ಆದಿಕವಿಶ್ರೀಮಹರ್ಷಿವಾಲ್ಮೀಕಿವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ರಾಯಚೂರು
ADIKAVI SRI MAHARSHI VALMIKI UNIVERSITY, RAICHUR
Krishna Tunga Campus, Mantralaya Road (N.H. 167), Yergera-584133, Raichur, Karnataka
DEPARTMENT OF P.G STUDIES IN MICROBIOLOGY

Chairman Chairman microbiology@raichuruniversity.ac.in

No. ASMVU/ACA/MICROBIOLOGY/2024-25/ Date: 03/07/2025.

To,
The Register (Evaluation)
Adikavi Sri Maharshi
Valmiki University, Raichur.

Proceedings of UG BoS meeting in Microbiology

Proceedings of the meeting of Board of Studies in Microbiology (UG) held on 03-07-2025 at 11.30 am through online mode (Google meet - https://meet.google.com/tvh-fauv-eyt).

Members:

1. **Dr. Suyamindra Kulkarni** — Chairman (BoS)
   Associate professor and Chairman
   ASM University, Raichur, Karnataka
2. **Dr. Sadashiv S. O.** — Member
   Assiastant Professor,DoS in Food Technology
   Davangere University, Shivaganogthri,
   Davanagere, Karnataka
3. **Dr. Kamala Navaratna** — Special Invitee
   Department of Microbiology, LVD college, Raichur

1. The BoS chairman welcomed all the members of the Board for the meeting and placed agenda before them for discussion.
2. The Board thoroughly discussed the pros and cons of the framed syllabus (Two theory and two practical papers) and approved the same for the upcoming III and IV semester students of UG at ASM University, Raichur.
   The details of the paper as follows

Sl. No.	Semester	Paper code	Paper title	
1.	III	C3MCB1T1	Molecular Biology and Genetic Engineering	Theory
2.		C3MCB1P1	Molecular Biology and Genetic Engineering	Practical
3.	IV	C4MCB1T1	Environmental and Agricultural Microbiology	Theory
4.		C4MCB1P1	Environmental and Agricultural Microbiology	Practical

3. Finally, the meeting was concluded with vote of thanks to all member by BoS Chairman, for their valuable time and suggestions in constructive framing of the syllabus.

Chairman (BoS)

Enclosure
1) Syllabus copy

CHAIRMAN
Department of Micro-Bio...
Raichur University, Raichur

ADIKAVI SHRI MAHARISHI VALMIKI UNIVERSITY, RAICHUR

B. Sc. Microbiology

SYLLABUS

With Effect from 2024-25

DISCIPLINE SPECIFIC CORE COURSE (DSC) FOR

SEM III and VI,

SKILL ENHANCEMENT COURSE (SEC) FOR SEM IV/V/VI and ELECTIVE COURSES FOR SEM V AND VI

AS PER NEP (Revised):2024

Adikavi Shri Maharishi Valmiki University, Raichur

B.Sc. in Microbiology

Effective from 2024-25

Sem.	Type of Course	Theory/ Practical	Course Code	Course Title	Instruction hour/ week	Total hours / sem	Duration Of Exam	Marks			Credits
								Formative	Summative	Total	
I	DSC-1	Theory	**C1MCB1T1**	Basic Microbiology and Techniques	04hrs	60	03hrs	20	80	100	04
	DSC-2	Practical	**C1MCB1P1**	Basic Microbiology and Techniques	04hrs	56	03hrs	10	40	50	02
II	DSC-3	Theory	**C2MCB1T1**	Microbial Physiology and Genetics	04hrs	60	03hrs	20	80	100	04
	DSC-4	Practical	**C2MCB1P1**	Microbial Physiology and Genetics	04hrs	56	03hrs	10	40	50	02
III	DSC-5	Theory	**C3MCB1T1**	Molecular Biology and Genetic Engineering	04hrs	60	03hrs	20	80	100	04
	DSC-6	Practical	**C3MCB1P1**	Molecular Biology and Genetic Engineering	04hrs	56	03hrs	10	40	50	02
1V	DSC-7	Theory	**C4MCB1T1**	Environmental and Agricultural Microbiology	04hrs	60	03hrs	20	80	100	04
	DSC-8	Practical	**C4MCB1P1**	Environmental and Agricultural Microbiology	04hrs	56	03hrs	10	40	50	02
*V	DSC-9A	Theory	**C5MCB2T1**	Food and Industrial Microbiology	04hrs	60	03hrs	20	80	100	04
	DSC-10A	Practical	**C5MCB2P1**	Food and Industrial Microbiology	04hrs	56	03hrs	10	40	50	02
	DSC-9B	Theory	**C5MCB2T2**	Microbial Biotechnology and Bioinformatics	04hrs	60	03hrs	20	80	100	04
	DSC-10B	Practical	**C5MCB2P2**	Microbial Biotechnology and Bioinformatics	04hrs	56	03hrs	10	40	50	02
VI	DSC-11A	Theory-	**C6MCB2T1**	Immunology and Medical Microbiology	04hrs	60	03hrs	20	80	100	04
	DSC-12A	Practical	**C6MCB2P1**	Immunology and Medical Microbiology	04hrs	56	03hrs	10	40	50	02
	DSC-11B	Theory-	**C6MCB2T2**	Advances in Microbiology and Biostatistics	04hrs	60	03hrs	20	80	100	04
	DSC-12B	Practical	**C6MCB2P2**	Advances in Microbiology and Biostatistics	04hrs	56	03hrs	10	40	50	02
V	OEC-1	Theory	**C5MCB5T1**	General Microbiology	03hrs	45	03hrs	20	80	100	03
VI	OEC-2	Theory	**C6MCB5T1**	Applied Microbiology	03hrs	45	03hrs	20	80	100	03
IV/V/ VI	Skill	Practical	**C0MCB6T1**	Microbial Quality Control in Food and Pharma Industries	04hrs	56	03hrs	10	40	50	02

*Student shall either DSC 9A and DSC10A or DSC 9B and DSC10B in 5th semester. Similarly, DSC 11A and DSC12A or DSC 11B and DSC12B in 6th semester.

** Student shall study Skill of this subject either in 4th / 5th / 6th but not in all the semester.

Adikavi Shri Maharishi Valmiki University, Raichur
B.Sc. Microbiology

Programme Specific Outcomes (PSO):

On completion of the 03 years Degree in Microbiology students will be able to:

- Demonstrate, solve and understand the major concepts in all the disciplines of --.
- Understand practical skills so that they can understand and assess risks and work safely and competently in the laboratory.
- To apply standard methodology to the solutions of problems in Microbiology
- Provide students with the ability to plan and carry out experiments independently and assess the significance of outcomes.
- Develop in students the ability to adapt and apply methodology to the solution of unfamiliar types of problems.
- Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of Microbiology.
- To build confidence in the candidate to be able to work on his own in industry and institution of higher education.
- To develop an independent and responsible work ethics and to explore the microbial world and analyzing the specific benefits and challenges.
- Applying the knowledge acquired to undertake studies and identify specific remedial
- Measures for the challenges in health, agriculture, and food sectors.
- Thorough knowledge and application of good laboratory and good manufacturing
- Practices in microbial quality control.
- Understanding biochemical and physiological aspects of microbes and developing
- broader perspective to identify innovative solutions for present and future challenges posed by microbes.
- Understanding and application of microbial principles in forensic and working, knowledge about
- Clinical microbiology. Enhance and demonstrate analytical skills and apply basic computational and
- To apply statistical techniques in the field of microbiology

B.Sc. Semester–III
Discipline Specific Course (DSC)-Microbiology
Course Title:-Molecular Biology and Genetic Engineering
Course Code:- C3MCB1T1

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours /Semester	Duration of Exam	Formative Assessmet Marks	Summative assessment Marks	Total Marks
DSC-5	**Theory**	**04**	**04**	**60hrs.**	**3hrs.**	**20**	**80**	**100**

Course Outcomes (COs): At the end of the course students will be able to:

CO1: Understand concepts involved in transcription, translation, regulation of gene expression in Prokaryotes and Eukaryotes.

CO2. Students will understand the process of molecular basis, Mutations, DNA repair mechanisms and protein synthesis.

CO3. Understand the protein synthesis in eukaryotes, translation process and regulation mechanisms in bacteria.

CO4. Students will learn tool of genetic engineering, terminologies, recombination techniques and DNA isolation, transfer and screening techniques.

Unit	Title: Molecular Biology and Genetic Engineering PART A: Molecular Biology	60 hrs/ Sem
Unit I	**Molecular basis of Life:** Central dogma of life. Introduction to DNA Structure and Watson Crick model of DNA, DNA as a genetic material - Griffith experiment of Transformation, Proof that genetic information stored in DNA, Enzymatic approach to prove DNA mediates transformation by A very, MacLeod and McCarty, Hershey and Chase experiment to prove DNA carries the genetic information in T2 bacteriophage, Organization of genes in mitochondria and chloroplast. **(8 hrs.)** **Mutations and repair mechanisms** Nature and types of mutations: Point mutation and Frame shift mutations. Detection of mutations. DNA damage and repair mechanism (SOS and Excision) **(3 hrs.)** **Protein Synthesis in prokaryotes**: Transcription – Transcription bubble, RNA Polymerase and regulation by lac operons. Translation – process of initiation, elongation and termination. **(4 hrs.)**	15 hrs.
Unit II	**Protein Synthesis in Eukaryotes**: **Transcription**: Eukaryotic RNA polymerases - RNA polymerase I, II, III. Mechanism of RNA polymerase. Transcription factors, TATA Box, Post transcriptional modifications, **Translation**: Structure and processing of tRNA and Ribosome., Formation of initiation complex. Stages of translation - Initiation, Elongation and termination. Role of eIFs. Elongation of polypeptide - EF-Tu, EF-G, peptide bond formation, peptidyl transferase activity, translocation, eEFs. Termination. Post translational Modifications. **(7 hrs.)**	15 hrs.

	Regulation of transcription: Positive and negative transcriptional control in bacteria. Operon concept, polycistronic mRNA. *lac* operon - negative inducible, allolactose, mutants of *lac* operon structure of *lac* repressor, mechanism of binding of repressor to operator. Catabolite repression of *lac* operon. Regulation by lac repressor and CAP. *trp* operon regulation - repressor control, regulation by Gal operon in Eukaryotes **(5Hrs)** **Regulation through modification of gene structure:** DNase I hypersensitivity, histone modifications, chromatin remodelling, DNA methylation. Regulation through RNA processing and degradation. Regulation through RNA interference **(3 hrs)**	
Unit III	**Tools of genetic engineering**: Definition of genetic engineering, milestones in genetic engineering, prospects and problems of genetic engineering. **(2 hrs.)** **Tools in Microbial Genetic Engineering**: Restriction modification systems-Types, Mode of action, nomenclature, applications of restriction enzymes in genetic engineering. DNA modifying enzymes and their applications: DNA polymerases, Methylases, Terminal deoxynucleotidyl transferase, kinases, phosphatases and DNA ligases. **(4 hrs.)** **Cloning Vectors**: Definition and Properties. Characteristics of cloning vectors. Plasmid vectors: pBR and pUC series. Bacteriophage lambda, cosmids, BACs, YACs. Use of linkers and adaptors. **(4 hrs.)** **Expression vectors**: mammalian SV40-based expression vectors. **(2 hrs.)** **Cloning host-** Escherichia coli and Saccharomyces cerevisiae as Cloning host, **PCR** – Working Principle and applications, **Molecular markers-** RFLP, RAPD **(3 hrs.)**	15 hrs.
Unit IV	**DNA Isolation, transfer and Screening methods** **Isolation and Detection of DNA**: Isolation of DNA and plasmid DNA, restriction digestion and ligation of DNA, Agarose gel electrophoresis, Blotting techniques- Southern blotting, Northern blotting, Western blotting. **(4 hrs.)** **DNA transfer methods**: Calcium chloride mediated gene transfer, Agrobacterium mediated DNA transfer, Electroporation and Micro-injection. **DNA sequencing:** Chemical method and Sanger method **(5 hrs.)** **Screening and selection of recombinant host cells**: Insertional activation - antibiotic selection. Inactivation - Blue white selection. In situ colony/DNA hybridization and in Immunological techniques. **(3 hrs.)** **Gene Library:** Construction of Genomic library and cDNA library, DNA finger printing technique – Principle and Applications, Merits and Demerits **(3 hrs.)**	15 hrs.

Recommended books:

1. Karp, G., Iwasa, J., & Marshall, W. (2023). *Karp's Cell and Molecular Biology* (10th ed.). Wiley.
2. Krebs, J. E., Goldstein, E. S., & Kilpatrick, S. T. (2021). *Lewin's Genes XIII* (13th ed.). Jones & Bartlett Learning.

3. Watson, J. D., Baker, T. A., Bell, S. P., Gann, A., Levine, M., & Losick, R. (2020). *Molecular Biology of the Gene* (8th ed.). Pearson.
4. Malacinski, G. M. (2018). *Freifelder's Essentials of Molecular Biology* (5th ed.). Jones & Bartlett Learning.
5. Berg, J. M., Tymoczko, J. L., Gatto, G. J., & Stryer, L. (2019). *Biochemistry* (9th ed.). W.H. Freeman.
6. Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., & Walter, P. (2014). *Molecular Biology of the Cell* (6th ed.). Garland Science.
7. Tropp, B. E. (2012). *Molecular Biology: Genes to Proteins* (4th ed.). Jones & Bartlett Learning.
8. Allison, E. A. (2015). *Fundamental Molecular Biology* (3rd ed.). Wiley.

Formative Assessment for Theory	
Assessment Occasion / type	**Marks**
Internal Assessment Test 1	10
Internal Assessment Test 2	10
Total	**20Marks**
Formative Assessment as per guidelines.	

B.Sc. Semester–III
Discipline Specific Course (DSC)
Practical: Molecular Biology and Genetic Engineering

Course Title: Molecular Biology and Genetic Engineering

Course Code: C3MCB1P1

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours /Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
DSC-6	**Practical**	**02**	**04**	**56 hrs.**	**3hrs.**	**10**	**40**	**50**

Course Outcomes (COs): At the end of the course, students will be able to:

CO 1: Students get Expertise in GLP, SOP in molecular biology experiments thoroughly.
CO 2: Hands on Expertise in the field of molecular biology Experiments such bacterial genome extraction, isolation, plasmid isolation.
CO 3: These practical will serves platform for molecular biology field and explore the knowledge in molecular biology research.
CO:4 Students will get expertise in DNA, RNA estimation, Studying semiconservative model of replication, mutant selection by Replica plate method and DNA fingerprinting techniques.

List of the Experiments, each will have 4hrs / Week (Minimum 12 experiments)

1. Good Laboratory Practices and Safety Measures of Biohazard materials.
2. Study of Micropipette operation and calibration.
3. Standard operating procedure for molecular biology tools/equipment's.
4. Preparation of Buffers and Reagents.
5. Isolation of Bacterial Genomic DNA.
6. Isolation of Plasmid from *E. Coli* Cells.
7. Detection of DNA by gel electrophoresis.
8. Estimation of DNA by DPA colorimetric/spectrophotometric method.
9. Estimation of RNA by orcinol colorimetric/ spectrophotometric method.
10. Estimation of Total free Amino acids.
11. Extraction and estimation of protein from Animal/plant source by salt precipitation and organic solvent method.
12. Study of semi-conservative replication of DNA through micrographs / schematic representations
13. DNA fingerprinting technique through micrographs / schematic representations
14. Identifying Mutants by Replica plate technique.
15. Study of Plasmids by chart
    a) pBR322
    b) pUC18and19
    c) SV40
    d) Bacteriophages

Books recommended:

References:

1. Brown, T. A. (2023). Genetics: A molecular approach (4th ed.). Cdn. Stancly Phonics Ltd.
2. Colwell, R. R. (2012). Microbial diversity (2nd ed.). Academic Press.
3. Davis, R. W., Bolstein, D., & Roth, J. R. (1980). A manual for genetic engineering. Cold Spring Harbor Laboratory.
4. De Robertis, E. D. P., & De Robertis, E. M. F. (2017). Cell and molecular biology (8th ed.). Lea & Febiger.
5. Karp, G. (2023). Cell biology (10th ed.). McGraw Hill.
6. American Society for Microbiology. (2020). Recombinant DNA (3rd ed.). American Society for Microbiology.
7. Nicholl, D. S. T. (2020). An introduction to genetic engineering (4th ed.). Cambridge University Press.
8. Peters, P. (2015). A guide to genetic engineering (3rd ed.). WMC Brown.
9. Salle, A. J. (2019). Fundamental principles of bacteriology (10th ed.). Tata McGraw Hill.
10. Smith, J. (2018). Molecular biology (6th ed.). Faber and Faber Publications.
11. Stanier, R. Y., & Ingraham, J. L. (2019). General microbiology (6th ed.). Prentice Hall of India.
12. Watson, J. D. (2020). Recombinant DNA (4th ed.). Scientific American Books.

PATTERN OF PRACTICAL EXAMINATION
Practical examination – B. Sc. IV Semester MICROBIOLOGY

Duration: 3 hours **Max. Marks: 40**

Q. 1	Major question	12 Marks
Q. 2	Minor question	08 Marks
Q. 3	Identify and comment	06 marks
Q. 4	Journal	05 Marks
Q. 5	Tour report	05 Marks
Q. 6	Viva – Voce	04 Marks