Bachelor of Applied Science (Food Technology)

Second-year subjects

208-210 Financial Management for Resource Ind I

See full subject details on page 3.

208-216 Food Microbiology

Availability: Gilbert Chandler campus.

Credit points: 12.5 **HECS-band:** 2

Coordinator: Ms Susan Pepper

Contact: Five hours per week *(Semester 1)*.

Description: The objective of this subject is to enable students to:

- describe the micro-organisms of importance to the manufacture of food products and explain the effects they exert upon manufacturing practice and quality;
- explain the effect of manufacturing processes upon the activity and survival of particular types and species of micro-organisms;
- analyse problems associated with micro-organisms that occur within food factories and dairy foods;
- describe the role of microbes in the treatment of factory effluent; and
- describe new applications of microbes and microbial by-products in the food industry.

The content includes microflora of dairy products; food spoilage; public health hazard; characteristics of *Salmonella, S. aureus. Clostridium, E. coli, B. cereus, Yersinia, Campylobacter, Listeria*; control of micro-organisms in food manufacturing; sampling and line and environmental survey techniques; and applications of microbial genetics to new technologies.

Assessment: Three practical reports of 1000 words (10% each); two 2-hour examinations (30% each); assignment of 1500 words (20%).

208-218 Production Management

Availability: Gilbert Chandler campus

Credit points: 12.5 **HECS-band:** 2

Contact: Five hours per week *(Semester 2)*.

Description: The objective of this subject is to enable students to:

- state and evaluate the requirements of various regulations influencing food manufacturing units;
- identify strategies for scheduling of production;
- evaluate critical factors in planning and constructing a dairy food manufacturing unit, and apply an understanding of these factors to the design of a dairy food manufacturing unit;
- identify key components of an effective storage and distribution system for food;
- prepare operating budgets for defined production units;
- develop and implement strategies for the optimisation of production systems and resources;
- identify and evaluate different methods for treating factory effluent;
- implement strategies for preventative maintenance programs in a food production unit;
- understand the principles of factory layout, provision of factory services preventative maintenance, effective cleaning and sanitation practices, retrieval and storage of raw materials, prevention of contamination, effective personal hygiene practices, regulatory requirements and disposal of waste materials;
- understand the factors involved in factory layout and the associated provision of services;
- implement sound principles of raw material handling and storage;
- apply the principles of preventative maintenance;
- identify and manage sources of contamination of foodstuffs;
- have a working knowledge of regulations relevant to factory practice;
- understand factors affecting efficient cleaning and sanitation; and
- apply principles of waste disposal.

The content includes regulations and codes of practice; factory design, planning and construction; production scheduling; production scheduling; concepts, factors influencing; production budgeting, factors influencing budget preparation, loss monitoring; stock rotation and control, storage, warehousing, materials handling, transport, regulatory requirements; effective storage and distribution systems, food storage requirements and systems; environment and effluent control, effluent disposal, types of effluent, regulations, costs; factory layout and services; raw material handling; preventative maintenance; contamination of foodstuffs; regulatory requirements; cleaning and sanitation; and waste disposal.

Assessment: Five industry visit reports of 1000 words (40%); assignment-literature review of 2000 words (20%); 2-hour examination (40%)

208-224 Industry Placement II

Availability: Gilbert Chandler campus

HECS-band: 2

Coordinator: Dr Mani Iyer

Contact: Ninety hours of academic work within a minimum period of three months employment in industry *(Year long)*.

Description: The objective of this placement is to provide students with an opportunity and environment to:

- analyse the manufacturing process with respect to the optimum use of resources, the application of technologies, and the quality of product;
- analyse the interactions of manufacturing processes, quality specifications, human resources, marketing and business constraints;
- develop and apply knowledge and occupational skills appropriate to the industry; and
- observe and analyse the activities of the analytical laboratory with emphasis on methodology and equipment used in analysis, quality assurance functions, and the interaction with production and development.

The content includes analysis of manufacturing processes with respect to the optimum use of resources, the application of technologies and the quality of product; investigation of the scientific principles as applied to the technologies utilised in process; identification of potential applications of new technologies to existing manufacturing processes and evaluation of proposals on basis of technical, economic, resource and industry considerations; evaluation of analytical techniques employed to monitor process and product quality on the basis of efficiency, reliability and validity; prospects for introduction of innovative methods of analysis; and the interaction of factors such as the manufacturing process, quality assurance, marketing and business constraints, human resources, and total industry influence.

Assessment: Industry analysis report of 4000 words (100%).

208-311 Engineering Applications

Availability: Gilbert Chandler campus

Credit points: 12.5 **HECS-band:** 2

Coordinator: Mr John Near

Contact: Five hours per week *(Semester 1)*.

Description: The objective of this subject is to enable students to study at greater depth particular areas of engineering applications, and to develop students' ability to:

- describe an automated process control system and identify its components;
- describe the principles of PID control;
- identify the difference between process regulation and sequence control;
- operate an automated process control system;
- recommend a choice of control system;
- participate in the commissioning of a control system; and
- understand the principles of programming for PLCs.

Students will study, in depth, the following topics: heat transfer applications, heat loads, cold rooms, insulation; pneumatics, membrane engineering; the physical and engineering principles used in the design, operation and control of each application; quantification of the operating parameters which determine function and application to industrial processes; current technology and developments; available literature on operation, design, equipment and current developments; design project covering fundamental aspects of a simple application and analysis of the functionality of an existing system; principles of automated process control: use of micro-processors for process control and instrumentation; definitions of feedback, feed-forward, cascade, PID control; hardware and software for process control: the nature of hardware components for process control, design, limitations, advantages; typical graphical interface software; programming languages; operation of an automated process control system; selected automated systems; graphical interface and keyboard; stand alone PID controllers; systems installation and maintenance - selection, installation and maintenance of a process control system; factors to be considered in selection of system hardware and software; training of operators; and advantages and disadvantages of automated systems.

Assessment: Assignment of 3000 words (30%); two practical reports of 1500 words (15% each); 2-hour examination (40%).

Third-year subjects

202-302 Human Resource Management

See full subject details on page 4.

208-305 Production and Management Techniques

Availability: Gilbert Chandler campus

Credit points: 12.5 **HECS-band:** 2

Coordinator: Dr Vijay Mishra

Contact: Five hours per week *(Semester 1)*.

Description: The objective of this subject is to develop a student's ability to use a range of decision-support systems and qualitative techniques for production and management problems.

The content includes control of cost, budget and cost benefit analysis; maintenance control; material and capacity requirements planning; production scheduling and information systems; production facility design and optimisation; decision-making and resource allocation approaches; linear programming and tabular programming; inventory control and marginal analysis; service levels and queuing theory; production and process planning and scheduling; simulation techniques; project network management; and facility location and layout design.

Assessment: Three assignments of 2000 words (20% each); 2-hour examination (40%).

208-310 Analytical Techniques

Availability: Gilbert Chandler campus

Credit points: 12.5 **HECS-band:** 2

Coordinator: Dr Hubert Roginski

Contact: Five hours per week *(Semester 1)*.

Description: The objective of this subject is to develop students' ability to:

- describe the physical, chemical and microbiological principles which underlie rapid and instrumental techniques for testing and analysing raw materials and finished products;
- evaluate innovative instrumental methods for specific purposes and materials against criteria of reliability and validity of results, and of cost and efficiency of monetary and labour resources; and
- select rapid or instrumental methods for analyses appropriate to the type of evaluation or assessment required.

Each of the following types of analytical techniques will be studied in line with the objectives outlined: physical, chemical, and microbiological parameters to be assessed; principles of instrumentation and/or methodology and applications of these principles to the technologies employed in analytical techniques; comparison of instrumental and/or rapid methods to conventional techniques of analysis; operation, calibration and standardisation procedures as applicable to particular techniques; assessment and evaluation of data derived from instrumental and/or rapid methods. Methods to be examined are chromatographic, TLC, HPLC, GLC; ion exchange separations; spectrophotometry, UV, visible, AA; mass spectrometry; serological techniques, FA, ELISA, monoclonal antibody; DNA and RNA technology, probes, PCR; electrophoretic separations; impedance; and industrial and research applications.

Assessment: Laboratory reports (20%); two examinations of 1.5 hours each (40% each).

208-312 Biochemistry and Fermentation Technology

Availability: Gilbert Chandler campus

Credit points: 12.5 **HECS-band:** 2

Coordinator: Dr Hubert Roginski

Contact: Five hours per week *(Semester 2)*.

Description: The objective of this subject is to develop students' ability to:

- describe the energetic balances within the cell and relate these to the nature of biochemical reactions;
- explain the effect of oxygen and substrate influences on the rate and nature of cellular reactions and pathways;
- describe qualitatively the structure and function of enzymes;
- describe the role of DNA and RNA in controlling protein synthesis and explain the significance of DNA to cell characteristics;
- describe the degradative and synthetic pathways for carbohydrates, fats and protein;
- explain the interaction of selected metabolic pathways;
- explain the microbiological biochemical and engineering aspects of industrial fermentations;
- explain the interaction of microbiological, biochemical and engineering factors on the design and operational efficiency of industrial fermentations; and
- evaluate fermentation technologies against criteria of efficiency, economics, and environmental impact.

The content includes introduction to biochemistry as important to the microorganisms in dairy food manufacture and to human nutrition; the nature of biochemically significant compounds; bioenergetics of the cell; the role of ATP, its synthesis in catabolic pathways and use in biosynthesis and transport; ATP formation under aerobic and anaerobic condition; the role of enzymes, co-enzymes and vitamins; enzyme properties and functions as they influence reaction kinetics and thermodynamics of cellular reactions; introduction to structure and replication of DNA and RNA, and protein synthesis; metabolic pathways such as tricarboxylic acid cycle, glycolysis, oxidation of fats, and degradation of amino acids; synthesis of carbohydrates, fats and proteins; regulation of metabolism, cultivation of micro-organisms substrate use and product formation; fed-batch culture; continuous culture, chemostats, cell recycling; biological reactor design; engineering considerations; scale-up and scale-down downstream processing; and products and processes.

Assessment: Two 2-hour examinations (50% each).

208-314 Technology of Food Processing

Availability: Gilbert Chandler campus.

Credit points: 12.5 **HECS-band:** 2

Coordinator: Dr Hubert Roginski

Contact: Five hours per week *(Semester 1)*.

Description: The content includes food additives and preservatives; food preservation; science and technology of manufacture/processing foods; and techniques for evaluation of consumer acceptance.

Assessment: Major assignment 2500 words (30%); two examinations of 1.5 hours each (35% each)

208-315 Research Project

Availability: Gilbert Chandler campus

Credit points: 12.5 **HECS-band:** 2

Coordinator: Mr Alan Morgan

Contact: Five hours per week *(Semester 2)*.

Description: The objective of this subject is to develop a student's ability to:

- identify a specific problem relevant to the dairy food industry;
- formulate a logical program of investigation directed towards the problem;
- identify important components of the problem;
- select appropriate methodologies to investigate the problem.
- execute a controlled investigation of the problem;
- analyse the results of the investigation quantitatively and evaluate the significance of results obtained;
- prepare a written report of the investigation;
- present orally a summary of the investigation findings; and
- recognise the implications of the investigation findings as they influence technical, economic, environmental, human or political considerations for the industry.

The content includes problem identification, literature review, design and justification of investigation, execution of experimental work, analysis of results, oral presentation of findings, and preparation of written research report.

Assessment: Project proposal and literature review of 3000 words (15%); seminar presentation of proposal (15%); project report of 5000 words (50%); seminar presentation of project report (20%).

208-319 Trends in Food Science and Nutrition

Availability: Gilbert Chandler campus.

Credit points: 12.5 **HECS-band:** 2

Coordinator: Dr Hubert Roginski

Contact: Five hours per week *(Semester 2)*.

Description: The content includes applications of dairy ingredients; fat/protein fraction, bio-active milk fractions; casein applications; functional dairy ingredients; pro-biotic products; developments in food technology; enzyme processing; imitation foods and fat replacement; supercritical extractions; product development concepts and systems; legislation and foods; nutrition cultural trends; social significance; food habits; major nutrient groups; intake, absorption, and dietary balance; calorimetry; energy requirements; food toxicology; chemical residues; natural and synthetic hazards; allergic reactions; role of packaging; packaging materials; product requirements; manufacture of packaging materials; packaging equipment and processes; testing and quality of packaging; and environmental and waste considerations.

Assessment: Literature review of 3000 words (30%); two industry visit reports of 1000 words (10% each); 2-hour examination (50%).

208-321 Food Safety, Quality and Regulation

See full subject details on page 2.

Elective subjects

208-220 Fermented Milk Products

Availability: Gilbert Chandler campus

Credit points: 12.5 **HECS-band:** 2

Coordinator: Mr Neil Willman

Contact: Five hours per week *(Semester 2).*

Description: The objective of this subject is to enable students to:

- understand how the critical steps in milk fermentation can be managed;
- identify the different characteristics of the major categories of cheese;
- state the effects that each stage of the fermentation and cheese-making process has on milk and curd;
- explain how adjustments and modifications can be made to the basic process of manufacture to alter product characteristics;
- evaluate the benefits of different approaches to mechanisation and automation;
- state the origins of defects in quality in different fermented products;
- state the legal requirements determining manufacture of different fermented products; and
- compare the fermentation of milk to fermentation of other foods.

The content includes markets and customer requirements; principles of fermented product manufacture; QC sampling; testing and recording; packaging of products; cleaning and sanitation; quality requirements; and yoghurt and other fermented milks.

Assessment: Five practical reports of 1000 words (20% total); two 2-hour examinations (30% each); literature review of 2000 words (20%).

208-221 Frozen and Fat Products

Availability: Gilbert Chandler campus

Credit points: 12.5 **HECS-band:** 2

Coordinator: Mr Sam Cutri

Contact: Five hours per week *(Semester 1).*

Description: The objective of this subject is to develop a student's ability to:

- describe the theoretical and practical aspects of manufacturing frozen milk products;
- identify customer requirements and adjust procedures to manufacture various types of products;
- state the causes of defects in the finished product and recommend action to minimise these defects;
- state the legal requirements determining processing and composition of the finished product;
- identify potential areas for product losses and recommend strategies for minimising losses;
- describe theoretical and practical aspects of processing other frozen foods;
- understand the interaction of chemical, microbiological, nutritional and engineering factors in affecting end product quality.
- describe theoretical and practical aspects of processing other frozen foods;
- identify customer requirements and recommend procedures to manufacture different products to meet customer requirements;
- state the causes of defects in the finished product and recommend action to minimise these defects;
- state the legal requirements determining processing and composition of the finished product; and
- understand the interaction of chemical, microbiological, nutritional, and engineering factors in affecting end product quality.

The content includes introduction to frozen milk products; structure of ice-cream; ice-cream formulations and ingredients; mix preparation; homogenisation and pasteurisation of mix; cooling and ageing; addition of flavours and colours; freezing and packaging; hardening and storage; evaluation of finished product; other frozen products; cleaning and sanitation of ice-cream manufacturing equipment; quality control and assurance; markets for frozen milk products; customer requirements for fat products; principles of butter making; preparation of cream; churning and working; packaging and storage; reworking; organoleptic evaluation; cleaning and sanitation; butter making; other fat products; cultured butter; anhydrous milk fat; and ghee manufacture.

Assessment: Two practical reports of 1500 words (15% each); two 2-hour examinations (25%) each; literature review of 2000 words (20%).

208-222 Concentrated and Dried Dairy Products

Availability: Gilbert Chandler campus

Credit points: 12.5 **HECS-band:** 2

Coordinator: Mr Michael Robinson

Contact: Five hours per week *(Semester 2).*

Description: The objective of this subject is to enable students to:

- state customer requirements and describe different applications of products;
- describe the different techniques used to concentrate milk solids;
- assess how the functional properties of the end product are influenced by the use of different types of driers;
- list the critical points in the manufacture of a specified powder;
- identify the different functional properties of casein, caseinates, co-precipitates, whey protein concentrates;
- state critical points in the manufacturing process which affect the functional properties of a casein related product;
- state the legal requirements determining the manufacture of the different concentrated milk and whey products;
- describe suitable concentrations and drying processes for other foods; and
- understand the interaction of chemical, microbiological, nutritional, and engineering factors in affecting end product quality.

The content includes products and production figures; evaporation principles; components and function of evaporators; principles of drying; components and functions of driers; powders made from milk and whey, types and functional properties; specific cleaning requirements in concentration and drying plants; and casein and related products, types, functional properties, manufacturing process, uses.

Assessment: Five practical reports of 1000 words (20% total); two 2-hour examinations (30% each); literature review of 2000 words (20%).

208-223 Liquid Products and Membrane Technology

Availability: Gilbert Chandler campus

Credit points: 12.5 **HECS-band:** 2

Contact: Five hours *(Semester 2).*

Description: The objective of this subject is to develop the student's ability to:

- describe the theoretical and practical aspects of processing liquid dairy products, non-dairy products and dairy desserts;
- implement the practice of processing and packaging liquid milk products, non-dairy products and dairy desserts;
- describe customer requirements and adjust procedures to various product applications for liquid milk products;
- identify possible causes of defects in the finished product and recommend action to minimise these defects;
- state the legal requirements determining processing and composition of the finished product;
- explain the interaction of chemical, microbiological, nutritional and engineering factors in affecting end product quality;
- become familiar with the terminology for membrane processes and technology;
- understand the principles underlying membrane separation technologies;
- identify major applications for the processes in the dairy food industry;
- describe the manufacturing process of various products made using one or more membrane technologies;
- understand the cleaning and sanitation requirements for the membrane technology equipment and its accessories; and
- evaluate the scope for various membrane processes in treating various streams including the treatment of waste streams.

The content includes market and customer requirements; formulations of products; heat treatment; packaging and handling milk and cream products; cleaning and sanitation; quality control and assurance; principles of ultra heat treatment; specific UHT products; selection and preparation of milk or milk products; homogenisation; dairy desserts; membrane terminology; membrane materials and modules; classification of membrane processes; application of membrane processes; factors affecting the performance of membrane systems; fouling of membrane systems; demineralisation technologies; manufacture of dairy products using membrane technologies; cleaning and sanitation of membrane systems; and other applications of membrane technologies such as those in waste treatment.

Assessment: Two 2-hour examinations (40%); practical report (20%).