

Bachelor of Applied Science (Dairy Foods)

First year subjects

209-102 Food Science

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Mr M Robinson

Contact: 5 hours per week (Semester 1) (*Semester 1*).

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

- recognise the role of water in foods and its role in food preservation;
- recognise the major food components in terms of chemical structure, reactivity and physical properties;
- recognise the role of minor food components in foods;
- have an overview of the role of food additives, their function and origins;
- have an overview of general food preservation techniques.
- perform unit process employed in food manufacture;
- explain the principals which underline unit processes; and
- relate the effect of unit processes to end product quality parameters.

The content includes food components; water; carbohydrates; proteins; enzymes; lipids; vitamins and minerals; minor components; introduction to food preservation, additives and preservatives; physical properties of foods; the principles and practice of unit operations in the manufacture and processing of foods; pumping; mixing; nature of particles in: liquid-liquid, solid-liquid, solid-solid, solid/liquid-gas; filtration and clarification; separation; homogenisation; heat treatment; drying; freezing; and concentration.

Assessment: Assignment of 1500 words (20%); two 2-hour examinations (40% each).

209-103 Engineering Physics

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Mr John Near

Contact: 6 hours per week (*Semester 1*).

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

- explain the physical principles of processes and equipment operations in a dairy food factory;
- apply the conventions for using symbols, equations, formulae and graphical representations;
- apply a knowledge of physical properties and their measurement;
- explain the relationship between heat and temperature and apply this understanding to problems of heat transfer, latent heat and phase change;
- define the pressure, flow and velocity characteristics of liquids and make related calculations;
- explain the physical properties of thermal expansion, stress/strain relationships, and deformation behaviour of solids; and
- apply fundamental concepts of electricity.

The content includes physical properties and their measurement; heat, temperature energy; properties and behaviour of fluids; physical properties of solids; fundamentals of electricity; and fundamentals of light and radiation.

Assessment: Five 500-word assignments (4% each); five practical reports (4% each); two 2-hour examinations (30% each).

209-104 Chemistry

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Mr Chis Higgs

Contact: 6 hours per week (*Semester 1*).

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

- apply an understanding of atomic and molecular structure to the properties of elements and compounds;
- explain phase change phenomena in terms of molecular, atomic or ionic interactions;
- use the conventions for chemical symbols, formulae and equations;
- describe the nature of chemical change;
- carry out chemical calculations for a variety of reactions;
- explain the principles of chemical determinations by volumetric and gravimetric methods;
- apply theories of acid and base action and make appropriate calculations;

- apply concepts of oxidation and reduction;
- name and describe basic categories of organic compounds;
- explain properties of organic compounds on the basis of structure and nature of functional groups; and
- relate basic principles to the physical and chemical properties of milk and other foods.

The content includes nature and structure of matter; chemical symbols and formulae; periodic table; nature of chemical change; writing chemical equations; chemical calculations; stoichiometry; concentrations of solutions; acids, bases neutralisation pH, buffers; oxidation and reduction; equilibria; organic chemistry; and physical and chemical properties of milk and other foods.

Assessment: One 1500 word assignment (20%); five practical reports (4% each); two 2-hour examinations (30% each).

209-105 Computing and Statistics

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Mr Chris Higgs

Contact: 5 hours per week (*Semester 1*).

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

- describe a range of computing systems and explain applications of computer based information services;
- recognise and specify personal computer hardware components;
- correctly operate a personal computer and its operating system including maintenance and minor fault diagnosis;
- create, maintain, update, transfer and back-up data files;
- determine appropriate software to use given a data processing requirement;
- select an appropriate computer system for use in a given enterprise;
- gain useful proficiency in the following types of software packages: word processing, spreadsheet, database;
- apply logarithms and exponentials to physical problems;
- analyse physical problems using rate of change, behaviour and limits of functions;
- use approximation, derivatives and integrals to solve calculations of distance, area, volume, work, pressure, and time within physical systems;
- apply statistical techniques to sampling, quality control, experimental data and other data relevant to the management of a food production subject;
- understand the principles of measures of central tendency and distribution;
- calculate and explain probability and understand the probability distributions;
- relate sampling distributions to statistical considerations;
- explain applications of estimation statistics;
- apply concepts of correlation and regression; and
- explain the principles of hypothesis testing.

The content includes types of personal computers available; the place for computers and the programs used in them; hardware, including microprocessors, memory, disk drives, monitors, keyboards, printers, modems, power supplies; software, including word-processing, databases, spreadsheets, graphics, utilities, disk operating systems; testing and implementation of software; possible applications in the dairy industry; methods of data storage; operations of computers including keyboard skills, maintenance, backing up and transferring data; virus protection and security of data; collection, organisation and analysis and report of data; measures of dispersion, probability distributions for discrete and continuous variables; and sampling distributions, estimation, analysis of variance, correlation and regression, hypothesis testing and the meaning of significance, integration, application of the definite integral and transcendental functions, rates of change and the limits of a function and applications of algebraic functions.

Assessment: Two examinations of two hours each (30% each); four exercise (10% each).

209-106 Introduction to Food Microbiology

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Mr Alan Morgan

Contact: 5 hours per week (*Semester 2*).

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

- describe the nature of micro-organisms, their classification, identification, growth and cultivation;

- describe the importance of micro-organisms for food processing, fermentations, food spoilage and food poisoning;
- describe and evaluate both qualitatively and quantitatively the action of anti-microbial agents, chemical and physical;
- apply basic microbiological principles to the production, handling, processing and marketing of foods;
- perform basic laboratory techniques for studying micro-organisms;
- describe routine microbiological analyses for milk and other raw materials and for finished food products;
- select and evaluate analytical techniques for specific purposes and materials;
- identify appropriate techniques for use in quality control procedures;
- perform practical analyses of raw materials, food products, environmental samples and packaging materials; and
- understand the principles of test design.

The content includes microbiological diversity; fungi: yeasts and moulds; bacterial structure; bacterial growth and nutrient requirements; bacterial classification and identification; viruses: structure, replication and identification; methods for cultivation and identification of micro-organisms; control of micro-organisms; organisms of importance to dairy/food industry; microbiological quality of raw milk; rationale for microbiological testing; principles of test design; sample preparation; and microbiological testing of milk and dairy products and food.

Assessment: Two examinations of two hours each (30% each); four exercise (10% each).

209-107 Quality Management

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Mr Sam Cutri

Contact: 5 hours per week (*Semester 1, repeat 2*).

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

- devise a total quality management program for a specific product in a dairy food production subject;
- describe quality requirements for different domestic and international markets;
- evaluate the requirements of the Department of Primary Industry and Energy approved Quality Assurance mode of inspections and AS 9301-9303; and
- develop strategies for implementing total quality management systems within a production unit.

The content includes the nature of quality, principles and parameters; quality planning; sampling plans; quality manual requirements; and quality systems.

Assessment: Assignment of 2000 words (40%); one 2-hour examinations (40%); case study of 1500 words (20%).

209-108 Food Engineering

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Dr Vijay Mishra & Mr John Near

Contact: 5 hours per week (*Semester 2*).

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

- analyse pump characteristics and relate pumping system characteristics for optimum pump selection;
- quantify steam requirements for applications of steam heating in processing;
- understand the principles of heat exchange as related to various processing applications; and
- study at greater depth particular areas of engineering applications.

The content includes pumping and flow systems; steam production and heating applications; heat exchange design, types and applications; refrigeration; psychrometrics and air conditioning; 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; and design project covering fundamental aspects of a simple application and analysis of the functionality of an existing system.

Assessment: Two hour examination (40%); two practical reports of 2000 words (30% each).

209-109 Food Chemistry

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Dr Vijay Mishra

Contact: 5 hours per week (*Semester 2*).

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

- describe the composition of the different components of food;
- explain the effects of handling, storing and processing on the food components;
- evaluate the effect of the food components on human health and human nutrition;
- describe the properties, structure, composition and function of components of milk and dairy products;
- explain the implications of the properties of milk components for processing, quality, properties and nutrition;
- describe, explain, predict and evaluate the effects of handling, processing and manufacture on individual milk components and on the interaction of different milk components;
- describe routine physical, chemical and microbiological analyses for milk and other raw materials and for finished food products;
- select and evaluate analytical techniques for specific purposes and materials;
- identify appropriate techniques for use in quality control procedures;
- perform practical analyses of raw materials, food products, environmental samples and packaging materials; and
- understand the principles of test design.

The content includes water: water structure and properties; sorption phenomena; lipids: review of the structure, properties and characteristics; emulsions and emulsifiers; antioxidants for fats and oils; proteins: review of structural characteristics of protein, properties, functions and classifications; carbohydrates: review of structure and classification, carbohydrates as thickeners and stabilisers; colour: pigments of plants and animals, stability and reactions; enzymes: review of the nature, definition and mechanism of action, enzyme classification, substrate specificity, the composition of milk; milk proteins caseins, proteins with antimicrobial properties, whey proteins, fat globule membrane proteins, specific techniques for milk proteins, milk proteins and non-dairy foods, lipids, lactose, vitamins in milk, minerals in milk, inter-relationship and interaction of various components within dairy products; and rationale for chemical testing of foods: principles of test design, sample preparation, chemical testing of milk and dairy products and foods.

Assessment: Six practical reports of 500 words (20% in total); two 2-hour examinations (40% each).

209-110 Industry Placement I

Availability: Gilbert Chandler campus

HECS-band: 2

Coordinator: Mr Alan Morgan

Contact: 90 hours of academic work within a minimum period of three months employment in industry (*Semester 1, repeat 2*).

Description: The objective of this placement is to:

- provide an awareness of the routines and practices in a dairy food manufacturing unit;
- allow opportunity for students to enhance their skills in the practices of dairy food manufacture;
- provide experience of a commercial industrial environment;
- observe and analyse the layout of services and interaction of activities within the factory; and
- observe and analyse the relationship of elements of the organisation as they interact within the factory.

The content includes equipment operations: the working of dairy equipment and instruments, start-up and shut down procedures for a range of equipment, common problems associated with the operation of the equipment, measures to remedy the problems; manufacture of specific dairy products, the principles and practice of commercial manufacture of dairy products, the commercial process of manufacture, common defects in the product, measures to control product quality; factory services and layout: analysis of the layout of services and interaction of activities within the factory, suggested modifications to improve the interaction of activities within the factory; and organisational interaction: analysis of the relationship of various sections of organisation as they interact within the factory.

Assessment: Evaluation of factory report of 3000 words (100%).

Second year subjects

209-205 Food Microbiology

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Mr Sam Cutri

Contact: 5 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%).

209-206 Human Resources

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Mr Alan Morgan

Contact: 5 hours per week (*Semester 1*).

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

- communicate effectively in writing, in oral presentations, in personal interaction, and in work situations;
- understand the communication process and factors which influence effective communication;
- describe and understand the nature of group dynamics;
- apply principles of communication to human interactions and supervision in the workplace;
- apply the skills, knowledge and understanding required to operate effectively as a supervisor;
- identify and implement appropriate leadership styles;
- identify factors that contribute to job satisfaction for employees;
- apply team building strategies as they apply to work teams;
- understand and implement strategies for staff training;
- explain the nature and importance of human resources as an organisational asset;
- provide a knowledge of the theories, techniques and approaches to managing people-related problems and issues;
- develop an understanding of the industrial relations system including current issues in Australia; and
- develop strategies for the minimisation of industrial conflict.

The content includes communication process, group dynamics, workplace interactions both formal and informal, role of supervision, leadership, team building, motivation, job satisfaction, training; nature and importance of human resource management; selection and retention of staff; training and developing people; performance appraisal; establishing and maintaining effective employee relations; industrial relations structure; industrial relations; and challenges from structural efficiency negotiations.

Assessment: Three assignments of 2000 words (30% each); seminar presentation (10%).

209-207 Production Management

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Dr Mani Iyer

Contact: 5 hours per week (*Semester 1*).

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; 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%)

209-208 Business and Financial Management

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Assoc Prof Bill Malcolm

Contact: 5 hours per week (*Semester 1*).

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

- identify the major types of financial analysis and their functions;
- interpret information from selected financial analysis;
- identify the need for different types of budgets in the management of the business;
- prepare budgets for selected areas; and
- identify strategies for effective management of economic resources of a production unit.

The content includes financial analysis: types and purposes, balance sheets, profit/loss, cashflow, break even; historical cost accounting: strengths/weaknesses; cost-volume-profit relationships; costs for decision-making: fixed incremental, marginal, sunk, opportunity; cost classifications: fixed; evaluation and selection of investment projects; cost of capital; discounted cash flow analysis; sources of finance; working capital management; financial modelling; pricing decisions; budgets: flexible vs static; decision-making under varying conditions of risk; reporting; forecasting; risk analysis; and financial structure of companies and implications for financial decisions.

Assessment: Four assignments of 2000 words (25% each).

209-209 Fermented Milk Products

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Mr Neil Willman

Contact: 5 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%).

209-210 Frozen and Fat Products

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Dr Mani Iyer

Contact: 5 hours per week (*Semester 2*).

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%).

209-211 Concentrated and Dried Dairy Products

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Mr Michael Robinson

Contact: 5 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%).

209-212 Liquid Products and Membrane Technology

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Mr Chris Higgs

Contact: 5 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%).

209-213 Industry Placement II

Availability: Gilbert Chandler campus

HECS-band: 2

Coordinator: Dr Mani Iyer

Contact: 90 hours of academic work within a minimum period of three months employment in industry (*Semester 1, repeat 2*).

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%).

Third year subjects

209-305 Production Management Techniques

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Dr Vijay Mishra

Contact: 5 hours per week (*Semester 1*).

Description: The objective of this subject is to develop a students 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 assignment of 2000 words (20% each); 2-hour examination (40%).

209-306 Analytical Techniques

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Dr Hubert Roginski

Contact: 5 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).

209-307 Engineering Applications

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Mr John Near

Contact: 5 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%).

209-308 Biochemistry and Fermentation Technology

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Dr Hubert Roginski

Contact: 5 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 micro-organisms 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).

209-309 Food Industry Policy and Planning

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Prof Ellen Goddard

Contact: 5 hours per week (*Semester 2*).

Description: At the completion of this subject students will be able to:

- explain the significance of dairy farming practices as factors influencing the production of milk;
- identify end product quality parameters required by customers;
- become conversant with the legislation relating to production, storage, transport, processing/manufacturing of milk, and handling and sale of dairy products;
- identify the different organisations in the Australian dairy industry, their roles and the possible interactions with companies;
- understand the supply and demand for food products compared to other products;
- identify a suitable market segment for a given product;
- prepare a market plan for a selected product;
- discuss the place of new products in the company and market;
- identify key internal and external operating environmental factors;
- understand the linkages between these factors and business management;
- identify key industrial and business pressures, constraints, threats and opportunities; and

- identify, analyse and evaluate strategic approaches to key identified opportunities and threats.

The content includes production and utilisation of milk, farm aspects of milk production; structure of Australian dairy industry; Australian food industry; food processing in Australia; company ownership; markets for dairy products; government/statutory authorities and industry organisations; legislation; code of practice; principles of consumer behaviour and market demand; role of markets; introduction to marketing concepts as opposed to selling; market segmentation; introduction to marketing mix; product life cycle; product development concepts and systems; industrial markets; export markets and cultural differences; product range and depth; pricing objectives/decisions; packaging talks; brand decision; promotion; distribution channels; and inter-dependent linkages impacting on the Australian dairy and food industries.

Assessment: Two assignments of 2500 words (30% each), one assignment of 3000 words (40%).

209-310 Food Technology I

Credit points: 12.5

HECS-band: 2

Coordinator: Dr Hubert Roginski

Contact: 5 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)

209-311 Research Project

Availability: Gilbert Chandler campus

Credit points: 12.5

HECS-band: 2

Coordinator: Mr Alan Morgan

Contact: 5 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%).

209-315 Food Technology II

Credit points: 12.5

HECS-band: 2

Coordinator: Dr Hubert Roginski

Contact: 5 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%).