NATIONAL DIPLOMA: ENGINEERING: INDUSTRIAL
Qualification code: NDEI03 - NQF Level 6

Campus where offered: Pretoria Campus (day and block mode classes)
Last year of new intake: 2018
Teach-out (phase-out) date: 31 December 2023

Students registered for this qualification should complete their studies according to the teach-out date prescribed for the qualification, subject to the stipulations of Regulation 3.1.11 and 3.1.13 in the Students' Rules and Regulations.

Information on phased-out programmes can be obtained from the TUT website, www.tut.ac.za.

Key to asterisks:
* Information does not correspond to information in Report 151.
(Deviations approved by the Senate in August 2005, May 2008 and April 2010.)

CURRICULUM
Consult the 2016 Faculty Prospectus for the full contents of the qualification.

FIRST YEAR
Please note that no registration will take place after December 2018 for first semester- and December 2019 for second-semester subjects.

CODE	SUBJECT	CREDIT	PREREQUISITE SUBJECT(S)
FIRST SEMESTER			
CAI101T	Computer-Aided Draughting I*	(0,047)*	
EGN101T	Engineering Communication I*	(0,042)	
ETT101T	Electrotechnology I	(0,083)	
MAT171T	Mathematics I	(0,083)	
MDR101B	Mechanical Engineering Drawing I	(0,083)	
MHC101T	Mechanics I	(0,083)	
MME101T	Mechanical Manufacturing Engineering I	(0,083)	
TOTAL CREDITS FOR THE SEMESTER:		0,504	
SECOND SEMESTER			
EWK121T	Engineering Work Study I	(0,083)	Engineering Communication I Mathematics I Mechanical Manufacturing Engineering I Mechanics I
MAT271B	Mathematics II	(0,083)	Mathematics I
MFR201T	Manufacturing Relations II	(0,083)	Engineering Communication I
MME201T	Mechanical Manufacturing Engineering II	(0,083)	Computer-Aided Draughting I Mechanical Engineering Drawing I Mechanical Manufacturing Engineering I
PEI111T	Production Engineering: Industrial I	(0,083)	
QTQ101T	Qualitative Techniques I	(0,083)	Mathematics I
TOTAL CREDITS FOR THE SEMESTER:		0,498	
TOTAL CREDITS FOR THE FIRST YEAR:		**1,002**	

SECOND YEAR
Please note that no registration will take place after December 2020 for first semester- and December 2021 for second-semester subjects.

CODE	SUBJECT	CREDIT	PREREQUISITE SUBJECT(S)
FIRST SEMESTER			
CSG201T	Costing II	(0,083)	
EWK221T	Engineering Work Study II	(0,083)	Engineering Work Study I
FLM201T	Facility Layout and Materials Handling II	(0,083)	Engineering Work Study I Production Engineering: Industrial I
MAT351T	Mathematics III	(0,083)	Mathematics II
PEI211T	Production Engineering: Industrial II	(0,083)	Mechanical Manufacturing Engineering I Production Engineering: Industrial I
QAS201T	Quality Assurance II	(0,083)	Qualitative Techniques I
TOTAL CREDITS FOR THE SEMESTER:		0,498	
SECOND SEMESTER			
ATM301B	Automation III	(0,085)*	Mechanical Manufacturing Engineering II
EWK321T	Engineering Work Study III	(0,083)	Engineering Work Study II
IAC321T	Industrial Accounting III	(0,083)	Costing II
IED201T	Industrial Engineering Systems Design II*	(0,083)	Engineering Communication I Mechanics I
ILE301T	Industrial Leadership III	(0,083)	Manufacturing Relations II
ORS321T	Operational Research III	(0,083)	Production Engineering: Industrial II
TOTAL CREDITS FOR THE SEMESTER:		0,500	
TOTAL CREDITS FOR THE SECOND YEAR:		**0,998**	

THIRD YEAR

CODE	SUBJECT	CREDIT	PREREQUISITE SUBJECT(S)
FIRST SEMESTER			
EXP1IEN	Work-Integrated Learning I	(0,500)	
TOTAL CREDITS FOR THE SEMESTER:		0,500	
SECOND SEMESTER			
EXP2IEN	Work-Integrated Learning II	(0,500)	Work-Integrated Learning I
TOTAL CREDITS FOR THE SEMESTER:		0,500	
TOTAL CREDITS FOR THE THIRD YEAR:		**1,000**	
TOTAL CREDITS FOR THE QUALIFICATION:		**3,000**	

SUBJECT INFORMATION (OVERVIEW OF SYLLABUS)

The syllabus content is subject to change to accommodate industry changes. Please note that a more detailed syllabus is available at the Department or in the study guide that is applicable to a particular subject. On 8 August 2018, the syllabus content was defined as follows:

A

AUTOMATION III (ATM301B) **1 X 3-HOUR PAPER**

(Subject custodian: Department of Industrial Engineering)

Challenges in the Manufacturing Environment. Automation concept. Control systems. Numerical control systems. Robotics systems. Material handling systems. Flexible manufacturing systems. Pneumatics. Electro-pneumatics. (Total tuition time: ± 68 hours)

C

COMPUTER-AIDED DRAUGHTING I (CAI101T) **CONTINUOUS ASSESSMENT**

(Subject custodian: Department of Mechanical Engineering, Mechatronics and Industrial Design)

Introduction to computer-aided design (CAD), various software application packages, component and assembly modeling. Students operate CAD software in order to produce three-dimensional models, providing a basis for more advanced CAD applications and compound drawings. (Total tuition time: ± 80 hours)

COSTING II (CSG201T) **1 X 3-HOUR PAPER**

(Subject custodian: Department of Managerial Accounting and Finance)

Basic methods and a group of selected techniques of cost accounting for application in the business environment. The subject consists of two modules. (Total tuition time: ± 68 hours)

E

ELECTROTECHNOLOGY I (ETT101T) **1 X 3-HOUR PAPER**

(Subject custodian: Department of Electrical Engineering)

The correct use of SI units and their applications. Construction and care of batteries. WS theory and different measuring instruments. The influence of magnetic lines, the application and use of magnetic fields, inductance and the factors that influence it. Capacitors and their functioning. (Total tuition time: ± 70 hours)

ENGINEERING COMMUNICATION I (EGN101T) **CONTINUOUS ASSESSMENT**

(Subject custodian: Department of Applied Languages)

Communication theory, non-verbal communication (body language). Oral presentations, interviews, developing leadership and participation skills. Technical reports and correspondence. (Total tuition time: ± 68 hours)

ENGINEERING WORK STUDY I (EWK121T) **1 X 3-HOUR PAPER**

(Subject custodian: Department of Industrial Engineering)

Introduction to work study. Productivity and work study. Choice of method study techniques. Use of method study techniques. Work measurement (time studies). Human factors (and work study work). Ergonomics (an introduction). Working conditions and work environment. Jigs and clamps (an introduction). Computer applications. (Total tuition time: ± 68 hours)

ENGINEERING WORK STUDY II (EWK221T) **1 X 3-HOUR PAPER**

(Subject custodian: Department of Industrial Engineering)

Work measurement (advanced). Predetermined time systems. Standard data. Activity sampling. Analytical and comparative estimation. Ergonomics (advanced). Work study applied in the administration function. Work improvement (advanced). (Total tuition time: ± 68 hours)

ENGINEERING WORK STUDY III (EWK321T) **1 X 3-HOUR PAPER**

(Subject custodian: Department of Industrial Engineering)

Performance improvement programs. Productivity improvement, Objective Matrix, South African Excellence Model. Systems analyses and design for management. (Total tuition time: ± 68 hours)

F

FACILITY LAYOUT AND MATERIALS HANDLING II (FLM201T) **1 X 3-HOUR PAPER**

(Subject custodian: Department of Industrial Engineering)

Introduction. Strategic facilities planning. Product. Process and schedule design. Activity relationships and space requirements. Personnel requirements. Handling of materials. Facility layout. Computer-supported layout. Receiving and shipping. Storage and warehousing. Manufacturing. Office planning. Facility services. Non-manufacturing applications. Evaluating and selecting a facilities plan. Preparing and selling the facilities plan. Implementing and maintaining the facilities plan. (Total tuition time: ± 68 hours)

I

INDUSTRIAL ACCOUNTING III (IAC321T) **1 X 3-HOUR PAPER**

(Subject custodian: Department of Accounting)

Introduction to financial management. Financial analysis, planning and control. Working capital management. Investment decisions. Computer applications. (Total tuition time: ± 68 hours)

INDUSTRIAL ENGINEERING SYSTEMS DESIGN II (IED201T) **1 X 3-HOUR PAPER**

(Subject custodian: Department of Industrial Engineering)

Introduction to systems engineering, the systems design process from conceptual to detail design, models for economic evaluations, design for operational feasibility with emphasis on reliability and maintainability. (Total tuition time: ± 68 hours)

INDUSTRIAL LEADERSHIP III (ILE301T) **1 X 3-HOUR PAPER**

(Subject custodian: Department of Management and Entrepreneurship)

Leaders and management. Management planning, organising, leading and control. (Total tuition time: ± 68 hours)

M

MANUFACTURING RELATIONS II (MFR201T) **1 X 3-HOUR PAPER**

(Subject custodian: Department of People Management and Development)

Introduction to human behaviour. Introduction to human resources management. Job evaluation, human resources planning and recruitment. Selection and induction. Individual and organisational development. Performance management. Compensation, integration, maintenance, retirement. (Total tuition time: ± 68 hours)

MATHEMATICS I (MAT171T) **1 X 3-HOUR PAPER**

(Subject custodian: Department of Mathematics and Statistics)

Basic mathematics. Differentiation. Integration. Matrices and determinants. Vectors. Data handling. Complex numbers or mensuration. (Total tuition time: ± 60 hours)

MATHEMATICS II (MAT271B) **1 X 3-HOUR PAPER**

(Subject custodian: Department of Mathematics and Statistics)

Revision of differentiation. Differentiation of functions with more than one variable. Further integration. Numerical methods. First-order ordinary differential equations. Matrices (Gauss elimination). (Total tuition time: ± 60 hours)

MATHEMATICS III (MAT351T) **1 X 3-HOUR PAPER**

(Subject custodian: Department of Mathematics and Statistics)

First-order differential equations. Higher-order differential equations. Basic mathematical modelling. Laplace transforms. Systems of differential equations. Numerical solutions of differential equations. Fourier Series. (Total tuition time: ± 70 hours)

MECHANICAL ENGINEERING DRAWING I (MDR101B) **CONTINUOUS ASSESSMENT**

(Subject custodian: Department of Mechanical Engineering, Mechatronics and Industrial Design)

Printing, freehand sketches. Construction of scales, ellipse, square screw thread. Isometric drawing. Oblique drawings. Development of pipes. Curve of interpenetration of T-ends and pipe connections. Projections of prisms and pyramids. Drawing language; for example, of machining symbols. First-angle and third-angle orthographic projection drawings of single objects, assembly drawings and detail drawings. (Total tuition time: ± 68 hours)

MECHANICAL MANUFACTURING ENGINEERING I (MME101T) **1 X 3-HOUR PAPER**
(Subject custodian: Department of Mechanical Engineering, Mechatronics and Industrial Design)
Safety and safety legislation. Identification and application of various types of steel. Heat treatment of steel. Hand and machine tools. Metal cutting and machining. Alloy metals. Casting processes. Welding. (Total tuition time: ± 68 hours)

MECHANICAL MANUFACTURING ENGINEERING II (MME201T) **1 X 3-HOUR PAPER**
(Subject custodian: Department of Mechanical Engineering, Mechatronics and Industrial Design)
Measurement. Operative practical testing. Quality and dimensional control. Gauging and measurement. Measuring instruments. Comparators. Surface measurement. (Total tuition time: ± 68 hours)

MECHANICS I (MHC101T) **1 X 3-HOUR PAPER**
(Subject custodian: Department of Mechanical Engineering, Mechatronics and Industrial Design)
Moments, centroids, kinematics, forces and Newton's laws, momentum and impulse, work and energy, circular motion, statics. (Total tuition time: not available)

O

OPERATIONAL RESEARCH III (ORS321T) **1 X 3-HOUR PAPER**
(Subject custodian: Department of Industrial Engineering)
Fundamentals of decision theory. Decision trees and utility theory. Marginal analysis and normal distribution. Game theory. Linear programming: graphic methods. Linear programming: the simplex method. Linear programming: sensitivity analysis, duality. Linear programming: applications. Transportation and assignment. Integer programming, goal programming and the branch and bound method. Dynamic programming. Simulation. Markov analysis. (Total tuition time: ± 90 hours)

P

PRODUCTION ENGINEERING: INDUSTRIAL I (PEI111T) **1 X 3-HOUR PAPER**
(Subject custodian: Department of Industrial Engineering)
Introduction to production management. Production management in perspective. The nature of operating systems and operations management. Product service design. Facility planning and layout. Capacity management. (Total tuition time: ± 68 hours)

PRODUCTION ENGINEERING: INDUSTRIAL II (PEI211T) **1 X 3-HOUR PAPER**
(Subject custodian: Department of Industrial Engineering)
Forecasting. Aggregate planning tactics. Just-in-time systems and purchasing management. Inventory management. Material requirements planning. Operations scheduling. (Total tuition time: ± 68 hours)

Q

QUALITATIVE TECHNIQUES I (QTQ101T) **1 X 3-HOUR PAPER**
(Subject custodian: Department of Mathematics and Statistics)
Introduction to statistics. Descriptive statistics: graphical representation of data, measurements of central position, measures of dispersion. Basic probability concepts. Probability distributions. Sampling and sampling distributions. Confidence intervals. Hypothesis testing: one sample and two sample. Means, percentages (proportions), variances. Linear regressions and correlation. Hypothesis testing – Chi-square. Analysis of variance. Non-parametric. (Total tuition time: ± 68 hours)

QUALITY ASSURANCE II (QAS201T) **1 X 3-HOUR PAPER**
(Subject custodian: Department of Industrial Engineering)
Essentials of a quality management system. Statistical process control: introduction to quality improvement. The quality life cycle, introduction to statistical process control, basic statistical calculations, analyses and interpretation of control charts, control of attribute control charts, design of experiments, principles of statistical design and analysis, experiments. (Total tuition time: ± 90 hours)

W

WORK-INTEGRATED LEARNING I (EXP1IEN) **WORK-INTEGRATED LEARNING**

(Subject custodian: Department of Industrial Engineering)

Workshop factors: labour machine technology (types and uses), workshop planning and control, inventory control and storage, drawing office practice (design and interpretation), maintenance. Industrial engineering aspects: method study, time studies, labour standards, distribution line analysis, labour schedules. (Total tuition time: six months)

WORK-INTEGRATED LEARNING II (EXP2IEN) **WORK-INTEGRATED LEARNING**

(Subject custodian: Department of Industrial Engineering)

Work study. Quality assurance. Production. Systems. Facility layout and materials handling. The following fields could be covered: material-handling analysis, equipment specifications, selection and evaluation, mechanisation and automation, plant layout (analysis and renewal), office layout and planning, productivity (equipment utilisation studies and capacity analysis), form design and control, industrial systems analysis and design. (Total tuition time: six months)