University of Pretoria Yearbook 2019

MEng Technology and Innovation Management (Coursework) (12250254)

Minimum duration of study	2 years
Total credits	180

Programme information

- Unless the Dean, on recommendation of the relevant head of department, decides otherwise, the master's degree is conferred on the basis of examinations of coursework and a mini-dissertation (including an examination on the mini-dissertation).
- A minimum of 180 credits is required to obtain the MEng degree. A mini-dissertation (60 credits) and coursework (120 credits) is included in the programme.
- Recognition is not granted for credits acquired during studying for the BEngHons or the BScHons.
- The curriculum is determined in consultation with the relevant head of department. Any specific module is offered on condition that a minimum number of students are registered for the module, as determined by the relevant head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as for information on the syllabi of the modules. The various departmental postgraduate brochures should also be consulted.

Admission requirements

?The admission requirement for the MEng is a BEng or equivalent qualification. A selection procedure takes place prior to admission to the Master’s degree. Restrictions may be placed on the number of students admitted. Postgraduate selection takes place as stipulated in the respective departmental rules. (click here)

Examinations and pass requirements

The stipulations of the relevant Faculty regulations are applicable.
Guidelines for the preparation and examination of mini-dissertations are available from the department.

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the masters degree must complete his or her studies within three years provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

Research information

A student must by means of a mini-dissertation prove that he or she is capable of planning, instituting and executing a scientific investigation. As part of the examination a student must submit an article and present at the final year symposium. The article should be based on the research that the student has conducted for the dissertation and be approved by the supervisor. Conferment of the degree may be made subject to compliance with the stipulations of this regulation.

Pass with distinction

A student who completes the master's degree on grounds of coursework and a mini-dissertation, passes with distinction if a weighted average mark of at least 75% is obtained in the first 180 credits obtained for the degree provided that 60 of these credits are allocated to the mini-dissertation. However, the degree is not awarded with distinction should a student fail any of these modules (excluding modules which have been timeously discontinued). The degree is also not awarded with distinction if a student obtains less than 70% for the mini-dissertation. The degree must be completed within the prescribed study period.

Curriculum: Year 1

Minimum credits: 180

Core modules

Corporate entrepreneurship 880 (IEE 880)

Module credits	10.00
Prerequisites	No prerequisites.
Contact time	20 contact hours per semester
Language of tuition	Module is presented in English
Department	Engineering and Technology Management
Period of presentation	Semester 1 or Semester 2

Module content

Corporate Entrepreneurship (CE) or Intrapreneurship refers to the means by which an organisation revitalises itself and alters its competitive contour through embarking in entrepreneurial activities which focus on innovation. CE is one of the key tools to take organisations forward in an environment faced by global challenges. This module focuses on the fundamentals of CE, how to design an entrepreneurial organisation, building cultures to support technological intrapreneurship, business model innovation, organisational digital transformation, and how to enable continuous intrapreneurial performance within a corporation.

Mini-dissertation 899 (IGB 899)

Module credits	90.00
Prerequisites	No prerequisites.
Language of tuition	Module is presented in English
Department	Engineering and Technology Management
Period of presentation	Year

Module content

A research project on a topic of the student’s choice from any of the modules offered by the Graduate School of Technology Management is done. The work takes place under the supervision of a study leader (project adviser). In addition to the satisfactory completion of the report itself, the student also has to prepare an article based on the project and present it at the final-year symposium held during November each year. Evaluation is based on the report content, article, as well as the presentation. A follow-up symposium is also held during May in the next year.

New product development 880 (INP 880)

Module credits	10.00
Prerequisites	No prerequisites.
Contact time	20 contact hours
Language of tuition	Module is presented in English

Department	Engineering and Technology Management
Period of presentation	Semester 1 or Semester 2

Module content

The development of new products is a key business function. There is always a high risk of failure but the best companies manage to launch successful new products on a continuous basis. The objective of this module is to provide students with the concepts and insight necessary both to do product development and to manage it. The strategies, processes, tools and techniques used by leading-edge companies for new product development are introduced. The module examines different stages of product development, from idea generation to market testing and includes the assessment and selection of appropriate business models. The role and impact of fourth industrial revolution technologies, like rapid prototyping with 3D printing, are also considered. Key questions addressed in the module are: how does product/process development fit into the overall business context; what products, processes, systems or services should be developed; how does one go about developing a new product/process; and how should one measure performance in product/process development and improve? Further selected concepts and topics like design thinking, design management, success factors, relationship to systems engineering, reduction of uncertainty, and software for NPD are also introduced. Although the emphasis is on physical products, many of the concepts covered in the module are equally applicable to service development.

Organisation and innovation 880 (INV 880)

Module credits	10.00
Prerequisites	No prerequisites.
Contact time	20 contact hours per semester
Language of tuition	Module is presented in English
Department	Engineering and Technology Management
Period of presentation	Semester 1 or Semester 2

Module content

This module has been designed for master’s students wishing to build substantive and methodological knowledge in two profound and related disciplines and phenomena: organisation studies and innovation studies. It focuses on providing an overview of the main concepts, theoretical perspectives and models regarding organisation, technological innovation and the relationships between different forms of organisation and technological innovation (e.g. organising for creativity; systems supporting innovation). This module further explains innovation at several levels of analysis (individuals, teams, organisations, sectors, nations). Students are expected to apply the acquired knowledge in their workplace.

Science, technology and innovation policy 880 (ISP 880)

Module credits	10.00
Prerequisites	No prerequisites.
Contact time	20 contact hours per semester
Language of tuition	Module is presented in English
Department	Engineering and Technology Management

Period of presentation	Semester 1 or Semester 2

Module content

Science, Technology & Innovation (STI) policy is about decisions and actions that are taken by governments in order to promote research, technology development and innovation which are critical to economic growth and development, as well as the procurement and use of scientific knowledge in public policy-making. In this module students will be introduced to concepts of and issues in STI policy, followed by a brief history of innovation theory and how STI are critical to economic productivity and development. The range of policy instruments which can be used to stimulate STI will also be reviewed, as well as the characterisation of the instruments which have been adopted by African countries. A range of frameworks for assessing the effectiveness of different STI policies and innovation systems, with particular reference to South Africa and other African countries, forms part of this module.

Strategic technology and innovation management 880 (IST 880)

Module credits	10.00
Prerequisites	No prerequisites.
Contact time	20 contact hours per semester
Language of tuition	Module is presented in English
Department	Engineering and Technology Management
Period of presentation	Semester 1 or Semester 2

Module content

The objective of this module is to provide students with the necessary skills to develop technology and innovation strategies for organisations. Themes include the concepts of technology and innovation strategy, processes of strategic management, formulation of technology and innovation strategies, strategy implementation, technology roadmapping, scenario development and future thinking. Appropriate case studies are used to link the theory and practice.

Fundamentals of technology management 802 (ITB 802)

Module credits	10.00
Prerequisites	No prerequisites.
Contact time	20 contact hours per semester
Language of tuition	Module is presented in English
Department	Engineering and Technology Management
Period of presentation	Semester 1 or Semester 2

Module content

Technology is often seen as the engine of economic growth. Technology management is therefore an important function within any organisation. Technology is present over the whole lifecycle of innovation projects and its activities. The typical technology management activities are Identification, Selection, Acquisition, Learning, Exploitation and Protection. Organisations should be able to master this portfolio of technology management activities to be competitive, especially in a technology and innovation environment. The module therefore addresses themes such as Technology Intelligence and Scanning, Technology Forecasting, Emerging Technologies, Technological capability assessment and development, R&D Management, Technology Transfer, Technology Planning, and Roadmapping and Technology Protection.

Curriculum: Final year

Minimum credits: 60

Core modules

Project economics 880 (IBD 880)

Module credits	10.00
Prerequisites	No prerequisites.
Contact time	20 contact hours per semester
Language of tuition	Module is presented in English
Department	Engineering and Technology Management
Period of presentation	Semester 1 or Semester 2

Module content

This module will focus on insight in the field of Decision Analysis (DA), Risk Management (RM) and Techno-Economic Analysis (TEA), with the application of the basic principles of decision analysis, risk identification, feasibility assessment and financial return in the context of innovation and technology activities within the enterprise. Theory and practice are important and is illustrated by for example the application of DA and TEA in various functional areas of the enterprise. Techno-economics analysis (TEA), also referred to as economic feasibility studies, is a core technique which is used to support decision making within the technology and innovation context of enterprises. Some of the fundamental approaches for DA, RM and TEA use the generic models of net present values, discounted cash flows, internal rates of return and the time value of money to compare expenses against earnings. In this module, aspects of the principles of techno-economics and the structure of TEA will be integrated with DA and RM to support and guide decisions relating to investment in, for example, future technology and innovation projects.

Mini-dissertation 899 (IGB 899)

Module credits	90.00
Prerequisites	No prerequisites.
Language of tuition	Module is presented in English
Department	Engineering and Technology Management
Period of presentation	Year

Module content

A research project on a topic of the student’s choice from any of the modules offered by the Graduate School of Technology Management is done. The work takes place under the supervision of a study leader (project adviser). In addition to the satisfactory completion of the report itself, the student also has to prepare an article based on the project and present it at the final-year symposium held during November each year. Evaluation is based on the report content, article, as well as the presentation. A follow-up symposium is also held during May in the next year.

Elective modules

Systems thinking 801 (IBI 801)

Module credits	10.00
Prerequisites	No prerequisites.
Contact time	20 contact hours per semester
Language of tuition	Module is presented in English
Department	Engineering and Technology Management
Period of presentation	Semester 1 or Semester 2

Module content

The modern world consists of “systems”. This is evident from everyday discussions. Statements such as “The system failed us”, or “The national energy system is under pressure” abound. Most people have little or no understanding of what a system is, or how to deal with it. Digging deeper into the concept of “system” leads one to realise that engineers and scientists without any working knowledge of “systems thinking”, or as some describe it, “thinking in systems”, rarely succeed when attempting to solve the problems of our time mainly because they do not know how to deal with trending patterns. Peter Senge, author of the book The Fifth Discipline and well-known systems thinker, defines systems thinking as “both a thinking skill and a language for understanding and working with complexity”. This module will provide you with the know-how and tools to achieve the desired outcomes in your real-world environment, notably when that world includes complex and wicked problems. The real-world in this case includes people as well. This module will challenge almost everything you have been taught to date. After completing this module you will view the world in a different way. You will become a big-picture thinker who can transcend your own discipline with ease. The module includes the history and benefits of systems thinking, systems thinking terminology, managing interrelationships, overview of appropriate tools and methodologies including system dynamics, soft systems methodology, systemigrams, etc. These will be illustrated further by applying them to relevant case studies. This module is the ideal complement to systems engineering, which focuses mainly on hard systems whereas systems thinking focuses on soft systems.

The role of projects in realising (more) sustainable business strategies and a more sustainable society is one of the emerging topics in project management. From the literature on this topic, two types of relationship between sustainability and project management appear: the sustainability of the project’s product, the deliverable the project realises, and the sustainability of the project’s process of delivering and managing the project. The first relationship, sustainable projects, is well studied and addressed, for example in relationship to eco-design and ‘green’ construction. The second relationship, sustainable project management, is emerging as a new ‘school of thought’ in project management.

As project managers play a pivotal role in the sustainability of their projects, this module will discuss the ‘why?’, ‘what?’ and ‘how?’ of sustainable project management. The lectures will discuss the concepts of sustainability, the role of projects in sustainability, the impact of sustainability on project management, the integration of sustainability in the project management process and the structure of a ‘Sustainability Management Plan’.

Industrial marketing 801 (IIM 801)

Module credits	10.00
Prerequisites	No prerequisites.

Contact time	20 contact hours per semester
Language of tuition	Module is presented in English
Department	Engineering and Technology Management
Period of presentation	Semester 1 or Semester 2

Module content

This module will primarily address marketing in the industrial environment, not commercial environment. It is based on the principles of business to business marketing (B2B) as well as services marketing. The primary objective of this module is to provide students from a technology or engineering background with a thorough foundation of basic marketing principles and how it can be applied in practice. The areas of market segmentation, macro and micro market environment, developing a value proposition, and understanding buyer behaviour will be explained. Services marketing will include: service development and design, pricing aspects, how services are delivered, how to manage employees and customers in service delivery, managing demand and supply, marketing communication aspects, building customer relationships and loyalty, and how to recover service failures.

Commercialisation and intellectual property 881 (IKG 881)

Module credits	10.00
Prerequisites	No prerequisites.
Contact time	20 contact hours per semester
Language of tuition	Module is presented in English
Department	Engineering and Technology Management
Period of presentation	Semester 1 or Semester 2

Module content

Modern societies increasingly depend on the development and successful commercialisation of new technology that may exist either in the form of knowledge, process, product, service, or combinations of these forms. The module addresses principles and practices required to identify and package technology so as to increase the chance of successful commercialisation. The module highlights the significance of the systems of innovation concept and emphasises the integration of innovation and technology management with entrepreneurial flair in order to facilitate successful commercialisation of technology towards the generation of economic growth, wealth and prosperity. Candidates studying the module will be required to analyse case studies and to carry out a practical exercise.

Quality management 801 (IKK 801)

Module credits	16.00
Prerequisites	No prerequisites.
Contact time	20 contact hours per semester
Language of tuition	Module is presented in English
Department	Engineering and Technology Management
Period of presentation	Semester 1 or Semester 2

Module content

The general objective with this module is to emphasise understanding and application of the concepts of quality management within technological enterprises. The module focuses on important concepts and definitions of quality such as quality in design and processes to ensure customer satisfaction. The role and relevance of quality management systems and standards. The link between quality and competitive advantage, leadership, ethics, culture, empowerment, partnering, and teamwork. The measurement of quality and the use of tools and techniques for process and product improvement. Organisational quality management implementation strategies.

Knowledge and information management 884 (ILB 884)

Module credits	10.00
Prerequisites	No prerequisites.
Contact time	20 contact hours per semester
Language of tuition	Module is presented in English
Department	Informatics
Period of presentation	Semester 1 or Semester 2

Legal aspects 803 (ILC 803)

Module credits	10.00
Prerequisites	No prerequisites.
Contact time	20 contact hours per semester
Language of tuition	Module is presented in English
Department	Engineering and Technology Management
Period of presentation	Semester 1 or Semester 2

Module content

The objective of this module is to present the basic principles of the law with which the project manager has to deal with during the planning and execution of a project. An introduction is presented on the sources of law, the structure of the South African legal system and representatives sources of obligations. The general law of contract is done in great detail with special reference to clauses used in contracts, different types of contracts as well as breach and remedies. Practical examples are given to enable the student to understand how the law is applied in practice. Special attention is then given to the law of purchase and sale and to construction/engineering law (letting and hiring of work). Further attention is also given to aspects of labour law and alternative dispute resolution. Another relevant aspect discussed in less detail is representation (agency).

Sustainability 802 (ILE 802)

Module credits	16.00
Prerequisites	No prerequisites.
Contact time	20 contact hours per semester
Language of tuition	Module is presented in English

Department	Engineering and Technology Management
Period of presentation	Semester 1 or Semester 2

Module content

The role of projects in realising (more) sustainable business strategies and a more sustainable society is one of the emerging topics in project management. From the literature on this topic, two types of relationship between sustainability and project management appear: the sustainability of the project's product, the deliverable the project realises, and the sustainability of the project's process of delivering and managing the project. The first relationship, sustainable projects, is well studied and addressed, for example in relationship to eco-design and 'green' construction. The second relationship, sustainable project management, is emerging as a new 'school of thought' in project management.
As project managers play a pivotal role in the sustainability of their projects, this course will discuss the 'why?', 'what?' and 'how?' of sustainable project management. The lectures will discuss the concepts of sustainability, the role of projects in sustainability, the impact of sustainability on project management, the integration of sustainability in the project management process and the structure of a 'Sustainability Management Plan'.

Project planning 802 (IMP 802)

Module credits	10.00
Prerequisites	No prerequisites.
Contact time	20 contact hours per semester
Language of tuition	Module is presented in English
Department	Engineering and Technology Management
Period of presentation	Semester 1 or Semester 2

Module content

Project Planning introduces the learner to the basic concepts of project management. This module will set the scene for the rest of the MPM programme and addresses project management principles, standards, guidelines, institutes, certifications, professionalism and best practices. Defining and designing a project life-cycle is discussed followed by the process of initiating and planning a project. The importance of a well-defined scope statement and work-breakdown structure are explained which will include needs analysis, user requirement definitions and systems thinking. Time management remains integral with different scheduling techniques addressed and applied. The last part of the module provides an overview of the module to follow and how each will fit into the total discipline of project management.

New ventures and entrepreneurship 801 (IOE 801)

Module credits	10.00
Prerequisites	No prerequisites.
Contact time	20 contact hours per semester
Language of tuition	Module is presented in English
Department	Engineering and Technology Management
Period of presentation	Semester 1 or Semester 2

Module content

This module aims to provide a wider understanding of the concepts and importance of entrepreneurship and the requirements and processes in commercialising technology-based ventures.
The themes include methodology in screening opportunities and understanding the commercialisation process; compiling technology entrepreneurship strategies; product development process and business model development; understanding and protecting intellectual property; funding options for entrepreneurial ventures, and understanding the scope and content of a business plan.

Programme and portfolio management 802 (IPM 802)

Module credits	10.00
Prerequisites	No prerequisites.
Contact time	20 contact hours per semester
Language of tuition	Module is presented in English
Department	Engineering and Technology Management
Period of presentation	Semester 1 or Semester 2

Module content

This module introduces programmes, portfolios, the basics of corporate strategy, as well as the processes that link projects to strategy.
The processes include: screening and selection of projects; portfolio design for strategic fit and balance; allocation (and scheduling) of funds and other key resources to selected projects; the interface to detailed planning, execution, and gate reviews; as well as benefit assessment of individual projects and programmes. Attention is paid to the roles of PM methodologies, front-end loading, feasibility studies and business cases in the process of project screening, as well as to techniques used to assess projects individually and relative to one another.
The roles of individuals and groups such as the Corporate Board, executives, steering committees/review boards, a project management office, a project portfolio manager and the project sponsor in the processes that link strategy and individual projects are described.

Risk management 801 (IRI 801)

Module credits	10.00
Prerequisites	No prerequisites.
Contact time	20 contact hours per semester
Language of tuition	Module is presented in English
Department	Engineering and Technology Management
Period of presentation	Semester 1 or Semester 2

Module content

This module focuses on insight in the field of risk management and the application of the basic principles of risk identification, assessment, treatment and control in the business enterprise and also systems technology innovation and project management. Theory and practice are important and a number of case studies are used to illustrate the application of risk management in various functional areas of the enterprise. Risk can be defined as "the presence of adverse events or conditions that can threaten the survival of the system, or prevent the objectives of the system to be achieved". All systems including project or technology systems, natural and human-made, are exposed to risk and this risk should be managed in a responsible way by any business enterprise. The risk exposure of modern organisations is increasing due to complex technical systems, resource structures, processes and interactions. The risk management process involves establishing the goals and objectives for the organisation or functional unit, identifying the risks, quantifying and prioritising the risks, developing responses to the high priority risks, and monitoring the operations. Business enterprises in the manufacturing and service industries have a number of functional areas and processes that are interlinked. Risk management and decision analysis are therefore applied in development of new products or services, operations, maintenance, projects, safety and security. The module also includes aspects of detailed risk analysis such as risk simulation, etc.

The information published here is subject to change and may be amended after the publication of this information. The General Regulations (G Regulations) apply to all faculties of the University of Pretoria. It is expected of students to familiarise themselves well with these regulations as well as with the information contained in the General Rules section. Ignorance concerning these regulations and rules will not be accepted as an excuse for any transgression.