FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Sciences *(Diploma / Degree/Honors)*			**Semester - III**	Session: **2024-2025**
1	**Course Code**	**BOSC-03 T**		
2	**Course Title**	**Archegoniate and Fossils**		
3	**Course Type**	**Discipline Specific course (DSC)**		
4	**Pre-requisite** (if, any)	***As per program***		
5	**Course Learning. Outcomes (CLO)**	➢ students will be familiar with amphibians and reptiles plants ➢ progressive evolution in plants ➢ relics of past plants ➢ diversity in plants ➢ development of seeds.		
6	**Credit Value**	**3 Credits**	***Credit = 15 Hours - learning & Observation***	
7	**Total Marks**	**Max. Marks: 100**	**Min Passing Marks: 40**	

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Bryophyta:** Morphology, structure, reproduction and life history, distribution, classification, evolution of gametophytes and sterilization of sporogenous tissue. General account of- Riccia, Marchantia, Anthoceros and Funaria , Economic and ecological importance of bryophytes.	12
II	**Pteridophytes:** Morphology, anatomy and reproduction, classification, evolution of stele, heterospory, telome theory and origin of seed habit, general account and life history of of Psilotum, Lycopodium, Sellaginella, Equisetum Pteris, Marsilea	11
III	**Gymnosperm :** Characteristics of Gymnosperms, the vessel - less & fruitless seed plants, Classification of Gymnosperm; Polyembryony in Gymnosperms and its role; Distribution of Gymnosperm in India; Economic importance of Gymnosperm. General account of Cycas, Pinus, Gnetum Concepts of living fossil (Cycas & Ginkgo); Angiospermic characters of Gnetum.	11
IV	**Fossil:** Fossil and fossilization, types of fossils Geological time table **Brief account of the families of Pteridospermales** –Rhynia, Calamites. **General Account and Affinities -** Cycadeoidales Pentoxylales and Cordaitales	11
Keywords	Archegonia, seedless, heterospory, fossils	

Signature of Convener & Members (CBoS) :

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PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Puri, P. (1980) Bryophytes, Atma Ram and Sons, Delhi.
2. Vashishtha, B. R. (2005) Pteridophytes S. Chand and Co., Delhi.
3. Bhatnagar, S. P., Moitra, A. (1996) Gymnosperms, New Age International Pvt. Ltd., New Delhi.

Text Books Recommended –

4. Sporne, K. K. (1991) The Morphology of Gymnosperm. B. I. Publishing Pvt. Ltd., Bombay.
5. Stewart, W. N. and Ruthwell, G. W. (1993) Paleobotany and the Evolution of Plants. Cambridge Univ. Press, UK.
6. Singh, H. (1978) Embryology of Gymnosperms; Encyclopedia of Plant Anatomy X. Gebruder Bortraeger, Berlin.

Online Resources–

- **e-Resources / e-books and e-learning portals**
- **www.swayam.ac.in**
- **www.ignou.ac.in**
- **www.egyankosh.ac.in**
- **www.iitm.ac.in**
- **www.eskillindia.org**
- **www.eshiksha.mp.gov.in**
- **www.vlab.co.in**
- **www.internshala.com**
- **www.ndl.iitkgp.ac.in**

Online Resources–

e-Resources / e-books and e-learning portals

- https://study.com/learn/lesson/bryophytes-characteristics-examples.html
- https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book%3A_General_Biology_(Boundless)/26%3A_Seed_Plants/26.02%3A_Gymnosperms/26.2A%3A_Characteristics_of_Gymnosperms
- https://www.google.com/search?q=fossils&sca_esv=09379ecd0b6efd91&rlz=1C1CHBD_enIN1091IN1093&sxsrf=ACQVn09ytjzqRGwbydx-p0sOZFXGRnmfcw%3A1713546819943&ei=Q6YiZvefOde5vr0PtMuyqAg&oq=fossils&gs_lp=Egxnd3Mtd2l6LXNlcnAiB2Zvc3NpbHMqAggAMg0QABiABBixAxhDGIoFMgoQLhiABBhDGIoFMgUQABiABDIFEAAYgAQyBRAAGIAEMgoQABiABBhDGIoFMgUQABiABDIFEAAYgAQyBRAAGIAEMgUQABiABEjhKlAAWPIUcAB4AJABAJgBgwKgAYcLqgEFMC41LjK4AQHIAQD4AQGYAgegAukLwgIKECMYgAQYJxiKBcICBBAjGCfCAhEQLhiABBixAxjRAxiDARjHAcICCBAAGIAEGLEDwgIKEAAYgAQYFBiHApgDAJIHBTAuMy40oAfSWw&sclient=gws-wiz-serp
- https://www.google.com/search?q=fossils&sca_esv=09379ecd0b6efd91&rlz=1C1CHBD_enIN1091IN1093&sxsrf=ACQVn09ytjzqRGwbydx-p0sOZFXGRnmfcw%3A1713546819943&ei=Q6YiZvefOde5vr0PtMuyqAg&oq=fossils&gs_lp=Egxnd3Mtd2l6LXNlcnAiB2Zvc3NpbHMqAggAMg0QABiABBixAxhDGIoFMgoQLhiABBhDGIoFMgUQABiABDIFEAAYgAQyBRAAGIAEMgoQABiABBhDGIoFMgUQABiABDIFEAAYgAQyBRAAGIAEMgUQABiABEjhKlAAWPIUcAB4AJABAJgBgwKgAYcLqgEFMC41LjK4AQHIAQD4AQGYAgegAukLwgIKECMYgAQYJxiKBcICBBAjGCfCAhEQLhiABBixAxjRAxiDARjHAcICCBAAGIAEGLEDwgIKEAAYgAQYFBiHApgDAJIHBTAuMy40oAfSWw&sclient=gws-wiz-serp
- https://www.google.com/search?q=pteridophytes&sca_esv=09379ecd0b6efd91&rlz=1C1CHBD_enIN1091IN1093&sxsrf=ACQVn0-V0lp75QZG3sbfKrfltXB0GPdZyA%3A1713546628592&ei=hKUiZuvFI9q-juMPkr-DkAY&oq=pter&gs_lp=Egxnd3Mtd2l6LXNlcnAiBHB0ZXIqAggAMg0QABiABBixAxhDGIoFMgoQABiABBhDGIoFMgoQABiABBhDGIoFMgUQABiABDIKEAAYgAQYQxiKBTINEC4YgAQYsQMYQxiKBTIFEC4YgAQyChAAGIAEGEMYigUyChAAGIAEGEMYigVI_ihQAFixCnAAeACQAQCYAfQBoAGiBqoBBTAuMi4yuAEBvAEA-AEBmAIEoALgBsICChAjGIAEGCcYigXCAgQQIxgnwgIKEC4YgAQYQxiKBZgDAJIHBTAuMi4yoAfOSg&sclient=gws-wiz-serp
- https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book%3A_General_Biology_(Boundless)/26%3A_Seed_Plants/26.02%3A_Gymnosperms/26.2A%3A_Characteristics_of_Gymnosperms

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Internal Assessment (CIA):	**30 Marks**
End Semester Exam (ESE):	**70 Marks**

Continuous Internal Assessment (CIA):30 (By Course Teacher)	Internal Test / Quiz-(2): **20 +20** Assignment / Seminar - **10** Total Marks - **30**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE): 70	**Two section – A & B** Section A: **Q1.** Objective – **10 x1= 10** Mark; **Q2.** Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Sciences *(Diploma / Degree/Honors)*			**Semester - III**	Session: **2024-2025**
1	**Course Code**	**BOSC-03**		
2	**Course Title**	**Lab. Course-03 (Archegoniate and Fossils)**		
3	**Course Type**	**Laboratory course**		
4	**Pre-requisite** (if, any)	***As per program***		
5	**Course Learning. Outcomes (CLO)**	At the end of the course students will be familiar ➢ with amphibians and reptiles plants ➢ progressive evolution in plants ➢ relics of past plants ➢ diversity in plants ➢ Development of seeds.		
6	**Credit Value**	**1 Credits**	***Credit =30 Hours Laboratory or Field learning/Training***	
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 20**	

PART -B: Content of the Course

Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)

Module	Topics (Course contents)	No. of Period
Lab./Field Training/ Experiment Contents of Course	**Bryophyta:** Comparative study of the anatomy of vegetative and reproductive parts of *Marchantia, Pellia, Anthoceros, Notothylus, Funaria, Polytrichum.* **Pteridophyta:** Comparative study of the anatomy of vegetative and reproductive parts of *Psilotum, Lycopodium, Selaginella, Equisetum, Gleichenia,Pteris, Ophioglossum, Isoetes.* **Gymnosperms:** Comparative study of the anatomy of vegetative and reproductive parts of *Cycas, Ginkgo, Cedrus, Abies, Picea, Cupressus, Araucaria, Cryptomeria, Taxodium, Podocarpus, Agathis, Taxus, Ephedra* and *Gnetum.* ▪ Collection of various gymnospermic plant materials. ▪ Field work – as far practicable conveniently. **Fossil:** Study of important fossil gymnosperms from prepared photographs, slides and specimens.	**30**
Keywords	Archegonia, venter, bryophytes, pteridophytes	

Signature of Convener & Members (CBoS) :

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PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. The Practical Fossil Finder (Practical Handbook) Hardcover – 1 October 1991by Steve Parker (Author) Publishers Facts On File Inc
2. Practical Botany (Part I) ISBN #:81-301-0008-8 Sunil D Purohit, Gotam K Kukda & Anamika Singhvi Edition:2013 Apex Publishing House Durga Nursery Road, Udaipur, Rajasthan (bilingual).
3. Pandey S.K. (2012). Quick Concept of Botany. Publisher LAP LAMBERT Academic Publishing GmbH & Co. KG, Germany (ISBN: 978-3-8484-3104-5).
4. Dubey, R. C. and Maheshwari. D.K. 2012. Practical Microbiology, S. Chand & Company, Pvt. Ltd., New Delhi.
5. Pandey. B.P. 2014 Modern Practical Botany, (Vol-I) S. Chand and Company Pvt. Ltd., New Delhi.

Reference Books Recommended –

1. Principles of Paleontology Edition 3 Paperback–1 January 2006 by Arnold Miller, Michael Foote Publishers - W.H.Freeman & Co Lt

Online Resources–

- **e-Resources / e-books and e-learning portals**
- **www.swayam.ac.in**
- **www.ignou.ac.in**
- **www.egyankosh.ac.in**
- **www.iitm.ac.in**
- **www.eskillindia.org**
- **www.eshiksha.mp.gov.in**
- **www.vlab.co.in**
- **www.internshala.com**
- **www.ndl.iitkgp.ac.in**

Online Resources–

- **e-Resources / e-books and e-learning portals**

1. **https://efaidnbmnnnibpcajpcglclefindmkaj/https://egyankosh.ac.in/bitstream/123456789/69611/1/Unit-9.pdf**
2. https://www.encyclopedia.com/science/encyclopedias-almanacs-transcripts-and-maps/fossil-and-fossilization
3. https://palaeobotany.org

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks
Continuous Internal Assessment (CIA): 15 Marks
End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): 15 **(By Course Teacher)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE): 30	**Laboratory / Field Skill Performance: On spot Assessment** **A. Performed the Task based on lab. work - 20 Marks** **B. Spotting based on tools & technology (written) – 10 Marks** **C. Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Science *(Diploma / Degree/Honors)*		**Semester - III**	Session: **2024-2025**	
1	**Course Code**	**BOSE- 01 T**		
2	**Course Title**	**Natural resources and management**		
3	**Course Type**	**Discipline specific Elective (DSE)**		
4	**Pre-requisite** (if, any)	***As per program***		
5	**Course Learning. Outcomes (CLO)**	At the end of this course, the students will be able to ➢ Understand natural resources and their sustainable utilization. ➢ Knowledge on land, water, energy, and forest resources. ➢ Students will learn about the practices of natural resource management. ➢ Knowledge on the international and national efforts of natural resource management.		
6	**Credit Value**	**3 Credits**	***Credit = 15 Hours - learning & Observation***	
7	**Total Marks**	**Max. Marks: 100**	**Min Passing Marks: 40**	

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Natural resources** ➢ Definition and types. ➢ Natural resources' conservation Role of an individual in conservation of natural recourses, Significance, ➢ Sustainable utilization of resources' : Concept, approaches economic, ecological, and socio-cultural activities.	12
II	**Land and freshwater resources** ➢ Land as a resource ➢ Soil erosion and desertification ➢ Soil degradation and management. ➢ Forest resources use and over exploitation, deforestation ➢ Water resources, use and overutilization of surface and ground water ➢ Fresh Marine and estuarine ecosystems; ➢ Wetlands threats and management strategies	11
III	**Biological Resources** ➢ Biodiversity-definition and types ➢ Value of biodiversity ➢ Biodiversity at global, national an regional levels ➢ Threats; Management strategies; ➢ Bioprospecting. IPR; CBD; National Biodiversity Action Plan). ➢ Forests: Cover and its significance (with special reference to India); ➢ Major and minor Forest products; ➢ Renewable and non-renewable sources of energy.	11
IV	**Contemporary practices in resource management** ➢ National and international efforts in resource management and conservation. ➢ Waste management practices ➢ Natural resource Accounting ➢ Environmental impact assesement EIA ➢ Geographical information System GIS ➢ Participatory Appraisal of naturl Resource ➢ Ecological Footprint with emphasis on carbon footprint,	11
Keywords	**Resources, Biodiversity, Resources management, IPR, CBD.**	

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Vasudevan, N. (2006). Essentials of Environmental Science. Narosa Publishing House, New Delhi.
2. Singh, J. S., Singh, S.P. and Gupta, S. (2006). Ecology, Environment and Resource Conservation. Anamaya Publications, New Delhi.

Reference Books Recommended –

1, Rogers, P.P., Jalal, K.F. and Boyd, J.A. (2008). An Introduction to Sustainable Development. Prentice Hall of India Private Limited, New Delhi.

Online Resources–

- **e-Resources / e-books and e-learning portals**
- **https://www.sciencedirect.com/topics/social-sciences/natural-resource**
- **https://efaidnbmnnnibpcajpcglclefindmkaj/https://egyankosh.ac.in/bitstream/123456789/66166/2/Unit4.pdf**
- **https://efaidnbmnnnibpcajpcglclefindmkaj/https://www.ers.usda.gov/webdocs/publications/41964/30289_biological.pdf?v=0#:~:text=16-,What%20Are%20Biological%20Resources%3F,forests%2C%20and%20other%20natural%20lands.**
- http://surl.li/spcdd
- https://shorturl.at/ewyIP
- https://shorturl.at/cimoF

Online Resources–

- **e-Resources / e-books and e-learning portals**
- **www.swayam.ac.in**
- **www.ignou.ac.in**
- **www.egyankosh.ac.in**
- **www.iitm.ac.in**
- **www.eskillindia.org**
- **www.eshiksha.mp.gov.in**
- **www.vlab.co.in**
- **www.internshala.com**
- **www.ndl.iitkgp.ac.in**

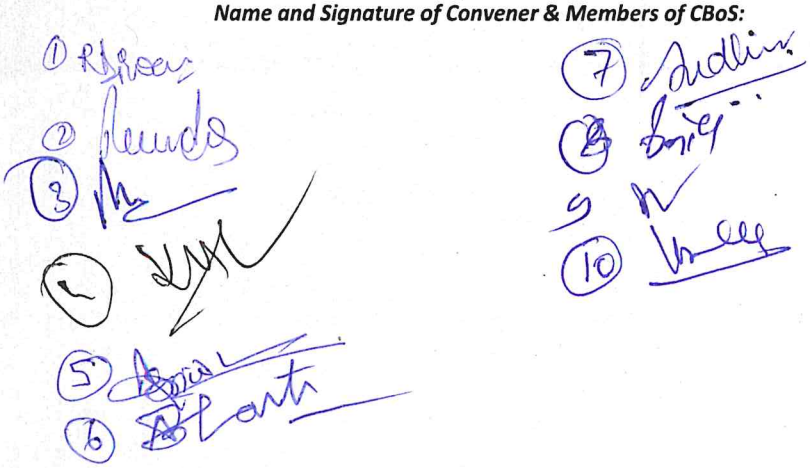
PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Internal Assessment (CIA):	**30 Marks**
End Semester Exam (ESE):	**70 Marks**

Continuous Internal Assessment (CIA): 30 **(By Course Teacher)**	Internal Test / Quiz-(2): **20 +20** Assignment / Seminar - **10** Total Marks - **30**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE): 70	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of CBoS:



FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF BOTANY

COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Science *(Diploma / Degree/ Honors)*		**Semester - III**	Session: **2024-2025**	
1	**Course Code**	**BOSE -01 P**		
2	**Course Title**	**Lab course -01 (Natural resources and management)**		
3	**Course Type**	**Laboratory course**		
4	**Pre-requisite** (if, any)	***As per program***		
5	**Course Learning. Outcomes (CLO)**	***at the end og then of the sesn*** O To understand natural resources and their sustainable utilization. O Acquire knowledge on land, water, energy, and forest resources. O Students will learn about the practices of natural resource management. O Acquire knowledge on the international and national efforts of natural resource management.		
6	**Credit Value**	**1 Credits**	***Credit =30 Hours Laboratory or Field learning/Training***	
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 20**	

PART -B: Content of the Course		
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)		
Module	**Topics (Course contents)**	**No. of Period**
Lab./Field Training/ Experiment Contents of Course	1) To compare protected and unprotected grassland stands using community coefficients 2) To estimate IVI of the species in a woodland using point centered quarter method. 3) To find out important grassland species using chi square test. 4) Scientific visits to a protected area, a wet land, a mangrove, NBPGR, BSI, CSIR, ICAR labs and a recognized botanical gardens or a museum. 5) To determine diversity indices (Shannon Wiener, concentration of dominance, species richness, equability and B diversity. 6) Field survey of a part of town or city to make the students aware of the diversity of plants in urban ecosystems. 7) Estimation of solid waste generated by a domestic system (biodegradable and non biodegradable) and its impact on land degradation. 8) Collection of data on forest covers of specific area. 9) Measurement of dominance of woody species by DBH (diameter at breast height) method. 10) Calculation and analysis of ecological footprint. 11) Ecological modeling.	**30**
Keywords	Community coefficient, IVI, diversity indices	

Signature of Convener & Members (CBoS) :

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. A Handbook of Human Resource Management Practice
2. Environmental and Natural Resource Economics_ A Contemporary Approach
3. Sustainable Management of Natural Resources_ Mathematical Models and Methods (Environmental Science and Engineering Environmental Science)

Online Resources–

- **e-Resources / e-books and e-learning portals**

1) https://shorturl.at/uIMTW
2) https://shorturl.at/yFJM3

Online Resources–

- **e-Resources / e-books and e-learning portals**
- **www.swayam.ac.in**
- **www.ignou.ac.in**
- **www.egyankosh.ac.in**
- **www.iitm.ac.in**
- **www.eskillindia.org**
- **www.eshiksha.mp.gov.in**
- **www.vlab.co.in**
- **www.internshala.com**
- **www.ndl.iitkgp.ac.in**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): 15 **(By Course Teacher)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE): 35	**Laboratory / Field Skill Performance: On spot Assessment** **A. Performed the Task based on lab. work - 20 Marks** **B. Spotting based on tools & technology (written) – 10 Marks** **C. Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Science *(Diploma / Degree/ Honors)*			**Semester - III**	Session: **2024-2025**
1	**Course Code**	**ZOSC-03T**		
2	**Course Title**	**Diversity of Invertebrates**		
3	**Course Type**	**Discipline Specific Course**		
4	**Pre-requisite** (if, any)	*As per Program*		
5	**Course Learning. Outcomes (CLO)**	**After successfully completing this course, the students will be able to -** ➢ Develop understanding on Invertebrate Animals on the basis of classification and Nomenclature. ➢ Develop understanding how simple/unicellular animals changed into multicellular and diploblastic forms through their anatomy and physiology. ➢ Gain Knowledge of key processes like formation of triploblastic animals (simple to complex form of body plan). ➢ Develop understanding on parasitic adaptations and life cycle of Helminthes. ➢ Develop understanding on the diversity in Artropoda, Mollusca and Echinodermata.		
6	**Credit Value**	**3 Credits**	*Credit = 15 Hours - learning & Observation*	
7	**Total Marks**	**Max. Marks: 100**		**Min Passing Marks: 40**

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**General Characters, Classification up to order and Type Study of Phylum Protozoa and Porifera with some special features: Protozoa:** General Characters and Classification of Phylum Protozoa up to order. **Type study:** Paramoecium, Protozoa and Disease. **Porifera:** General Characters and Classification of Phylum Porifera up to order. **Type study: Sycon.**	11
II	**General Characters, Classification and Type Study of Phylum Coelenterata, Helminthes and Annelida: Coelenterata** - General Characters and Classification of Phylum Coelenterata up to order. **Type Study:** Obelia. **Helminthes** - Classification of Phylum Helminthes up to order. **Type study:** Fasciola. **Annelida**- Classification of Phylum Annelida up to order. **Type study:** Pheretima (Earthworm).	11
III	**General Characters, Classification and Type Study of Phylum Arthropoda and Mollusca: Arthropoda** - General Characters and Classification of Phylum Arthropoda up to order. **Type study: Prawn. Mollusc**- General Characters and Classification of Phylum Mollusca up to order. **Type study: Pila.**	12
IV	**General Characters, Classification and Type Study of Phylum Echinodermata and Hemichordata:** General Characters and Classification of Phylum Echinodermata up to order. **Type Study:** Asterias (Starfish). General Characters and Classification of Phylum Hemichordata **Type Study:** Balonoglossus	11
Keywords	*Taxonomy, Nomenclature, Canal System, Protozoa, Balanoglossus, Torsion*	

Signature of Convener & Members (CBoS) :

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- R.L. Kotpal, Modern Textbook of Zoology Invertebrates. Rastogi Publication, Gangotri, Shivaji Road, Meerut
- V.K. Tiwari, Unified Zoology, Shivlal Agrawal and Company, Pustak Prakashak, Khajuri Bazar, Indore.
- Dr. S.M. Saxsen, Zoology, Ist Year, by a, Ram Prasad and Sons, Aagra and Bhopal.
- N. Arumugam, M.G. Ragunathan, T. Murugan, B. Ramnathan, A Textbook of Invertebrates by Saras Publication

Reference Books Recommended –

- Barrington, E.J.W. (1979). Invertebrate Structure and Functions. II Edition. E.L.B.S. and Nelson.
- Boradale, L.A. and Potts, E.A.(1961) Invertebrates: A Manual for the use of Students. Asia Publishing Home.
- Bushbaum, R. (1964). Animals without Backbones. University of Chicago Press.
- Hyman, L H. (1940-67). The Invertebrates, Vol. I-VI. McGraw-Hill, New York.
-

Online Resources–

- **http://ndl.iitkgp.ac.in/he_document/inflibnet_epgp/inflibnet_epgp/IN_I_e_P_P_1_Z_512_96_P_0_B_o_p_51542_M_1_M_L_c_P_D_a_P_o_E_P_1_51562_51563?e=9|*|||**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): **20** +**20** Assignment / Seminar - **10** Total Marks - **30**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in life Science *(Diploma / Degree/ Honors)*			**Semester - III**	Session: **2024-2025**
1	**Course Code**	**ZOSC-03P**		
2	**Course Title**	**Diversity of Invertebrates**		
3	**Course Type**	**Discipline Specific Lab Course**		
4	**Pre-requisite** (if, any)	***As per Program***		
5	**Course Learning. Outcomes (CLO)**	**After successfully completing lab course the students will be able to-** ➢ Develop understanding on the diversity of life with regard nonchordates. ➢ Gain Knowledge of grouping of animals on the basis of their morphological characteristics. ➢ Develop critical understanding how animals have changed from simple form to complex body plan. ➢ Acquired the detailed knowledge to think and interpret different animal species individually.		
6	**Credit Value**	**1 Credits**	***Credit =30 Hours Laboratory or Field learning/Training***	
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 20**	

PART -B: Content of the Course		
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)		
Module	**Topics (Course contents)**	**No. of Period**
Lab./Field Training/ Experiment Contents of Course	**List of labs to be conducted** • Study of different non-chordate taxa animals through models, slides and museum specimens in the laboratory. Emphasising classification, biogeography and diagnostic features of: Protozoa, Porifera, Coelenterata (also with special reference to Corals of Cnidarians), Helminthes, Annelida, Arthropoda, Mollusca and Echinodermata. • Histological slides of different Non chordate Taxa, slides of various larval forms of Helminthes, Crustacea and Echinodermata • **Dissection** of *Pheretima* to expose Alimentry canal and circum pharyngeal ganglia through Alternative methods of dissection. • Dissection of *Periplaneta* to expose the digestive system, salivary glands and Mouth Parts through Alternative methods of dissection. • Dissection of Prawn to expose appendages and statocyst through Alternative methods of dissection • Dissection of *Pila* to expose Nervous System through Alternative methods of dissection. • Study of Invertebrate animals in nature during a survey of a National Park/ Forest area/College campus. • **Group discussion/Viva or Seminar presentation on two related topics:** Polymorphism, Parasitic adaptations, Freshwater sponges, Biodiversity and climate change, Tree of Life, Marine zooplanktons and their ecological importance including oxygen evolution. • An "**animal album or Practical Record**" containing sketches, photographs, cut outs, with appropriate write up about the above mentioned taxa. • Study of some videos to develop understanding on the animals of different taxa.	**30**
Keywords	*Museum specimens, Histological slides, Alternative of Dissection, Animal album*	

Signature of Convener & Members (CBoS) :

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- S.S. Lal, Practical Zoology, Invertebrate. 12th Edition Rastogi Publications, Meerut, New Delhi.
- A manual of practical Zoology. Dr. P.S Verma, S. Chand Publication, New Delhi

Reference Books Recommended-

- Barrington, E.J.W. (1979). Invertebrate Structure and Functions. II Edition. E.L.B.S. and Nelson.
- Hyman, L H. (1940-67). The Invertebrates, Vol. I-VI. McGraw-Hill, New York.

Online Resources–

- **https://www.youtube.com/watch?v=GC5Ua6m873I**
- **https://www.youtube.com/watch?v=-qyM2Hskj84**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** **A. Performed the Task based on lab. work - 20 Marks** **B. Spotting based on tools & technology (written) – 10 Marks** **C. Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Science *(Diploma / Degree/Honors)*			**Semester - III**	Session: **2024-2025**
1	**Course Code**	**ZOSE- 01T**		
2	**Course Title**	**Parasitology**		
3	**Course Type**	**Discipline Specific Elective**		
4	**Pre-requisite** (if, any)	***As per Program***		
5	**Course Learning. Outcomes (CLO)**	➢ Students should comprehend the life cycles of various parasites, including their modes of transmission, intermediate hosts, and definitive hosts. ➢ Gain insights into the interactions between parasites and their hosts, including mechanisms of host invasion, evasion of host defenses, and pathogenesis. ➢ Develop the ability to recognize clinical manifestations associated with parasitic infections ➢ Understand the epidemiology of parasitic diseases ➢ Communicate effectively about parasitic diseases, including educating the public.		
6	**Credit Value**	**3 Credits**	***Credit = 15 Hours - learning & Observation***	
7	**Total Marks**	**Max. Marks: 100**	**Min Passing Marks: 40**	

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Viral diseases:** General characters, Structure and Classification of virus, A brief account of pathogenic viruses. Brief history of microbiology: germ theory of disease, Host pathogen interaction: invasion, antigenic heterogeneity, toxins and enzymes secretions. Viral diseases: hepatitis, influenza, AIDS, Covid -19 with emphasis on their causative agents, pathogenesis, diagnosis, prophylaxis and chemotherapy.	12
II	**Bacterial & Fungal diseases**: General characters, Structure and Classification of bacteria. **Bacterial Diseases:** A brief account of pathogenic bacteria, discovery of penicillin, diseases caused by *Streptococcus pneumonia, Salmonella typhi, Escherichia coli, Mycobacterium tuberculosis, Rickettsia, Spirochaetes* **Fungal diseases:** Ringworm infection, *Aspergillosis, candidiasis.*	11
III	**Protozoan parasites**: An overview of protozoa & disease. Introduction to parasites and parasitic diseases. Mode of transmission, portals of entry and implications of parasitism. Parasitic adaptations. Concept of zoonotic diseases. Protozoan diseases of medical importance: Brief account of life History, pathogenicity of the following Protozoa with reference to Man, prophylaxis and treatment: *Entamoeba histolitica, Trypanosoma gambiens, Plasmodium vivex, Giardia.*	11
IV	**Helminth parasites:** An overview of Helminthic diseases. Brief account of life History, pathogenicity of the following Helminths with reference to Man, prophylaxis and treatment. *Taenia solium, Schistosoma haematobium, Ascaris lumbricoides, Wuchereria branrofti.* Vector insects.	11
Keywords	*Micrology, pathogenic bacteria, Protozoan parasites, Helminth parasites, Toxicology, toxic againts*	

Signature of Convener & Members (CBoS) :

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- Agrawal Anju Principles of Toxicology
- Parija, S. C. (2013) Textbook of Medical Parasitology, Protozoology & Helminthology (Text and colour Atlas), IV Edition, All India Publishers & Distributers, New Delhi.
- Ichhpujani, R.L. and Bhatia, R. (2009) Medical Parasitology. III Edition, Jaypee BrothersMedical Publishers (P) Ltd., New Delhi
- Ahmed, N., Dawson, M., Smith, C. and Wood, Ed. (2007) Biology of Disease. Taylor andFrancis Group.
- Chatterjee, K. D. (2009). Parasitology: Protozoology and Helminthology. XIII Edition, CBSPublishers & Distributors (P) Ltd.
- Arora, D. R and Arora, B. (2001) Medical Parasitology. II Edition. CBS Publications andDistributors
- Chatterjee, K.D (2015) Parasitology (13th edition)

Reference Books Recommended –

- Jawetz, M. and Adelberg (2015) Medical Microbiology (27th edition)
- Noble, E.R. and Noble, G.A. (1989) Parasitology: The Biology of Animal Parasites. VIEdition, Lea and Febiger

Online Resources–

- **http://ndl.iitkgp.ac.in/he_document/inflibnet_epgp/inflibnet_epgp/IN_I_e_P_P_1_Z_51296_P_0_B_o_p_51542_M_1_M_L_c_P_D_a_P_o_E_P_1_51562_51563?e=9|*||**
- **http://ndl.iitkgp.ac.in/he_document/inflibnet_epgp/inflibnet_epgp/IN_I_e_P_P_1_Z_51296_P_0_B_o_p_51542_M_2_P_d_a_p_o_w_b_51594_51595?e=3|*|||**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Internal Assessment (CIA):	**30 Marks**
End Semester Exam (ESE):	**70 Marks**

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): **20 +20** Assignment / Seminar - **10** Total Marks - **30**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Science *(Diploma / Degree/ Honors)*			**Semester - III**	Session: **2024-2025**
1	**Course Code**	**ZOSE- 01P**		
2	**Course Title**	**Parasitology**		
3	**Course Type**	**Discipline Specific Elective Lab Course**		
4	**Pre-requisite** (if, any)	***As per Program***		
5	**Course Learning. Outcomes (CLO)**	**At the end of this course, the students will be able -** ➢ Identify common parasitic Protozoa and Helminth. ➢ Learn techniques for studying growth of bacteria and its staining. ➢ Learn the techniques for examine Sputum, Blood, Urine and Stool samples for pathology		
6	**Credit Value**	**1 Credits**	***Credit =30 Hours Laboratory or Field learning/Training***	
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 20**	

PART -B: Content of the Course

Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)

Module	Topics (Course contents)	No. of Period
Lab./Field Training/ Experiment Contents of Course	➢ Study of permanent slides and specimens of parasitic Protozoans and Helminthes. ➢ Pathological examination of sputum, blood, urine and stool. ➢ Blood: Erythrocyte Sedimentation Rate (ESR), Haematocrit. ➢ Staining and identification of Gram positive and Gram negative bacteria. ➢ Preparation of thin and thick blood films to diagnose Plasmodium infections/ or permanent slides. ➢ Preparation of temporary and permanent slides of faecal matter by saline preparation and concentration techniques to identify cysts of parasitic Protozoans and Helminthes eggs /or parmanant slides studies. ➢ Study Kinetics of bacterial growth and staining techniques. ➢ Group discussion or Seminar presentation on one or two related topics ➢ Group discussion/quiz/seminar on topics related to theory. ➢ Preparation of practical record or Album of parasites.	**30**
Keywords	*Parasitic protozoa, helminth, ESR, Gram positive and Gram negative*	

Signature of Convener & Members (CBoS) :

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- Ghosh Saugala, Panikar's Text book of Parasitology. Jaipyee Brothers
- Ananthanarayan and Paniker's Textbook of Microbiology, Twelfth Edition, Universities press

Reference Books Recommended –

- K.D. Chattargee, Parasitology . CBS Publisher

Online Resources–

- **http://ndl.iitkgp.ac.in/he_document/swayam_ugc_moocs/swayam_ugc_moocs/IN_S U M 1 U C 17 A D 4127 M L h o A L w P A o A L 34326 34327?e=7|*|||**
- **http://ndl.iitkgp.ac.in/he_document/swayam_ugc_moocs/swayam_ugc_moocs/IN_S U M 1 U C 17 A D 4127 M L h o T s a F h 10250 10251?e=8|*|||**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** **A. Performed the Task based on lab. work - 20 Marks** **B. Spotting based on tools & technology (written) – 10 Marks** **C. Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
Department of Biochemistry
Course Curriculum

PART- A: Introduction				
Program: Bachelor in Science *(Diploma / Degree / Honors)*		**Semester - III**		Session: **2024-2025**
1	**Course Code**	**BCSC- 03 T**		
2	**Course Title**	Enzymology		
3	**Course Type**	Discipline Specific Course (Theory)		
4	**Pre-requisite (if, any)**	As Per the Program		
5	**Course Learning. Outcomes (CLO)**	*On successful completion of the course, the student shall be able to:* ➢ Describe the enzyme catalysis and regulatory enzymes. ➢ Explain the mechanism of action of enzymes and role of vitamins as coenzyme precursors. ➢ Express the Michaelis-Menten equation, and double reciprocal plots, and graphical representation of various inhibitors. ➢ Describe the principles and methods of Diagnosis by enzymes.		
6	**Credit Value**	**3 Credits**	***Credit = 15 Hours - learning & Observation***	
7	**Total Marks**	**Max. Marks: 100**		**Min Passing Marks: 40**

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Introduction to enzymes:** Nature of enzymes - protein and non-protein (ribozyme). Cofactor and prosthetic group, apoenzyme, holoenzyme. IUBMB classification of enzymes. Coenzymes. **Features of enzyme catalysis** Catalytic power and specificity of enzymes (concept of active site), Fischer's lock and key hypothesis, Koshland's induced fit hypothesis	09
II	**Enzyme kinetics:** Relationship between initial velocity and substrate concentration, steady state kinetics, equilibrium constant - Mono substrate reactions. Michaelis-Menten equation, Lineweaver-Burk plot, Km and Vmax, K_{cat} and turnover number. Effect of pH, temperature and metal ions on the activity of enzyme.	12
III	**Enzyme inhibition:** Reversible inhibition (competitive, uncompetitive, non-competitive, mixed and substrate). Mechanism based inhibitors. **Mechanism of action of enzymes** - General features - proximity and orientation, strain and distortion, acid base and covalent catalysis (chymotrypsin, lysozyme).	12
IV	**Regulation of enzyme activity:** Control of activities of single enzymes (end product inhibition) and metabolic pathways, feedback inhibition (aspartate transcarbomoylase), reversible covalent modification phosphorylation (glycogen phosphorylase). Proteolytic cleavage- zymogen. Multienzymecomplex as regulatory enzymes, pyruvate dehydrogenase. Isoenzymes - properties and physiological significance (lactate dehydrogenase). **Application of enzymes in diagnostics:** (SGPT, SGOT, creatine kinase, alkaline and acidphosphatases), Enzyme electrodes, biosensors.	12
Keywords	Coenzyme, Ribozyme, Cofactor, Apoenzyme, Michaelis-Menten equation.	

Name and Signature of Convener & Members of CBoS:

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H.Freeman and Company (New York), ISBN:13: 978-1-4641-0962-1 / ISBN:10:1-4292-3414-8.
- Biochemistry (2011) 4th ed., Donald, V. and Judith G.V., John Wiley & Sons Asia Pvt.Ltd. (New Jersey), ISBN:978-1180-25024.
- Fundamentals of Enzymology (1999) 3rd ed., Nicholas C.P. and Lewis S., OxfordUniversity Press Inc. (New York), ISBN:0 19 850229 X.

Online Resources–

e-Resources / e-books and e-learning portals

- https://www.jbc.org/Enzymology
- https://www.sciencedirect.com/topics/medicine-and-dentistry/enzymology
- https://www.biologyonline.com/dictionary/coenzyme
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3770912/
- https://www.eposters.net/redirect/?ID=16026&UID=0&Type=poster
- https://link.springer.com/chapter/10.1007/978-0-387-35141-4_34

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks
Continuous Internal Assessment (CIA): 30 Marks
End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): **20 +20** Assignment / Seminar - **10** Total Marks - **30**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
Department of Biochemistry
Course Curriculum

PART- A: Introduction				
Program: Bachelor in Science *(Diploma / Degree/ Honors)*			**Semester -III**	Session: **2024-2025**
1	**Course Code**	**BCSC- 03 P**		
2	**Course Title**	Enzymology		
3	**Course Type**	Discipline Specific Course (Practical)		
4	**Pre-requisite (if, any)**	As Per the Program		
5	**Course Learning. Outcomes (CLO)**	On successful completion of the course, the student shall be able to: ➢ Explain purification of proteins by various methods. ➢ Estimate enzyme activity by different methods. ➢ Explain progress curve of enzyme. ➢ Practice the effect of physical parameters on enzyme activity.		
6	**Credit Value**	**1 Credits**	***Credit =30 Hours Laboratory or Field learning/Training***	
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 20**	

PART -B: Content of the Course

Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)

Module	Topics (Course contents)	No. of Period
Lab./Field Training/ Experiment Contents of Course	➢ Partial purification of acid/ alkaline phosphatase. ➢ Assay of enzyme activity and specific activity, e.g. acid/ alkaline phosphatase. ➢ Effect of pH on enzyme activity and determination of optimum pH. ➢ Determination of Km and Vmax using Lineweaver-Burk graph. ➢ Isolation and purification of urease. ➢ Inhibition of alkaline/acid phosphatase activity by EDTA ➢ Effect of substrate concentration on alkaline phosphatase activityand determine of its Km value. ➢ Effect of temperature of enzyme activity and determination of activation energy. ➢ Effect of enzyme concentration on enzyme activity.	**30**
Keywords	Assay, Enzyme, Specific activity, Temperature,	

Name and Signature of Convener & Members of CBoS:

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York), ISBN:13: 978-1-4641-0962-1 / ISBN:10:1-4292- 3414-8.
- Biochemistry (2011) 4th ed., Donald, V. and Judith G.V., John Wiley & Sons Asia Pvt. Ltd. (New Jersey), ISBN:978-1180-25024.
- Fundamentals of Enzymology (1999) 3rd ed., Nicholas C.P. and Lewis S., Oxford University Press Inc. (New York), ISBN:0 19 850229 X.

Online Resources–

- **e-Resources / e-books and e-learning portals**
- https://en.wikibooks.org/wiki/Biochemistry
- https://www.pdfdrive.com/biomolecules-books.html
- https://ncert.nic.in/textbook.php

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: **50 Marks**

Continuous Internal Assessment (CIA): **15 Marks**

End Semester Exam (ESE): **35 Marks**

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks	
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** **A. Performed the Task based on lab. work - 20 Marks** **B. Spotting based on tools & technology (written) – 10 Marks** **C. Viva-voce (based on principle/technology) - 05 Marks**		**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
Department of Biochemistry
Course Curriculum

PART- A: Introduction				
Program: Bachelor in Science *(Diploma / Degree / Honors)*			**Semester - III**	Session: **2024-2025**
1	**Course Code**	**BCSE- 01 T**		
2	**Course Title**	Clinical Biochemistry		
3	**Course Type**	Discipline Specific Elective (Theory)		
4	**Pre-requisite (if, any)**	As per the Program		
5	**Course Learning. Outcomes (CLO)**	*On successful completion of the course, the student shall be able to:* ➢ Learn about the normal constituents of urine, blood and their significance in maintaining good health. ➢ Understand the mechanisms of causation of diseases of liver, kidney and of Cancer. ➢ Describe with the variations in the levels of trigycerides and lipoproteins and their relationship with various diseases. ➢ Explain with the role of enzymes in diagnosis of various diseases.		
6	**Credit Value**	**3 Credits**	***Credit = 15 Hours - learning & Observation***	
7	**Total Marks**	**Max. Marks: 100**	**Min Passing Marks: 40**	

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Urine:** Normal composition of urine – volume, pH, colour, specific gravity. Constituents-urea, uric acid, creatinine, pigment. Abnormal constituents – glucose, albumin, ketone bodies, vriations in urea, creatinine, pigments and their clinical significance in brief. Abnormalities in Nitrogen Metabolism – Uremia, hyperuricemia, porphyria and factors affecting nitrogen balance.	09
II	**Blood:** Normal constituents of blood and their variation in pathological conditions - urea, uric acid, creatinine, glucose, bilirubin, total protein, albumin/globulin ratio. Lipid profile cholesterol, triglycerides, lipoproteins - HDL and LDL. **Blood Clotting –** Disturbances in blood clotting mechanisms – haemorrhagic disorders – haemophilia, von Willebrand's disease, purpura, Rendu-Osler-Werber disease, thrombotic thrombocytopenic purpura, disseminated intravascular coagulation, acquired prothrombin complex disorders, circulating anticoagulants.	12
III	**Diagnostic Enzymes** – Enzymes in health and diseases. Biochemical diagnosis of diseases by enzyme assays – SGOT, SGPT, alkaline phosphatase, CPK, cholinesterase, LDH Disorders of liver and kidney – Jaundice, fatty liver, normal and abnormal functions of liver and kidney. Inulin and urea clearance. **Electrolytes and acid-base balance** – Regulation of electrolyte content of body fluids and maintenance of pH, reabsorption of electrolytes.	12
IV	**Biochemistry of Cancer**, Cellular differentiation in cancer, carcinogens and cancer therapy **Inborn errors of metabolism:** Sickle cell anaemia, phenyl ketonuria, Neimann – Pick disease and Gaucher's disease.	12

Keywords	Blood, Urine, Cancer, Enzymes, Diseases

Name and Signature of Convener & Members of CBoS:

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- Concise Medical Physiology – Choudhary – New Central Book Agency – Calcutta.
- TextBook of Medical Physiology – Guyton – Prism Books Pvt. Ltd. – Bangalore.
- Harper's Biochemistry – Murray, Granner, Mayes, and Rodwell – Prentice Hall International Inc.
- Textbook of medical physiology: A. C. Gyton, and J. E HallSaunders Elsevier Publications, A division of Reed Elsevier India Pvt .Ltd.New Delhi ISBN 81-8147-084-2
- T.M. Delvin (editor), Text book of biochemistry with clinical correlation, (1982), John Wiley & Sons Inc. USA.

Online Resources–

e-Resources / e-books and e-learning portals

- https://www.sciencedirect.com/topics/medicine-and-dentistry/enzymology
- https://www.jbc.org/Enzymology
- https://www.biologyonline.com/dictionary/coenzyme
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3770912/
- https://www.eposters.net/redirect/?ID=16026&UID=0&Type=poster
- https://link.springer.com/chapter/10.1007/978-0-387-35141-4_34

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks
Continuous Internal Assessment (CIA): 30 Marks
End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **20 +20** Assignment / Seminar - **10** Total Marks - **30**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
Department of Biochemistry
Course Curriculum

PART- A: Introduction				
Program: Bachelor in Science *(Diploma / Degree / Honors)*			**Semester - III**	Session: **2024-2025**
1	**Course Code**	**BCSE-01 P**		
2	**Course Title**	Clinical Biochemistry		
3	**Course Type**	Discipline Specific Elective (Practical)		
4	**Pre-requisite (if, any)**	As Per the Program		
5	**Course Learning. Outcomes (CLO)**	On successful completion of the course, the student shall be able to: ➢ Understand Qualitative and quantitative analysis of constituents of biological fluids such as urine, blood and their estimation using standard methods.		
6	**Credit Value**	**1 Credits**	***Credit =30 Hours Laboratory or Field learning/Training***	
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 20**	

PART -B: Content of the Course

Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)

Module	Topics (Course contents)	No. of Period
Lab./Field Training/ Experiment Contents of Course	➢ Qualitative and quantitative analysis of urine : proteins, Bence-Jones proteins, Cl-, Ca+2 ➢ Qualitative analysis of abnormal constituents in urine - glucose, albumin, bile pigments, bile salts and ketone bodies. ➢ Separation of Blood Plasma and Serum ➢ Determination of A/G ratio in serum ➢ Isolation and estimation of serum cholesterol ➢ Serum enzyme assays: alkaline phosphatase, SGOT, SGPT ➢ Estimation of bilirubin (conjugated and unconjugated) in serum. ➢ Estimation of total lipids in serum by vanillin method. ➢ Estimation of cholesterol in serum. ➢ Estimation of blood urea nitrogen from plasma. ➢ Estimation of SGPT and SGOT in serum. ➢ Preparation of starch from potato and its hydrolysis by salivary amylase. a. Determination of achromatic point in salivary amylase. b. Effect of sodium chloride on amylases	**30**
Keywords	Blood, Plasma, Liver function test, Serum enzymes	

Name and Signature of Convener & Members of CBoS:

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York), ISBN:13: 978-1-4641-0962-1 / ISBN:10:1-4292- 3414-8.
- Biochemistry (2011) 4th ed., Donald, V. and Judith G.V., John Wiley & Sons Asia Pvt. Ltd. (New Jersey), ISBN:978-1180-25024.
- Fundamentals of Enzymology (1999) 3rd ed., Nicholas C.P. and Lewis S., Oxford University Press Inc. (New York), ISBN:0 19 850229 X.

Online Resources–

- **e-Resources / e-books and e-learning portals**
  https://www.thermofisher.com/in/en/home/references/protocols/cell-and-tissue-analysis/elisa-protocol/elisa-sample-preparation-protocols/plasma-and-serum-preparation.html
- https://labmonk.com/determination-of-sgot-and-sgpt
- https://www.labcorp.com/help/patient-test-info/total-protein-and-albuminglobulin-ag-ratio
- https://link.springer.com/article/10.1007/s101570200005
- https://jcp.bmj.com/content/jclinpath/6/3/173.full.pdf

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: **50 Marks**

Continuous Internal Assessment (CIA): **15 Marks**

End Semester Exam (ESE): **35 Marks**

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** **A. Performed the Task based on lab. work - 20 Marks** **B. Spotting based on tools & technology (written) – 10 Marks** **C. Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF MICROBIOLOGY
COURSE CURRICULUM

PART – A: Introduction			
Program: Bachelor in Life Science (Diploma/Degree)		**Semester - III/IV**	**Session: 2024-25**
1	Course Code	MBVAC-01	
2	Course Title	Microbes and Human Health	
3	Course Type	Value Added Course (VAC)	
4	Prerequisite (If Any)	As per Program	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to – ➢ define the basic concept of Infection and disease ➢ explain various serological tests ➢ illustrate the basic knowledge of Immune status of human body ➢ identify various infectious diseases	
6	Credit Value	02 Credits	*Credit = 15 Hours - Learning & Observation*
7	Total Marks	Max. Marks: 50	Minimum Pass marks: 20

PART – B: Content of the Course

Total No. of Teaching-Learning Periods: (01 Hr. per Period) - 30 Periods (30 Hours)

Unit	Topics (Course contents)	No. of Periods
I	**Infection & Disease:** Difference between infection and disease, Important terminologies along with suitable examples; primary infection, secondary infection, contagious infection, nosocomial infections, clinical infection, subclinical infection, zoonoses, vector borne infection. Epidemic, endemic and pandemic diseases.	08
II	**Routes of entry and transmission of disease:** Portal of entry, Portal of exit, Reservoir, susceptible host. Direct contact, indirect contact, Airborne, vector borne, blood borne, non-contact vehicle transmission. Exposure, risk and standard precautions, expanded precautions. Control of routes of transmission.	08
III	**Serological reactions:** Basic concept of serological reactions, blood cell counting, Agglutination, precipitation. Blood group determination, Widal test, VDRL test. Total RBC count, Total leucocyte count, Platelet count, Differential count, Estimation of haemoglobin.	07
IV	**Viral and Bacterial infection:** Common water borne infections, air borne infections; their causes, sign & symptoms, pathogenesis, diagnosis, treatment and prevention.	07
Key Words	**Infection, Disease, Virulence, Pathogenesis**	

Name and Signature of Convener and Members of CBoS

PART – C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

1. A Text Book of Microbiology; Dubey & Maheshwari.
2. General Microbiology; Vol I & II, Powar C.B. and Daginawala H.I., Himalayn Pub. House, Bombay.
3. Text book of Microbiology; Ananthanarayan R. and Paniker C.K.J. (2009). 8th edition, University Press Publication
4. A Text Book of Microbiology; P. Chakraborthy, 3rd Edn, New Central book Agency (P) Ltd, Kolkata, India 2005.

Reference Books:

1. Preventive and Social Medicine, Park and Park

- https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SBMA1302.pdf
- https://www.news-medical.net/health/Modes-of-Transmission.aspx
- https://courses.lumenlearning.com/suny-microbiology/chapter/how-pathogens-cause-disease/

PART – D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 50 Marks
Continuous Internal Assessment (CIA): 15 Marks
End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	**Internal Test/ Quiz – (2): 10 & 10** **Assignment/ Seminar + Attendance: 05** **Total Marks: 15**	Better Marks out of the two Test/ Quiz + obtained marks in Assignment shall be considered against **15** Marks

End Semester Exam (ESE):	**Two Section – A & B** Section A: **Q1.** Objective **05 X 1 = 05 Mark**; **Q2.** Short answer type – **5X2 = 10 Marks** Section B: Descriptive answer type qts., **1 out of 2** from each unit – **4X05 = 20 Marks**

Name and Signature of Convener and Members of CBoS

10/6/24 10.6.24 Rashmi 10.6.24 10.6.24 Dr. Nelson

10/6/24 (Dr. Swethana Nagal) 10/6/24 (DR. V. Shanthi) Sadhana 10-6-24

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART-A: Introduction				
Program:Bachelor *(Certificate / Diploma / Degree)*			**Semester – I/III/V**	Session: **2024-2025**
1	**Course Code**	**ZOVAC-01**		
2	**Course Title**	**Public Health and Hygiene**		
3	**CourseType**	**Value Added Course**		
4	**Pre-requisite**(if, any)	***As per Program***		
5	**Course Learning. Outcomes(CLO)**	➢ Understand the importance of hygiene. ➢ Identify current national and global public health problems. ➢ Aware about the issues of food safety, water safety, vaccination, and obesity. ➢ Create general medical awareness in daily life. ➢ Analyze the measures to live a healthy life.		
6	**CreditValue**	**2 Credits**	***Credit = 15 Hours -learning & Observation***	
7	**TotalMarks**	**Max.Marks:50**		**Min Passing Marks:20**

PART -B: Content oftheCourse

Total No. of Teaching–learning Periods (01 Hr. per period) - 30 Periods (30 Hours)

Unit	Topics (Course Contents)	No. of Period
I	**Maintenance of personal hygiene:** Introduction to public health and hygiene: determinants and factors. Pollution and health hazards: Water and air borne diseases. Radiation hazards: Network Towers and electronic gadgets (recommended levels, effects and precaution). Personal hygiene: Oral hygiene, Menstrual Hygiene, Ideal hand washing methods, Ideal food keeping methods.	07
II	**Nutrition and Health:** Classification of food into micro and macro nutrients. Balanced diet. Importance of dietary fibres. Significance of breast feeding. Malnutrition anomalies: Anaemia (Iron and B12 deficiency), Kwashiorkar, Marasmus, Rickets, Goiter (cause, symptoms, precaution and cure).	07
III	**Communicable/Contagious and Non-Communicable Diseases: Communicable viral diseases:** measles, chicken pox, swine flu (their causal agents, symptoms and prevention). **Communicable bacterial diseases:** tuberculosis, typhoid, cholera (their causal agents, symptoms and prevention). **Sexually transmitted diseases:** AIDS, Syphilis (their causal agents, symptoms and prevention). **Non-communicable diseases:** hypertension, arthritis, Diabetes, peptic ulcer, obesity, depression and anxiety (their causal agents, symptoms and prevention).	09
IV	**Public Health Management & General Medical Awareness:** Vaccination, Benefits of institutional deliveries, Deworming drive: Use of Albendazole. First Aid: Electrocution, Road Accident, Burn, Lightning Strike, Envenomation. Importance of Cardiopulmonary resuscitation (CPR). Blood Donation: Eligibility, Health Screening. Road Safety: Good Samaritan, General safety precautions on Road and Motion Sickness. Fire Safety: Fire Control and Fire Extinguisher Categories.	07
Keywords	*Health, Hygiene, Nutrition, Disorders, Vaccination, Safety, Fire, Blood, Medication.*	

Signature of Convener & Members (CBoS):

PART–C:Learning Resources

Text Books, Reference Books and Others

Text BooksRecommended –

- Mary Jane Schneider (2011) Introduction to Public Health.
- Muthu, V.K. (2014) A Short Book of Public Health.

Reference Books Recommended

- Detels, R. (2017) Oxford Textbook of Public Health (6th edition).
- Gibney, M.J. (2013) Public Health Nutrition.
- Wong, K.V. (2017) Nutrition, Health and Disease.

Online Resources–

- **https://www.fda.gov/drugs/investigational-new-drug-ind-application/general-drug-categories**
- **https://www.nfpa.org/news-blogs-and-articles/blogs/2023/08/01/fire-extinguisher-types**
- **https://www.redcross.org/take-a-class/cpr/performing-cpr/what-is-cpr#:~:text=What%20Is%20the%20Purpose%20of,healthcare%20workers%20and%20emergency%20responders.**
- **https://unesdoc.unesco.org/ark:/48223/pf0000226792**

Online Resources–

- **https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S001827/P001833/M029447/ET/15245666876.21Q1.pdf**
- **https://www.nhm.gov.in/images/pdf/programmes/mhs/Training_Materials/PDF_English/reading_material.pdf**

PART-D:Assessment andEvaluation

Suggested Continuous Evaluation Methods:
MaximumMarks: 50 Marks
ContinuousInternal Assessment(CIA):15 Marks
EndSemesterExam(ESE):35Marks

Continuous InternalAssessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **10 &10** Assignment/Seminar +Attendance- **05** Total Marks -**15**	Better marks out of thetwo Test / Quiz+obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Two section – A & B** Section **A**: **Q1**. Objective – **05 x1= 05** Mark; **Q2**. Short answer type- **5x2 =10Marks** Section **B**: Descriptive answer type qts.,**1out of 2** from each unit-**4x05=20Marks**	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM - (2024-28)

DEPARTMENT OF **HINDI**

COURSE CURRICULUM

PART -A : Introduction				
Program: Bachelor in Arts Certificate/Diploma/Degree/Honors		Semester - I		Session: 2024-25
1	Course Code	AEC-03		
2	Course Title	हिन्दी भाषा–1		
3	Course Type	Ability Enhancement Course		
4	Pre-requisite (if any)	As per requirement		
5	Course Learning Outcome (CLO)	1. विद्यार्थी हिन्दी भाषा एवं व्याकरण संबंधी ज्ञान से समृद्ध होंगे। 2. भाषा ज्ञान के माध्यम से भारतीय संस्कृति एवं भावनात्मक एकता के महत्व को समझने की क्षमता विकसित हो सकेगी। 3. मुहावरे एवं लोकोक्तियों का महत्व समझ सकेंगे। 4. व्यंग्य, निबंध एवं कविता विधा से परिचित होंगे। 5. निबंध लेखन एवं अपठित गंद्याश के माध्यम से विद्यार्थियो का बौद्धिक विकास हो सकेगा।		
6	Credit Value	2 Credits	(01 Credit = 15 Hours - learning & Observation)	
7	Total Marks	Maximum Marks : 50		Minimum Passing Marks : 20

PART -B : Content of the Course		
Total No. of Teaching-Learning Periods (01 Hr. Per Period) - 30 Periods (30 Hours)		
Unit	Topics (Course Contents)	No. of Period
I	**रचनाएं** भारत वंदना – सूर्यकांत त्रिपाठी 'निराला' (कविता) भोलाराम का जीव – हरिशंकर परसाई (व्यंग्य) चोरी और प्रायश्चित – महात्मा गांधी (निबंध)	8
II	**हिन्दी व्याकरण एवं शब्द रचना** उपसर्ग, प्रत्यय, संधि, समास पर्यायवाची शब्द, विलोम शब्द, अनेकार्थी शब्द, समश्रुत शब्द, अनेक शब्दों के लिए एक शब्द	7
III	**हिन्दी व्याकरण एवं रचना पक्ष** मुहावरे एवं लोकोक्तियां पारिभाषिक शब्दावली एवं हिन्दी में पदनाम, शब्द शुद्धि, वाक्य शुद्धि	8
IV	**रचनात्मक लेखन** निबंध लेखन अपठित गद्यांश (नोट विद्यार्थी को किसी एक विषय पर निबंध व प्रदत्त गद्यांश का शीर्षक तथा सारांश लिखना होगा।)	7
Keywords		

Signature of Convener & members (CBoS):

11/6/2024 11/6/2024 11/6/24 11-06-2024

PART -C : Learning Resource
Text Books, Reference Books and Others
1. भारतीयता के अमर स्वर – डॉ. धनंजय वर्मा, मध्यप्रदेश हिन्दी अकादमी 2. आधुनिक हिन्दी व्याकरण और रचना – डॉ. वासुदेव नंदन 3. हिन्दी भाषा और व्यवहार – डॉ. गंगा चरण त्रिपाठी 4. हिन्दी व्याकरण माला – डॉ. के.आर. गहिया, डॉ. विमलेश शर्मा 5. हिन्दी व्याकरण – कामता प्रसाद गुरू
Online Resources -
1 www.bookspace.in 2 https://libgmm.com 3 https://www.gkexams.com

PART -D : Assessment And Evaluation		
	Suggested Continuous Evaluation Methods : Maximum Marks : 50 Marks Continuous Internal Assessment (CIA) : 15 Marks End Semester Exam (ESE) : 35 Marks	
Coninuous Internal Assessment : (CIA) : (By Course Teacher)	Internal Test/Quiz-(2) : 10 & 10 Marks Assignment/Seminar+Attendance - 05 Total Marks 15	Better marks out of the two Text/Quiz obtained marks in assignment shall be considered against 15 Marks
End Semester Exam (ESE) :	Two Section - A&B Section A : Q1 Objective - 05X1=05 Marks Section A : Q2 Short Answer Type - 5X2=10 Marks Section B : Descriptive Answer Type Qts. 1 out of 2 From Each Unit - 4X5=20 Marks Total =35 Marks	

11/6/2024

11/6/24

11-06-2024

11/06/24