60	**MM:** 100 (Int.: 30 + Ext.: 70)

Course Outline

Unit I: Introduction

- Philosophy: Meaning, nature, importance
- Branches of philosophy
- Relationship between philosophy and education
- Concept of truth, welfare, and beauty according to Indian philosophy.
- Philosophy of education-Concept, nature, scope, and need
- Philosophical aims of education

Unit II: Indian and Western Schools of Philosophy

- Vedant and Buddhism with special reference to aims, curriculum, methods, teacher – taught relations, discipline
- Idealism, naturalism, and pragmatism with special reference to aims, curriculum, methods, teacher – taught relations, discipline
- Contribution of Indian and western schools of philosophy to the current education system

Unit III: Prominent Indian & Western Educational Thinkers

- Vivekananda
- Aurobindo
- Mahatma Gandhi
- Rabindranath Tagore
- Krishnamurti
- Plato
- Aristotle
- Rousseau
- John Dewey

Unit IV: Education and Socialization

- Sociology and education, sociology of education
- Education as an agent of socialization and social change
- Social stratification and the role of education in social mobility
- Constitutional Provisions for education and the role of education in fulfillment of the constitutional promise of freedom, equality, justice, and fraternity.
- Role of education in promoting national integration and international understanding
- Equity and Equality in Education – meaning, nature and forms of inequality
- Liberalization, privatization, globalization and internationalization of education

Suggested Reading:

1. Bayles, E.E. (1971). Pragmatism in education. New York: Harper and Row Publishers.
2. Brubacher, J.S. (1939). Modern philosophies of education. New York: Mc-Graw Hill.
3. Butler, J.D. (1968). The four philosophies and their practices in education. New York: Harper and Row Publishers.
4. Chaube and Chaube (1994) Foundations of Education. Vikas Publishing House Pvt. Ltd.
5. Chaube, S.P & Chaube, A. (2000). Philosophical and Sociological Foundations of Education. Agra: Vinod Pustak Mandir
6. Dewey, J. (1921). Reconstruction in philosophy. London: University of London Press.
7. Oad, L.K. (1979). Shiksha ki darshnik prishthbhumi. Jaipur: Rajsthan Hindi Granth Academy.
8. Pandey, R.S. (1995). Shiksha darshan. Agra: Vinod Pustak Mandir.
9. RadhaKrishanan, S. (2002). Indian philosophy, Vol. I & II. New Delhi: Oxford University Press.
10. Dewey, J. (1916). Democracy and education.
11. Durkhim, E. (1956). Education and society. New York: The Free Press.
12. Lal, R.B. (1993.). Shiksha ke Darshnik aur samaj shastriya siddhant. Meerut: Rastogi Publication.
13. Mathur, S.S. (2008). Shiksha Siddhant. Agra: Vinod Pustak Mandir.
14. Rao, M.S.A. (1967). Paper in the sociology of education. New Delhi: NCERT.
15. Shukla S. & Kumar, K. (1985). Sociological perspective in education. Delhi: Chanakya Publication.

PSYCHOLOGICAL FOUNDATIONS OF EDUCATION	
Course Code: BED202	**Credit:** 04 (L-3, T-1, P-0)
Contact Hours: 60	**MM:** 100 (Int.: 30 + Ext.: 70)

Course Outline

Unit I: Educational Psychology

- Meaning, Nature, and Scope of Psychology
- Relationship between psychology and education
- Meaning, Nature and Scope of Educational Psychology
- Significance of knowledge of educational psychology for teachers

Unit II: Human Development

- Concept and principles of growth, development and maturity
- Stages of human development
- Factors influencing human development
- Dimensions of human development: Social, emotional, moral, linguistic, and cognitive development
- Developmental Theories: Piaget's Cognitive Development Theory, Vygotsky's Theory of Cognitive Development, Kohlberg's Moral Development Theory, Erickson's Theory of Psycho-Socio Development

Unit III: Learning and Motivation

- Learning and Theories of learning
- Factors affecting learning and transfer of learning
- Motivation and Theories of Motivation

Unit IV: Individual Differences

- Intelligence: Concept and Measurement
- Theories of Intelligence, Intelligence Tests
- Personality: Concept and its determinants
- Theories of Personality
- Creativity: Concept, Meaning, Nature and Teaching strategies to foster creativity
- Difference between Intelligence and Creativity, Characteristics of Creative Children
- Mental Health: Concept, Factors affecting Mental Health
- Adjustment: Concept, Characteristics and Maladjustment
- Defense Mechanisms: Types and Implications
- Group Dynamics: Concept & Implications, Sociometry

Suggested Reading:

1. Agarwal, J.C. (1981). Essentials of educational psychology, Delhi: Doaba Books.
2. Agrawal, J. C. (1994). Essentials of Educational Psychology. New Delhi: Vikas Publishing House Pvt. Ltd
3. Atkinson, R.L. (1983). Introduction to psychology. New York: HBT.
4. Chauhan, S.S. (2001). Advanced educational psychology. New Delhi: Vikas Publishing House.
5. Dash, B.N. (2015). Education & Human Development. New Delhi: Dominant

Publishers & Distributors Pvt Ltd.
6. De Cecco, J.P. The psychology of learning and instruction. New Delhi: Prentice-Hall of India, Pvt. Ltd.
7. Gage, N.L., & Berliner, D.C. Educational psychology. Chicago: McNally College Publishing Co.
8. Hurlock, E.B (2005). Child Growth and Development. New York.:Tata Mc. Graw Hill Publishing Company
9. Kakkar, S.B. (2005). Educational Psychology. New Delhi: Prentice-Hall of India Pvt.Ltd.
10. Loran, J.W., & B.L. Walley. Introduction to early childhood education. New York: D. VanNor Stand Co.
11. Lovel, K. An Introduction to human development. London: Scott, Foreman and Co.
12. Mangal, S.K. (2007). Essentials of Educational Psychology. Prentice Hall India Learning Pvt. Ltd.
13. Mathur, S. S. (2009). Educational Psychology. Agra: Agrawal Publications
14. Morse, W.C. & Wingo, G.M. Psychology &teaching. Bombay: P.B. Taraporewala Sons & Co. Pvt. Ltd.
15. Oven, S. Educational psychology: An introduction. Boston: Little, Brown & Co.
16. Pathak, P.D. (2016). Educational Psychology. Vinod Pustak Mandir
17. Selvam, M. (2014). Educational Psychology of Learning & Human Development. New Delhi: A.P.H. Publishing Co.
18. Shaffer, D. R. & Kipp, K. (2004). Developmental Psychology: Childhood & Adolescence. (9th Ed.). USA: Wodsworth.
19. Sivakumar, D. & Vanirani, S. (2014). Psychology of Learning & Human Development. Jaipur: Aavishkar Publishers
20. Skinner, C.E. (Ed). (1950). Elementary educational psychology. New York: Prentice Hall Inc. 1950.
21. Woolfolk, A. Educational psychology. Delhi: Dorling Kindersley (India) Pvt. Ltd.,

READING AND REFLECTING ON TEXT	
Course Code: BED203	**Credit:** 02 (L-2, T-0, P-0)
Contact Hours: 30	**MM:** 50 (Int.: 15 + Ext.: 35)

Course Outline

Objective: To prepare teachers as reflective practitioners, provide opportunities to the student teachers to read the given texts and then to the critically examine the ideas presented in the texts and organize debates/discussions around the ideas.

Transaction Mode: A response-based approach will be followed where students are regarded as active meaning makers whose personal experience will be tapped for the interpretation of the text. Students as readers and writers will participate in the constructive reading- writing process. Open forums will accompany the discussion of texts.

Unit I: Understanding Reading

- Reading: Meaning and Purpose
- Process or Stages of Reading
- Type of Texts in School Curriculum
- Barriers to reading
- Reading disabilities
- Five stages in the Development of Reading
- Reading for Comprehension (Skimming, Scanning, Intensive and Extensive Reading)
- Levels of Comprehension

Unit II: Critical and Reflective Reading

- Reflection: Meaning and Concept
- Research that supports reflective practice: Kolb's learning cycle, Gibbs' reflective cycle, Schön 'reflection-in-action' and 'reflection-on-action'
- Reflection in reading
- Strategies for students to become reflective readers
- Benefits of reflective practice

Unit III: Practicing Academic Reading

- Reading leading to Note-Making
- Research Notes, Pattern Notes (spider gram, table, flowchart and tree diagram)
- Assessing academic reading
- **Activities for Practicing Reflective Reading (Following activities are to be conducted in class involving student-teachers):**
    - Maintaining a reflective journal by student-teachers

    - **Activity 1:** The Story of the Eagle and the Chicken
      Source: https://mecschool.co.za/wp-content/uploads/2020/04/The-fable-of-eagle-and-the-chicken-2.pdf

      Guidelines for conducting the activity:
        - The story may be read out to the students without the title and the final message

- After listening to the story, each student has to provide a title and a moral of the story
- The students may be asked to think of a similar situation in their own lives or in the life of anyone else whom they know
- Each student speaks about his experience
- The written work of each student may be submitted.

- **Activity 2:** National Education Policy 2020
  Source:
  https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
  Guidelines for conducting the activity:
  Following parts of the policy may be used for the activity:
  i. The Vision of Policy
  ii. Teacher Education (point 15.4)
  iii. Structure of School Education
  - Each student is asked to read the text individually and identify the topic sentence of each paragraph
  - They are instructed to make notes of each section of the text
  - Students are asked to write the summary of each section
  - The written work should be submitted.

Suggested Reading:

1. Ahmadi, M.R. et al (2016). The importance of metacognitive reading strategy awareness in reading comprehension. English language teaching. Retrieved from https://www.researchgate.net/publication/273989234_The_Importance_of_Metacognitive_Reading_Strategy_Awareness_in_Reading_Comprehension
2. Angelo T.A., & Cross, K.P. (1993). Classroom assessment techniques: A Handbook for college teachers. San Franciso: Jossey-Bass.
3. Banks, J.A., & Banks, C.A. (Eds.) (2004). Handbook of research on multicultural education. San Francisco: Jossey-Bass
4. IGNOU (2016). Reading and Reflecting on Texts. Director, School of Education, IGNOU, New Delhi
5. Pandey, L. (2015). On the Threshold of Reading: A Compilation of Articles on Reading. NCERT: New Delhi.
6. Sreekanth, Y. (2021). Reading and Reflecting on Texts: A Source Book for Secondary Teacher Education. IUCTE (RIE Mysore): NCERT

PSYCHOLOGY PRACTICAL	
Course Code: BED251	**Credit:** 02 (L-0, T-0, P-2)
Contact Hours: 30	**MM:** 50 (Int.: 15 + Ext.: 35)

Course Outline

Standardized psychological tests pertaining to the following will be selected and taught to student-teachers:

- Memory
- Transfer of learning
- Intelligence
- Personality
- Habit formation in Adolescence
- Adjustment

Note: Pupil teacher will make a practical notebook of Psychology Practical, detailing introduction of tests, administration procedure, test results and their interpretation, which along with oral test on various tests will be assessed by teacher(s) designated by HOD for internal evaluation and subsequent evaluation by external examiner for external evaluation.

SCOUTS AND GUIDES CAMP	
Course Code: BED252	**Credit:** 02 (L-0, T-0, P-2)
Contact Hours: 30	**MM:** 50 (Int.: 15 + Ext.: 35)

Course Outline

- Have brief information of the origin of Scouting and Guiding along with definition, purpose principles and method of the Bharat Scouts and Guides.
- Information about the Scout Promise, Law & Motto.
- Knowledge about the Scout and Guide Sign, Salute and left-hand shake and be able to demonstrate.
- Know the parts of Scout Uniform and how to wear it correctly.
- Know the composition and significance of the National Flag, the Bharat Scouts & Guides Flag and the World Scout Flag and Flag Etiquette.
- Sing correctly National Anthem, BSG Prayer and BSG Flag Song. Know about the composer, duration and meaning of the song.

Scouts and Guides Camp will have three components:

1. Participation in all activities of Scout and Guide Camp organized by the University
2. Report writing for Scout and Guide Camp
3. Participation in Viva voce at the end of semester.

Note: For successful completion of the course, all three components ar e compulsory.