अध्ययन मंडल बैठक दिनांक / /2025

विषय– जैव–प्रौद्योगिकी

विश्वविद्यालय अन्तर्गत संचालित एम. एस सी. जैव–प्रौद्योगिकी प्रोग्राम के पाठ्यक्रम को सत्र 2024–25 में प्रवेशित छात्र–छात्राओं हेतु राष्ट्रीय शिक्षानीति 2020 के अनुरूप स्नातकोत्तर प्रोग्राम के तृतीय एवं चतुर्थ सेमेस्टर (III and IV Semester) में लागू करने की निम्नानुसार अनुशंसा की जाती है:–

Program: M.Sc. Biotechnology									
Course Type	**Course Code**	**Course Title**	**Paper**	**Semester**	**Credits**	**Max Marks**	**Min Marks**	**CIA**	**ESE**
Third Semester									
DSC	BTSC-13T	Genetic Engineering	T	III	4	100	40	30	70
DSE	BTSE-14T	Immunology	T	III	3	100	40	30	70
DSE	BTSE-15T	Enzymology	T	III	3	100	40	30	70
DSE	BTSE-16T	Advanced Techniques in Biotechnology	T	III	3	100	40	30	70
DSE	BTSE-17T	Methodology, Philosophy and Ethics of Research	T	III	3	100	40	30	70
DSC	BTSC-13P	Lab Course-V	P	III	2	50	20	15	35
DSE	BTSE-14,15,16,17P	Lab Course-VI	P	III	2	50	20	15	35
Fourth Semester									
DSC	BTSC-18P	Project Work-Dissertation	P	IV	10	300	120	50	250
		Seminar based on Project work-dissertation		IV	8	200	80	60	140
		Viva-Voce		IV	2	100	40	30	70

टीप :– परीक्षा योजना एवं प्रश्न पत्र के प्रारूप को भी राष्ट्रीय शिक्षानीति 2020 के अनुरूप लागू करने की अनुशंसा की जाती है ।

आज दिनांक / /2025 को जैव–प्रौद्योगिकी अध्ययन मंडल की बैठक में निम्नलिखित अध्यक्ष/सदस्य उपस्थित हुये :–

क्र0 नाम पदनाम अध्यक्ष/सदस्य हस्ताक्षर

Two Year M.Sc. Biotechnology Programm (2024-26)
Shaheed Mahendra Karma Vishwavidyalaya, Bastar
Course Curriculum

Part A : Introduction			
Programm: Master of Science Biotechnology		**Semester: III Sem**	**Session 2025-26**
1	Course Code	**BTSC-13T**	
2	Course Title	**Genetic Engineering**	
3	Course Type	Discipline-Specific Core course (DSC)	
4	Pre-requisite (if any)	As per program	
5	Course Learning Outcomes (CLO)	**After completing this course, the students will be able to –** • Understand about structure of genetic material. • Understand about tools and techniques used in genetic engineering. • Understand the mechanism of gene expression and protein purification. • Develop concepts of gene editing and its applications.	
6	Credit Value	04 Credits Credit = 15 Hours-Learning and Observation	
7	Total Marks	Max. Marks : 100	Min. Passing Marks : 40

Part B : Content of Course (Theory)		
Total number of Teaching-Learning Periods (01 Hr per Period) : 45 Periods (45 Hours)		
Unit	**Topics (Course Content)**	**No. of Period**
I	**Introduction to Genetic Engineering:** 1. Overview of genetic engineering and its historical development. 2. Basic molecular biology concepts: DNA structure, replication, transcription, and translation. 3. Enzymes used in genetic engineering: restriction enzymes, ligases, polymerases.	15
II	**Recombinant DNA Technology:** 1. Gene cloning: isolation, purification, and amplification of DNA fragments. 2. Vectors: plasmids, bacteriophages, cosmids, and BACs. 3. Transformation and transfection methods. 4. Selection and screening of recombinant clones.	15
III	**Gene Expression and Protein Production:** 1. Promoters, enhancers, and other regulatory elements. 2. Expression vectors for prokaryotic and eukaryotic hosts. 3. Protein purification and analysis.	15
IV	**Genome Editing:** 1. Introduction to genome editing techniques: Zinc Finger Nucleases (ZFNs), TALENs, and CRISPR-Cas9. 2. Mechanism of action and applications of CRISPR-Cas9. 3. Ethical considerations of genome editing. 4. Application of genetic engineering.	15
Keywords	Pharmacokinetics, pharmacodynamics, secondary metabolites, combinatorial drugs	

Part C : Learning Resource
Text Books, Reference Books, Other Resources
Text Books- • "Genetic Engineering" by Smita Rastogi and Neelam Pathak: • "Genetic Engineering" by P.S. Verma and V.K. Agarwal. • "Genetic Engineering: Theory and Application" by Vishal Trivedi
Reference Book-
• "Principles of Gene Manipulation and Genomics" by Primrose and Twyman • "Molecular Cloning: A Laboratory Manual" by Sambrook and Russell • "Lehninger Principles of Biochemistry" by Nelson and Cox • "Molecular Biology of the Cell" by Alberts et al.
Online Resources-
https://nptel.ac.in/courses/102103074
http://www.digimat.in/nptel/courses/video/102103093/L03.html

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 + Attendance: **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 - **10x1 =10 Marks**; Q2- Short Answer type-**5x4 =20 Marks** **Section B**: Descriptive answer type Ques. **1 out of 2** from each unit- **4x10=40 Marks.**	

Name and signature of convener and members of BoS:

Two Year M.Sc. Biotechnology Programm (2024-26)
Shaheed Mahendra Karma Vishwavidyalaya, Bastar
Course Curriculum

Part A : Introduction			
Programm: Master of Science Biotechnology		**Semester: III Sem**	**Session 2025-26**
1	Course Code	**BTSE-14T**	
2	Course Title	**Immunology**	
3	Course Type	Discipline-Specific Elective course (DSE)	
4	Pre-requisite (if any)	As per program	
5	Course Learning Outcomes (CLO)	**After completing this course, the students will be able to –** • Explain the role of immune cells, organs and their mechanism in body defense mechanism. • Apply knowledge of immunology in various cellular functions, inculcate knowledge of various issues related to immunological reactions. • Identify, formulate, and solve problems arisen due to the inefficient functioning of the immune system leading to various immunological diseases and to interpret association of immune system with cancer, autoimmunity & transplantation. • Apply the knowledge of immune associated mechanisms in medical biotechnology research, to develop and demonstrate immunological techniques.	
6	Credit Value	03 Credits Credit = 15 Hours-Learning and Observation	
7	Total Marks	Max. Marks : 100	Min. Passing Marks : 40

Part B : Content of Course (Theory)		
Total number of Teaching-Learning Periods (01 Hr per Period) : 45 Periods (45 Hours)		
Unit	**Topics (Course Content)**	**No. of Period**
I	**Introduction and overview** Introduction and overview of immunology, cells of immune system, innate and cellular immunity, physical and chemical barriers, cellular defenses, inflammation, receptors involved in innate immune system, cells and organs involved in adaptive immune response, fate of antigen after penetration, interrelationship between innate and acquired immunity.	12

II	**Antigens, antibodies and their interactions** Requirements of immunogenicity, primary and secondary responses, major classes of antigens, basic structure of antibodies, antibody classes and biological activity, antigenic determinants on immunoglobulins, immunoglobulin super family, organization and expression of immunoglobulin genes, Antibody diversity, antigen-antibody interactions: immunoprecipitation, agglutination, ELISA, immunofluorescence, flow cytometry	11
III	**Generation of B- cell and T- cell responses** Biology of B lymphhocytes: introduction, ontogeny, B cell membrane proteins, signal transduction molecules associated with membrane immunoglobulins, biology of T-cells: antigen specific T cell receptors, T cell differentiation, thymic selection, role of major histocompatibility complex in immune response, activation and function of T and B cells, cytokines, complement system.	11
IV	**Immune system in health and disease** Hybridoma technology: commercial production of antibodies using monoclonal antibodies. Vaccines: live attenuated, killed, subunit, conjugate and DNA vaccines. Production of recombinant antibodies and edible vaccines, development of diagnostics and immunoprophylactics using biotechnology and nanotechnology tools.	11
Keywords	Antigen, Antibody, Hybridoma technology, T-cell, B-cell, MHC	

Part C : Learning Resource
Text Books, Reference Books, Other Resources
Text Books- • The elements of Immunology, F. H. Khan, Pearson Education, India • Immunology, 3rd Edition, Kuby J. (1997), W.H. Freeman & Co., New York
Reference Book- • Immunology – A short course 3rd Edition, Benjamin E. (1996), John Wiley, New York • Essential Immunology, 9th Edition, Roitt, I.M. (1997), Oxford Black Well Science, London • Immunology – An introduction, 4th Edition, Tizard I.R. (1995), PhiladephiaSauders College press.
Online Resources-
Online resources- https://onlinecourses.nptel.ac.in/noc22_bt40/preview

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 + Attendance: **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 - **10x1 =10 Marks**; Q2- Short Answer type-**5x4 =20 Marks** **Section B**: Descriptive answer type Ques. **1 out of 2** from each unit- **4x10=40 Marks.**	

Name and signature of convener and members of BoS:

Two Year M.Sc. Biotechnology Programm (2024-26)
Shaheed Mahendra Karma Vishwavidyalaya, Bastar
Course Curriculum

Part A : Introduction			
Programm: Master of Science Biotechnology		**Semester: III Sem**	**Session 2025-26**
1	Course Code	**BTSE-15T**	
2	Course Title	**Enzymology**	
3	Course Type	Discipline-Specific Elective course (DSE)	
4	Pre-requisite (if any)	As per program	
5	Course Objectives	The objective of this course is to provide students with basic knowledge on enzyme structure, functions and mode of action. The acquired knowledge can be applied in establishing industries focusing on enzymes purification, characterization and potential applications.	
6	Course Learning Outcomes (CLO)	**After completing this course, the students will be able to –** • Develop competency in enzymatic mechanisms. • Explore the mechanistic process of enzymes. • Develop industrial application of enzymes by learning immobilization techniques of enzymes. • Develop skills for entrepreneurship.	
7	Credit Value	03 Credits Credit = 15 Hours-Learning and Observation	
8	Total Marks	Max. Marks : 100	Min. Passing Marks : 40

Part B : Content of Course (Theory)		
Total number of Teaching-Learning Periods (01 Hr per Period) : 45 Periods (45 Hours)		
Unit	**Topics (Course Content)**	**No. of Period**
I	**Basics of enzymes** 1. Introduction and properties of enzymes. Concepts of coenzymes, cofactors, holoenzymes, apoenzyme. 2. Isolation and purification of enzymes: Methods for homogenization of tissue, Method for protein purification. 3. Enzyme nomenclature and classification. 4. Models for enzyme specificity (Lock and key, induced-fit and transition-state stabilization hypothesis).	12

II	**Enzyme kinetics** 1. Concept of activation energy for uncatalyzed and catalyzed reaction. 2. Type of reaction (zero-order, first-order and second order). 3. Unisubstrate enzyme kinetics; derivation of Michaelis-Menten equation; significance of Vmax, Km and different plots (Lineweaver-Burk, Eadie-Hofstee and Hanes plots). 4. Enzyme inhibition and kinetics – type of inhibition (reversible and irreversible), competitive, non competitive, uncompetitive, mixed, partial, substrate, and allosteric.	11
III	**Regulation of enzymes** 1. Enzyme regulation: Product inhibition, feedback control, covalent modification. 2. Allosteric Proteins and enzymes enzymes with special reference to haemoglobin, aspartate transcarbamoylase and phosphofructokinase. 3. Qualitative description of concerted and sequential models. Negative cooperativity and half-site reactivity.	11
IV	**Enzyme variations and applications** 1. Measurements analysis of binding isotherm, cooperativity, Hill and Scatchard plots. 2. Isoenzymes- multiple forms of enzymes with special reference to lactate dehydrogenase. 3. Immobilized enzymes and cells: Methods of immobilization, use of immobilized enzymes, advantage and disadvantage of immobilized enzymes. 4. Ribozymes	11
Keywords	Enzyme, cofactor, isoenzyme, enzyme kinetics, enzyme inhibition, ribozyme	

Part C : Learning Resource
Text Books, Reference Books, Other Resources
Text Books- Biochemistry- U. Satyanarayana Modern enzymology- Dr. Vinod Ramkrishna Ragade and Dr. B.B. Sharma
Reference Book- • Lehninger Principles of Biochemistry; Nelson and Cox. • Biochemistry; Voet and Pratt. • Principles of Enzymology; Price and Stevens. • Enzyme Biocatalysis, Principles and Applications; Andres Illanes. • Enzyme Kinetics; Hans Bisswanger
Online Resources-
Online resources- https://onlinecourses.nptel.ac.in/noc23_bt05/preview
onlinecourses.swayam2.ac.in/cec20_bt20/preview

<table>
<tr><th colspan="3">Part D : Assessment and Evaluation</th></tr>
<tr><td colspan="3">Suggested continuous Evaluation Methods:
Maximum Marks: 100 Marks
Continuous Internal Assessment (CIA): 30 Marks
End Semester Exam (ESE): 70 Marks</td></tr>
<tr><td>Continuous Internal Assessment (CIA) (By Course Teacher):</td><td>Internal Test/Quiz-(2): 20+20
Assignment/Seminar + Attendance: 10
Total Marks: 30</td><td>Better Marks out of the two test/Quiz+ obtained marks in Assignment shall be considered against 30 Marks</td></tr>
<tr><td>End Semester Exam (ESE):</td><td colspan="2">Two Section: A & B
Section A: Q1. Objective - 10x1 =10 Marks; Q2- Short Answer type-5x4 =20 Marks
Section B: Descriptive answer type Ques. 1 out of 2 from each unit- 4x10=40 Marks.</td></tr>
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Name and signature of convener and members of BoS:

Two Year M.Sc. Biotechnology Programm (2024-26)
Shaheed Mahendra Karma Vishwavidyalaya, Bastar
Course Curriculum

Part A : Introduction			
Programm: Master of Science Biotechnology		**Semester: III Sem**	**Session 2025-26**
1	Course Code	**BTSE-16T**	
2	Course Title	Advanced Techniques in Biotechnology	
3	Course Type	Discipline-Specific Elective course (DSE)	
4	Pre-requisite (if any)	As per program	
5	Course Learning Outcomes (CLO)	**After completing this course, the students will be able to –** • Understand the basic concepts, applications and limitations of bio-analytical techniques. • Develop practical skills to undertake future analytical/research activities.	
6	Credit Value	03 Credits Credit = 15 Hours-Learning and Observation	
7	Total Marks	Max. Marks : 100	Min. Passing Marks : 40

Part B : Content of Course (Theory)		
Total number of Teaching-Learning Periods (01 Hr per Period) : 45 Periods (45 Hours)		
Unit	**Topics (Course Content)**	**No. of Period**
I	**Microscopy:** history and principles of microscopy, light microscopy: sample preparation, bright field, dark field, phase contrast and fluorescent microscopy; Electron microscopy: fixation and staining techniques in electron Microscopy, transmission and scanning electron microscopy; confocal microscopy, atomic force microscopy.	12
II	**Chromatography:** Basics of Chromatography, Paper chromatography, Thin layer chromatography; Affinity chromatography, Gel Filtration chromatography, Ion Exchange chromatography, Gas chromatography, HPLC. **Centrifugation:** introduction to laboratory centrifuges, basic principle, RCF and Sedimentation Coefficient, differential centrifugation, density gradient centrifugation. Biosensors: basic techniques, microbial biosensors, radio-imaging techniques (Ultrasonography, CT Scan etc.).	11

III	**Nucleic acid amplification:** variation and application of PCR, Electrophoresis: Principle of electrophoresis, Agarose gel electrophoresis, Polyacrylamide gel electrophoresis (PAGE) (Native PAGE and SDS PAGE), isoelectric focusing, two-dimensional (2D) gel electrophoresis, pulse field electrophoresis.	11
IV	**Spectroscopy:** Theory and applications; UV-Visible spectroscopy, Fluorescence spectroscopy, atomic absorption spectroscopy, Infrared spectroscopy (IR), electron spin resonance spectroscopy (ESR), nuclear magnetic resonance spectroscopy (NMR), Mass spectroscopy, X-Ray Diffraction.	11
Keywords	Microscopy, Chromatography, Centrifugation, Electrophoresis, PCR, Spectroscopy	

Part C : Learning Resource
Text Books, Reference Books, Other Resources
Text Books- • FSK Brar Pharmaceutical - Essentials of Pharmaceuticals - S. Chand • SP Vyas, Dixit-Pharmaceutical Biotechnology – CBS Gupta P.K. Biotechnology and Genomics, Rastogi Publication.
Reference Book- • Hugo W.B. and Russell A.D. Pharmaceutical Microbiology- Wiley India • Purohit, Saluja- Pharmaceutical Biotechnology- Student Edition.
Online Resources-
Online resources- https://onlinecourses.nptel.ac.in/noc19_bt23/preview
https://nptel.ac.in/courses/104102113

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 + Attendance: **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 - **10x1 =10 Marks**; Q2- Short Answer type-**5x4 =20 Marks** **Section B**: Descriptive answer type Ques. **1 out of 2** from each unit- **4x10=40 Marks.**	

Name and signature of convener and members of BoS:

Two Year M.Sc. Biotechnology Programm (2024-26)
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Course Curriculum

Part A : Introduction			
Programm: Master of Science Biotechnology		**Semester: III Sem**	**Session 2025-26**
1	Course Code	**BTSE-17T**	
2	Course Title	Methodology, Philosophy and Ethics of Research	
3	Course Type	Discipline-Specific Elective course (DSE)	
4	Pre-requisite (if any)	As per program	
5	Course Learning Outcomes (CLO)	**After completing this course, the students will be able to –** • Explain foundational concepts and philosophies underpinning research methodology • Identify and address ethical issues, dilemmas, and misconduct in research practice • Design robust research plans using appropriate methodologies • Apply ethical principles to publication processes and intellectual property challenges • Demonstrate competence in data analysis, interpretation, and academic writing for dissemination	
6	Credit Value	03 Credits Credit = 15 Hours-Learning and Observation	
7	Total Marks	Max. Marks : 100	Min. Passing Marks : 40

Part B : Content of Course (Theory)		
Total number of Teaching-Learning Periods (01 Hr per Period) : 45 Periods (45 Hours)		
Unit	**Topics (Course Content)**	**No. of Period**
I	**Foundations of Research Methodology and Philosophy** - Introduction to research: definition, need, types (qualitative, quantitative, mixed methods) - Philosophical foundations: epistemology, ontology, paradigms - Research approaches: inductive, deductive, and abductive reasoning - Defining and selecting research problems; review of literature	12
II	**Ethics in Research** - Introduction to ethics: definitions, scope, moral philosophy - Research ethics: informed consent, confidentiality, data protection - Ethical standards and dilemmas in research - Research misconduct: fabrication, falsification, plagiarism - Role of ethics committees and institutional review boards	11

III	**Research Design and Methods** - Principles of research design and planning - Sampling designs, data collection: survey, case study, experiments - Data analysis: overview, quantitative and qualitative analysis - Interpretation of results; reporting and dissemination of research findings	11
IV	**Publication Ethics and Intellectual Property** - Publication ethics: authorship, contributorship, conflict of interest - Identifying predatory publications, best practices in publication - Intellectual property rights: patents, copyright, plagiarism detection tools - Open access and responsible publication	11
Keywords	Research methodology, Ethics, Review of literature, IPR, Data analysis	

Part C : Learning Resource
Text Books, Reference Books, Other Resources
Text Books- - T. Gopinath, Aman Sharma, Sourabh Prakash, "Research Methodology & Ethics: A Beginner's Guide" - V.A. Saharan, H. Kulhari, H.R. Jadhav (Eds.), "Principles of Research Methodology and Ethics in Pharmaceutical Sciences" (CRC Press, 2024)
Reference Book- - Peter Pruzan, "Research Methodology: The Aims, Practices and Ethics of Science" (Springer) - Russell C., Hogan L., Junker-Kenny M., "Ethics for Graduate Researchers. A Cross-disciplinary Approach" - K. Williamson, G. Johanson, "Research methods for students, academics and professionals: information management and systems"
Online Resources-
https://onlinecourses.swayam2.ac.in/nou22_ge73/preview; https://onlinecourses.swayam2.ac.in/nou23_ge30/preview
https://onlinecourses.nptel.ac.in/noc25_hs184/preview
https://www4.uib.no/en/studies/courses/ps901

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 + Attendance: **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 - **10x1 =10 Marks**; Q2- Short Answer type-**5x4 =20 Marks** **Section B**: Descriptive answer type Ques. **1 out of 2** from each unit- **4x10=40 Marks.**	

Name and signature of convener and members of BoS:

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Course Curriculum

Part A : Introduction				
Programm: Master of Science Biotechnology			**Semester: III Sem**	**Session 2025-26**
1	Course Code	**BTSC-13P**		
2	Course Title	Lab Course-V (Based on BTSC-13T)		
3	Course Type	Discipline-Specific Course (DSC)- Practical		
4	Pre-requisite (if any)	As per program		
5	Course Learning Outcomes (CLO)	**After completing this course, the students will be able to –** • Extract high-quality genomic DNA from soil bacteria using standard molecular biology protocols. • Estimate the concentration and purity of bacterial DNA using spectrophotometric techniques. • Separate and analyze bacterial genomic DNA through agarose gel electrophoresis. • Amplify specific DNA sequences using Polymerase Chain Reaction (PCR) and interpret the results.		
6	Credit Value	02 Credits Credit = 60 Hours Laboratory or Field Learning/Training		
7	Total Marks	Max. Marks : 50	Min. Passing Marks : 20	

Part B : Content of Course (Practical)		
Total number of Learning/Training/Performance Periods : 30 Periods (60 Hours)		
Module	**Topics (Course Content)**	**No. of Period**
Lab/ Field/Training/ Experiment Contents of Course	1. Extraction of DNA from soil Bacteria. 2. Estimation of bacterial DNA by Spectrophotometer methods. 3. Separation of bacterial genomic DNA by Agarose gel electrophoresis. 4. DNA amplification by PCR.	30
Keywords	DNA isolation, spectrophotometer, agarose gel electrophoresis, restriction enzyme, ligation, PCR	

Part C : Learning Resource
Text Books, Reference Books, Other Resources
Text Books- Handbook of Techniques in Microbiology – A Laboratory Guide to Microbes* by A.S. Karwa &

H.B. Singh Microbiology A Laboratory Manual (Global Edition) by James Cappuccino
Reference Book- Microbiology: A Laboratory Experience by Holly Ahern Molecular Biology (5th Edition) by Robert F. Weaver
Online Resources-
https://vlab.amrita.edu/?sub=3&brch=77

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:** A. On spot assessment- 20 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 and members of BoS:

Two Year M.Sc. Biotechnology Programm (2024-26)
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Course Curriculum

Part A : Introduction			
Programm: Master of Science Biotechnology		**Semester: III Sem**	**Session 2025-26**
1	Course Code	**BTSE-14,15,16,17P**	
2	Course Title	Lab Course-VI (Based on BTSE-14,15,16,17T)	
3	Course Type	Discipline-Specific Elective course (DSE)- Practical	
4	Pre-requisite (if any)	As per program	
5	Course Learning Outcomes (CLO)	**After completing this course, the students will be able to –** • Prepare and analyze blood films for the identification of various blood cells and interpret microscopic findings. • Perform and interpret DOT ELISA assays for diagnostic or research applications. • Isolate proteins from biological samples using standard biochemical techniques. • Quantify protein concentrations using appropriate estimation methods. • Prepare and sterilize various types of culture media for the growth of microorganisms. • Apply aseptic and pure culture techniques to isolate and identify microbes from different environmental or clinical sources. • Develop scientific writing skills through the preparation of a research article based on experimental findings and literature review.	
6	Credit Value	02 Credits Credit = 60 Hours Laboratory or Field Learning/Training	
7	Total Marks	Max. Marks : 50	Min. Passing Marks : 20

Part B : Content of Course (Practical)		
Total number of Learning/Training/Performance Periods : 30 Periods (60 Hours)		
Module	**Topics (Course Content)**	**No. of Period**
Lab/ Field/Training/ Experiment Contents of Course	1. Blood film preparation and identification of cells. 2. DOT ELISA 3. Isolation of Protein 4. Protein estimation 5. Preparation of different culture media for culture of various microorganisms	30

	6. Pure culture techniques of microbes from various sources 7. Research article writing.
Keywords	ELISA, Protein estimation, microorganism, Pure culture

Part C : Learning Resource
Text Books, Reference Books, Other Resources
Text Books- • T. Gopinath, Aman Sharma, Sourabh Prakash, "Research Methodology & Ethics: A Beginner's Guide" • Aneja, K.R. (2007) Experiments in Microbiology, Plant Pathology and Biotechnology. New Age International.
Reference Book- • Wilson, K., & Walker, J. (2010). Principles and techniques of biochemistry and molecular biology. 7th edition. Cambridge University Press.
Online Resources-
https://onlinecourses.nptel.ac.in/noc25_bt01/preview
https://onlinecourses.nptel.ac.in/noc24_cy57/preview

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:** A. On spot assessment- 20 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 and members of BoS:

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Course Curriculum

Part A : Introduction			
Programm: Master of Science Biotechnology		**Semester: IV Sem**	**Session 2025-26**
1	Course Code	**BTSC-18P**	
2	Course Title	Project-Dissertation	
3	Course Type	DSC	
4	Pre-requisite (if any)	As per program	
5	Course Learning Outcomes (CLO)	**After completing this course, the students will be able to –** Learn how to select and defend a topic of their research. How to effectively plan, execute, evaluate and discuss their experiments. Students demonstrate considerable improvement in the flowing area: • In-depth knowledge of the chosen area of research. • Compatibility to critically and systematically integrate knowledge to identify issues that must be addressed within framework of specific thesis. • Competence in research design and planning. • Compatibility to create, analyze and critically evaluate different technical solutions. • Ability to conduct research independently. • Ability to perform analytical techniques/experimental methods • Project management skills, paper writing skills • Communication and interpersonal skill.	

Course Type	Course Code	Course Title	Paper	Semester	Credits	Max Marks	Min Marks	CIA	ESE
DSC	BTSC-18P	Project Work-Dissertation	P	IV	10	300	120	50	250
		Seminar based on Project work-dissertation		IV	8	200	80	60	140
		Viva-Voce		IV	2	100	40	30	70

- The project has to be carried out in recognized national laboratories or UGC recognized universities.
- The valuation of all the projects will be carried out by the external examiner and HoD of UTD or its nominee at the UTD Centre.

- The project work should be related to the field of Biotechnology. The project report should include declaration by the candidate, certificate by the supervisor, acknowledgement, title and introduction along with the following points:

    1. Introduction
    2. Review of Literature
    3. Materials and Methods
    4. Results & Discussions
    5. Summary
    6. Bibliography

Name and signature of convener and members of BoS: