UNIVERSITY OF LADAKH

SYLLABUS

OF

THE FOUNDATION COURSE

OF

LIFE SCIENCES

(UNDER NEP – 2020)

(Implemented w.e.f Academic Session 2023-24)

UNIVERSITY OF LADAKH

SYLLABI OF THE FOUNDATION/INTRODUCTORY COURSE IN LIFE SCIENCES

UNDER NATIOANL EDUCATION POLICY - 2020

(Session2023-2024)

OBJECTIVE OF THE COURSE

The curriculum of the program was develop so as to provide students with a basic understanding of the various branches of Life sciences and the opportunities each branch carries.

CHOICEBASEDCREDITSYSTEM

The Four-year under-graduate level course ……..consists of 4-year course(under CBCSpattern)with semester system 8semesters,with two semesters in a year and each semester carrying 20 credits, thus a total of 40 credits per year and 160 credits in all. Each credit carries a weightage of 25 marks and thus a total of 500 marks in a semester.

The new education policy – 2020 will be applicable to all the semesters from the academic session 2023-24.

Semester-I **(Marks:500)**

		(CoreCourses)			
Paper	**Course No.**	**Title**	**Max. Marks**	**Con.Hours**	**Total Credits**
Foundation	FC-DSC	Foundation course in Life Sciences	75	36	03
Foundation	FC-DSC-L	Practical foundation courses in life Sciences	25	12	01
Interdisciplinary	ID – 1		75	45	03
Interdisciplinary	ID – 2		75	45	03

Totalcredits: 20

Semester-II **(Marks: 500)**

		(CoreCourses)			
Paper	**Course No.**	**Title**	**Max. Marks**	**Con.Hours**	**Total Credits**
Foundation	FC-DSC	Foundation course in life sciences	75	36	03
Foundation	FC-DSC - L	Practical Foundation course in life sciences	25	12	01
Interdisciplinary	ID – 1		75	45	03
Interdisciplinary	ID – 2		75	45	03

Total credits = 20

Syllabus of the Foundation Course in Life Sciences under NEP-2020

Semester – I **Credit – 3+1** **Max Marks – 100**

Objectives:

1. To provide the students with an opportunity to develop basic knowledge about the animal diversity.
2. To impart knowledge regarding biological significance of Carbohydrates, Amino acids, Proteins present in cell.
3. To provide basic knowledge about the plant diversity and to choose the elective subjects broadening their skills in the field of botany.
4. To familiarise students with modern research activities in Life sciences.

Unit I Introduction to Biotechnology (16 periods)

1.1. Definitions, concept and scope of Biotechnology

1.2. Genetic Engineering (Recombinant DNA Technology).Restriction enzymes and cloning vector and its features (Plasmid).

1.3. Application of Biotechnology in health (Vaccine production),Agriculture(genetically modified crop -Bt cotton).

1.4. Overview of Biosafety issues and patent.

Unit II Introduction to BiochemistryI (16 periods)

1.1 Carbohydrates: monosaccharides- structure of aldoses and ketoses,
1.2 open and ring structure, anomers, epimers and enantiomers;
1.3 Formation of disaccharides, polysaccharides-homo and hetero polysaccharides; reducing and non-reducing sugar.
1.4 Proteins:Structure and classification of amino acid, peptide bond, organization of protein structure into primary, secondary and tertiary.

Unit III Introduction to Plants (16 periods)

1.1 General characteristics (Occurrence, Morphology and Reproduction) of Fungi (*Rhizopus*) and Algae.
1.2 General characteristics (Occurrence, Morphology and Reproduction) of Bryophytes(*Marchantia*) and Pteridophytes.
1.3 General characteristics (Occurrence, Morphology and Reproduction) of Gymnosperms, Introduction to Angiosperms(Monocots and Dicots).
1.4 Alternation of generations, Heterospory, Seed habit.

Unit IV Basic Zoology I (16+4 periods)

1.1 Overview of Five kingdom classification,
1.2 General Characteristics of Non-Chordates (Protozoans, Porifera,Coelenterates, Platyhelminthes, Nemathelmithes, Annelida, Arthropoda, Mollusca and Echinodermata);
1.3 Chordates (Protochordate, Agnatha, Pisces, Amphibia, Reptile, Aves, Mammals)
1.4 **General Microbiology**:
Basic structure of Virus (RNA- Tobacco mosaic virus, DNA- T4-Bacteriophage) and Bacteria (Escherichia coli)

Practicals

1. Qualitative Test for Carbohydrates by Benedict's test.
2. Study of permanent slides/models/photographs of Gram negative microbe E.coli.
3. Study of the museum specimens belonging one each from chordate and non chordate.
4. Preparation of culture media for bacterial culture
5. To describe plant specimens available in the lab (One each from Fungi, Algae, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms)

References:

Essential Readings

1. Lehninger's Principles of Biochemistry, Nelson and Cox, W.H.Freeman and company, New York. 8th Edition (2021).
2. Biochemistry, Satyanarayana and Chakrapani, Arunabha Sen Books and Allied (P)Ltd 5th Edition (2020).
3. An Introduction to Practical Biochemistry. David T. Plummer. McGraw Hill Edition (India) Pvt. Ltd. 3rd Edition (2017)
4. Modern Textbook of Zoology: Invertebrates by R.L Kotpal. Rastogi Publishers
5. Modern Textbook of Zoology: Vertebrates by R.L Kotpal. Rastogi Publishers
6. A Manual of Practical Zoology by P. S. Verma
7. Singh, Pandey & Jain: Diversity of Microbes and Cryptogams, Gymnosperms.
8. Principles of Gene Manipulation: An Introduction to Genetic Engineering R. W Old and S. B. Primrose(sixth edition)
9. Bendre and KumarA text book of Practical Botany Vol I (Rastogi Publications)
10. Jordan,E.L.,Verma,P.S.,Chordate Zoology(2013),S.Chand and company,New Delhi

Suggested Readings

11. Fundamentals of Biochemistry, Jain and Jain,S.Chand. 7th edition (2016).
12. Voet's Principles of Biochemistry, Voet and Voet, 5th Edition (2018)
13. Prescott's Microbiology by Willey, Joanne; Sherwood, Linda; Woolverton, Chris, 8th edition(2011) McGraw Hill.
14. H.N. Srivastava; Botany Vol-I, Diversity of Microbes & Cryptogams.
15. Imtiyaz Hussain and Vaishali Yadav; Text book of Botany; Microbes, Cryptogams and Gymnosperms.
16. B. R. Vashishta, Botany for degree students Fungi.

Syllabus of the Foundation Course in Life Sciences under NEP-2020

Semester – II **Credit – 3+1** **Max Marks – 100**

Objectives:

1. To understand basic structural organization and physiological processes in animal
2. To impart knowledge regarding biological significance of Lipids and nucleic acids present in cell.
3. To familiarise students with modern techniques for Life science research.
4. To provide basic knowledge about the applied botany and to choose the elective subjects broadening their skills in the field of botany

Unit I Biotechniques (16 periods)

1.1. Gel Electrophoresis-Principle and its application,Polymerase chain reaction and its application
1.2. Spectrophotometry-Principle and application,
1.3. Centrifugation-Application and rotor types
1.4. Streaking and Spreading of Microbial cultures.

Unit II Introduction to Biochemistry II (16 periods)

1.1. Lipids: Introduction, classification, properties of Fatty Acid, Saturated and Unsaturated Fatty acids, Essential Fatty acids, Simple and Mixed Triacylglycerol;
1.2. Nucleic Acids:Introduction, purine and pyrimidine bases, general composition, nucleosides, nucleotides,
1.3. features of DNA double helix, Chargaff's rule of DNA composition,
1.4. Structure and types of RNA.

Basic BotanyII(16 periods)

1.1. Plant taxonomy and physiology: General account of plant classification (Artificial, Natural and Phylogenetic), Herbarium- preparation and role.
1.2. Basics of Transpiration, Ascent of Sapand Photosynthesis.
1.3. Plant Anatomy and reproductive biology:Meristematic and Permanent tissues, Cambium-types and function, Basic structure of flower, pollination, Concept of Double fertilization.
1.4. Economic Botany:Important Medicinal and Aromatic plants (*Aconitumheterophyllum, Podophyllum hexandrum*and*Dactylorhizahatagirea*)

Basic Zoology II(16+4 periods)

1.1. **Digestive system**: structure of digestive system in ruminants.
Circulatory system: structure of mammalian heart; Blood and its composition
1.2. **Excretory system:** structure of mammalian Kidney;
1.3. **Respiratory system:** Gills in fishes and lungs in mammals.
Reproductive system: Physiological demand of viviparity(oestrous cycle and menstrual cycle).
1.4. **Basic Microbiology**Microbial interaction (Mutualism, Commensalism, Predation, Parasitism and Competition); symptoms, mode of transmission and control of bacterial disease (Tuberculosis-) and viral disease (AIDS)

Practicals:

1. Digestive, Reproductive, Respiratory and Execratory System of rat/ mouse through charts/video clips.
2. Qualitative Test for Lipids by emulsification test.
3. To study the principle and application of important instruments (autoclave, incubator, hot air oven) .
4. Preparation of temporary mount of dicot root, dicot stem and dicot leaf (*Helianthus annus*)
5. Separation of plant pigments by paper chromatography

References

Essential Readings

1. Lehninger's Principles of Biochemistry, Nelson and Cox, W.H.Freeman and company, New York. 8th Edition (2021).
2. Biochemistry, Satyanarayana and Chakrapani, Arunabha Sen Books and Allied (P)Ltd 5th Edition (2020).
3. An Introduction to Practical Biochemistry. David T. Plummer. McGraw Hill Edition (India) Pvt. Ltd. 3rd Edition (2017)
4. *Wilson* and *Walker's* Principles and *Techniques* of Biochemistry and Molecular *Biology(2018)*
5. S.C. Rastogi (2001); Essentials of Animal Physiology
6. Seth M Kisia (2011); Vertebrates- structure and function
7. P.S. Verma: Practical vertebrate Zoology.
8. Prescott's Microbiology by Willey, Joanne; Sherwood, Linda; Woolverton, Chris, 8th edition(2011) McGraw Hill.
9. R.L.Kotpal –Modern text Book of Vertebrate Zoology Rastogi Publications.
10. Jordan,E.L.,Verma,P.S.,Chordate Zoology(2013),S.Chand and company,New Delhi
11. Singh, V., Pande, P. C. and Jain, D.K. 2010. Structure, Development and Reproduction in Angiosperms.Rastogi Publications, Meerut, India.
12. Singh, G. (2012). Plant Systematics: Theory and Practice. Oxford & IBH Pvt. Ltd., New Delhi. 3rdedition.
13. Taiz, L., Zeiger, E., (2010). Plant Physiology.Sinauer Associates Inc., U.S.A. 5th Edition.
14. Kochhar, S. L. (2011). Economic Botany in the Tropics, MacMillan Publishers India Ltd., New Delhi.4th edition.
15. Guyton and Hall (2016); Text book of medical physiology 13th edition. Philadelphia, Elsevier.
16. Prosser CL. 1973. Comparative Animal Physiology. WB Saunders and Company

Suggested Readings

17. Fundamentals of Biochemistry, Jain and Jain,S.Chand. 7th edition (2016).
18. Voet's Principles of Biochemistry, Voet and Voet, 5th Edition (2018)
19. N.S. Subrahmanyam. 2009. Modern plant taxonomy
20. Ethnobotany And Plants Of Trans-Himalaya. by O.P. Chaurasia Et.al 2007; Satish publication.
21. Plants of Ladakh: A photographic guide 2021 by KonchokDorjey and Phuntsog Dolma... published by NCF