

2024

M.Tech.in Marine Biotechnology

Curriculum

To ignite young talented minds having strong foundation in Science to take up major challenges which human race faces and to find practical solutions through marine biotechnological interventions

SPONSORED BY THE DEPARTMENT OF BIOTECHNOLOGY
GOVERNMENT OF INDIA

NATIONAL CENTRE FOR AQUATIC ANIMAL HEALTH
COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY
LAKESIDE CAMPUS
FINE ARTS AVENUE
COCHIN -682016



M. Tech. Marine Biotechnology

The M. Tech. programme in Marine Biotechnology sponsored by Department of Biotechnology, Government of India is an unique educational programme in its kind in India

Programme Outcome

To ignite young talented minds having strong foundation in Science to take up major challenges which human race faces and to find practical solutions through marine biotechnological interventions to address the following challenges:

- 1. Food and nutritional security through enhancement of marine/aquatic food production through intensive aquaculture*
- 2. Depleting fuel stock and requirement of next generation fuel (Bio-fuel) for next generation human race*
- 3. Climate change and need of its reversal for survival*
- 4. Human and animal health related issues and requirement of next generation pharmaceuticals with least or no side effects*

Over above three decades, Government of India has been supporting infrastructure development and research in focused areas of Marine Biotechnology to develop novel processes and products aiming at enhancement of marine biotech industrial processes, biomedical material development, environment management and intensive aquaculture production. In any such movement, appropriate manpower with the right mind set is a vital component, and to satisfy this requirement the M. Tech. programme in Marine Biotechnology has been conceptualized. The curriculum has been built with the global concept of education 'Find Solutions to the Human Problems in Class Rooms'. Through this programme we look forward to generate Academicians, Scientists, Technocrats, Entrepreneurs and Planners to address the above cited issues and to find appropriate solutions. Accordingly, the curriculum has been formulated with a programme specific outcome to generate professionals in 1. Aquatic Animal Health Management, 2. Marine Algal Biotechnology, 3. Marine Pharmacology, 4. Marine Bioprocess Engineering and 5. Genetic Improvement in Aquaculture.

The programme is offered at National Centre for Aquatic Animal Health, Cochin University of Science and Technology under the supervision of an Advisory Board having Vice Chancellor as the patron and a Placement and Biotechnology Entrepreneurship Committee to ensure the placement of students desirous to work in Industries or provide handholding support to students desirous to start their own enterprise/start-ups under different schemes of Central/State Government, both constituted by the University as per the directives of DBT.

Admission to the programme is through qualifying Graduate Aptitude Test in Biotechnology (GAT-B), conducted by National Testing Agency on behalf of the Regional Centre for Biotechnology, Faridabad for the Department of Biotechnology, Government of India. This examination is to rank the eligibility of the candidate among all applicants during the year, and the candidates will be given a GAT-B rank based on which they may apply to M. Tech. programme in Marine Biotechnology.

Scheme of Examination in M. Tech. in Marine Biotechnology

Duration of the course

4 semesters

Eligibility:

Minimum 60% marks or equivalent CGPA (under grading system) from any recognized university in any one of the following.

Candidates with minimum 60% marks or equivalent CGPA (under grading system) from any recognized university in B.Tech. or BE in Biotechnology/M.Sc in any branch of Life Sciences including Marine Biology with a qualifying score in Graduate Aptitude Test in Biotechnology (GAT-B) conducted by National Testing Agency on behalf of Department of Biotechnology, Government of India are eligible to apply for admission to the M.Tech. Marine Biotechnology programme.

Accumulated minimum credits required for successful completion of the programme- **80**

Semester 1

Course Code and Title	Instruction		Evaluation		Total
	C / E	Credits	Continuous assessment	Semester End Examination	
Theory					
Theory (Core)					
24-431-0101 Biotechnological Interventions in Marine Biodiversity Conservation	C	2	50	50	100
24-431-0102 Marine Genomics and Proteomics	C	3	50	50	100
24-431-0103 Introduction to marine pharmacology	C	3	50	50	100
24-431-0104 Bioprocess Engineering	C	3	50	50	100
Theory (Elective)					

Elective 1	E	2	50	50	100
Elective 2	E	2	50	50	100
Elective 3	E	3	50	50	100
Lab (Skill Development)					
24-431-0105 Skill Development in Recombinant DNA Technology	C	2	50	50	100
24-431-0106 Skill Development in Marine Microbial Diversity Determination	C	2	50	50	100
24-431-0107 Skill Development in Cell culture and hybridoma/Antibody Technology	C	1	50	50	50

Core: 16 Credits; Elective: 7; Credits; Total: 23

Semester 2

Course Code and Title	Instruction		Evaluation		Total
	C/E	Credits	Continuous assessment	Semester End Examination	
Theory					
Theory (Core)					
24-431-0201 Biotechnological interventions in Aquatic Animal Health	C	3	50	50	100
24-431-0202 Marine Bioprocess Engineering	C	3	50	50	100
24-431-0203 Marine Algal Biotechnology	C	3	50	50	100
24-431-0204 Genetic Improvement for High health brood stock	C	3	50	50	100
Theory (Elective)					
Elective 1	E	2	50	50	100
Elective 2	E	2	50	50	100
Elective 3 MOOC Course	E	2		100	100

Lab Elective	E	1	50	50	100
Lab (Skill Development)					
0-431-0205 Skill Development in Biotechnological Interventions in Aquatic Animal Health Management	C	2	50	50	100
24-431-0206 Skill Development in Marine Pharmacology	C	1	50	50	100
24-431-0207 Skill Development in Marine Bioprocess Engineering.	C	1	50	50	100
24-431-0208 Skill Development in Model systems, Molecular genetics and Genome engineering	C	1	50	50	100
24-431-0209 Skill development in marine algal biotechnology	C	1	50	50	100
Lab Elective	E	1	50	50	100

Core: 17 Credits; Elective: 7 Credits; Total: 24 credits

Note: As per the University regulations, it is mandatory for the students to undertake one MOOC Course approved by the Departmental Council.

Semester 3

Course Code and Title	Instruction		Evaluation		Total
	C/E	Credits	Continuous assessment	Semester End Examination	
24-431-0301 Bioentrepreneurship and industry management	C	2	50	50	100
24-431-0302 Research Methodology and Scientific Communication	C	2	50	50	100

24-431-0303 Intellectual Property Rights, Biosafety and Bioethics	C	2	50	50	100
24-431-0304 Project proposal preparation and submission	C	2	50	50	100
Research Project	C/E	Credits	Assessment by the Research Guide	Assessment by the Examination Committee	Total
24-431-0305 Research Project Progress Review and Viva Voce Examination in the area of specialization	C	10	50	50	100
Skill Development Programme (continuous evaluation) (Any one of the programmes per student)					
Elective 1	E	5	50	50	100
Elective 2	E	5	50	50	100
Elective 3	E	5	50	50	100
Elective 4	E	5	50	50	100
Elective 5	E	5	50	50	100

Core: 18; Elective:5; Total : 23 credits

Optional

MOOC Course/ Interdisciplinary Elective to be opted from other Departments	E	2	50	50	100
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As part of choice based credit system, a student can opt for an interdisciplinary elective course offered by other Departments in the University.

Semester 4

Course Code and Title	Instruction		Evaluation		
	C/E	Credits	Assessment by the Research Guide*	Assessment by the Examination Committee	Total
24-431-0401 Research Project - Report Submission and Presentation and Comprehensive Course Viva	C	18	50		100

**Based on periodic assessment of the work of the candidate*

Core: 18 credits

List of Elective Courses

- 24-431-0108 Cell and Hybridoma Technology
- 24-431-0109 Marine Microbiology
- 24-431-0110 Bioinformatics, Systems and Computational Biology
- 24-431-0111 Nano-biotechnology
- 24-431-0210 Model Systems, Molecular Genetics and Genome Engineering for Stock Improvement
- 24-431-0211 Marine Pharmacology in Practice
- 24-431-0212 Enzyme Engineering & Technology
- 20-431-0213. Skill Development in Marine Animals Handling and Maintenance
- 24-431-0306 Marine Pharma Industry Development
- 24-431-0307 Genetic Improvement in Aquaculture
- 24-431-0308 Marine Algal Biotechnology for Industrial Applications
- 24-431-0309 Aquatic Animal Health Management
- 20-431-0310 Marine Bioprocess Industry Development
- 20-431-0311 Products and services of oceans (Inter Departmental Elective Offered for other Departments)
- Elective: MOOC Course during 2nd or 3rd semester of the programme as approved by the Departmental Council

M.Tech. Marine Biotechnology Programme

Total credits: 88 (Core: 69 Elective: 19)

Semester 1: 23; Semester 2: 24; Semester 3: 23; Semester 4: 18.

General regulations to be known by students:

1. A student shall acquire a minimum of 36 credits in the first and second semesters before he/she registers for third semester.
2. The minimum number of credits to be earned by a student for the award of the M.Tech. degree shall be 80 subject to the condition that the candidate successfully completes all the core and elective courses prescribed by the Centre

3. Minimum attendance required: 75%
4. A student shall register and complete at least one online course as one of the Electives.
5. Interdepartmental elective is optional.
6. The pass minimum in a subject is 50 %, with a separate minimum of 45% for end semester examination.

Grading Scale

Range of Marks	Grade	Weightage
Below 50%	F- Failed	0
50-59	D- Satisfactory	6
60-69	C- Good	7
70-79	B - Very Good	8
80-89	A - Excellent	9
90 and above	S - Outstanding	10

Overall performance at the end of the semester will be indicated by Grade Pont Average (GPA) calculated as follows:

$$\text{GPA} = \frac{G_1C_1 + G_2C_2 + G_3C_3 + \dots + G_nC_n}{C_1 + C_2 + C_3 + \dots + C_n}$$

where 'G' refers to the grade weightage and 'C' refers to the credit value of corresponding course undergone by the student.

At the end of the final semester Cumulative Grade Point Average (CGPA) will be calculated based on the above formula.

Classification for the Degree (M.Tech.) will be as follows

Classification	CGPA
First Class with distinction	8 and above
First Class	6.5 and above
Second Class	6 and above

Declaration of Results

The final marks will be reported to the University for tabulation and declaration of results. The University shall issue mark list at the end of each semester.

M.Tech. Marine Biotechnology Programme

Programme Outcome (PO)

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Programme Specific Outcome (PSO)

To generate professionals in:

- PSO1. Aquatic Animal Health Management,
- PSO2. Marine Algal Biotechnology,
- PSO3. Marine Pharmacology,
- PSO4. Marine Bioprocess Engineering and
- PSO5. Genetic Improvement in Aquaculture.



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