BACCALAUREUS TECHNOLOGIAE: ENGINEERING: CHEMICAL
Qualification code: BTCE02 - NQF Level 7

Campus where offered: Pretoria Campus (evening classes)
Last year of new intake: July 2019
Teach-out (phase-out) date: 30 June 2021

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.

CURRICULUM
Consult the 2019 Faculty Prospectus for the full contents of the qualification.

SUBJECTS PRINTED IN BOLD ARE NOT FOR REGISTRATION PURPOSES.

ATTENDANCE

CODE	SUBJECT	CREDIT
PJC400T	Project: Chemical Engineering IV	(0,100)

FIRST SEMESTER

CET401T	**Chemical Engineering Technology IV**	
CET40YT	Chemical Engineering Technology: Heat and Mass Transfer IV	(0,100)
CET40ZT	Chemical Engineering Technology: Unit Operations IV	(0,100)
CPD401T	**Chemical Process Design IV**	
CPD40XT	Chemical Process Design: Equipment Design IV	(0,100)
MTE301T	Mathematics: Chemical Engineering III	(0,100)
REA401T	Reactor Technology IV	(0,100)

SECOND SEMESTER

CET401T	**Chemical Engineering Technology IV**	
CET40XT	Chemical Engineering Technology: Fluid Flow IV	(0,100)
CPD401T	**Chemical Process Design IV**	
CPD40YT	Chemical Process Design: Plant Design IV	(0,100)
PCI401T	Production Engineering: Chemical Industry IV	(0,100)
PCT401B	Process Control IV	(0,100)

TOTAL CREDITS FOR THE QUALIFICATION: **1,000**

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 module. On 01 October 2019, the syllabus content was defined as follows:

C

CHEMICAL ENGINEERING TECHNOLOGY: FLUID FLOW IV (CET40XT) **1 X 3-HOUR PAPER**
(Subject custodian: Department of Chemical, Metallurgical and Materials Engineering)
Fluid properties, fluid statics, flow measurements. Conservation of mass energy and momentum: control volume approach. Flow in Pipes: (A) flow of Newtonian fluids: general characteristics of pipe flow, fully developed laminar flow, fully developed turbulent, dimensional analysis of pipe flow, open channel flow (B) flow of non-newtonian fluids: apparent viscosity, pressure drop in pipes, expansion and contraction losses. Centrifugal pumps: types of pumps, centrifugal pump theory, ideal pump, actual pump performance, power transmission, types of impellers, pump cavitation, factors that affect pump capacity, multistage centrifugal pumps, leak-proof centrifugal pumps, pump priming. Compressible flow: introduction, flow of gas through a nozzle or orifice, converging-diverging nozzles for gas flow, flow in pipes, shock waves. Fluid motion in the presence of solid particles: relative motion between a fluid and a single particle, relative motion between a fluid and a concentration of particle, fluid flow through packed bed, fluidization. Flow of multiphase mixtures: introduction, two-phase gas (vapour)-liquid flow, flow regimes and flow patterns, hold-up, pressure, momentum and energy relations and non-newtonian flow. (Total tuition time: ± 60 hours)

CHEMICAL ENGINEERING TECHNOLOGY: HEAT AND MASS TRANSFER IV (CET40YT) **1 X 3-HOUR PAPER (OPEN BOOK)**
(Subject custodian: Department of Chemical, Metallurgical and Materials Engineering)
Introduction to conduction, convection and radiation. Steady-state one-dimensional conduction. Steady-state conduction in multiple dimensions. Condensation and boiling heat transfer. Mass transfer. (Total tuition time: ± 60 hours)

CHEMICAL ENGINEERING TECHNOLOGY: UNIT OPERATIONS IV (CET40ZT) **CONTINUOUS ASSESSMENT**
(Subject custodian: Department of Chemical, Metallurgical and Materials Engineering)
Design project, consisting of the design of a processes unit (heat exchangers, furnaces, distillation columns, etc.). Different stages in the development of a design, conceptual design, physical data collection, economic evaluation, flow diagrams and final detailed design. (Total tuition time: ± 60 hours)

CHEMICAL PROCESS DESIGN: EQUIPMENT DESIGN IV (CPD40XT) **1 X 3-HOUR PAPER**
(Subject custodian: Department of Chemical, Metallurgical and Materials Engineering)
Development of conceptual flow sheets for chemical processes. Equipment sizing and costing. Economic evaluation of projects. Linear and non-linear models in flow-sheet design. Unit equation models. Solution of linear and non-linear equations in flow sheets. Thermodynamic options in flow sheets. Functioning of process simulator. (Total tuition time: ± 60 hours)

CHEMICAL PROCESS DESIGN: PLANT DESIGN IV (CPD40YT) **CONTINUOUS ASSESSMENT**
(Subject custodian: Department of Chemical, Metallurgical and Materials Engineering)
The development of a conceptual flow sheet for a specific chemical process. Familiarisation with the functioning of a process simulator. Flow sheet design and simulation on the process simulator. (Total tuition time: ± 60 hours)

M

MATHEMATICS: CHEMICAL ENGINEERING III (MTE301T) **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: ± 60 hours)

P

PROCESS CONTROL IV (PCT401B) **1 X 3-HOUR PAPER**

(Subject custodian: Department of Chemical, Metallurgical and Materials Engineering)

Chemical process modelling, Laplace transform, dynamic analysis of processing systems, design of feedback, feed-forward and other control systems. The focus is on understanding control design principles and their implementation in the chemical processing industry. (Total tuition time: ± 60 hours)

PRODUCTION ENGINEERING: CHEMICAL INDUSTRY IV (PCI401T) **1 X 3-HOUR PAPER**

(Subject custodian: Department of Chemical, Metallurgical and Materials Engineering)

Introduction. Descriptive statistics, for example, graphic representation of data, measures of central position and measures of dispersion. Probability theory – Bayes' theorem. Probability distributions. Sampling theory. Decision theory. Statistical inference. Estimation and hypothesis testing. Linear regression and correlation. Non-parametric tests. (Total tuition time: ± 60 hours)

PROJECT: CHEMICAL ENGINEERING IV (PJC400T) **PROJECT ASSESSMENT**

(Subject custodian: Department of Chemical, Metallurgical and Materials Engineering)

Students must undertake an experimental examination of an approved physical or extractive metallurgical topic. It must consist of a literature study, planning and execution of experimental work, the interpretation of results and an oral, as well as a written report. (Total tuition time: ± 60 hours)

R

REACTOR TECHNOLOGY IV (REA401T) **1 X 3-HOUR PAPER**

(Subject custodian: Department of Chemical, Metallurgical and Materials Engineering)

Analysis of kinetic data. Theoretical foundations of chemical kinetics (reaction mechanisms, collision theory, transition state theory). Analysis of complex reactions. Design of ideal isothermal reactors. Temperature and energy effects. Non-ideal reactors/residence time considerations. Heterogeneous catalysis reactors. (Total tuition time: ± 60 hours)