

AI 3201

Biological Material and Biodegradation

3 credits

Biodeterioration in natural materials; its causes, effects and prevention. The effects of different organisms in the decay of a variety of natural materials including metals, and organisms used in biodeterioration testing. The techniques used in assessing the extent and cause of deterioration. Biodeterioration of timber in aquatic environments, petroleum products, synthetic polymers, tobacco and rubber in contact with water and sewage. The microbial degradation of preservatives and antimicrobial agents and pesticides. Product resistance to microbial attack structural factors influencing biodegradability.

AI 3202

Introduction to Agro-Industry

2 credits

The natural environment and the problems of world agricultural production. Scientific and technological aspects of converting animal and plant products into a variety of agro-industrial products, improvement and acceptability evaluation.

AI 3204

Processing of Agricultural Products I

3 credits

Prerequisite: AI 3201 Biological Material and Biodegradation

Factors and processes for converting agricultural raw materials into value-added finished products. Chemical, physical, mechanical and biological properties of the raw materials such as cow hides, starch, rubber, fiber, woods, etc.

AI 3205

Biochemical Engineering

3 credits

Prerequisite: BS 2010 Basic Biochemistry
BS 2011 Introduction to Microbiology

The application of biological organisms to production processes in fermentation, bioprocessing and enzyme technology. Topics include fermentation processes; factors in processing and operation, fermentation kinetics and modelling; aeration and agitation, sterilization, bioreactors, scale-up and downstream processing.

AI 3206

Agro-Industrial Management and Marketing

3 credits

Prerequisite: BG 2403 Introduction to Economics

The principles and problems involved in the transfer of agricultural products from producer to consumer; consumer psychology, production and distribution policies, costing and pricing, sales promotion and the improvement of marketing efficiency. This course will also include the fundamentals of agro-industrial management such as: plant location, design and maintenance, work study, network analysis, marketing and product design, development and manufacture control of production, inventory, costs and quality. Capital budgeting and investment criteria.

AI 3207

Unit Operation for Agro-Industry I

3 credits

Prerequisite: BT 3013 Introduction to Bioprocessing Engineering

Application of chemical engineering concepts such as dimensional analysis, order of magnitude analysis, macroscopic and microscopic balances and mathematical modelling to the study of various unit operations important to the agro-industry. These include fluid mechanics agitation, filtration, separation by gravity and by centrifugation; heat transfer by conduction, convection and radiation.

AI 4208 Processing of Agricultural Products II 3 credits

Prerequisite: AI 3204 Processing of Agricultural Products I

Mechanical properties of agro-industrial products and related equipment such as milling, tanning, fabricating. Stress, strain, stress-strain relationships, rate of shear and elasticity. Temperature effects and dimensional analysis.

AI 4209 Unit Operation for Agro-Industry II 3 credits

Prerequisite: AI 3207 Unit Operation for Agro-Industry I

Material and energy balance, theory of momentum transfer, heat transfer and mass transfer with application to biological materials and processes such as distillation, extraction, drying, evaporation, crystallization, absorption and adsorption. Kinetics of biochemical reaction.

AI 4210 Standard and Regulation of Agro-Industrial Product 2 credits

Prerequisite: AI 3202 Introduction to Agro-Industry or
FT 3101 Introduction to Food Technology

Legal and scientific issues involved in the regulation of the nation's agro-industrial products. Philosophy underpinning the application of regulatory statutes. Sources of information necessary for communication with the government and public. Agro-Industrial products policy and information.

AI 4211 Fermentation Process 3 credits

Prerequisite: AI 3205 Biochemical Engineering

Definitions, limitations and mechanism in fermentation process. Principle of selection, storage and collection techniques of microorganism. Nutrients needed for microbial growth, steps involving aerobic formation, foaming, and applications in a fermentor. Techniques to eliminate foreign microorganisms from raw materials, air and equipment. Kinetics of fermentations. Continuous fermentation by immobilization techniques. Fermentation products, manipulation of microbial systems to improve biological processes.

AI 4216 Fibre Technology 3 credits

Prerequisites: AI 3202 Introduction to Agro-Industry
AI 4208 Processing of Agricultural Products II

Introduction to materials, equipments and processes used in Fiber Technology. Research and development for using natural fiber as a raw material for agro-industrial products.

AI 4218 Agro-Industrial Product Development 3 credits

Prerequisite: BG 2403 Introduction to Economics

Study of the corporate research and development function for the improvement of existing products and development of new, economically feasible and marketable agro-industrial products. Application of chemical-physical characteristics of raw materials for the production of high quality products: product and process cost reduction, consumer evaluation, equipment and package development.