



Rayat Shikshan Sanstha's  
Karmaveer Bhaurao Patil College Vashi, Navi Mumbai  
(Autonomous)

Name of the Faculty: Science and Technology

Name of the Program: Masters in Science

Program Outcomes (POs)

PO-1	<b>Disciplinary Knowledge and Skills:</b> Acquire the comprehensive and in-depth knowledge of various subjects in sciences such as Physics, Chemistry, Mathematics, Microbiology, Bio-analytical Science, Computer Science, Data Science, Information Technology and disciplinary skills and ability to apply these skills in the field of science, technology and its allied branches.
PO-2	<b>Communication and Presentation Skills:</b> Develop various communication skills including presentation to express ideas evidently to achieve common goals of the organization.
PO-3	<b>Creativity and Critical Judgement:</b> Facilitate solutions to current issues based on investigations, evaluation and justification using an evidence-based approach.
PO-4	<b>Analytical Reasoning and Problem Solving:</b> Build a critical and analytical attitude in handling problems and situations.
PO-5	<b>Sense of Inquiry:</b> Curiously raise relevant questions based on highly developed ideas, scientific theories and their applications including research.
PO-6	<b>Use of Digital Technologies:</b> Use various digital technologies to explore information/data for business, scientific research and related purposes.
PO-7	<b>Research Skills:</b> Construct, collect, investigate, evaluate and interpret information/data relevant to science and technology to adapt, evolve and shape the future.
PO-8	<b>Application of Knowledge:</b> Develop a scientific outlook to create consciousness against the social myths and blind faith.
PO-9	<b>Moral and Ethical Reasoning:</b> Imbibe ethical, moral and social values to develop virtues such as justice, generosity and charity as beneficial to individuals and society at large.
PO-10	<b>Leadership and Teamwork:</b> Work cooperatively and lead proactively to achieve the goals of the organization by implementing the plans and projects in various field-based situations related to science, technology and society at large.
PO-11	<b>Environment and Sustainability:</b> Create social awareness about the environment and develop sustainability for the betterment of the future.
PO-12	<b>Lifelong Learning:</b> Realize that pursuit of knowledge is a lifelong activity and in combination with determined efforts, positive attitude and other qualities to lead a successful life.

  
Program  
Coordinator

  
BOS Chairman

  
Principal



Name of the Faculty: Science and Technology  
Name of the Specific Program: MSc Microbiology  
Program Specific Outcomes (PSO)

At the end of the two-year program, the student will understand and be able to-

<b>PSO-1</b>	Explain different branches of Microbiology such as Bacteriology, Virology, Immunology and Medical.
<b>PSO-2</b>	Explain various applications of Microbiology such as Environmental Microbiology, Industrial Microbiology, Food and Dairy Microbiology, Pharmaceutical Microbiology. Food Licensing and Certification and Quality assurance and Quality control, Biostatistics, Bioinformatics, Public health <i>etc.</i>
<b>PSO-3</b>	Design and execute experiments related to Basic Microbiology, Immunology, Molecular Biology, Recombinant DNA Technology, and Microbial Genetics.
<b>PSO-4</b>	Execute Research Project incorporating techniques of Basic and Advanced Microbiology under the supervision and Hands-on training (Internship)
<b>PSO-5</b>	Take up a suitable position in academia or industry, and pursue a career in research if so desired.

  
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Title of Specific Program: M.Sc. Microbiology		
Course Code	Title of Course	Course Outcomes
		After successful completion of each course in learner will be able to;
<b>Semester-I</b>		
PGMB101-CC	Cell Biology	<p>CO-1. Explain the structure &amp; function of various eukaryotic cell organelles. [2*]</p> <p>CO-2. Apply knowledge of cell biology to selected examples of changes in cell functions [3]</p> <p>CO-3. Distinguish the types and mechanisms of Apoptosis. [3*]</p> <p>CO-4. Understand the structure of the cytoskeleton &amp; mechanisms of cellular mobility. [2] *</p> <p>CO-5. Illustrate cellular communication with respect to Extracellular matrix and cell interaction [3*]</p> <p>CO-6. Differentiate between various stages of mitosis [4*]</p> <p>CO-7. Appraise different techniques used in cell biology [5] *</p> <p>CO-8. Dissect causes and new strategies for combatting cancer. [4] *</p>
PGMB102-CC	Molecular Genetics I	<p>CO 1: Distinguish between different molecular mechanisms of regulation on gene expression in eukaryotes [5] *</p> <p>CO 2: Assess the effect of chromosomal rearrangement in the functioning of cell [5] *</p> <p>CO 3: Categorize/ classify different molecular tools used in Genetics [4]*</p> <p>CO 4: Correlate inheritance of cellular organelles with that of the nucleus. [3] *</p> <p>CO 5: Explain various factors leading to changes in the genetic structure of populations. [2] *</p> <p>CO 6: Evaluate genetic problems related to population genetics and restriction mapping [5] *</p> <p>CO 7: Design primers and carry out PCR [6] *</p>
PGMB103-CC	Basic Biochemistry	<p>CO1. Differentiate biomolecules on the basis of their properties [4*]</p> <p>CO2. Differentiate biomolecules on the basis of their properties. [4*]</p> <p>CO3. Understand basic concepts of biomolecules. [2*]</p> <p>CO4. Compare &amp; contrast between different levels of structure of proteins. [5*]</p> <p>CO5. Evaluate activity of enzymes using enzyme kinetics. [5*]</p> <p>CO6. Analyze biomolecules by various techniques. [4*]</p>
PGMB104-DSEC-1	Fermentation Technology	<p>CO1- Understand organizational set up in Fermentation Industry [2]*</p> <p>CO2-Distinguish between methods of Bio separation [2] *</p> <p>CO3- Explain carbon pathways for the formation of industrially important</p>



		<p>Secondary Metabolites [4] *</p> <p>CO4- Schematically explain the production of different fermentation products [4] *</p> <p>CO5- Evaluate different types of Risk management, Containment levels [4] *</p> <p>CO6- Diagrammatically explain the treatment of different industrial waste [4] *</p> <p>CO7- Produce &amp; analyze different fermentation products at laboratory scale [6] *</p>
PGMB104-DSEC-2	Food & Dairy Microbiology	<p>CO1. Signify the importance of microorganisms in food &amp; their stress responses. [2] *</p> <p>CO2. Illustrate the role of microorganisms in different fermented food products. [2] *</p> <p>CO3. Appraise different methods of microbial detection &amp; control. [5] *</p> <p>CO4. Evaluate the microbial quality of milk &amp; milk products. [4] *</p> <p>CO5. Compare &amp; contrast different milk products. [4] *</p> <p>CO6. Perform Sterility testing of sterile food products. [3] *</p> <p>CO7. Prepare and study the microbiology of fermented food like Dhokla and Idli. [5] *</p>
PGMB105-SEC	Food Licensing and Certification	<p>CO1. Interpret basic properties of food components [5*]</p> <p>CO2. Convince the use of materials used in food packaging [5*]</p> <p>CO3. Illustrate different regulatory and certification standards [4*]</p> <p>CO4. Explain handling of food by assessment of risk [2*]</p> <p>CO5. Understand the HACCP, TACCP, VACCP system flow of food [1*]</p> <p>CO6. Create and maintain a safe and sanitary working environment in food industry [6*]</p>
<b>Semester-II</b>		
PGMB201-CC	Research Methodology	<p>CO1- Understand various study designs and hypothesis pertaining to research topic [2*]</p> <p>CO2- Enlist different methods of data collection [1*]</p> <p>CO3- Describe varied methods of sampling [2*]</p> <p>CO4- Compare the role of different variables in research [4 *]</p> <p>CO5- Understand steps involved in processing data [2*]</p> <p>CO6 –Design research review article [3*]</p> <p>CO7- Elaborate in details Copyright and Neighbourin Rights and Filing Patent Applications[ 2*]</p>
		<p>CO 1: Distinguish between different molecular mechanisms of regulation on gene expression in eukaryotes [5] *</p> <p>CO 2: Assess the effect of chromosomal rearrangement in the functioning of cell [5] *</p> <p>CO 3: Categorize/ classify different molecular tools used in Genetics [4]</p>





PGMB202- CC	Molecular Genetics II	* CO 4: Correlate inheritance of cellular organelles with that of the nucleus. [3] * CO 5: Explain various factors leading to changes in the genetic structure of populations. [2] * CO 6: Evaluate genetic problems related to population genetics and restriction mapping 5] * CO 7: Design primers and carry out PCR [6] *
PGMB203- CC	Microbial Biochemistry	CO1. Differentiate biomolecules on the basis of their properties [4*] CO2. Differentiate biomolecules on the basis of their properties. [4*] CO3. Understand basic concepts of biomolecules. [2*] CO4. Compare & contrast between different levels of structure of proteins. [5*] CO5. Evaluate the activity of enzymes using enzyme kinetics. [5*] CO6. Analyze biomolecules by various techniques. [4*]
PGMB204- DSEC-1	Advances in Biotechnology	CO:1-Explain the microbiological methods in Marine environment [3*] CO:2- Evaluate & analyze different marine-derived compounds [5*] CO:3- Compare the different methods used for synthesis of nanostructures [5*] CO:4- Employ the synthesized nano-structures on medical field [3*] CO:5- Explain Cell Extraction methods & Recovery of cells[2*] CO:6- Construct the biogas plant on laboratory scale [6*] CO:7 – Prepare microbial bioplastics[5*]
PGMB204- DSEC-2	Pharmaceutic al Microbiology	CO:1- Understand Quality Assurance and Quality Management in pharmaceutical industries[2*] CO:2- Illustrate the guidelines of ISO certification & NABL accreditation [3*]CO:3- Distinguish between QA, QC, GMP and cGMP [5*] CO:4- Analyze various microbiological tests of pharmaceutical & cosmetic products [4*]CO:5- Explain the document maintenance in pharmaceutical industries [2*] CO:6- Apply the knowledge of calibration and validation of different laboratory instruments[3*]
PGMB205- SEC	Quality Assurance and Quality Controlin Pharmaceutic alIndustries	CO:1- Understand Quality Management System in pharmaceutical industries [2*] CO:2- Illustrate the Concept, evolution and scopes of quality control and quality assurance[3*] CO:3- Distinguish between QA, QC. [5*] CO:4- Analyze various microbiological tests of pharmaceutical & cosmetic products [4*] CO:5- Explain the Biological Standardization & Quality Control in pharmaceutical industries[2*] CO:6- Apply the knowledge of Audits and Regulatory Compliance.
<b>Semester-III</b>		



PGMB301	Research Methodology	<p>CO1: Understand the fundamental concepts of Research Methodology[2]*</p> <p>CO2: Justify the problem undertaken as a research project [5]*</p> <p>CO3: Understand characteristics of a good sample design and implement his/her research problem [6]*</p> <p>CO4: Compare the role of different variables in research [4]*</p> <p>CO5: Discuss steps involved in processing data [2]*</p> <p>CO6: Apply biostatistics to his/her research and increase its credibility [3]*</p>
PGMB302	Food and Pharmaceutical Microbiology	<p>CO1: Signify importance of microorganisms in food and to discuss its role[2]*</p> <p>CO 2: Justify various mechanisms are involved in microbial stress response in food. [5]*</p> <p>CO 3: Compare and contrast conventional and rapid methods for detecting microbial contamination in food. [4]*</p> <p>CO 4: Apply seven principles of HACCP in food industry. [4]*</p> <p>CO 5: Perform Sterility testing of sterile pharmaceutical product. [3]*</p> <p>CO 6: Compare and contrast between GMP and cGMP. [4]*</p>
PGMB303	Microbial Biotechnology	<p>CO1: Isolation methods for detection of microorganisms and microbial activity, Metabolic diversity[3]*</p> <p>CO2: Schematically explain the degradation of pollutants[4]</p> <p>CO3: Comprehensive information of Sample preparation, cell extraction and cell recovery [3]*</p> <p>CO4: Describe methods involved in bioenergy generation[2]*</p> <p>CO5: Prepare silver nanoparticles[3]*</p> <p>CO6: Produce PHB from marine bacterial species[3]*</p>
<b>Semester-IV</b>		
PGMB401	Analytical techniques and introduction to 'omics'	<p>CO1: Exhibit chromatography techniques with mass spectrometry with for mass analysis[3]*</p> <p>CO2: Compare and Contrast X-ray and UV photoelectron spectroscopies[4]*</p> <p>CO3: Illustrate Auger electron spectroscopy[4]*</p> <p>CO4: Summarize Hybridization microarray technologies [2]*</p> <p>CO5: Exhibit the molecular biology techniques for proteomics, genomics, transcriptomics, metabolomics and pharmacogenomics [3]*</p> <p>CO6: Set up a PCR[6]*</p>
PGMB402	Industrial Microbiology	<p>CO1: Understand organizational set up in Industrial Microbiology[2]*</p> <p>CO2: Illustrate Strain Improvement of industrial microorganisms[3]*</p>





		<p>CO3: Isolation of mutants viz. auxotrophic mutants, induced mutants, resistant mutants and reverting mutants[3]*</p> <p>CO4:Diagrammatically and schematically fermentation plant, downstream processing [4]*</p> <p>CO5: Produce Antibiotic [3]*</p> <p>CO6: Isolate and Study bioleaching by Microorganisms[3]*</p>
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**Note:** Numbers in bracket ( ) indicates cognitive levels of revised Blooms Taxonomy as follows:

**(1): Remembering, (2): Understanding, (3): Applying, (4): Analysing, (5): Evaluating, (6): Creating**



Sr. No	Course Code	Name of Course Coordinator	Signature
SEM-I			
1	PGMB101-CC	Mr. Arjun Potinde	<i>Arjun Potinde</i>
2	PGMB102-CC	Mr. Vineet Kala	<i>Vineet</i>
3	PGMB103-CC	Ms. Mrunalini Patil	<i>Patil</i>
4	PGMB104-DSEC-1	Ms. Dhanashri Pachhade	<i>D.P. Pachhade</i>
5	PGMB104-DSEC-2	Mr. Sandesh Gharge	<i>Sandesh Gharge</i>
6	PGMB105-SEC	Mr. Vishal Waghmare	<i>Waghmare</i>
SEM-II			
9	PGMB201-CC	Dr. Keshav Shinde	<i>Shinde</i>
10	PGMB202-CC	Mr. Vineet Kala	<i>Vineet</i>
11	PGMB203-CC	Dr. Rajeshri Ghorpade	<i>R. Ghorpade</i>
12	PGMB204-DSEC-1	Mr. Sandesh Gharge	<i>Sandesh Gharge</i>
13	PGMB204-DSEC-2	Ms. Mrunalini Patil	<i>Patil</i>
14	PGMB205-SEC	Expert Faculty	<i>Dr. Sandesh Gharge</i>
SEM-III			
17	PGMB301	Dr. Keshav Shinde	<i>Shinde</i>
18	PGMB302	Mr. Sandesh Gharge	<i>Sandesh Gharge</i>
19	PGMB303	Dr. Rajeshri Ghorpade	<i>R. Ghorpade</i>





SEM-IV			
20	PGMB401	Ms. Darshana Raut	
21	PGMB402	Dr. Keshav Shinde	

Course  
Coordinator

Program  
Coordinator

BOS Chairman

Principal