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(Accredited by NAAC with Grade A+)

GU/Acad –PG/BoS - GU-ART /2025-26/727 Date: 28/01/2026

CIRCULAR

The approved syllabus of the Goa University–Admission Ranking Test (GU-ART) for **Master of Science in Atmospheric Sciences** Programme 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 Programmes.

ASHWIN V LAWANDE Digitally signed by ASHWIN V LAWANDE Date: 2026.01.28 12:50:13 +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 OF SCIENCE IN ATMOSPHERIC SCIENCES PROGRAMME

Effective from AY: 2026-27

Modules	Content
Module 1:	**Earth's Atmosphere** – Components of Earth's atmosphere, The early atmosphere, Composition of the present-day atmosphere, Vertical structure of the atmosphere, Temperature scales, Air pressure and density.
Module 2:	**Earth's heat-budget and Gravity** – Insolation, Earth's long-wave radiation, Atmospheric greenhouse effect, Earth's annual energy balance, Newton's laws of motion and gravitation, Atmospheric waves, Centrifugal and centripetal forces, Momentum and energy conservation theorems, Relation between pressure, volume and temperature in adiabatic processes.
Module 3:	**Atmospheric circulation** – Hydrological cycle, Evaporation, Condensation, Saturation, Humidity, Precipitation processes, types, Rain, Snow, measurements, Air pressure and winds, Atmospheric pressure, Metereological Instruments, The Monsoon.
Module 4:	**Greenhouse gases -** Koppen's and Thornthwaite's scheme of classification of climate, Climate change, aerosols.
Module 5:	**Radiation -** Basic laws, Rayleigh and Mie scattering, multiple scattering, Wien's displacement law, Stefan–Boltzmann law, Planck's law, Weather observations and transmission – Meteorological satellites – Polar orbiting and geostationary satellites.
Module 6:	**Basic Mathematics** – Permutations and Combinations, Sequences and Series, Ratio and proportions, Co-ordinate systems, Vectors, Mathematical logic, Circles, Parabola, Relations and Functions, Determinants and Matrices, Differential calculus, Derivatives, Applications of Derivatives, Integrals and applications, Vector Algebra, Linear Programing, Probability, Numerical Methods,
Module 7:	**Basic Physics** – Units, Motion and forces, Conservation of energy and momentum, Electricity and magnetism, Waves, Gravity. Colligative properties of water – Lowering of vapour pressure and elevation of boiling point, depression of freezing point, Specific heat of water, Viscosity, Surface Tension, Buoyancy. Electro-magnetic spectrum – Properties of electro-magnetic radiations, Black-body radiation, Temperature and heat transfer, Latent Heat, Conduction, Convection, Radiation, Absorption,

	Emission, Laws of thermodynamics, Current Electricity, Magnetic Effects of Current and Magnetism, Electro-magentic induction and A.C., Electromagnetic waves, Ray optics and wave optics, Dual nature of matter, Atoms and nuclei, Semi-conductors. Heat and thermodynamics, Properties of matter and acoustics, Waves and oscillations, Optics, Modern physics, Classical mechanics, Thermal physics, Mathematical physics, Atomic and molecular physics, Introduction to astronomy and astrophysics, Physics of communication.
Module 8:	**Statistics** – Mean, Median, Quantiles, Variance, Standard deviation, Correlation, Regression, Slope, Intercept, Data collection, Types of Data, Classification, tabulation and graphical representation, Interpolation and extrapolation, Measures of central values, Measures of dispersion, Probability, Sampling, distributions, Tests of significance, Time-Series Analysis.
References/ Readings:	1. Essentials of Meteorology: An Invitation to the Atmosphere; Eighth Edition; 2018; C. Donald Ahrens and Robert Henson; Cengage Learning, 20, Channel Center Street, Boston, MA 02210, USA 2. The Atmosphere and Ocean: A Physical Introduction; Third Edition; 2012; Neil C. Wells, John Wiley & Sons, Ltd. 3. Tropical Meteorology: An Introduction; 2013; T.N. Krishnamurti, Lydia Stefanova and Vasubandhu Misra, Springer 4. Meteorology Today: An Introduction to Weather, Climate, and the Environment; 2012; C. Donald Ahrens, Peter L. Jackson, Christine E. J. Jackson; Nelson Education 5. Classical Mechanics; 2013; P. V. Panat; Narosa Publishing. 6. Linear Algebra: A Modern Introduction; Third Edition; 2011; David Poole; Brooks/ Cole, Cengage Learning 7. Fundamentals of Physics, Haliday, Resnik and Walker, John Wiley and Sons. 8. Physics for Degree Students B.Sc. First Year; 2010; C. L. Arora and P. S. Hemne; S. Chand Publishing 9. Physics for Degree Students B.Sc. Second Year; 2012; C. L. Arora and P. S. Hemne; S. Chand Publishing 10. Physics for Degree Students B.Sc. Third Year; 2014; C. L. Arora and P. S. Hemne; S. Chand Publishing 11. Mathematical methods for Physics and Engineering; 2006; K. F. Riley, M. P. Hobson and S. J. Bence; Cambridge University Press 12. Heat and Thermodynamics; 1997; M.W. Zemansky and R.H. Ditman; McGraw Hill. 13. Quantitative Aptitude for Common Admission Test; Arun Sharma, McGraw Hill (6th Edition). 14. Mathematics for Degree Students B.Sc. First Year; 2010; P. K. Mittal; S. Chand 15. Mathematics for Degree Students B.Sc. Third Year; 2016; U. S. Rana; S. Chand 16. Basic Statistics; 2006; B. L. Agarwal; New Age International Publishers

	17. CK-12 Basic Physics - Second Edition; James J Dann and James H Dann; https://www.ck12.org/book/peoples-physics-book-basic/, retrieved on 13 January 2022 18. Fundamentals of Mathematics; 2008; Denny Burzynski; https://cnx.org/contents/XeVIW7Iw@4.6:4lF8HG_a@2/Perimeter-and-Circumference-of-Geometric-Figures, retrieved on 13 January 2022