

University of Pretoria Yearbook 2025

Systems engineering 780 (BSS 780)

Qualification	Postgraduate
Faculty	Faculty of Engineering, Built Environment and Information Technology
Module credits	24.00
NQF Level	08
Programmes	BEngHons specialising in Industrial Engineering BScHons in Applied Science specialising in Industrial Systems
Prerequisites	BBA 781
Contact time	24 contact hours
Language of tuition	Module is presented in English
Department	Industrial and Systems Engineering
Period of presentation	Semester 1 or Semester 2

Module content

Systems engineering is a multidisciplinary engineering profession that focuses on the conception, design, development, architecting, integration and management of complex systems over their life cycle. It does this by creating, executing and coordinating an interactive platform for all stakeholders viz: clients, consumers, design team/technical crew and management team amongst others. Complexity of systems hinges on diversity, multiplicity and intricacy of intra and interconnectivity of system entities. This module will commence briefly with some introductory knowledge prior to diverting to intermediate and advanced concepts with specific attention given to case studies, software applications and emergence of research opportunities. Artificial Intelligence (AI) systems covering robotics systems modelling amongst others would be addressed and given a special preference.

[Block Week One]: Design, Operations and Performance of Systems

Systems Design, Architecting, verification, Analysis and validation

Model-Based Systems Engineering

Matlab Demo of Requirements Deployment-Modelling of case study systems.

Operation of systems-covering: Reliability of systems; Maintenance-Time and Condition based

Fuzzy Logic/Biomimicry Maintenance.

[Block Week Two]:Complexity of interaction in Systems

Understanding and modelling system complexity, IoT (Internet of Things), RoTs (Relationship of Things), System of Systems, System of System of Systems, Life Cycle Analysis of interacting systems.

[Block Week Three]: Understanding and Modelling AI Systems

Robotic Arm and Vehicle, Design, Dynamics (Kinematics and Kinetics), Static analysis and joint stiffness; Sensors and Actuators.

General Academic Regulations and Student Rules

The [General Academic Regulations \(G Regulations\)](#) and [General Student Rules](#) apply to all faculties and registered students of the University, as well as all prospective students who have accepted an offer of a place at the University of Pretoria. On registering for a programme, the student bears the responsibility of ensuring that they familiarise themselves with the General Academic Regulations applicable to their registration, as well as the relevant faculty-specific and programme-specific regulations and information as stipulated in the relevant yearbook. Ignorance concerning these regulations will not be accepted as an excuse for any transgression, or basis for an exception to any of the aforementioned regulations. The G Regulations are updated annually and may be amended after the publication of this information.

Regulations, degree requirements and information

The faculty regulations, information on and requirements for the degrees published here are subject to change and may be amended after the publication of this information.

University of Pretoria Programme Qualification Mix (PQM) verification project

The higher education sector has undergone an extensive alignment to the Higher Education Qualification Sub-Framework (HEQSF) across all institutions in South Africa. In order to comply with the HEQSF, all institutions are legally required to participate in a national initiative led by regulatory bodies such as the Department of Higher Education and Training (DHET), the Council on Higher Education (CHE), and the South African Qualifications Authority (SAQA). The University of Pretoria is presently engaged in an ongoing effort to align its qualifications and programmes with the HEQSF criteria. Current and prospective students should take note that changes to UP qualification and programme names, may occur as a result of the HEQSF initiative. Students are advised to contact their faculties if they have any questions.