



Universiteit van Pretoria Jaarboek 2017

BIngHons Elektroniese Ingenieurswese (12240092)

Duur van studie 1 jaar

Totale krediete 128

Programinligting

Die leergang word in oorleg met die betrokke departementshoofde bepaal. 'n Student moet in modules met 'n totaal van minstens 128 krediete slaag.

Die graad word slegs op grond van eksamens toegeken.

Toelatingsvereistes

Behoudens die bepalinge van die Algemene Regulasies Reg. G.1.3 en G.54, word 'n BIng-graad of 'n gelykwaardige kwalifikasie vir toelating vereis.

Ander programspesifieke inligting

Studente mag 32 krediete se modules uit 'n ander spesialisrigting of departement neem, met toestemming van die Koördineerder: Nagraadse studie.

Eksamens en slaagvereistes

- Die eksamen in elke module wat die student volg, word in die eerste normale eksamentydperk na afsluiting van klasse (dit wil sê Oktober/November of Mei/Junie) afgeneem.
- 'n Student vir die honneursgraad moet sy of haar studie in die geval van voltydse studente binne twee jaar, en in die geval van na-uurse studente, binne drie jaar na eerste registrasie vir die graad voltooi, met dien verstande dat die Dekaan, op aanbeveling van die departementshoof, in buitengewone omstandighede 'n vasgestelde beperkte verlenging van die tydperk kan goedkeur.
- 'n Student moet in elke module minstens 50% in die eksamen behaal waar 'n semester- of jaarpunt nie vereis word nie. 'n Module mag net een maal herhaal word.
- In gevalle waar daar wel 'n semester- of jaarpunt toegeken word, word 'n minimum eksamenpunt van 40% en 'n finale punt van 50% vereis.
- Geen her- of spesiale eksamens word op nagraadse vlak toegestaan nie.

Slaag met lof

'n Student slaag met lof as hy of sy 'n geweegde gemiddelde van minstens 75% behaal het in die eerste 128 krediete waarvoor geregistreer is (modules wat betyds gestaak is, uitgesluit). Indien die student enige module druipe (modules wat betyds gestaak is, uitgesluit), kan die graad nie met lof behaal word nie.



Kurrikulum: Finale jaar

Minimum krediete: 128

Kernmodules

Navorsingsprojek: Ontwerp en laboratorium 733 (EPT 733)

Module-inhoud:

*Hierdie inligting is slegs in Engels beskikbaar.

This module will include extensive laboratory experiments to test the principles and possible solutions of the proposed M Eng research project and will include inter alia the following. These will include hardware and/or software experiments:

- (i) Introduction to instrumentation and measuring techniques in general and specifically as applied in the field of research.
- (ii) Structured laboratory work to introduce the specific problem investigated for the research undertaken.
- (iii) Structured laboratory work to test the proposed solution for the problem addressed.
- (iv) Confirmation experiments.

| | |
|----------------------------|---------------------------------|
| Modulekrediete | 32.00 |
| Voorvereistes | Geen voorvereistes. |
| Kontaktyd | 10 lesings per week |
| Onderrigtaal | Module word in Engels aangebied |
| Akademieorganisasie | Elektriese, Elektroniese en Re |
| Aanbiedingstydperk | Semester 1 of Semester 2 |

Syferkommunikasie 732 (ETD 732)

Module-inhoud:

*Hierdie inligting is slegs in Engels beskikbaar.

Digital Communications ETD 732 is a first semester graduate course in Electronic Engineering, presented by the Signal Processing and Telecommunications Group, in collaboration with the Centre for Radio and Digital Communication (CRDC). The content of the course is as follows: Introduction to digital communications, digital communications applications and services. Review of: probability and stochastic processes, source coding, characterisation of communication signals and systems and optimum receivers for the AWGN channel. Advanced synchronisation systems: Carrier and symbol recovery. Shannon's channel capacity theorem and introduction to coding. Signal design for band-limited channels. Digital modulation techniques. Communication through band-limited linear filter channels. Introduction to adaptive equalisation. Spread spectrum signals for digital communications. Simulation of digital communication systems. Digital realisation of digital communication subsystems. Digital communication laboratory.

| | |
|-----------------------|---------------------|
| Modulekrediete | 32.00 |
| Voorvereistes | Geen voorvereistes. |



| | |
|-------------------------------|---------------------------------|
| Kontaktyd | 32 kontakure per semester |
| Onderrigtaal | Module word in Engels aangebied |
| Akademiese organisasie | Elektriese, Elektroniese en Re |
| Aanbiedingstydperk | Semester 1 |

Elektroniese verdediging - elektroniese ondersteuning 781 (ELB 781)

Module-inhoud:

*Hierdie inligting is slegs in Engels beskikbaar.

The role of electronic support (ES) receivers from tactical and strategic perspectives. ES system architectures including analogue and digital receivers. The following topics will be considered: signal detection, parameter estimation including direction finding (DF) angle of arrival (AoA) estimation and pulse repetition interval (PRI) tracking, emitter classification and low probability of detection (LPD) and low probability of intercept (LPI) techniques to counter ES receivers.

| | |
|-------------------------------|---------------------------------|
| Modulekrediete | 32.00 |
| Kontaktyd | 32 kontakure per semester |
| Onderrigtaal | Module word in Engels aangebied |
| Akademiese organisasie | Elektriese, Elektroniese en Re |
| Aanbiedingstydperk | Semester 1 of Semester 2 |

Mikrogolftorie 780 (EMM 780)

Module-inhoud:

*Hierdie inligting is slegs in Engels beskikbaar.

Review of EM theory and transmission lines, analysis of transmission lines and waveguides, microwave network analysis, impedance matching, power dividers, couplers and hybrids, microwave filters.

| | |
|-------------------------------|---|
| Modulekrediete | 32.00 |
| Voorvereistes | Mikrogolwe en antennes EMZ 320 of gelykstaande. |
| Kontaktyd | 32 kontakure per semester |
| Onderrigtaal | Module word in Engels aangebied |
| Akademiese organisasie | Elektriese, Elektroniese en Re |
| Aanbiedingstydperk | Semester 1 |

Advanced topics in intelligent systems 733 (EAI 733)

Module-inhoud:

The aim of the module is to augment the general background provided by the EAI 732 module with the specific theoretical background required for MEng. The module will, depending on the intended



research field of the student, incorporate advanced theory from fields such as: Digital Image Processing, Computer and Robotic Vision, Probabilistic Robotics, Data Fusion, Hardware and Software Parallel Processing, Real-Time and Reactive Systems.

| | |
|-------------------------------|---------------------------------|
| Modulekrediete | 32.00 |
| Voorvereistes | EAI 732 |
| Kontaktyd | 10 lesings per week |
| Onderrigtaal | Module word in Engels aangebied |
| Akademiese organisasie | Elektriese, Elektroniese en Re |
| Aanbiedingstydperk | Semester 1 of Semester 2 |

Optimale beheer 780 (EBO 780)

Module-inhoud:

*Hierdie inligting is slegs in Engels beskikbaar.

Optimal control of dynamic systems: continuous time systems, the Euler Lagrange equations, minimum time problems, the Pontryagin maximum principle; feasible control: computation of control input strategies for nonlinear systems such that the given control specifications are satisfied; feedback control of dynamic systems: dynamic programming for continuous time and discrete time nonlinear systems; applications in manufacturing systems; parametrisations of nonlinear/intelligent controller structures and applications of feasible control; linear systems: linear optimal control, linear optimal observers; application of feasible control in the computation of linear optimal output feedback controllers such that the design specifications are satisfied including: robustness against parameter variations, disturbance rejection, command following, frequency domain specifications.

| | |
|-------------------------------|--------------------------------------|
| Modulekrediete | 32.00 |
| Voorvereistes | Inleidende beheermodule soos EBB 320 |
| Kontaktyd | 32 kontakure per semester |
| Onderrigtaal | Module word in Engels aangebied |
| Akademiese organisasie | Elektriese, Elektroniese en Re |
| Aanbiedingstydperk | Semester 1 |

Intelligente stelsels 732 (EAI 732)

Module-inhoud:

*Hierdie inligting is slegs in Engels beskikbaar.

This module provides the theoretical background necessary to understand, research and develop real-world software and hardware systems that incorporate and exhibit intelligent behaviour. The module incorporates advanced theory from fields such as Artificial Intelligence, Computational Intelligence, Machine Learning, Pattern Recognition and Signal Processing. Core topics of the module include: Bayesian Theory, Neural Networks, Kernel Methods, Graphic Models, and Numerical Bayesian Methods.

| | |
|-----------------------|-------|
| Modulekrediete | 32.00 |
|-----------------------|-------|



| | |
|-------------------------------|---------------------------------|
| Voorvereistes | Geen voorvereistes. |
| Kontaktyd | 10 lesings per week |
| Onderrigtaal | Module word in Engels aangebied |
| Akademiese organisasie | Elektriese, Elektroniese en Re |
| Aanbiedingstydperk | Semester 1 |

Inleiding tot navorsing 732 (EIN 732)

Module-inhoud:

*Hierdie is 'n verpligte module.

*Hierdie inligting is slegs in Engels beskikbaar.

The aim of this module is to teach students to critically evaluate research literature, including conference papers and journal articles, in order to determine the current state of knowledge in a particular specialist area. It will also provide students with the principles of research to enable them to conduct research and prepare an original project in their particular specialist area.

| | |
|-------------------------------|---------------------------------|
| Modulekrediete | 32.00 |
| Voorvereistes | Geen voorvereistes. |
| Kontaktyd | 16 kontakure per semester |
| Onderrigtaal | Module word in Engels aangebied |
| Akademiese organisasie | Elektriese, Elektroniese en Re |
| Aanbiedingstydperk | Semester 1 of Semester 2 |

Antenneteorie 780 (EMA 780)

Module-inhoud:

*Hierdie inligting is slegs in Engels beskikbaar.

Types of antennas and radiation mechanisms, parameters of antennas, radiation integrals, near and far field radiation, duality theorem, wire antennas, antenna arrays, mutual coupling and mutual impedance, surface equivalence theorem, reaction theorem, moment methods in antenna analysis, travelling wave antennas, microstrip antennas, horn antennas, physical optics, reflector antennas, antenna synthesis.

| | |
|-------------------------------|---|
| Modulekrediete | 32.00 |
| Voorvereistes | Mikrogolwe en antennas EMZ 320 of gelykstaande. |
| Kontaktyd | 32 kontakure per semester |
| Onderrigtaal | Module word in Engels aangebied |
| Akademiese organisasie | Elektriese, Elektroniese en Re |
| Aanbiedingstydperk | Semester 2 |



Multiveranderlike beheerstelsels 732 (EMB 732)

Module-inhoud:

*Hierdie inligting is slegs in Engels beskikbaar.

Introduction to linear dynamic systems: Modes, stability, controllability, observability, multivariable poles and zeros, state-space and transfer function descriptions. Singular values and singular value decomposition. Feedback performance specifications in the frequency domain. Synthesis via state space methods. Optimal control techniques, model predictive control.

| | |
|-------------------------------|-------------------------------------|
| Modulekrediete | 32.00 |
| Voorvereistes | Inleidende beheermodule soos EBB320 |
| Kontaktyd | 32 kontakure per semester |
| Onderrigtaal | Module word in Engels aangebied |
| Akademiese organisasie | Elektriese, Elektroniese en Re |
| Aanbiedingstydperk | Semester 2 |

Telekommunikasiestelsel-ingenieurswese 732 (ETT 732)

Module-inhoud:

*Hierdie module words slegs in Engels aangebied.

| | |
|-------------------------------|---------------------------------|
| Modulekrediete | 32.00 |
| Voorvereistes | Geen voorvereistes. |
| Kontaktyd | 32 kontakure per semester |
| Onderrigtaal | Module word in Engels aangebied |
| Akademiese organisasie | Elektriese, Elektroniese en Re |
| Aanbiedingstydperk | Semester 1 of Semester 2 |

Navorsingsprojek: Teorie 732 (EPT 732)

Module-inhoud:

*Hierdie inligting is slegs in Engels beskikbaar.

This module will cover the essential theoretical background of the student's proposed M Eng topic and include inter alia the following:

- (i) Field definition and descriptions
- (ii) In-depth study into background and theory relevant to the problem to be addressed
- (iii) Problem definition and description
- (iv) Mathematical simulations of the problem

| | |
|-----------------------|---------------------|
| Modulekrediete | 32.00 |
| Voorvereistes | Geen voorvereistes. |



| | |
|-------------------------------|---------------------------------|
| Kontaktyd | 10 lesings per week |
| Onderrigtaal | Module word in Engels aangebied |
| Akademiese organisasie | Elektriese, Elektroniese en Re |
| Aanbiedingstydperk | Semester 1 of Semester 2 |

Elektroniese verdediging - elektroniese teenmaatreëls 780 (ELB 780)

Module-inhoud:

*Hierdie inligting is slegs in Engels beskikbaar.

Radar, including aspects such as: radar frequency bands and their characteristics, radar types (eg tracking vs search radar), the radar range equation, radar cross-section (RCS), target characteristics such as scintillation and glint, pulse compression, coherent and non-coherent integration (eg Doppler processing), range and Doppler ambiguities, target tracking including simple tracking filters and angle-tracking techniques (eg monopulse), high range-resolution (HRR) techniques, and environmental effects such as atmospheric attenuation and multipath. Electronic attack (EA) - also referred to as jamming or electronic countermeasure (ECM) - including the relationship between good system design and EP, and basic EP techniques to counter the EA techniques listed above.

| | |
|-------------------------------|---------------------------------|
| Modulekrediete | 32.00 |
| Voorvereistes | Geen voorvereistes. |
| Kontaktyd | 10 lesings per week |
| Onderrigtaal | Module word in Engels aangebied |
| Akademiese organisasie | Elektriese, Elektroniese en Re |
| Aanbiedingstydperk | Semester 1 of Semester 2 |

Hernieubare energie 732 (EGH 732)

Module-inhoud:

*Hierdie inligting is slegs in Engels beskikbaar.

This course will cover various renewable energy technologies including Wind, Solar Photovoltaic systems, Distributed generation and Hybrid power system.

| | |
|-------------------------------|---------------------------------|
| Modulekrediete | 32.00 |
| Kontaktyd | 32 kontakure per semester |
| Onderrigtaal | Module word in Engels aangebied |
| Akademiese organisasie | Elektriese, Elektroniese en Re |
| Aanbiedingstydperk | Semester 1 of Semester 2 |



Die inligting wat hier verskyn, is onderhewig aan verandering en kan na die publikasie van hierdie inligting gewysig word.. Die [Algemene Regulasies \(G Regulasies\)](#) is op alle fakulteite van die Universiteit van Pretoria van toepassing. Dit word vereis dat elke student volkome vertrouwd met hierdie regulasies sowel as met die inligting vervat in die [Algemene Reëls](#) sal wees. Onkunde betreffende hierdie regulasies en reëls sal nie as 'n verskoning by oortreding daarvan aangebied kan word nie.