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ताळगांव पठार,
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(Accredited by NAAC with Grade A+)

GU/Acad –PG/BoS - GU-ART /2025-26/594 Date: 28.11.2025

CIRCULAR

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

The Dean/Vice-Dean (Academic) of the School of Biological Sciences and Biotechnology 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 VYAS LAWANDE
Digitally signed by ASHWIN VYAS LAWANDE
Date: 2025.11.28 12:21:32 +05'30'

(Ashwin V. Lawande)
Deputy Registrar – Academic

To,
1. The Dean, School of Biological Sciences and Biotechnology, Goa University.
2. The Vice-Dean (Academic), School of Biological Sciences and Biotechnology, 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 FOOD TECHNOLOGY PROGRAMME

Effective from AY: 2026-27

Modules	Content
Module 1:	**Microbiology**
	Classification & Identification of Microorganisms; Microscopic Techniques for Examination & Enumeration of Microorganisms; Media Used for the Growth of Microorganisms; Cell & Tissue Culture Techniques; Microbial Nutrition **Bacteria:** Morphology & Structure; Cultivation on Microbiological Media; Reproduction & Growth; Physiology; Production & Maintenance of Pure Cultures & Cultural Characteristics; Bacterial Nutrition **Yeasts & Moulds:** Morphology & Structure of Fungi; Cultivation on Microbiological Media; Reproduction & Growth; Physiology; Production & Maintenance of Pure Cultures & Cultural Characteristics; Classification; Association of moulds with other organisms; Fungal Nutrition **Algae:** Morphology & Structure; Algal Habitats; Biological & Economical importance; Characterization & Classification; Association with other organisms; Algal Nutrition **Protozoa:** Occurrence & Habitat; Free-living & Symbiotic Protozoa; Importance; Morphology & Structure; Reproduction - Asexual Reproduction, Sexual Reproduction & Regeneration; Classification & Characterization; Protozoal Nutrition **Viruses:** Significance; Morphology & Structure - Nucleic Acid & Capsid Structure; Viruses of bacteria, plants & animals; Replication - Adsorption, Penetration, Transcription, Assembly & Release; Viral Multiplication Cycle - Lytic cycle & Lysogenic Cycle (Mechanism & Prophage DNA Replication); Classification, Isolation, Identification & Cultivation Progressive & Fatal diseases associated with Viruses in Plants & Animals; Viroids & Prions **Human Health & Diseases:** Human Diseases (typhoid, pneumonia, common cold, amoebiasis, ascariasis, tape worm) & their control
Module 2:	**Biochemistry, Metabolism & Physiology**
	Carbohydrates: Definition, Structure, Properties, Functions, Classification:

Approved by: Academic Council on 7th November 2025

	Homo & Hetero Polysaccharides, Mucopolysaccharides, Bacterial cell wall polysaccharides, Glycoproteins & their biological functions, Dietary Sources, Deficiencies & Excess, Metabolic Pathways- Glycolysis, Gluconeogenesis, Glycogenesis, Glycogenolysis, Citric Acid Cycle, Dietary Fibre – Definition, Sources & Functions **Proteins & Amino Acids:** Definition, Structure, Properties, Functions, Classification, Dietary Sources, Chemical Reactions, Deficiencies & Excess, Metabolic Pathways- Transamination, Deamination, Decarboxylation, Urea Cycle, Forces stabilising protein structure & shape, Protein Purification, Denaturation & renaturation of proteins. Fibrous & globular proteins. **Lipids, Fats & Oils:** Definition, Structure, Properties, Functions, Classification, nomenclature & properties of fatty acids, essential fatty acids. Phospholipids, sphingolipids, glycolipids, cerebrosides, gangliosides, & Cholesterol. Dietary Sources, Chemical Reactions, Deficiencies & Excess, Metabolic Pathways - Fatty Acid Oxidation, Biosynthesis of Fatty Acids, Synthesis & Functions of Cholesterol **Vitamins & Minerals:** Classification, Functions, Dietary Sources, Diseases due to Deficiencies & Excess **Enzymes:** Nomenclature & classification of Enzymes, Holoenzyme, apoenzyme, Cofactors, coenzyme, prosthetic groups, metalloenzymes, monomeric & oligomeric enzymes, activation energy & transition state, enzyme activity, specific activity, common features of active sites, enzyme specificity: types & theories, Michaelis-Menten equation. Factors affecting enzyme activity, **Energy & Regulation**: microbial metabolism for energy release & conservation, use of energy for biosynthesis; Energy Production by Photosynthesis - cyclic & non-cyclic photophosphorylation **Physiology:** Digestion, Absorption, & Transport of Foods & Nutrients **Diet-Related Diseases:** Malnutrition, Diabetes, Cardiovascular Disease, Anaemia, Cancer – causes & basic dietary guidelines for prevention & management**.** **Genetics**: Gene Structure, Replication & Mutation; Structure of Double Helical DNA; Central Dogma; Recombinant DNA Techniques, Genetically Modified Foods
Module 3:	**Cell Biology**
	Structure & Organisation of Plant & Animal Cells: size, shape, & structural diversity, Cell membrane: structure (fluid mosaic model), lipid bilayer, membrane proteins, Membrane transport: diffusion, osmosis, facilitated diffusion, active transport, endocytosis, exocytosis, Cell organelles & their functions, Cytoskeleton & motility, **Cell Cycle & Cell Division:** Phases of the cell cycle (G_1, S, G_2, M), Checkpoints & regulation (cyclins, CDKs, p53, Rb), Mitosis & cytokinesis, Meiosis & genetic recombination, Cell cycle control & cancer **Cell Differentiation, Development & Death:** Stem Cells & totipotency,

	Cellular ageing & senescence, Necrosis, Apoptosis, Autophagy **Techniques in Cell Biology:** Microscopy: light, fluorescence, confocal, electron (SEM/TEM), Cell fractionation & organelle isolation, Flow cytometry, Cell culture techniques, Immunocytochemistry & fluorescence tagging
Module 4:	**Nutrition & Food Science**
	Fundamentals of Food Science: Introduction to food, nutrients, & balanced diet, Functions, sources, & requirements of carbohydrates, proteins, fats, vitamins, & minerals, Energy metabolism & Basal Metabolic Rate (BMR), Meal planning & dietary guidelines (ICMR, WHO), Nutritional labeling & dietary standards, Principles of diet therapy & therapeutic modifications of normal diet, Nutrition in different life stages (infants, children, adolescents, adults, elderly), **Dietary management of diseases & special conditions:** diabetes, obesity, cardiovascular, renal, liver, gastrointestinal, & endocrine disorders, Nutrition in surgical conditions, burns, & critical care, Enteral & parenteral nutrition, Assessment of nutritional status (anthropometric, biochemical, clinical, dietary), Malnutrition & deficiency disorders (PEM, anaemia, vitamin/mineral deficiencies) **Nutrition education & communication:** National nutrition programs (ICDS, Mid-Day Meal, POSHAN Abhiyaan), Food security, fortification, & sustainable nutrition
Module 5:	**Food Processing, Preservation & Hygiene:**
	Processing methods of food & beverages: Dairy, Beverages Baked & Fermented products **Food Preservation & Hygiene:** Definition & importance of food preservation, Causes of food spoilage, Principles of preservation- inhibition, inactivation, avoidance. Traditional techniques & Modern methods. Natural versus Synthetic preservatives **Mechanisms of Control of Microorganisms:** Hygiene, Asepsis & Sanitation; Physical & Chemical Methods to Control Microorganisms **Food-borne Infections & Intoxications:** Food Poisoning, cholera, gastrointestinal diseases; Microbial Toxins, Indicator Organisms
Module 6:	**Environmental Science**
	Environmental pollution: air, water & soil pollution, chemical reactions in atmosphere, smog, major atmospheric pollutants, acid rain, ozone & its reactions, effects of depletion of ozone layer, greenhouse effect & global warming- pollution due to industrial wastes, green chemistry as an alternative tool for reducing pollution, strategies for control of environmental pollution

Module 7:	Chemistry
	Chemical Bonding & Molecular Structure: Ionic Bonding: General characteristics of ionic bonding. Energy considerations in ionic bonding, lattice energy & solvation energy & their importance in the context of stability & solubility of ionic compounds. Covalent bonding: VB Approach: Shapes of some inorganic molecules & ions on the basis of VSEPR & hybridisation. **Fundamentals of Organic Chemistry**: Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance & Hyperconjugation. Cleavage of Bonds: Homolysis & Heterolysis. Structure, shape & reactivity of organic molecules: Nucleophiles & electrophiles. **Aliphatic Hydrocarbons:** Functional group approach, preparations & reactions – Alkanes, Alkenes, Alkynes **Aromatic Hydrocarbons:** Functional group approach, preparations & reactions – Aromatic hydrocarbons. **Other organic Hydrocarbons:** Alkyl & Aryl Halides, Alcohols, Phenols, Ethers, Carboxylic acids & their derivatives, Amines & Diazonium Salts, Amino Acids, Peptides & Proteins, Alkaloids, Terpenes. **Physical Chemistry**: Laws of Thermodynamics, Ionic Equilibria- Strong, moderate & weak electrolytes, degree of ionisation, factors affecting degree of ionisation, ionisation constant & ionic product of water. Ionisation of weak acids & bases, pH scale, common ion effect. Salt hydrolysis- calculation of hydrolysis constant, degree of hydrolysis & pH for different salts. Buffer solutions. Solubility & solubility product of sparingly soluble salts – applications of the solubility product principle. **Solutions:** Thermodynamics of ideal solutions: Ideal solutions & Raoult's law, deviations from Raoult's law – non-ideal solutions. Vapour pressure-composition & temperature-composition curves of ideal & non-ideal solutions. **Phase Equilibrium:** Phases, components & degrees of freedom of a system, criteria of phase equilibrium. **Conductance:** Conductivity, equivalent & molar conductivity & their variation with dilution for weak & strong electrolytes. **Electrochemistry:** Reversible & irreversible cells. Concept of EMF of a cell. Measurement of EMF of a cell. Nernst equation & its importance. Types of electrodes. Standard electrode potential. Electrochemical series. Liquid junction potential & salt bridge. pH determination using hydrogen electrode & quinhydrone electrode. **Chemicals in medicines:** analgesics, tranquillisers, antiseptics, disinfectants, antimicrobials, antifertility drugs, antibiotics, antacids, antihistamines; Chemicals in food - preservatives, artificial sweetening agents, elementary idea of antioxidants; Cleansing agents - soaps & detergents, cleansing action **Polymers:** Classification - natural & synthetic, methods of polymerization (addition & condensation), copolymerization, important polymers: natural & synthetic like polythene, nylon polyesters, Bakelite, rubber; Biodegradable & non-biodegradable polymers

Module 8:	**Food Safety Standards & Agencies**
	Food Adulteration, BIS, ISI, FDA, FSSAI, Codex Alimentarius, FAO, WHO, FPO, ISO
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