

Short description MPM and MEM modules

Construction Management KBS 803

The Project and Construction Management Professions Act (Act 48 of 2000) defines Construction Management and Construction Project Management as follows:

Construction Project Management is the management of projects within the built environment from conception to completion, including management of related professional services. The Construction Project Manager is the one point of responsibility in this regard.

Construction Management is the management of the *physical construction process* within the built environment and includes the co-ordination, administration, and management of resources. The Construction Manager is the one point of responsibility in this regard.

Although the name of the module only refers to construction management the focus of this module will however be much broader. This module provides an overview of the construction industry. Organisational and environmental challenges are addressed. Unique characteristics of the industry are highlighted. A lifecycle perspective of construction projects and assets is developed. An overview of the global construction economy is provided.

Engineering Asset Management IAM 801

"Asset Management" may be defined as a life cycle process for creating, establishing, maintaining, operating, rehabilitating and divesting an asset in an optimal or balanced manner to satisfy the constraints imposed by economy, ergonomics, technical integrity and business performance. Within this definition, physical assets include equipment, infrastructure, people and plant. The 'holistic' view implied here recognises the wider range of disciplines required for strategic decisions and tactical management of physical assets. Strategy and tactics depend on the asset, whereas people processes underpin the effective management of an asset.

The overall objective for the physical Asset Management module is to provide an integrated understanding of the complimentary disciplines applicable to the management of engineered assets. The module will emphasise the synergy between specialist and cross-disciplinary skills and their respective roles with respect to the management of physical assets. The overall outcome for the learner will be awareness of the collaboration required and application of cross-disciplinary skills in technical, engineering, finance logistics, human communication, and other functions to achieve effective management of physical assets.

Decision Analysis and Risk Management IRI 801

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, 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 is therefore applied in development of new products or services, operations, maintenance, projects, safety and security.

Engineering Logistics (Not to be presented in 2018)

IIX 801

The objective is to introduce the student to the fundamental concepts of the engineering of logistics (i.e. logistic system design). This is done from the perspective of the developer of the system. A broad view of logistics is taken by introducing a model for integrated logistic support to be able to view the engineering of logistics within the right perspective.

This module has been designed to (1) provide the student with a framework, fundamental knowledge and basic skills related to logistics engineering; (2) prepare the student to fulfil his/her logistics engineering roles and responsibilities as a team member of a system development project. This is done by introducing the concept of integrated logistic support with all its associated technical and management disciplines; investigating the goal, objectives and processes of logistics engineering; how to establish an operations and support concept; how the logistic support analysis process can aid in design influencing and the establishment of detailed logistic requirements; how to manage the logistics development process; and finally an introduction to the technologies associated with specifying, designing and producing the logistic support elements.

Financial Management

FBS 830

The module objective is to provide the student with a thorough understanding and knowledge about the role and functioning of financial management in order to achieve the objective of the firm. The module is student centred. Consequently students should continuously strive towards a high level of self-activity. Study-units should be studied by students beforehand. During class discussions the emphasis will fall on problems and obscurities, which may arise from the study material. The syllabus of the module comprises the following: Understanding corporate annual financial reports. Financial statement analysis. The time value of money. Risk and rates of return. Valuation. Capital investment decisions. The required rate of return and long-term financing. Capital structure decisions. Long-term financing instruments. Short-term financing instruments. Current asset management.

Information Management

ILB 884

"Information systems are at the heart of virtually every business interaction, process, and decision, especially when one considers the vast penetration of the Web in the last few years. Managers do not have the luxury of abdicating participation in information system decisions. Managers who choose to do so risk limiting their future business options. In essence, managers who let someone else make decisions about their information systems are letting someone else make decisions about the very foundation of their business. This is a module about managing and using information, presented for current and future managers as a way of

introducing the broader implications of the impact of Information systems. Attention will be given to IT in very broad terms, including traditional data processing and management information systems, as well as enterprise resource planning systems, electronic commerce data resource warehousing and data mining, managerial support systems, groupware, artificial intelligence applications, and so forth."

Introduction to Project Management IPM 801

This module forms the basis for many (if not all) of the MPM modules that follow. As the name of the module indicates, it is designed to give the MPM student an introduction of some basic concepts. One aspect of great importance in project management is to manage projects in a way that would ensure that the project would be finished on time (either completed by a predetermined due date or, alternatively, completed as soon as possible). In addition to reviewing the basic concepts of project management, *project time management* is therefore covered in depth in this module.

Legal Aspects of Project Management ILC 803

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, legal representatives and the right of persons. The general law of contract is done in great detail with special reference to clauses used in contracts, as well as to different types of contracts. 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). Other relevant aspects discussed in less detail are representation (agency), credit agreement law (lease agreements), as well as the relevant aspects of labour law and alternative dispute resolution.

Literature Study ILS 801

The overall objective of this module is to provide students with sufficient knowledge and skills to undertake a detailed and comprehensive literature review. This course is an integral part of the Research Process and will be aligned with the Research Proposal of the student. The major part of the course consists of individual self-study done by the student outside the classroom in his/her own time, complemented by student-centred and co-operative learning/teaching methods during lectures. The self-study includes prescribed reading and individual assignments.

Maintenance Management

IIB 801

The objective of this module is to obtain the required theoretical knowledge of maintenance management and apply the principles and methodology in practice, with an emphasis on the tools, techniques, procedures and processes to manage the maintenance function within any business enterprise. The module comprises the following themes:

Introduction to Maintenance Management, Maintenance Planning, Organisation of Maintenance Resources, Leading in the Maintenance Environment, Control of the Maintenance Function, Reliability, Maintainability and Availability, Maintenance Approaches and Strategies

Marketing Management

IIM 801

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.

New Ventures and Entrepreneurship

IOE 801

This subject 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 commercialization process; compiling Technology Entrepreneurship Strategies, Product Development Process & Business Model development; understanding and protecting Intellectual Property, funding options for Entrepreneurial Ventures and understanding the scope and content of a Business Plan.

People Management

PEM 883

The aim of this module is to equip engineering managers to understand the human challenges within the engineering environment and manage these with the aim of optimal performance. The module draws on insights from organisational behaviour and human resource management to prepare engineering managers on three levels. Firstly, managing people through effective recruitment, selection and placement as well as managing diversity, motivation, performance, training, careers and labour relations. Secondly, managing relationships between people by considering team development and group dynamics. Thirdly, equipping engineering managers to deal with organisational processes by considering conflict management and negotiations, stress management, leadership, organisational communication,

change management and organisational culture.

Production and Operations Management IPP 801

This module presents an integrated perspective on the central role of production and operations (manufacturing and services) within industrial enterprises and covers the spectrum of systems, products and services. Firstly, the module deals with the role of the production and operations function in the enterprise and its interaction with the other functions in the organisation, emphasising aspects like customer requirements, competitiveness and measurements. An overview of the different types of production/operations processes is also provided. Secondly, the basic elements within the POM environment are covered in detail and include the aspects of quality in production/operations, master planning consisting of demand management, production and capacity planning and the master production schedule, purchasing, scheduling and inventory reduction. TOC with its foundation as a continuous improvement management approach is central to the module. The aim is to supply the student with background knowledge to understand the principles of production and operations management.

Project Financial and Cost Management IPF 802

The first part (*financial management*) of the module focuses on: Understanding corporate annual financial reports. Financial statement analysis. The time value of money. Risk and rates of return. Valuation. Capital investment decisions. The required rate of return and long-term financing. Capital structure decisions. Long-term financing instruments. Short-term financing instruments. Current asset management.

The second part of the module addresses only some aspects *project cost management*. The management of project costs is of critical importance. This aspect of management can materially influence the ultimate success or failure of a project. In this module, students are introduced to the concepts, ideas and methods used in cost determination and management. Upon studying this module, the student should understand what accountants do, to the extent that he/she should be familiar with the alternative methods available and the limitations of the various methods. This will allow the student to interact meaningfully with the accounting members of a team without necessarily accepting the accountant's answer as sacrosanct. The module covers topics such as: Cost determination, Activity-based costing, relevant costing and Project pricing considerations.

Project Human Resource Management IHR 801

This subject addresses the critical success factors in projects pertaining to people and human resource systems and processes applied in a project environment. This module is divided into four study units:

- **Overview of Organisational Behaviour, and Human Resource Management:** related macro-trends impacting on the project environment.
- **Managing People in Projects:** Understanding who the key stakeholders are and how to manage and lead them to positively contribute towards project performance, e.g. understanding individual performance, managing people diversities and building

effective project work relationships. Human Resource systems and processes applied to projects, e.g. staff acquisition, motivation and job satisfaction, performance management, labour relations and sustainable people development.

- **Project team work:** Team development and group dynamics.
- **Organisational processes impacting on project success:** organisational design/matrix structure, leadership in projects, conflict management and negotiations with stakeholders, power and politics in the project environment, managing a project as a change process and stress management.

Project Management IPK 803

The nature of projects and project management. The project life cycle and project phases. Organisational aspects of project management. Project teams and roles. Responsibility matrixes. Processes and methodologies for planning and control: Initiating the project, Scope planning, Scope definition and the WBS, Scope verification and work authorisation. Scheduling: Stochastic PERT, CPM time-cost tradeoffs and critical chain. Resource planning and scheduling of multiple projects and scheduling of multiple projects. Cost estimating, project budgeting and project cash flow. The control process. Performance analysis: earned value and performance indices. Project closure: evaluation, reporting and termination. Project management information systems. Project closure and continuing improvement. Reasons for project successes and failures.

Project Management Practice IMP 801

This module aims to address the final knowledge area, namely Integration. The objectives of the module are to:

- Identify, develop and motivate a Project Business Case,
- Develop an integrated Project Plan that will be used as reference for project implementation.

Learners will need to utilise all the knowledge and skill obtained during the MPM modules, source additional information and apply to a practical project.

Project Procurement Management IPJ 801

On all projects a significant amount of work is contracted to other organisations, and the rest is contracted internally. Procurement, the study of everything to do with contracting, is thus a vital part of project management. This module will cover the processes involved with procurement, specifically Procurement Planning, Solicitation Planning, Solicitation, Source Selection, Contract Management and Contract Close-out. It includes issues such as the various contracting models; the methods of entering into a contract; the types of contract; incentive contracts; contractual risk transfer, risk management and risk enforcement; and source selection techniques based on the analytic hierarchy process. A special focus will be on build-own-operate-transfer contracts in the form of public-private partnerships, as an example of a sophisticated procurement process.

Project Quality Management

IQM 801

The objective of this module is to create awareness of quality as an integrating tool, rather than a subset of project management, and to develop participant's skills to improve their overall ability in delivering better quality projects. Topics to be covered include project quality management in context, quality during project planning, project quality management during design and development, tools and techniques, quality systems (ISO 9001, 10006) and case studies.

Project Risk Management

IRM 801

The objective of this module is to obtain the required theoretical knowledge of project risk management and to apply the methodology in practice, with an emphasis on the tools, techniques, procedures and processes to manage risks within any project. The module comprises the following themes:

Introduction to Project Risk Management, Risk management standards and approaches, Probability and distributions, Risk management planning, Identification of risks, Risk analysis and evaluation, Risk resolution and treatment, Risk monitoring and control, Tools and techniques for risk management, Overall project risk, Cost and schedule risk simulation

Project System Engineering

ISE 802

The module is similar to System Engineering and Management ISE 801, because the objective is also to provide *context* for MPM and to better understand the technology-based enterprise. The objective is to *conceptualise* a tech-based enterprise in terms of processes and interaction amongst processes. These are essential to you as a developing engineering manager and project manager to be successful in your studies and application in the work environment. The *system life cycle*, phases and related processes are focussed upon. High-level process modelling and design are also touched on. The *information management challenge* and processes in the enterprise are analysed and related to business processes. Certain aspects of logistics, configuration management and organisational design are studied. The focus is on Project management activities within the SE process. The important and integrating role of the Project Manager to make SE successful is addressed.

Quality Management

IKK 801

The objective of this module is to create the ability to initiate and manage the implementation of Total Quality Management (TQM) in an organization. Concepts and definitions of quality. Framework for TQM. Design as a key process in ensuring customer satisfaction. The process approach to planning for quality. The role and relevance of quality management systems such as ISO 9000. Use of excellence models such as the South African Excellence Model for self-assessment and benchmarking. Measurement of quality. Tools and techniques for quality improvement. Quality as a process at senior level in an organization. The roles of teams in implementing TQM. Importance of communications and training in implementing TQM.

Research Methodology

INI 800

The overall objective of this module is to provide students with sufficient knowledge and skills to undertake independent research for a masters' dissertation. The major part of the course consists of individual self-study done by the student outside the classroom in his/her own time, complemented by student-centred and co-operative learning/teaching methods during lectures. The self-study includes prescribed reading, individual assignments and preparation for the examination. The lecturer will act as a guide to the students to acquire the necessary knowledge and skills through self-study and practical exercises, in addition to formal lectures.

Research Project

MEng: IGB 898 done during second year.

MSc: ISC 898 done during second year.

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 and present a paper based on the project at a final year symposium held during November each year. Evaluation is based on report content, article, as well as the presentation. A follow-up symposium is also held during May in the next year.

Strategic Management

ISM 801

The objective with this module is to stimulate strategic thinking and the development of strategic decision making skills amongst students in the field of strategic management in an engineering environment. In this module the following topics are addressed:

Concepts and Practice of Strategy: An historical background serves as introduction. Classical concepts and misconceptions in strategic and operational management work are given.

The Process of Strategic Management: The work content and structure of strategic management are discussed. A schematic model of the process is developed.

Formulation of Strategy: This section gives a statement of the work to be done in formulation of strategy. The following aspects are covered: The company mission. External environment. Environmental forecasting. The company SWOT analysis. Formulating objectives and grand strategies. Strategic analysis and choice.

Implementation of Strategy: In the concluding part of the module attention is given to implementation through business functions, structure, leadership and culture, rewards, control mechanisms for measuring, evaluating and corrective actions.

Strategic Project Management

ISM 804

The conducting of projects is the means for achieving strategic objectives as well as the way that many organisations realise value. Only the right projects should consume the limited money and human resources available to maximize Organizational Effectiveness and Efficiency. This module deals with the holistic system that enables organisations to successfully navigate from strategy definition to delivery of the value expected from the strategy. It includes the processes, the management systems necessary to achieve system effectiveness as well as a number of tools that can be used at the various steps in the processes.

System Engineering and Management ISE 801

This module provides *context for the MEM Programme*, i.e. how the other modules will interact to form an integrated whole. The system engineering process and management activities are addressed within the *context of the technology-based enterprise*. The objective is to *conceptualise* a tech-based enterprise in terms of processes and interaction amongst processes. These are essential to you as a developing engineering manager and project manager to be successful in your studies and application in the work environment. The *system life cycle*, phases and related processes are focussed upon. High-level process modelling and design are also touched on. The *information management challenge* and processes in the enterprise are analysed and related to business processes. Certain aspects of logistics, configuration management and organisational design are studied.

Technology Management ITB 801

This subject aims to provide the student with insight into the concept of technology and the utilization thereof in the business environment to achieve the strategic goals of the enterprise. The module in technology management provides theory and application skills, mainly at the operational level. Themes addressed are: Technological evolution, Technology and competitiveness, Linking technology to business strategy. Theory of technology, Technology forecasting, Introduction to intellectual property, Technology audits and acquisition strategies, Introduction to the national context.

