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ताळगांव पठार,
गोंय - ४०३ २०६
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(Accredited by NAAC with Grade A+)

GU/Acad –PG/BoS - GU-ART /2025-26/615 Date: 08.12.2025

CIRCULAR

The syllabus of the Goa University–Admission Ranking Test (GU-ART) for **Master of Science in Marine Microbiology** and **B.Ed. in Marine Microbiology** Programmes, approved by the Academic Council in its meeting held on 7th November 2025 is attached.

The Dean/Vice-Dean (Academic) of the School of Earth, Ocean and Atmospheric Sciences and the Principals of all the affiliated Colleges are requested to take note of the above and bring the contents of this Circular to the notice of all concerned, including students aspiring to pursue the Master's and B.Ed. Programmes.

ASHWIN VYAS LAWANDE
Digitally signed by ASHWIN VYAS LAWANDE
Date: 2025.12.08 15:06:28 +05'30'

(Ashwin V. Lawande)
Deputy Registrar – Academic

To,
1. The Dean, School of Earth, Ocean and Atmospheric Sciences, Goa University.
2. The Vice-Dean (Academic), School of Earth, Ocean and Atmospheric Sciences, Goa University.
3. Principals of all the affiliated Colleges.

Copy to:
1. Controller of Examinations, Goa University.
2. Assistant Registrar (Admissions), Goa University.
3. Assistant Registrar Examinations (UG/PG), Goa University.
4. Director, Directorate of Internal Quality Assurance, Goa University for uploading the Syllabus on the University website.

GOA UNIVERSITY

SYLLABUS FOR GOA UNIVERSITY-ADMISSIONS RANKING TEST (GU-ART) FOR MASTER'S & B.Ed. IN MARINE MICROBIOLOGY PROGRAMMES

Effective from AY: 2026-27

Modules	Content
Module 1:	**Microbiology**
	Diversity and distribution of various microbial groups, classification schemes; Germ theory of diseases; Role of microorganisms and their applications; types of associations; Structure of eukaryotes and prokaryotes (Archaea and Eubacteria) and differences; Organization and ultrastructure of prokaryotic cell (Bacterial cell); Endospore: structure, sporulation and germination; Eukaryotic cell organelles; Nutritional types; Prebiotics, Probiotics, Synbiotics and Nutraceuticals; Cell signalling pathways; Bacterial Chemotaxis, Quorum sensing in bacteria; mitosis and meiosis; Cell death and apoptosis
Module 2:	**Techniques in Microbiology**
	Instruments in Microbiology; Good Laboratory Practices (GLP) and biosafety; Growth curve - generation time, diauxic growth; Growth parameters; Standard Plate Count (SPC); Most Probable Number (MPN); preservation techniques; culture media; Gibb's Free Energy; Buffers; Batch/Continuous cultures; Staining; Microscopy; Physical methods of microbial control; Chemical methods of microbial control; microbial enumeration; ATP as a high energy system; ETC and oxidative phosphorylation, substrate level phosphorylation.
Module 3:	**Biochemistry**
	Biomolecules and metabolic pathways; qualitative and quantitative tests for carbohydrates, proteins, nucleic acids, lipids; detection methods; L & D forms; Aerobic and anaerobic respiration; major pathways in heterotrophs & regulation; Pasteur effect; mixed acid fermentations; enzymes, coenzyme, cofactors, prosthetic group; classification and nomenclature; specific activity of enzymes; mechanism of action; activation energy, multienzyme complex; mechanisms of solute transport; enzyme inhibition.
Module 4:	**Microbial Genetics**
	Chromosomes, DNA, purines, pyrimidines, nucleosides, nucleotides, Watson-Crick model; prokaryotic DNA; eukaryotic DNA, split genes, mitochondrial and chloroplast DNA; modes of replication; transcription in

Approved by: Academic Council on 7th November 2025

	prokaryotes and eukaryotes; post-transcriptional modification; ribozyme, ribosomes; translation; post-translational processing & modification; inhibitors of protein synthesis; protein organization, glycosylation, protein sorting and export from Golgi Apparatus; Operons, induction and repression; conjugation, transformation, transduction; mutations – types, mutagenesis, DNA damage and repair; recombination – Holliday model; Lytic and lysogenic cycles; Chromosome mapping. *Mutations;* Auxotrophs, Complementation Test. Types of mutations; Molecular recombination and molecular taxonomy: General features of recombination, types of recombination; PCR, Sanger's method, Maxam and Gilbert's method, Shot gun sequencing; Omics
Module 5:	**Ecology** Ecosystems - structure and functions, producers, consumers and decomposers, energy flow, ecological pyramids, food chains and webs. Community structure: ecological succession, trophic structure-zonation and stratification. Habitats: aquatic, terrestrial - soil, atmospheric, plants – endophytes, extreme environments; application of microbes in environment - solid waste treatment, liquid waste treatment; BOD, COD; Microbe animal interactions – ruminants, bioluminescence; microbial bioremediation, biodegradation, biomagnification, eutrophication, water analyses & water potability; biofilms; nitrogen fixation, phosphate solubilization, mycorrhizae, biofertilisers, biopesticides; Multidrug Resistance; biosensors
Module 6:	**Concepts in Botany** Mendelism: Principles of inheritance; backcross and test cross; incomplete dominance, codominance and lethal alleles; gene interactions – dominant, recessive, complementary, supplementary, duplicate; Extrachromosomal inheritance; sex-linked inheritance; Linkage and crossing-over; Mushroom biology: Morphology, diagnostic characters, reproduction, life cycle; Mushroom spore isolation and spore culture; pileus tissue culture; ecological and economic importance of fungi; general characteristics, types and significance of symbiotic fungal associations (lichens and mycorrhizae); ecological and economic importance of algae, morphological features of *Nostoc*, *Spirogyra*, *Sargassum*; plant diseases, Koch's postulates; mangrove ecology; biofertilizers.
Module 7:	**Concepts in Zoology** Protozoans and Helminthes of public health importance: Protozoan causing intestinal amoebiasis and malaria; Helminths infestations-Tapeworm and Round worm; Medical importance and control of disease-causing vectors: Anopheles sp., *Culex* sp., *Aedes* sp. Food and Water Borne Diseases (Jaundice, Cholera, Traveller's diarrhoea, Typhoid), Zoonotic and Vector borne diseases (COVID-19, Rabies; Malaria, Dengue); Insect Pollination, metamorphosis & ecdysis (Moulting), Aposematism (Warning Coloration), Insect Communication, insect migration, Eusociality in Hymenoptera (Ants, Bees, Wasps), Insect Mimicry, Parasitoidism in insects
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