University of Pretoria Yearbook 2016

BScHons Applied Science Applied Science: Industrial Systems (12243011)

Duration of study	1 year
Total credits	128

Programme information

The BScHons (Applied Science) degree is conferred by the following academic departments:

- Chemical Engineering
- Civil Engineering
- Industrial and Systems Engineering
- Materials Science and Metallurgical Engineering
- Mechanical and Aeronautical Engineering
- Mining Engineering

Any specific module is offered on the condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as on the syllabi of the modules. The relevant departmental postgraduate brochures must also be consulted.

Admission requirements

An appropriate bachelor's degree, a BTech degree or equivalent qualification.

Other programme-specific information

The modules CPB 410, CBI 410 and CSS 420 do not form part of the postgraduate block presentations. Individual arrangements have to be made with the relevant lecturer regarding attendance of lectures, study material, tests and assignments.

Curriculum: Final year

Minimum credits: 128

Core modules

Industrial analysis 780 (BAN 780)

Module credits	16.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	Not for Industrial Engineering students
Contact time	24 contact hours per semester
Language of tuition	English
Academic organisation	Industrial and Systems Eng
Period of presentation	Semester 1 or Semester 2

Module content

- Monte Carlo Simulation
- Continuous Simulation
- System Dynamics
- Multi-objective Decision-making
- Operations Research
- Decision Analysis
- Discrete Simulation

Quality management 780 (BGH 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

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)

Module credits	16.00
Prerequisites	No prerequisites.
Contact time	48 Contact hours
Language of tuition	English
Academic organisation	Industrial and Systems Eng
Period of presentation	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)

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

A key objective of supply chain management is to develop competiveness 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)

Module credits	16.00
Prerequisites	BOB 310
Contact time	48 contact hours per semester
Language of tuition	English
Academic organisation	Industrial and Systems Eng
Period of presentation	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)

Module credits	16.00
Prerequisites	No prerequisites.
Contact time	48 Contact hours
Language of tuition	English
Academic organisation	Industrial and Systems Eng
Period of presentation	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