

■ **EG401 MINE POWER SUPPLY AND DRAINAGE**

OFFERED To be advised

This unit acquaints the student with the provision and reticulation of mine services and power supply, and the effect of mine and surface water. Ground water, pumps and pipelines, mine dewatering, preventing inflow, mining under water, flooding, disposal. Capacity and power factor, distribution systems, cables transformers, protection, signals and automation, lighting, thyristor control, flame and explosion proofing, tariffs, compressed air, electro-hydraulic systems.

■ **EG402 PRODUCTION DRILLING AND BLASTING**

OFFERED To be advised

This unit reinforces present knowledge in production drilling and blasting, and examines up-to-date production drilling and blasting methods. Content includes production drilling methods and equipment, bits and drilling accessories, explosive types, explosive properties and characteristics, principles of blasting, initiation systems, small-scale methods of drilling and blasting, large-scale methods and mass blasting, crater blasting systems, controlled blasting techniques, vibrations and air blast, secondary breaking, case studies and costs.

■ **EG403 TUNNELLING & MINE DEVELOPMENT**

OFFERED To be advised

This unit develops an understanding of conventional and mechanised tunnelling methods and their application to mine development. Mine planning, shafts versus declines, conventional tunnelling, jumbo methods, road headers, full face tunnel boring, raising methods, sinking and winzings, ground support, underground layouts, case studies and costs are the main topics covered.

■ **EG404 UNDERGROUND PRODUCTION SYSTEMS**

OFFERED To be advised

This unit develops an understanding of Australian and overseas underground production systems and their application to ore bodies of various shapes and other characteristics. The need for efficiency, the shift away from labour intensive systems, selecting a production system, stoping methods, coal mining methods, fill materials and transport, case studies and costs are the main topics covered.

■ **EG405 MATERIALS HANDLING AND HOISTING**

OFFERED To be advised

An introduction to the handling of broken rock and mineral products in underground mines. Hoisting, wire ropes, underground rail, trackless mining, pipeline systems, loaders, scrapers, conveyors, continuous mining.

■ **EG408 COMPANY ECONOMICS AND FINANCE**

OFFERED To be advised

This unit provides an understanding of the corporate economic environment at a mine. Marketing mineral products, abundance, price, credit assessment and financing of mines, feasibility studies, economic optimisation, financial analysis; pit optimisation; cut-off grades; production scheduling; maintenance replacement decisions, taxation, freight, balance sheets and Semesters 1&2 reports, equity and debt financing, true cost of capital, leverage, ratio analysis, project analysis, production economies, cost control systems and reporting.

■ **EG409 ROCK MECHANICS APPLICATIONS**

OFFERED To be advised

This unit gives an appreciation of rock mechanics theory and its practical application to the design of safe and efficient mining excavations. Mechanical properties of rock and their measurement, role of discontinuities, structural mapping and data presentation, hemispherical analysis, mechanisms of slope failure, effects of water, deterministic and probabilistic analysis, elastic theory, non-elastic behaviour, strength criteria, stress measurement, numerical modelling, support and reinforcement, backfill, monitoring rockmass performance.

■ **EG410 ORE RESERVE ESTIMATION**

OFFERED To be advised

This unit develops an understanding of current theory and practice in the sampling and evaluation of mineral deposits and grade control. Collection, preparation and analysis of mineral samples, problems of error and bias and their control, reporting and classification of resources and reserves, compositing and the extension function, classical estimation techniques, statistical approach, the geological database, orebody modelling, inverse distance weighting, the variogram, kriging, comparative review of estimation methods, grade control, case studies.

■ **EG411 SURFACE MINING OPERATIONS & EQUIPMENT**

OFFERED To be advised

This unit gives an overview of surface mining methods and equipment. Bench mining, strip mining, alluvial mining, bucket wheel excavators, draglines face shovels, hydraulic excavators, wheeled loaders, scrapers, continuous miners, in pit crushers, estimating and equipment selection.

■ **EG413 MINE SAFETY & ENVIRONMENTAL ENGINEERING**

OFFERED To be advised

This unit enables students to understand factors affecting the mine environment, and how to control them to achieve a safe, healthy and comfortable workplace. Legislative framework and requirements, historical development of health and safety philosophies, types of accidents and injuries, hazard management, human factors, manual handling, entry into confined spaces, control strategies, atmospheric contaminants and their control, noise, radiation heat and humidity, illumination, properties of mine air, measurement and control of airflow, mine fans, network theory and analysis, outbursts and explosions, fires, mine rescue.

■ **EG414 MINE SURVEYING**

OFFERED To be advised

This unit introduces the theory and practice of mine surveying to students without a surveying background. Introduction to surveying and use of survey instruments, location of drill holes, bench surveys, layout of blasting patterns, haul road set out, transfer of control from surface to underground, alignment of underground development, pickup surveys, recording of survey information, control systems, location and selection of stations, bore hole surveys, subsidence surveys, slope monitoring.

■ EG415 ENVIRONMENTAL MANAGEMENT OF MINES

OFFERED To be advised
 Managers' responsibility, environmental effects statements; legislation; noise; vibration; dust and visual impact; disposal of solid and liquid wastes; hazardous substances; effect of surface and ground water; risk management; environmental audits; assessment; monitoring soil management; rehabilitation; revegetation; community relations.

■ EK511 FUNDAMENTALS OF ENGINEERING (CALCULUS AND PHYSICS)

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITES Nil
 COREQUISITES Nil

This unit is intended to develop an in depth understanding of the most fundamental principles governing our physical world, presented in a context of engineering applications. The relationship between Science and Engineering is explained. Students are introduced to the fundamental quantities and units of mass, force, energy and electricity.

■ EK550 INTRODUCTION TO DESIGN & PRACTICE

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITES Nil
 COREQUISITES Nil

This unit introduces students to the basic concepts of engineering design, the design process and the application of computer aided design tools. The unit will enable students to describe and explain fundamental engineering concepts through hands on design, and to display a familiarity with a range of engineering devices, structures, systems and processes. Students will solve design problems independently and in teams using appropriate technology.

■ EK565 FUNDAMENTALS OF ENGINEERING (STATICS)

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITES Nil
 COREQUISITES Nil

This Unit is intended to develop an in depth understanding of the fundamentals of the statics element of applied mechanics. Topics include Dimensional analysis, two and three dimensional vector manipulation, resolution and adding of forces, equilibrium, free body diagrams, centroid of area, centre of mass, centre of gravity, analysis of pin jointed frames, bending moment and shear force diagrams, bending stresses in beams, combined axial and bending stresses.

■ EK566 FUNDAMENTALS OF ENGINEERING (DYNAMICS)

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITES Nil
 COREQUISITES Nil

This Unit is intended to develop an in depth understanding of the fundamentals of the dynamics element of applied mechanics. Topics include Rectilinear Motion, Curvilinear Motion, Relative Motion, Kinetics of Particles, Rigid Body Dynamics, Introduction to Vibration, Simple Harmonic Motion, Introduction to the concept of natural frequencies and resonance in structures.

■ EK570 FUNDAMENTALS OF ENGINEERING (MATERIALS)

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITES Nil
 COREQUISITES Nil

This unit provides an introduction to the chemistry of engineering materials, the relationships between processing, structure and properties of materials and the interface between design and materials and process selection. Topics covered include introduction to bonding, classes of engineering materials (metals, polymers, ceramics and composites), the relationship between mechanical properties and microstructure, materials selection and the manufacturing processes available for engineering materials.

■ EK580 FUNDAMENTALS OF ENGINEERING (ELECTRICITY & MAGNETISM)

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITES Nil
 COREQUISITES Nil

This unit is intended to develop an in depth understanding of the basic concepts relating to electricity and magnetism. The unit encompasses such topics as the definition, measurement and relationship between voltage, current and resistance; Series and parallel circuits; Kirchoffs Laws; Use of "Electronic Workbench"; Electrical energy, power and efficiency; Magnetic fields, electromagnetism; Introduction to DC machines; Introduction to AC power; Introduction to electronic control.

■ EK590 FUNDAMENTALS OF ENGINEERING (APPLIED MATHEMATICS 1)

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITE EK511 or Equivalent VCE studies
 COREQUISITES Nil

This unit focuses on applied mathematics. Students are instructed in mathematical concepts that can be used to solve problems relating to engineering. The unit is designed to demonstrate to students that a good understanding of applied mathematics is a necessary ingredient to successful and reliable design.

■ EK635 ENGINEERING SURVEYING

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITE EK590
 COREQUISITES Nil

This unit introduces the student to concepts and methods of Engineering Surveying including: basic surveying instrumentation for measurement of lengths, angles, elevation; survey techniques used in survey control, engineering detail surveys, mine surveying, layout of engineering projects; computation and processing methods used in engineering surveying; the management of the processes of engineering surveying including equipment selection, management of personnel, survey data and records.

■ EK636 INTRODUCTION TO INFRASTRUCTURE ENGINEERING

CREDIT POINTS	15
OFFERED	One Semester
PREREQUISITE	EK570
COREQUISITES	Nil

A brief history of excavation technology; modern drills and their driving mechanisms; effect of rock and soil characteristics on excavation; properties of modern explosives; explosive initiation systems; principles of blasting; blasting techniques and applications; blasting and the environment; mechanised excavating techniques; trenching; quarrying; excavating for building foundations; Geometrical Road Design; Introduction to concrete construction.

■ EK640 THEORY OF MACHINES & DRIVES

CREDIT POINTS	15
OFFERED	One Semester
PREREQUISITES	EK565, EK566
COREQUISITES	Nil

This unit is designed to enable students to: describe system; model, simulate, control and design dynamic engineering systems using software; apply dynamic analysis to a variety of real engineering applications; relate experimental findings to the analytical model and system variables. Areas of study include: overview of industrial machinery; sources of mechanical power; machine drives and the transmission of power; mechanisms; engine dynamics; dynamic analysis of machinery; analysis of load/drive characteristics; evaluation of optimal conditions.

■ EK645 ANALYSIS OF ELECTRICAL MACHINES & DRIVES

CREDIT POINTS	15
OFFERED	One Semester
PREREQUISITE	EK590 or equivalent
COREQUISITES	Nil

This unit aims to present an introduction to electrical machines, as they would typically be encountered in industrial situations. Topics covered include: Revision of AC theory and analysis; Introduction to the concepts of multiple field magnetic systems; The Two Winding Transformer; The Three Phase Induction Machine; The DC Machine; The Synchronous Machine; The Single Phase AC Machine.

■ EK650 PRINCIPLES OF DESIGN & ANALYSIS

CREDIT POINTS	15
OFFERED	Both Semesters
PREREQUISITE	EK550
COREQUISITES	Nil

This unit enables students to describe and explain the principles of engineering design and analysis, to relate and integrate environmental, social, organisational, and economic aspects in engineering design and to identify and emphasise issues of sustainable development in engineering practice. It introduces students to the methods of product and component design and to their analysis using computer algebra systems. Design examples include electrical circuits, networks and systems, machine, mining and infrastructure elements.

■ EK660 FUNDAMENTALS OF ENGINEERING (FLUIDS & THERMOFLUIDS)

CREDIT POINTS	15
OFFERED	One Semester
PREREQUISITE	EK590
COREQUISITES	Nil

This unit is designed to introduce students to the fundamentals on which fluid mechanics and thermodynamics are based including: history of fluid mechanics, fluid statics; elementary fluid dynamics; similitude; viscous flow of fluids in conduits; flow around a body; rotary machines; elementary thermodynamics; air conditioning.

■ EK670 OCCUPATIONAL HEALTH & SAFETY

CREDIT POINTS	15
OFFERED	One Semester
PREREQUISITES	Nil
COREQUISITES	Nil

This unit aims to introduce undergraduate students to the theory and application of occupational health and safety management and the control of hazards. The unit is composed of optional topics. Students choose the most suitable combination of topics to fulfil their requirements and build on the level of knowledge and skills they have already attained in occupational health and safety.

■ EK680 FUNDAMENTALS OF ENGINEERING (SOLID MECHANICS)

CREDIT POINTS	15
OFFERED	One Semester
PREREQUISITES	EK565, EK566, EK590
COREQUISITES	Nil

This unit is designed to introduce students to the fundamentals on which solid mechanics is based including: history of solid mechanics; equilibrium; axial loading; torsion; beam analysis; shear flow; stresses and strain; columns; theories of failure; energy methods.

■ EK690 FUNDAMENTALS OF ENGINEERING (APPLIED MATHEMATICS 2)

CREDIT POINTS	15
OFFERED	One Semester
PREREQUISITE	EK590
COREQUISITES	Nil

This unit is designed to extend the students understanding of applied mathematics. The content includes differential equations, numerical methods, linear algebra, linear programming, functions of several variables, extreme values, LaGrange multipliers, vector calculus, line integrals and statistics.

■ EK701 NUMERICAL METHODS FOR ENGINEERS

CREDIT POINTS	15
OFFERED	Both Semesters
PREREQUISITES	EK660, EK680, EK690
COREQUISITES	Nil

This unit will introduce students to the more complex design tasks, which span disciplines and involve many areas of engineering science. Students will be exposed to the principles and methods of Modelling and Simulation, and optimisation in design. Heuristic, Mathematical and Numerical Modelling will be used in this process.

■ EK722 ENGINEERING MANAGEMENT & FINANCE

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITE Completion of at least first year of students study program

COREQUISITES

Nil

This unit discusses the concepts of project management and project financing from an engineering viewpoint. Topics covered include: Project management, planning, scheduling, budgeting and control using computer based tools; Health and safety; The legal system, Common Law, Contract, Negligence; Statutes, Trade Practices Act, Occupational Health and Safety and Environmental Protection Legislation; Community Involvement and Ethics; How does the economic system work? What is reported in company balance sheets?

■ EK731 ELECTRO-TECHNIQUES

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITES EK640, EK645
 COREQUISITES Nil

This unit focuses on the electro techniques of measurement, analysis and application of real world problems in an automation environment through the processing and control of linear and digital **signals**.

■ EK732 THERMOFLUIDS

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITES EK660, EK690
 COREQUISITES Nil

This unit furthers the understanding of students in the areas of fluids mechanics and thermodynamics. Areas of study include: Flow over immersed bodies, Open channel flow; Compressible flow; turbo machines; positive displacement machines; heat engine cycles; combustion; reciprocating internal combustion engines; refrigeration, heat pumps and air conditioning; heat transfer.

■ EK733 ANALYSIS OF DYNAMIC SYSTEMS 1

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITES EK690, EK640, EK645
 COREQUISITES Nil

This unit focuses on common principles of systems dynamics in a variety of engineering applications. Subjects covered include: Introduction to Dynamic Systems; System Linearisation (philosophy and technique); Using Differential Equations to Model the Dynamic Behaviour of Systems; Disturbance in Dynamic Systems; Laplace Transforms & Block Diagram (Leading to System Transfer Function); Transient Response and Stability Analysis; Steady State Performance of Dynamic Systems; Vibration Analysis.

■ EK734 ANALYSIS OF DYNAMIC SYSTEMS 2

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITE EK733
 COREQUISITES Nil

This unit focuses on common principles of systems dynamics in a variety of engineering applications and builds on studies undertaken in EK 733 Analysis of dynamic systems 1. Areas of study include: Free Vibration Analysis of the Single Degree of Freedom Systems; Frequency Domain Analysis of Dynamic Systems; Harmonically-Forced Vibration System and Resonance; Vibration Isolation and Measurement; Polar and Bode Plots; Stability Analysis in the Frequency Domain; Control System Design; Introduction to Digital System Analysis.

■ EK741 STRUCTURAL DESIGN & ANALYSIS

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITES EK680, EK690
 COREQUISITES Nil

This unit is designed to enable students to apply the finite element method of analysis to the solution of civil engineering situations. Content includes: Linear and non-linear stress definitions; Linear and non-linear strain definitions; Three dimensional isotropic linear elastic stress-strain relations; The basic principles of linear elastic analysis; The principles of the Weighted Residual Method; Virtual work and Potential energy; Linear elastic finite element analysis of trusses, beams and frames; Finite element analysis of plane stress and plain strain problems; Thin walled plate theory and finite element analysis of thin plates; Non linear finite element analysis; Plasticity in beams.

■ EK742 TRANSPORT INFRASTRUCTURE

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITES EK680, EK690, EK636
 COREQUISITES Nil

This unit focuses on the role of, planning of and design of modern transport infrastructure. Areas of study include: Transport and Society; Transport planning; Road pavement materials; Road and intersection design, terrain modelling, road design software; Road construction and maintenance; Traffic operations and studies; Provision for stationary vehicles; Traffic control and management; Railway engineering; Air and water transport; Transport economics and the future of transport.

■EK744 WATER & DRAINAGE INFRASTRUCTURE

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITES EK660, EK690
 COREQUISITES Nil

In this unit students will study the practical application of fluid mechanics relating to water and drainage infrastructure. Subjects covered include Pipeline and pumping systems, pipe networks; Unsteady flow in pipelines, water hammer and surge; Unsteady free surface flow; Loose boundary hydraulics, stable channel design; Hydraulic structures; Coastal hydraulics.

■ EK750 ENGINEERING DESIGN

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITES EK650, EK690
 COREQUISITES Nil

This unit will introduce students, in an experimental manner, to the more complex design tasks, which span disciplines and involve many areas of engineering science. Students will be exposed to the principles and methods of Modelling and Simulation, and optimisation in design. Heuristic, Mathematical and Numerical Modelling will be used in this process. Students will also be introduced to design for reliability, Failure Analysis and Quality in design, and exposed to the principles of Safety and Environmental Protection in design. Emphasis will be placed on computer aided design analysis.

■ EK751 TECHNOLOGY & SOCIETY

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITES Nil
 COREQUISITES Nil

Introduces students to the more complex system design tasks, which span disciplines and involve many areas of engineering science. Subjects covered include: Design codes; Design for safety, reliability, quality and cost; Safety principles and cost, engineering economics, basic system reliability, maintainability, hazard analysis, fault tree analysis, quantitative quality control; Environmental impact; Societal impacts; Engineering ethics.

■ EK752 STRUCTURAL DESIGN

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITES EK680, EK690
 COREQUISITES Nil

This unit introduces students to the more complex design tasks in civil engineering. Content includes: Introduction to building design; Introduction to concrete design; various design methods. Computational and simulation methods are emphasised throughout the unit as is the importance of occupational health and safety.

■ EK753 COMPUTER APPLICATIONS IN MINING

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITES Nil
 COREQUISITES Nil

In this unit students will study a number of the more complex system design tasks applicable to the mining industry. By the completion of the unit students will be proficient in the use of a number of state of the art mine design software applications. Areas of study include: Overview of current computer usage in the mining industry; Introduction to computing systems and equipment; Evaluation and selection of hardware and software; Computer applications in mine design, optimisation, planning, scheduling, simulation and project management; Workshops using selected packages in current usage.

■ EK781 GEOMECHANICS

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITES EK680, EK690
 COREQUISITES Nil

In this unit students will study the occurrence of groundwater and surface water, their sources, movement and effects, soil and rock mechanics. Areas of study include: Surface water - groundwater interaction; Groundwater movement and storage; Soil identification, grain size analysis; Physical properties of soils; Soil classification & characterisation; Soil elasticity and plasticity; Stress and Strain and their relationship; Rock Strength & Deformability; Geo-mechanical properties of rock.

■ EK783 UNDERGROUND PRODUCTION SYSTEMS

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITE EK636
 COREQUISITES Nil

The aim of this unit is to extend previous knowledge regarding the underground extraction of minerals. Subject areas include: the significance of the mining industry in the economy, the difficulties in starting a new mine, dilution and recovery, determination of which production system to use, common mining methods, selection of equipment, transportation systems, loading/unloading systems, resourcing requirements, financial aspects, personnel requirements, development and an appreciation of the social, political and environmental issues.

■ EK784 SURFACE MINING OPERATIONS

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITES EK690, EK636
 COREQUISITES Nil

This unit studies methods and associated requirements for the mining of minerals by surface methods. The content includes: mining methods, equipment, selection of mining method and equipment, haul road design, pit design, costing and estimation, an appreciation of the social, political and environmental issues.

■ EK821 MINE PLANNING AND SCHEDULING

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITE Completion of BEngSci (Mining) or Equivalent
 COREQUISITES Nil

This unit undertakes to extend existing knowledge of underground and surface mine planning and production scheduling. Fundamental concepts of planning will be developed by the use of modern simulation techniques employed within the mining industry.

■ EK822 ADVANCED MINE VENTILATION

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITE Completion of BEngSci (Mining) or Equivalent
 COREQUISITES Nil

This unit undertakes to extend existing knowledge of Mine Ventilation, especially in regard to ventilation planning, system optimisation and the design and planning of auxiliary systems of ventilation contaminant control.

■EK823 ADVANCED ROCK MECHANICS

CREDIT POINTS	15
OFFERED	One Semester
PREREQUISITE	Completion of BEngSci (Mining) or Equivalent
COREQUISITE	Nil

This unit undertakes to extend existing knowledge of rock mechanics particularly in relation to the design of support systems for surface and underground mines. Particular emphasis will be placed on the utilisation of modern computational techniques for the design and monitoring of rock support systems in mines.

■EK824 ADVANCED ROCK BREAKAGE

CREDIT POINTS	15
OFFERED	Both Semester
PREREQUISITE	Completion of BEngSci (Mining) or Equivalent
COREQUISITE	Nil

This unit undertakes to extend existing knowledge of the methods available to undertake the basic need in mining to break rock into appropriately sized fragments for subsequent mining and milling operations. Traditional methods will be reviewed and novel techniques will be described. The unit also develops and understanding of the design and planning of rock breakage methods and the application of modern tools to analyse and design appropriate systems.

■EK825 MINE ENVIRONMENTAL ENGINEERING

CREDIT POINTS	15
OFFERED	Both Semester
PREREQUISITE	Completion of BEngSci (Mining) or Equivalent
COREQUISITE	Nil

Mining has long been regarded as an environmentally unfriendly industry. The aim of this unit is to introduce mining engineers to the concepts of environmentally friendly mining and ecologically sustainable development from a mining engineering concepts. Legal responsibilities of the industry with respect to the environment act as a starting point for the development of ideas and attitudes of environmentally friendly mining, tailings disposal, effluent disposal, contaminated land management and mine closure and rehabilitation.

■ EK831 MACHINE SYSTEMS DESIGN

CREDIT POINTS	15
OFFERED	One Semester
PREREQUISITES	EK750, EK734
COREQUISITES	Nil

The unit will assist students to develop an efficient machine system by applying the study areas of static and dynamic strength design for machines, experimental stress analysis, ergonomics, and failure analysis.

■ EK833 INDUSTRIAL SYSTEMS CONTROL 1

CREDIT POINTS	15
OFFERED	One Semester
PREREQUISITES	EK731, EK734
COREQUISITES	Nil

This unit focuses on understanding the energy and control requirements in complex modern manufacturing and process industry. The unit encompasses the following main areas of study:

Electrical Power Systems; Hydraulic and Pneumatic Systems; Energy Control applications; Transducers and sensors; Feedback and process control; Digital process systems; Analogue systems; Batch processes; Computer based controllers; Expert systems; Artificial intelligence

Digital signal processing; Programmable logic controllers; Numerical control; Vision systems; Robotics.

■ EK834 INDUSTRIAL SYSTEMS CONTROL 2

CREDIT POINTS	15
OFFERED	One Semester
PREREQUISITE	EK833
COREQUISITES	Nil

This unit focuses on understanding the energy and control requirements in complex modern manufacturing and process industry and builds on material studied in EK 833. The unit encompasses the following main areas of study: Electrical Power Systems; Hydraulic and Pneumatic Systems; Energy Control applications; Transducers and sensors; Feedback and process control; Digital process systems; Analogue systems; Batch processes; Computer based controllers; Expert systems; Artificial intelligence; Digital signal processing; Programmable logic controllers; Numerical control; Vision systems; Robotics.

■ EK835 MACHINERY DYNAMICS

CREDIT POINTS	15
OFFERED	One Semester
PREREQUISITES	EK734, EK640
COREQUISITES	Nil

This unit encompasses an in depth analysis of machine dynamics and focuses on the contemporary engineering methods for dynamic modelling and simulation of machine systems and vibration analysis. This unit is designed to enable students to solve real world dynamic problems involving a wide range of industrial applications. Throughout the unit students will use computer algebra systems such as Maple for dynamic analysis and for correlation of results obtained through computer modelling with those measured experimentally in the laboratory or industrial setting.

■ EK837 INDUSTRIAL COMMUNICATION & NETWORKING

CREDIT POINTS	15
OFFERED	One Semester
PREREQUISITE	EK731
COREQUISITES	Nil

This unit focuses on local and wide area data transmission with respect to automation and control. It is designed to enable students to analyse and specify the communications requirement for an automation system and to determine the most likely reason why a communication system is not performing to the specified requirements. The unit encompasses the following main areas of study: optical fibre, radio and infrared systems; error detection and correction; flow control and encryption; LAN's with emphasis on MAP, TOP and IEEE 802 standards.

■ EK838 STRENGTH OF MATERIALS

CREDIT POINTS	15
OFFERED	One Semester
PREREQUISITE	EK680, EK690
COREQUISITES	Nil

This unit is designed to further the understanding of students in the area of Strength of Materials. Topics to be studied include: relationships of stress and strain; strain energy; thick walled pressure vessels; torsion; bending and deflection; fatigue strength design; plastic analysis

■ EK841 WASTE & WASTE WATER INFRASTRUCTURE

CREDIT POINTS	15
OFFERED	One Semester
PREREQUISITE	EK744
COREQUISITES	Nil

This unit enables students to identify the issues that are significant to public health engineering and to develop and implement strategies for achieving required public health engineering goals. Subjects studied include: Sanitary microbiology; Water chemistry; Water supply treatment and distribution; Wastewater collection and treatment; Design of water supply and wastewater treatment systems; Urban and rural drainage design; Solid waste management.

■ EK843 INFRASTRUCTURE DESIGN & CONSTRUCTION 1

CREDIT POINTS	15
OFFERED	One Semester
PREREQUISITES	EK752, EK 741
COREQUISITES	Nil

This unit focuses on the uses of concrete within modern infrastructure developments in both unstressed and prestressed forms. Subjects studied within this unit include: General Principles of reinforced concrete; Load estimation for reinforced concrete structures; Durability and fire resistance; The behaviour, analysis and design of reinforced concrete beams; The behaviour, analysis and design of reinforced concrete slabs; The behaviour, analysis and design of reinforced concrete columns; Detailing of reinforced concrete members; The behaviour, analysis and design of prestressed beams

■ EK844 INFRASTRUCTURE DESIGN & CONSTRUCTION 2

CREDIT POINTS	15
OFFERED	One Semester
PREREQUISITE	EK843
COREQUISITES	Nil

This unit gives an overview of the complete civil engineering design cycle and details the structural design of a number of structures employing a range of construction materials. Subject areas covered include: Masonry design; structural form and past practice; advanced loading evaluation; design practice in steel; design practice in concrete and masonry; unified building code.

■ EK845 INFRASTRUCTURE PLANNING & MANAGEMENT 1

CREDIT POINTS	15
OFFERED	One Semester
PREREQUISITES	EK752, EK741
COREQUISITES	Nil

This unit is intended to give the student a detailed overview of the principles and practice of urban design and development. Subject areas include: Historical background to urban design theory and practice; Planning and development legislation; Statutory planning; Performance based residential design; Subdivision design principles and practices; The development process.

■ EK846 INFRASTRUCTURE PLANNING & MANAGEMENT 2

CREDIT POINTS	15
OFFERED	One Semester
PREREQUISITE	EK845
COREQUISITES	Nil

This unit is intended to give the student a detailed overview of the principles and practice of urban and regional planning. Subject areas include: History of planning; Planning processes; Planning legislation; Regional planning; Development and Ecologically Sustainable development; Planning and design issues, such as neighbourhood structure, choice of housing types, transport networks, access to services and facilities, major centres, natural resources, agricultural land, cultural heritage, native title, community consultation.

■ EK851 DESIGN PROJECT 1

CREDIT POINTS	15
OFFERED	One Semester
PREREQUISITE	EK750 or EK752 or EK753
COREQUISITES	Nil

This unit is designed to enable students to produce a comprehensive engineering work that will prepare and help them to start a successful career. This unit represents an opportunity for the final year engineering student to demonstrate their capacity to define and successfully undertake the first stages of a substantial engineering project.

■ EK852 DESIGN PROJECT 2

CREDIT POINTS	15
OFFERED	One Semester
PREREQUISITE	EK851
COREQUISITES	Nil

This unit represents an opportunity for the final year engineering student to successfully complete a substantial engineering project and is a continuation of work started in E1851 during the first semester. Students are to provide documentation providing proof of successful project completion in the form of a printed and bound thesis.

■ EK871 RESEARCH PROJECT 1

CREDIT POINTS	15
OFFERED	Both Semester
PREREQUISITE:	Completion of BEngSci (Mining) or Equivalent
COREQUISITES	Nil

This unit represents an opportunity for the freshly starting Masters program students to demonstrate their capacity to define and successfully undertake the first stages of a mid-level research project.

■ EK872 RESEARCH PROJECT 2

CREDIT POINTS	15
OFFERED	Both Semester
PREREQUISITE	Completion of BEngSci (Mining) or Equivalent
COREQUISITES	Nil

This unit represents an opportunity for the Masters program student to further the research project which they started a semester earlier in EK871.

■ EK873 RESEARCH PROJECT 3

CREDIT POINTS	30
OFFERED	Both Semester
PREREQUISITE	EK871
COREQUISITES	Nil

This unit represents an opportunity for the Masters program student to finalise their research projects which they started earlier. Students will have to submit documents indicating the completion of the work. These documents are chiefly a finalised Masters thesis and a work diary.

■EK875 VIBRATION AND MACHINE DYNAMICS

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITE: Completion of BEngSci or Equivalent
 COREQUISITES Nil

This unit encompasses an in depth analysis of machine dynamics and focuses on the contemporary engineering methods for dynamic modelling and simulation of machine systems and vibration analysis. This unit is designed to enable students to solve real world dynamic problems involving a wide range of industrial applications. Throughout the unit students will use computer algebra systems such as Maple for dynamic analysis and for correlation of results obtained through computer modelling with those measured experimentally in the laboratory or industrial setting.

■EK876 DESIGN OF THERMAL SYSTEMS

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITE Completion of BEngSci or Equivalent
 COREQUISITES Nil

This unit is concerned with the application of engineering principles and techniques to the design, modelling and analysis of thermal and fluid handling systems and components involving applications of thermodynamics, economics, heat transfer, and fluid flow.

■EK877 REFRIGERATION AND AIR CONDITIONING

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITE Completion of BEngSci or Equivalent
 COREQUISITES Nil

This unit is designed to introduce students to some fundamentals of refrigeration and air conditioning. Subjects covered include the conservation of energy concept, thermal properties of matter, Air-Conditioning Systems and Controls, Different types of the refrigeration cycles, Pumps, fans, and heaters using in air-conditioning Compressors, condensers and evaporators, expansion devices and refrigerants.

■EK878 ROBOTICS

CREDIT POINTS 15
 OFFERED Both Semester
 PREREQUISITE Completion of BEngSci or Equivalent
 COREQUISITES Nil

This unit encompasses an in depth analysis of robotic systems and focuses on the contemporary engineering methods for dynamic modelling and simulation of robots. This unit is designed to enable students to solve real world dynamic problems involving a wide range of industrial applications. Throughout the unit students will use computer algebra systems such as Maple for dynamic analysis and for correlation of results obtained through computer modelling with those measured experimentally in the laboratory or industrial setting.

■EK879 RENEWABLE ENERGY

CREDIT POINTS 15
 OFFERED Both Semester
 PREREQUISITE Completion of BEngSci or Equivalent
 COREQUISITES Nil

To understand the importance of renewable energy sources and alternative energy system components. The unit will give an overview of the principles, technology developments and applications of energy sources other than fossil or nuclear fuels.

■ EK881 ROCK MECHANICS APPLICATIONS

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITE EK781
 COREQUISITES Nil

Intact rock and rockmass characterisation in relation to surface excavations and underground mining will be investigated through fieldwork examination and laboratory test definition. This is then followed up by design analyses and synthesis by using the processes of physical, numerical and analytical modelling.

■ EK882 MINERAL PROCESSING

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITES Nil
 COREQUISITES Nil

This unit includes Gy's sampling formula; three-product formula calculations and problems; heavy liquid analysis; gold recovery; metallurgical evaluation of new prospects; floatation; industrial minerals processing; flowsheet studies; smelter schedules; reflected light microscopy; instrumentation in mineral processing plants; extractive metallurgy of more common metals.

■ EK883 SUBSURFACE ENVIRONMENTAL ENGINEERING

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITES EK690, EK660
 COREQUISITES Nil

The objective of this unit is to give the student an in-depth treatment of the basic engineering science required for the study of underground environmental engineering and of underground environmental problems, which are experienced in mines. The unit will address the range of pollutants that can occur and investigate the various remedial strategies that may be employed by the ventilation engineer to provide a safe and economic solution to the problem. Design calculations form an integral part of the unit.

■ EK884 MINE POWER AND SERVICES

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITES EK783, EK784
 COREQUISITES Nil

This unit is intended to give a detailed overview of the provision of services within a mine. Subject areas include; Mine power systems, electrical, hydraulic, diesel, compressed air and hydro-power; mine dewatering; mine water inflow and flooding; water treatment and disposal; surface arrangements; solid waste disposal; mine rehabilitation and re-vegetation.

■ EK885 ORE DEPOSIT EVALUATION

CREDIT POINTS 15
 OFFERED One Semester
 PREREQUISITE SX627
 COREQUISITES Nil

This unit introduces students to a wide range of methods of evaluating mineral deposits, including appropriate sampling methods, reporting of mineral resources and reserve statements, resource estimation techniques and the principles of financial analysis as applied to the evaluation of mineral deposits. Subject areas covered include the definition of a mineral resource, legal and ethical requirements for reporting, geostatistics, value determination, sampling, grade control and reconciliation and financial evaluation.

■ EK891 PROGRAMMABLE LOGIC

CONTROLLERS
 CREDIT POINTS 15
 OFFERED Both Semester
 PREREQUISITE: Completion of BEngSci or Equivalent
 COREQUISITES Nil

This unit will allow students to gain an understanding of the control environment of programmable logic controllers in typical industrial settings.

■ EK892 TURBOMACHINERY

CREDIT POINTS 15
 OFFERED Both Semester
 PREREQUISITE Completion of BEngSci or Equivalent
 COREQUISITES Nil

This is an application, design-oriented unit that is intended to prepare students for a career in the turbomachinery area. Emphasised in the unit are compressible-flow (particularly gas turbine) applications, but a representative case of an incompressible-flow turbomachine, namely that of a centrifugal pump, is also covered. The unit material should lead student to use basic thermodynamics and fluid mechanics principles to assess the overall performance of a turbomachine and, in the end, perform the aerodynamic design of a turbomachinery component, according to a specified set of requirements.

■ EK893 MICROCONTROLLERS

CREDIT POINTS 15
 OFFERED Both Semester
 PREREQUISITE Completion of BEngSci or Equivalent
 COREQUISITES Nil

This unit will allow the student to study microcontrollers in the context of practical outcomes based on commercial and industrial applications.

■ EK894 AUTOMATED SYSTEMS CONTROL

CREDIT POINTS 15
 OFFERED Both Semester
 PREREQUISITE Completion of BEngSci (Mech/Elec) or Equivalent
 COREQUISITES Nil

Automated Systems Control is a unit that focuses on understanding the energy and electrical/electronic control requirements of modern manufacturing and process industries.

■ EK895 INDUSTRIAL DATA COMMUNICATIONS

CREDIT POINTS 15
 OFFERED Both Semester
 PREREQUISITE EK894
 COREQUISITES Nil

This unit examines the ways in which data communication techniques have been adopted and implemented in industrial settings. An introduction to existing international standards will be provided, along with examples of how some commercial products have utilised evolving commercial standards.

■ EK896 INDUSTRIAL ELECTRONICS

CREDIT POINTS 15
 OFFERED Both Semester
 PREREQUISITE Completion of BEngSci or Equivalent
 COREQUISITES Nil

This unit will allow students to gain an understanding of the role of digital and analogue electronic systems in modern industry.

■ EV471 HEALTH, SAFETY & ENVIRONMENT SYSTEMS 1 - INTRODUCTION & CONTEXT

CREDIT POINTS 10
 OFFERED January 2003 (1 week)

This unit introduces students to the Graduate Diploma in Occupational Hazard Management, and provides a context for that program. The student is introduced to: professional development as an occupational health, safety and workplace environmental practitioner; occupational health, safety and environmental management systems; and influencing management about their occupational health, safety and environmental systems. The following contexts for the course are provided: history; systems analysis and general management; and skill building in groups, oral presentations, report writing.

■ EV472 HEALTH, SAFETY & ENVIRONMENT SYSTEMS 2 - PREVENTION

CREDIT POINTS 10
 OFFERED July 2003 (1 week)
 PREREQUISITE EV471

This unit enables students to develop, implement review and continuously improve HSE management systems that best meet organisational needs. Students are introduced to systems thinking and a systems model of risk control as conceptual frameworks for managing HSE risks. Students will explore the application of quality management principles and tools to HSE management and the integration of HSE into mainstream management systems. This unit also explores aspects of the organisational environment that contribute to risk control, various approaches to HSE management and the elements of a HSE management system.

■ **EV473 HEALTH, SAFETY & ENVIRONMENT SYSTEMS 3 - COMPENSATION & REHABILITATION**

CREDIT POINTS 10

OFFERED January 2003 (1 week)

PREREQUISITE EV471, EV472

This unit enables students to develop, implement and manage workplace compensation and rehabilitation programs and to manage compensation and rehabilitation programs in relation to the environment. Through this unit students explore the main concepts in occupational rehabilitation, the public policy process and how it has shaped occupational rehabilitation, and the relationship between injury compensation information and prevention. This unit also poses a range of environmental management questions including to what system states do we rehabilitate the environment and who is compensated for what in terms of environmental damage.

■ **EV474 HEALTH, SAFETY & ENVIRONMENT SYSTEMS 4 - WORKPLACE AUDITS & DISSERTATION**

CREDIT POINTS 10

OFFERED July 2003 (1 week)

PREREQUISITES EV471, EV472, EV473

This unit enables students to gain knowledge and skills in relation to planning and conducting health, safety and environment systems auditing. This unit also provides students with an opportunity to re-construct their own philosophical "whole" in relation to health, safety and the environment and to study an area of interest at depth.

■ **EV481 CONTEMPORARY APPROACHES TO HSE**

CREDIT POINTS 10

OFFERED Over one semester, at the School's discretion.

This unit is designed to provide students with an opportunity to reflect upon, draw links between, integrate and apply contemporary approaches to the management of health, safety and the environment. Students will gain knowledge and skills in the application of the philosophies and principles of quality management and continuous improvement

■ **EV491 CONTROL OF HAZARDS 1 - ACCIDENT ANALYSIS MODELS**

CREDIT POINTS 10

OFFERED January 2003 (1 week)

This unit is designed to enable students to critically evaluate a range of models that attempt to explain the accident process. Students will learn how to model and analyse the processes that lead to damage and to usefully classify and report accident data. Students will explore psychological perspectives in relation to accident causation including human error and the attribution of responsibility for accidents.

■ **EV492 CONTROL OF HAZARDS 2 - RISK ASSESSMENT AND CONTROL TECHNIQUES**

CREDIT POINTS 10

OFFERED July 2003 (1 week)

PREREQUISITE EV491

This unit is designed to enable students to critically evaluate a range of risk assessment models and to develop knowledge and skills in structured risk analysis using the formal analytical techniques of Event and Outcome analysis. Students will learn how to apply the process of risk description, risk estimation and risk evaluation to the analysis of risk and to develop a risk management program. Students will explore the legal, moral and financial issues involved in funding and setting risk reduction priorities and to perform risk benefit analyses. Students will be introduced to risk related concepts such as risk perception and acceptable risk.

■ **EV493 CONTROL OF HAZARDS 3 - MANAGING HAZARDS**

CREDIT POINTS 10

OFFERED January 2003 (1 week)

PREREQUISITES EV491, EV492

Building upon the models and techniques for the control of hazards, this unit is designed to provide students with the skills to apply the process of hazard identification, risk assessment and risk control and control evaluation to common occupational and environmental problems such as machinery, noise and manual handling hazards.

■ **EV494 CONTROL OF HAZARDS 4 - MANAGING HAZARDS**

CREDIT POINTS 10

OFFERED July 2003 (1 week)

PREREQUISITES EV491, EV492, EV493

Building upon the models and techniques for the control of hazards, and utilising the process of hazard identification, risk assessment and risk control and control evaluation, this unit allows students to achieve a deep level of knowledge and skill in controlling hazards in the workplace and the environment. One selected topic/hazard such as chemicals will be explored/examined to present a framework for application to other issues encountered outside the course. The manipulation and application of statistical techniques is taught as an integral part of this unit.

■ **EV500 OCCUPATIONAL HEALTH, SAFETY AND ENVIRONMENTAL MANAGEMENT SYSTEMS**

CREDIT POINTS 30

OFFERED Over one semester, at the School's discretion

This unit is designed to enable students to develop, implement and manage HSE systems based on the following frameworks:

- Systems thinking;
- Contemporary approaches to HSE management;
- Quality as a framework for managing HSE;
- The legal framework in HSE;
- Public policy and HSE;
- Prevention; and
- Rehabilitation and Compensation.

■ **EV501 OCCUPATIONAL HAZARD MANAGEMENT**

CREDIT POINTS 30
OFFERED Over one semester, at the School's discretion.

This unit is designed to enable students to develop the knowledge, skills and values required to apply a variety of hazard analysis techniques in the workplace or the environment and to make recommendations for risk control based upon qualitative and quantitative assessments of risk. It provides students with a practical framework for addressing a range of occupational and environmental hazards such as hazardous substances, machinery, noise and manual handling hazards.

■ **EV810 THE CRITICAL RESEARCHER**

CREDIT POINTS 30
OFFERED January 2003 (1 week)

This unit is designed to allow participants to explore the context and systems within which they will conduct their research project, and practical skills in presenting their research findings orally and in writing. Candidates will be assisted to start their research project. The context includes multidisciplinary research studies and contemporary issues in occupational health and safety. The practical skills include: oral presentation skills, enhanced information literacy skills and multimedia publishing and communication. Candidates learn how to start their project via a scoping exercise and a literature review.

■ **EV820 RESEARCH METHODOLOGY AND DESIGN**

CREDIT POINTS 30
OFFERED January & July 2003 (1 week)
PREREQUISITE An introductory statistics unit.

This unit enables candidates to develop the design for their research project, through a knowledge of a variety of research methodologies. Experience is provided in using computer packages for both quantitative and qualitative methods.

■ **EV830 PRESENTATIONS**

CREDIT POINTS 20
OFFERED January & July 2003 (1 week)
COREQUISITES EV810, EV820

Candidates develop the skills for the effective preparation and presentation of conference papers and journal articles, associated with their research project. Candidates present a conference paper to an audience of people from outside the University. Candidates write a journal article, which is then peer reviewed.

■ **EV840 THESIS**

CREDIT POINTS 40
OFFERED January & July 2003 (1 week)
COREQUISITES EV810, EV820, EV830

Each candidate will conduct a research project, and write a thesis about, an occupational health and safety matter, under academic supervision. This unit builds on the candidate's research design, developed in the unit Research Methodology and Design.

■ **EV851 STUDIES IN OCCUPATIONAL HAZARD MANAGEMENT A**

CREDIT POINTS 10
OFFERED January or July 2003

These units are designed to provide recognition for bridging studies undertaken by candidates entering the Master of Applied Science (Occupational Health and Safety) at the University of Ballarat. The contents of these units will be that content from the Graduate Diploma in Occupational Hazard Management that the candidate's own studies and experience has not given them.

■ **EV852 STUDIES IN OCCUPATIONAL HAZARD MANAGEMENT B**

CREDIT POINTS 15
OFFERED January or July 2003

These units are designed to provide recognition for bridging studies undertaken by candidates entering the Master of Applied Science (Occupational Health and Safety) at the University of Ballarat. The contents of these units will be that content from the Graduate Diploma in Occupational Hazard Management that the candidate's own studies and experience has not given them.

■ **EV853 STUDIES IN OCCUPATIONAL HAZARD MANAGEMENT C**

CREDIT POINTS 20
OFFERED January or July 2003

These units are designed to provide recognition for bridging studies undertaken by candidates entering the Master of Applied Science (Occupational Health and Safety) at the University of Ballarat. The contents of these units will be that content from the Graduate Diploma in Occupational Hazard Management that the candidate's own studies and experience has not given them.