GU/Acad –PG/BoS - GU-ART /2025-26/610   Date: 04.12.2025

CIRCULAR

The syllabus of the Goa University–Admission Ranking Test (GU-ART) for **Master of Science in Marine Science** and **B.Ed. in Marine Science** 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 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 SCIENCE PROGRAMME

Effective from AY: 2026-2027

Modules	Content
	Fundamentals of Physics, Electronics and Mathematics
Module 1:	Fundamentals of physics, standards, units, vectors; Newton's laws of motion, energy, conservation laws; Properties of matter: density, pressure, surface tension, viscosity; Temperature scales, heat transfer, thermodynamic laws; Wave motion; Electromagnetic radiation, blackbody radiation laws; Current, voltage, circuit laws, magnetic poles; Ohm's law, Kirchhoff's laws; Sets, functions; Matrices, determinants, linear equations; Basic calculus; Measures of central tendency, measures of dispersion; Non-conventional energy- solar, wind, ocean; Atmospheric circulation; Clouds; Tropical cyclones; Ocean currents; Greenhouse effect.
	Fundamentals of Chemistry
Module 2:	Van der Waals equation of state; Bohr's theory, atomic orbitals (s, p, d); Raoult's law, lowering of vapor pressure, freezing point depression, boiling point elevation, Henry's law; Types of chemical bonds; Periodic table; Structure, shape, and reactivity of organic molecules; Acids and bases; IUPAC nomenclature, hybridization (sp3); Radioactive disintegration, decay constant, half-life, average life, nuclear fission, nuclear reactor; Absorption/emission of light, Beer-Lambert law; Atomic absorption spectrometry; Types of industrial waste, treatment and biosphere protection; Accuracy, precision, errors in instruments.
	Fundamentals of Biological Sciences and Biotechnology
Module 3:	Photosynthesis; Plant diversity and diseases; Microbial habitats and ecological roles; Microbial contributions to climate; Production of antibiotics, enzymes; Probiotics; Biosafety, bioethics, intellectual property rights (IPR) and biopiracy; Bio-based industries; DNA replication; Enzyme kinetics; Animal diversity and adaptations; Major habitats; Classification of fishes; Cultivable fishes and shellfish; Algal blooms; Osmoregulation, thermoregulation; Charles Darwin's theory of natural selection; Neo-Darwinism; Natural selection, convergent and divergent evolution; Biological speciation.

Module 4:	**Fundamentals of Geology** Origin of the Earth, internal structure, composition, and age of the Earth; Classification and physical properties of common silicate and non-silicate minerals; Classification and texture of igneous, sedimentary and metamorphic rocks; Agents and types of metamorphism; Concept of dip, strike; Classification of folds, faults, joints, unconformities; Major relief features of the earth; Types of weathering of rocks; Drainage patterns; Fluvial, aeolian, marine, glacial and karst landforms; Geological time units; Fossils; Plate tectonics; Natural disasters – earthquakes, tsunamis and volcanoes; Gravity and magnetic fields of the Earth.
References/ Readings:	1. Puri, B. R., Sharma, L. R., & Pathania, M. S. (2021). Principles of Physical Chemistry. Vishal Publishing Co., India. 2. Sharma, B. K. (2014). Industrial Chemistry. Krisha Prakashan, Meerut. 3. Christian G.D. (2004) Analytical Chemistry. Wiley publication, New York. 4. Singh, H., & Kapoor, V. K. (2012). Medicinal and Pharmaceutical Chemistry. Vallabh Prakashan, Pitampura, New Delhi. 5. Floyd T. (2022). Electronic Devices. Pearson Education Publication, NY. 6. Kumar, A., Kumaresan, S., & Sarma, B. K. (2018). A Foundational Course in Mathematics. Narosa Publishers, New Delhi. 7. Gupta, S. C. (2018). Fundamentals of Statistics. Himalaya Publishing House, India. 8. Kumar, A. A. (2016). Fundamentals of Digital Circuits. PHI Learning Pvt. Ltd., India. 9. Sears, F. W., Zemansky, M. W., & Young, H. D. (1997). University Physics. Narosa Publishing House, India. 10. Young, H. D., & Freedman, R. A. (2018). Sears and Zemansky's University Physics. Pearson, Boston. 11. Goel, A. (2010). Computer Fundamentals. Pearson Education, India. 12. Bahl, A., & Tuli, G. D. (2020). Essentials of Physical Chemistry. S. Chand Publications, India. 13. Rastogi VB (2018). Organic Evolution (Evolutionary Biology), MedTech, New Delhi. 14. Madigan, M. T., Bender, K. S., Buckley, D. H., Sattley, W. M., & Stahl, D. A. (2018). Brock biology of microorganisms. Pearson Education, New York. 15. Glick, B. R., & Pasternak, J. J. (2010). Molecular biotechnology: Principles and applications of recombinant DNA. ASM Press, Washington, DC. 16. Holmes, A. (2013). Principles of Physical Geology. Routledge, London. 17. Billings, M. P. (1954). Structural Geology. Pearson, NY. 18. Best, M. G. (2013). Igneous and metamorphic petrology. Blackwell Publishing, MA, USA.

Approved by: Academic Council on 7th November 2025