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# University of Pretoria Yearbook 2016

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## BEngHons Industrial Engineering (12240011)

**Duration of study** 1 year

**Total credits** 128

### Programme information

The curriculum is determined in consultation with the relevant heads of departments. A student is required to pass modules to the value of at least 128 credits.

The degree is awarded on the basis of examinations only.

### Admission requirements

Subject to the stipulations of the General Regulations, Reg. G.1.3 and G.54, a BEng degree or equivalent qualification is required for admission.

### Other programme-specific information

An appropriate bouquet of 8 modules must be selected in consultation with the Head of Department to comply with the requirements for one of the following domains of specialisation:

- Resource Optimisation (RO)
- Supply Chain Engineering (SCE)
- Business Process Management (BPM)

Industrial Engineers are not allowed more than 2 appropriate modules from other departments.

Non-Industrial Engineers are not allowed more than 1 appropriate module from other departments.

A maximum of 3 approved modules may be selected from other departments

### Examinations and pass requirements

- 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. November/January or June/July).
- A student registered for the honours degree must complete his or her studies within two years (full-time), or within three years (part-time) after first registration for the degree: Provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
- 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.
- In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
- No supplementary or special examinations are granted at postgraduate level.



## Pass with distinction

A student passes with distinction if he or she obtains a weighted average of at least 75% in the first 128 credits for which he or she has registered (excluding modules which were discontinued timeously). The degree is not awarded with distinction if a student fails any one module (excluding modules which were discontinued timeously).



## Curriculum: Final year

Minimum credits: 128

### Elective modules

#### Quality management 780 (BGH 780)

<b>Module credits</b>	16.00
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	24 contact hours
<b>Language of tuition</b>	English
<b>Academic organisation</b>	Industrial and Systems Eng
<b>Period of presentation</b>	Semester 1 or Semester 2

#### Module content

Professionally, engineers are confronted with issues related to product quality and performance or organisational excellence. The intention of this course is to provide an overview of the domain of modern quality management and to equip the student with theory, methodologies and tools and techniques to improve and achieve product quality and performance excellence.

The course covers the following topics;

- Contextualisation: The History, Guru's, Principles, Industrial setting and the Domain of Quality Management
- Practices of improving and achieving product quality: Role in Industrial Engineering, On-line and Off-line Quality Control Practices
- Frameworks of improving organisational excellence: National Quality Awards, ISO 9000 and other frameworks
- Practices of improving performance excellence: Quality and Competitive advantage, Customer and Supplier relationships, People Empowerment and Motivation, Quality Leadership and Organisational change.

#### Simulation modelling 780 (BUY 780)

<b>Module credits</b>	16.00
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	48 Contact hours
<b>Language of tuition</b>	English
<b>Academic organisation</b>	Industrial and Systems Eng
<b>Period of presentation</b>	Semester 1 or Semester 2



## Module content

- Stochastic Modelling
- Stochastic Simulation Modelling
- System Dynamics
- Agent Based Simulation
- Input/Output Analysis
- Simulation and Optimization
- Simulation Project Management
- Simulation Modelling Software

## Supply chain design 780 (BVK 780)

**Module credits** 16.00

**Prerequisites** No prerequisites.

**Contact time** 2 lectures per week

**Language of tuition** English

**Academic organisation** Industrial and Systems Eng

**Period of presentation** Semester 2

## Module content

Strategic design of supply chain networks, inventory management and supply chain integration. Framework for strategic alliances and third party logistics. Analysis and application of alternative supply chain reference models as the basis for modelling, analysis and improvement. Course outline: • Supply Chain Network Design • Strategic Management of Inventory • Supply Chain Integration • Strategic Alliances • Coordinated Product and Supply Chain Design • Supply Chain Modelling (SCOR, VRM)

## Design and analysis of experiments 780 (BDE 780)

**Module credits** 16.00

**Prerequisites** No prerequisites.

**Contact time** 24 contact hours

**Language of tuition** English

**Academic organisation** Industrial and Systems Eng

**Period of presentation** Semester 1 or Semester 2



## Module content

The design of an experiment may be defined as ‘the logical construction of an experiment in which the degree of uncertainty with which the inferences are drawn may be well defined’. The module deals with the following:

- Principles of experimental design (Randomisation, Replication and Blocking (local control))
- One-Factor-Two-level Factorial Designs
- One-Factor-Multi-level Factorial Designs
- o Completely Randomised Design (CRD) and introduction to ANOVA
- o Randomised Complete Block Design (RBD)
- o Latin Square Design (LSD)
- o Balanced Incomplete Block Design (BIBD)
- Factorial Experiments (2nd and 3rd factorial experiments)
- Blocking and Confounding in Factorial designs
- Overview of Factorial Designs

## Supply chain processes 781 (BLK 781)

<b>Module credits</b>	16.00
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	24 contact hours
<b>Language of tuition</b>	English
<b>Academic organisation</b>	Industrial and Systems Eng
<b>Period of presentation</b>	Semester 1 or Semester 2

## Module content

A key objective of supply chain management is to develop competitiveness and achieve a market advantage through the implementation of cross-functional processes as the mechanism to coordinate internal and external activities.

The course aims to create an understanding of the importance of integrating key supply chain business processes and to develop the ability to analyse and implement such processes across functional and corporate silos. Standardised process definitions and practices, including strategic and operational sub-processes and key performance measurements, are considered.

Course outline:

- Customer Relationship Management Process
- Supplier Relationship Management Process
- Customer Service Management Process
- Demand Management Process
- Order fulfilment Process
- Manufacturing Flow Management (Planning and Control) Process
- Product Development and Commercialisation Process
- Returns Management Process
- Assessment of Supply Chain Management (SCM) Processes
- Implementing and Sustaining SCM Processes
- Supply Chain Mapping Approaches
- Supply Chain Performance Measurement



## Manufacturing planning and control systems 782 (BPZ 782)

<b>Module credits</b>	16.00
<b>Prerequisites</b>	BOB 310
<b>Contact time</b>	48 contact hours per semester
<b>Language of tuition</b>	English
<b>Academic organisation</b>	Industrial and Systems Eng
<b>Period of presentation</b>	Semester 1 or Semester 2

### Module content

- Random variables review
- Forecasting models: Time Series models (Review); Regression models (Review); Auto regression and noise models; Integrated models (Causal and time series); Model selection techniques
- Aggregate planning models: Spread sheet models; MP models of Aggregate Planning (LP, DP, QP, GP, SP applications); Constrained systems models (Lagrangean)
- Lot sizing and disaggregation models: System characterisation and notations; Single item models (EOQ, EPQ, back ordering, discount, deteriorating, etc.); Dynamic Economic Lot models (DP and heuristics); Joint item lot sizing models; Multi echelon models; Safety stock modelling; Joint item disaggregation models with opening/target inventories
- Scheduling models: System characterisation and notations; Single and two machine/s sequencing models; Flow scheduling models; Job shop scheduling models; Constraint scheduling models; Line balancing techniques
- Overview of some pull based techniques

## Enterprise architecture 781 (BBA 781)

<b>Module credits</b>	16.00
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	48 Contact hours
<b>Language of tuition</b>	English
<b>Academic organisation</b>	Industrial and Systems Eng
<b>Period of presentation</b>	Semester 1 or Semester 2



## Module content

Enterprise Engineering is a developing discipline that aims to comprehend enterprise complexity and thereby master it (Hoogervorst, 2009).

Two important concepts support enterprise engineering: enterprise ontology and enterprise architecture. While enterprise ontology describes the essence of an enterprise, enterprise architecture provides normative guidance for design (Hoogervorst, 2009).

The course provides different approaches to describe/represent the enterprise (its essence and implemented versions) and guide its evolution.

The module covers:

- Background on Systems thinking, Systems Design and Systems Engineering
  - Different perspectives on alignment: creating coherency and consistency between different systems
  - Prominent approaches (and related mechanisms) to govern coherent and consistent enterprise design (e.g. Zachman, The Open Group, EA as Strategy, Hoogervorst/Dietz).
  - Enterprise Modelling (notation standards, languages using different tools).
  - Case studies.
  - Change Management
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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.