ASIIN

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PEESA III

Current status of Self-Assessment Reports and Quality Assurance

15.10.2020

Presented SARs

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Examples of good practice
1.1 Learning Outcomes

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INTRODUCTION

Education in engineering in particular will play a key role in building Africa's future technological innovation. This transition, also driven by globalisation, industry and employability, calls for an interdisciplinary approach and the ability to integrate theory with practice. As global energy resources come under pressure, engineers are needed that have a broad and expansive awareness of energy related issues such as energy efficiency, energy management, energy policy, energy access, etc. This qualification will aim to address the current shortfall in this arena. For Africa, energy access and efficiency, are both a prerequisite for reaching the Sustainable Development Goals of attaining affordable and clean energy, sustainable cities and communities, halving poverty, as well as for reducing carbon emissions. To achieve these goals, the qualification focusses on the opportunity of using existing energy resources as efficiently as possible by developing new processes and technologies. As such, the outcomes of this qualification will create a platform for innovation in the Energy Access and Energy Efficiency sector and therefore have a positive impact on socio-economic conditions in Africa.This programme will offer a mix of subject and research options that examine the specific regional energy resources in light of their specific societal needs. It will cover the range from natural to renewable resources with an emphasis on the technologies, processes and standards for efficient energy use and resource management. The programme will deal with the conventional energy production sectors (such as oil, gas and coal), as well as renewable sectors (such as solar, wind and biofuels), and will become a platform for human capital development on standards and policy directives of the participating countries' governments and its agencies.

Example CPUT: Brilliant introduction into the report; clearly outlining the motivation for the creation of the programme and the needs for the graduates

Examples of good practice
1.1 Learning Outcomes

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The objective of the programme is to provide the student with a solid understanding of the management fundamentals needed by engineers in an engineering environment. The program was established after feedback from industry indicated a need. Working engineers and their employees wanted a postgraduate program designed for working engineers that provided management skills while building on their engineering background. In particular, inputs from the department's advisory committee and the Faculty committee for postgraduate students led to the development of the selected collection of taught modules. The advisory committee also helped determine the most appropriate learning objectives for the program.

Example TUT: Clear and precise description of a needs analysis process for the developed programme

Examples of good practice
1.1 Learning Outcomes

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The learning outcomes of the degree are as follows:

→ Students will be able to demonstrate the use of data analysis at an advanced level and apply various techniques involved in venture capital creation.

→ Students will be able to construct complex system dynamic and life cycle models that will reflect real world industry and business practice

→ Students will be able to demonstrate an extensive understanding of project management or maintenance and quality engineering and be capable of practicing the principles of the subject matter.

→ Students will be able to conduct research, prepare and defend thesis level research. Students will engage in an extensive research project that involves developing clear objectives; research questions; formulation of hypothesis; in depth literature review; conducting experiments or simulations and validation of results. The research report is subject to the review and approval of external examiners.

Example TUT: Description of Learning Outcomes corresponding to EQF Level 7 and taking into account diverging levels of knowledge in an interdisciplinare programme.

1.1 Objective Matrix

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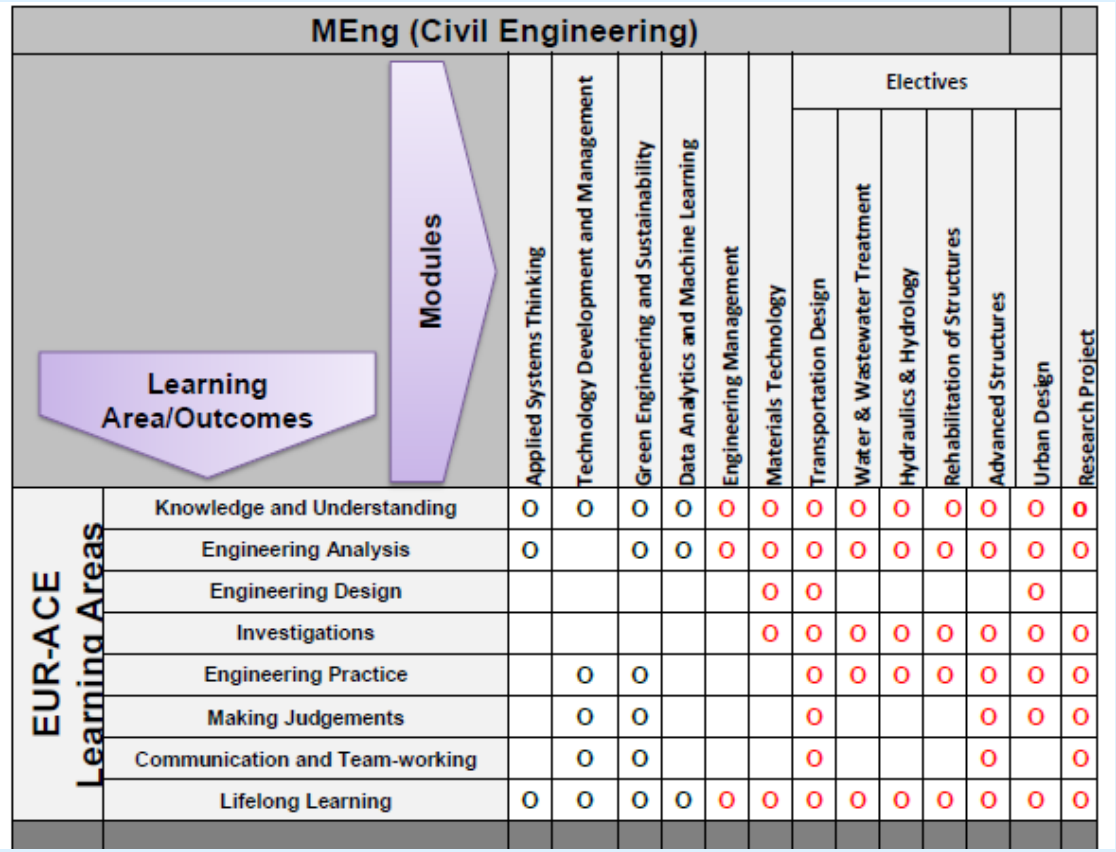

MEng (Civil Engineering)

EUR-ACE Learning Areas / Learning Area/Outcomes (Modules)	Applied Systems Thinking	Technology Development and Management	Green Engineering and Sustainability	Data Analytics and Machine Learning	Engineering Management	Materials Technology	Electives: Transportation Design	Electives: Water & Wastewater Treatment	Electives: Hydraulics & Hydrology	Electives: Rehabilitation of Structures	Electives: Advanced Structures	Electives: Urban Design	Research Project
Knowledge and Understanding	O	O	O	O	O	O	O	O	O	O	O	O	O
Engineering Analysis	O		O	O	O	O	O	O	O	O	O	O	O
Engineering Design						O	O					O	
Investigations						O	O	O	O	O	O	O	O
Engineering Practice		O	O				O	O	O	O	O	O	O
Making Judgements		O	O				O				O	O	O
Communication and Team-working		O	O				O				O		O
Lifelong Learning	O	O	O	O	O	O	O	O	O	O	O	O	O

Example DUT:

Precise graphic presentation of learning outcomes and EUR-ACE Standards

1.3 Curriculum

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Module name	CESM	SAQA Credits	NQF Level	Core/ Fundamental/Elective	Sem 1/ Sem 2/ Year
1. Energy Accounting and Economics	080901	20	9	Core	Sem1/Sem2
2. Process Energy Management	082201	25	9	Core	Sem1/Sem2
3. Electrical Systems	080901	20	9	Core	Sem1/Sem2
4. Renewable Energy	080901	25	9	Core	Sem1/Sem2
5. Research Project	080901	90	9	Core	Sem1/Sem2
Total		**180**			

Please see attached Annexure A and Criterion 1 section 1.4

Example VUT: Easily understandable presentation of the curricular structure, sequence of modules and distribution of credits: This is important for reviewers from a non-South-African context!

1.3 Curriculum

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Faculty	Engineering and the Built Environment	Department	Chemical Engineering
1	**Module title**	**Process Optimization**	26 **Module code**	TBC
5	**HEQSF level**	9	6 **HEQSF Credits**	16
7	**Annual/semester**	Semester	8 **Compulsory or elective**	Compulsory
9	**Total notional hours**	160	10 **Contact hours**	48
11	**Purpose of this module in relation to the programme/s**	This module covers the principles and application of optimization in the chemical industry. It will develop a students' ability to analyze a real-world problem and develop a mathematical formulation that is amenable to a solution using appropriate mathematical techniques and algorithms. The module contents include unconstrained optimization, linear programming, nonlinear programming with constraints, and mixed-integer optimization.		
12	**Learning outcomes**	: Outcomes of Instruction • Apply chemical engineering principles to formulate optimization problems in the chemical/process industry. • Analyse, Select and apply the appropriate solution method/algorithm such as LP, MINLP and NLP. • Understand advanced optimization techniques like Genetic algorithms		
13	**Graduate attributes developed and/or assessed in this module**	Student Outcomes Addressed by the Course • Ability to apply knowledge of mathematics, science, and engineering science. • Ability to identify, formulate and solve engineering problems. • Assess the impact of engineering solutions in a global, economic, environmental and societal context. • Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.		
14	**Module content**	• Basic concepts of optimization; • Optimization of unconstrained functions, Newton and Quasi-Newton Methods; • Unconstrained multivariable optimization, Simplex search, Grid search, Random search • Linear programming, Simplex and Barrier methods • Nonlinear Programming, Quadratic and Lagrangian methods • Mixed-Integer Programming, Branch-and Bounds method		
15	**Teaching and learning**	The module uses a combination of lectures, case discussions, selected paper readings, an accompanying textbook, hands-on projects, optimization challenges and industial applications. In the team project, students will analyze a real industrial problem, formulate a model, collect data, solve the problem using one of the techniques discussed in class, and interpret the solution for management.		
16	**Assessment and moderation**	The assessment for this module may be a combination of test, assignments and mini-projects / case studies.		

Example DUT: Comprehensive but still readable module description including all required information

6 Quality Management

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Students would be required to evaluate this during the annual student evaluation survey conducted by QMD. There would be regular follow up to monitor whether concerns raised by students have been addressed. However, to date surveys have only been conducted by individual lecturers. This is an area that needs improvement.

Example CPUT: Be open and self-critical, point out room for improvement in order to document awareness