UNIVERSITY of BRADFORD

Faculty of Engineering and Informatics
School of Engineering

Programme Specification

Programme title: **MEng Chemical Engineering**

Academic Year:	2017-18
Degree Awarding Body:	University of Bradford
Partner(s), delivery organisation or support provider (if appropriate):	
Final and interim award(s):	MEng (Honours) [Framework for Higher Education Qualifications (FHEQ) level 7] BEng (Honours) [Framework for Higher Education Qualifications (FHEQ) level 6] Diploma of Higher Education [Framework for Higher Education Qualifications (FHEQ) level 5] Certificate of Higher Education [Framework for Higher Education Qualifications (FHEQ) level 4]
Programme accredited by (if appropriate):	IChemE
Programme duration:	4 years full time, 5 years full time sandwich
UCAS code:	H8X0, H8C0
QAA Subject benchmark statement(s):	Engineering
Date of Senate Approval:	July 2014
Date last confirmed and/or minor modification approved by Faculty Board	June 2015

Introduction

Engineering is fundamental to the economic and social prosperity of the UK. It is the profession responsible for the creation of all material objects and systems necessary for modern life from concept to customer to decommissioning. The modern society relies on the work of Chemical Engineers who develop and design the processes that make the useful products for the society by efficient use and management of resources including oil & gas, water and energy while controlling health and safety procedures and protecting the environment.

The MEng programme sets out (i) to give technical depth across the discipline and in relevant specialist applications of technology, (ii) to provide breadth to encourage innovators and (iii) facilitate exposure to other engineering disciplines such as advanced materials engineering, food and pharmaceutical engineering. Upon graduation you will have the capacity for meaningful interdisciplinary interaction, leadership roles, and professional growth.

Your studies at Bradford will be a foundation for life aimed at developing a deep understanding of fundamental and advanced technical principles, analytical tools, and competence in their application together with a wide range of management, personal and professional skills. The course will provide you with essential tools based on the concept of sustainability and low carbon footprint for changing raw materials into useful products in a safe and cost effective way. As a qualified Chemical Engineer you will understand how to alter the chemical, biochemical or physical state of a substance, to create everything from health care products (face creams, shampoo, perfume, drugs) to food (dairy products, cereals, agro-chemicals) and water (desalination for freshwater) to energy (petroleum to nuclear fuels). An excellent way to develop these skills is to undertake an industrial placement as an integral part of your degree studies.

The School places emphasis on both teaching and research. We have particular research strengths in polymers, coating, applied rheology and materials engineering (including the creation of complex components from powders, composites, and polymers). We draw our research strengths from the combined expertise in the IRC in Polymer Science and Technology, the CIC in Polymer Engineering and the Engineering Materials Research Unit and inform our undergraduate programmes. During the later years of your MEng studies you can expect to interact with the School's research activity. We aim to produce MEng graduates who are imaginative, innovative, versatile and competitive, who will be able to progress rapidly to professional positions of responsibility with minimal additional training, and who can provide technical, managerial and entrepreneurial leadership in specialist/interdisciplinary projects.

Upon graduation you will be able to work as: (a) Projects Engineer (b) Design Engineer (c) Operations Engineer or (d) Research and Development Engineer (R&D) in Chemical/Petroleum/Food and Pharmaceutical Industries. You will have the capacity for professional growth to continue the path to Chartered Engineer (CEng) status. The ability of an engineer to think clearly and logically is widely appreciated by many other professions and your studies may well be a stepping stone to many alternative careers other than Engineering – a real foundation for life and for a lifetime of learning.

Programme Aims

The programme is intended to:

- To help graduates to develop the engineering, design, management and personal skills required to become professional Chemical Engineers and in doing so, also equip them for careers in other professions.
- To provide the educational requirements (in compliance with UK-SPEC) when combined with a period of further learning to permit progression to Chartered Membership of the IChemE and registration with EC^{UK} as a chartered engineer.

Programme Learning Outcomes

To be eligible for the award of Certificate of Higher Education at FHEQ level 4, students will be able to:

LO1a Understand basic fundamental concepts, principles and theories underpinning Chemical Engineering with knowledge in: engineering mathematics, fluid mechanics, thermodynamics, heat transfer; chemical reactions; materials; safety, health & environment.
LO2a Demonstrate basic knowledge and understanding of the principles and practice of chemical process design
LO8a Write basic research reports.
LO9a Use software packages in the analysis, modelling and simulation, and design of simple engineering systems
LO10a Use numerical methods for modelling and analysing simple engineering problems;
LO11a Select and apply appropriate data collection & manipulation methods to support problem solving
LO12a Apply skills of analysis, synthesis & evaluation to support basic process/product design
LO13a Plan, undertake and report an elementary investigation
LO14a Apply standard laboratory methods to obtain accurate data
LO15a Work in groups in order to meet shared objectives
LO19a Reflect on the need for further personal and professional development to improve your own performance

Additionally, to be eligible for the award of Diploma of Higher Education at FHEQ level 5, students will be able to:

LO1b Understand advanced principles and theories underpinning Chemical Engineering with knowledge in: engineering mathematics, fluid mechanics, chemical and engineering thermodynamics, mass & heat transfer; reaction engineering, safety, health & environment, project management.
LO2b Demonstrate higher level knowledge and understanding of the principles and practice of chemical process design
LO3a Demonstrate knowledge and understanding of business and management practices that are relevant to engineering and engineers
LO4a Demonstrate knowledge and understanding of key concepts, principles and theories required for successful innovation.
LO7 Learn research methods and apply these to find solutions of open ended engineering problems
LO8b Write research reports.

LO9b Use software packages, at advanced level, in the analysis, modelling and simulation, and design of engineering systems
LO10b Use numerical methods for modelling and analysing demanding engineering problems
LO11b Select and apply appropriate data collection & manipulation methods to support higher level problem solving
LO12b Apply skills of analysis, synthesis & evaluation to support advanced process/product design
LO13b Plan, undertake and report a comprehensive investigation
LO14b Apply standard laboratory methods to obtain accurate data;
LO15b Work in groups in laboratories, in order to meet shared objectives
LO17a Communicate with a variety of audience using a range of techniques
LO19b Reflect on the need for further personal and professional development to improve your own performance.

The award of Ordinary Degree of Bachelor at FHEQ level 6 is not applicable to this programme.

Additionally, to be eligible for the award of Honours Degree of Bachelor at FHEQ level 6, students will be able to:

LO1c Understand advanced concepts, principles and theories underpinning Chemical Engineering with knowledge in: business management, process design, petroleum engineering, control engineering, safety, health & environment
LO2c Demonstrate advanced knowledge and understanding of the principles and practice of chemical process design
LO3b Business and management practices that are relevant to engineering and engineers
LO4b Demonstrate detailed knowledge and understanding of key concepts, principles and theories required for successful innovation.
LO5a Apply engineering principles to the critical analysis of problems in order to create innovative process and product design solutions
LO6a Evaluate process, product and equipment designs and make improvement
LO9c Use software packages, at advanced level, in the analysis, modelling and simulation, and design of engineering systems
LO10c Use numerical methods for modelling and analysing complicated engineering problems;
LO11c Select and apply appropriate data collection & manipulation methods to support problem solving involving intricate systems
LO12c Apply skills of analysis, synthesis & evaluation to support complicated process/product design
LO13c Plan, undertake and report a major investigation
LO14c Apply standard laboratory methods to obtain accurate data;
LO15c Work in groups, in the final year design project, in order to meet shared objectives
LO17b Communicate with a variety of audience using a range of techniques
LO18a Use problem solving strategies to develop innovative solutions
LO19c Reflect on the need for further personal and professional development to improve your own performance.

Additionally, to be eligible for the award of Honours Degree of Master at FHEQ level 7, students will be able to:

LO1d Understand basic fundamental concepts, principles and theories underpinning Chemical Engineering with knowledge in: Upstream production and refinery operations, desalination technology, food and pharmaceutical engineering, polymer engineering, materials and manufacturing processes.
LO2d Demonstrate advanced knowledge and understanding of the principles and practice of chemical process design
LO4c Demonstrate thorough knowledge and understanding of advanced concepts, principles and theories required for successful innovation.
LO5b Apply advanced engineering principles to the critical analysis of problems in order to create innovative process and product design solutions
LO6b Evaluate critically process, product and equipment designs and make improvement
LO7 Learn research methods and apply these to find solutions of open ended engineering problems;
LO8c Write advanced research reports.
LO9d Use software packages, at advanced level, in the analysis, modelling and simulation, and design of complicated engineering systems
LO10d Use numerical methods in depth for modelling and analysing complicated engineering problems;
LO11d Select and apply appropriate data collection & manipulation methods to support rigorous problem solving involving complicated systems
LO12d Apply skills of analysis, synthesis & evaluation to support advanced and complicated process/product design
LO13d Plan, undertake and report elementary major research investigation
LO14d Apply advanced laboratory methods to obtain accurate data
LO16 Interact with technicians and professionals in industry or in a research environment
LO17c Communicate with a variety of audience using a range of techniques
LO18b Use advanced problem solving strategies to develop innovative solutions
LO19d Reflect on the need for further personal and professional development to improve your own performance.

Curriculum

Stage 1

FHEQ Level	Module Title	Type (Core)	Credits	Semester (s)	Module Code
4	Engineering Mathematics	C	20	1, 2	ENM4003-B
4	Computer Aided Engineering	C	20	1, 2	ENB4002-B
4	Materials & Structural Mechanics	C	20	1, 2	MAE4007-B
4	Skills for Engineering	C	20	1, 2	MAE4008-B
4	Chemistry for Engineers	C	20	1, 2	CFS4008-B
4	Fluid Mechanics 1	C	10	1	MAE4009-A
4	Thermodynamics 1	C	10	2	MAE4010-A

At the end of stage 1 (Level 4), students will be eligible to exit with the award of Certificate of Higher Education if they have successfully completed at least 120 credits and achieved the award learning outcomes.

Stage 2

FHEQ Level	Module Title	Type (Core/ option/ elective)	Credits	Semester (s)	Module Code
5	Further Engineering Mathematics and Statistics	C	20	1, 2	ENM5005-B
5	Heat Transfer & Thermodynamics	C	20	1, 2	CPE5003-B
5	Mass Transfer Operations	C	20	1, 2	CPE5004-B
5	Reaction Engineering	C	20	1, 2	CPE5005-B
5	Financial & Project Management	C	20	1, 2	ENB5003-B
5	Fluid & Particle Mechanics	C	10	1	CPE5006-A
5	Chemical Thermodynamics	C	10	2	CPE5007-A

At the end of stage 2 (level 5), students will be eligible to exit with the award of Diploma of Higher Education if they have successfully completed at least 240 credits and achieved the award learning outcomes.

Stage 3

FHEQ Level	Module Title	Type (Core/ option/ elective)	Credits	Semester (s)	Module Code
6	Design Project (Chemical Engineering)	C	30	1, 2	CPE6002-C
6	Six Sigma for Business Excellence	C	10	1	ENB6005-A
6	Petroleum Engineering	C	20	1, 2	CPE6006-B
5	Control Engineering	C	20	1, 2	MAE5010-B
6	Process Design	C	20	1, 2	CPE6005-B
6	Reliability & Safety Engineering	C	20	1, 2	ENB6009-B

Students will be eligible for the award of Honours Degree of Bachelor if they have successfully completed at least 360 credits and achieved the award learning outcomes.

Stage 4

FHEQ Level	Module Title	Type (Core/ option/ elective)	Credits	Semester (s)	Module Code
7	Advanced Research Project	C	20	1, 2	CPE7003-B
7	Desalination Technology	C	20	1	CPE7002-B
7	Material & Manufacturing Processes	C	20	1	CPE7008-B
7	Transport Phenomena	O	10	1	CPE7001-A
7	Design Optimisation	O	10	1	ENM7002-A
7	Computational Fluid Dynamics	O	10	1	CSE7004-A
7	Upstream Production & Refinery Operations	C	20	2	CPE7007-B
7	Food & Pharmaceutical Processes Engineering	C	10	2	CPE7006-A
7	Polymer Engineering	O	20	2	MAE7005-B
7	Engineering Computational Methods	O	10	2	ENG7007-A
7	Risk Management	O	10	2	ENB7003-A

Students will be eligible for the award of MEng if they have successfully completed at least 480 credits and achieved the award learning outcomes.

Placement and/or Study Abroad

This programme provides the option for students to undertake a work placement or period of study abroad between Levels5 and 6. Students wishing to take this option will be registered for the 5 year programme.

For further information about study abroad opportunities please refer to *http://www.bradford.ac.uk/international/erasmus-and-international-exchanges/*

Learning and Teaching Strategy

The teaching and learning strategy takes into consideration the learning outcomes, progression through the levels of study, the nature of the subject and the student intake, and the need for you to take greater responsibility for your own learning as you progress through the programme. The strategies and methods implemented are:

The teaching and learning methods implemented to engage you in developing your knowledge and understanding of the programme include formal lectures (including those from Visiting Lecturers), case studies, tutorial exercises, practical demonstrations, directed learning and individual work. The methods implemented in developing your intellectual skills include engaging with you during tutorial exercises, case studies, practical demonstration and supervised project work.

The methods implemented in developing your practical skills include demonstrations and practical sessions linked with the taught modules. You will carry out practical work throughout your study starting at Level 4. At Levels 5 and 6 you will engage with practical work on chemical engineering unit operations in a purpose built laboratory. You will also design equipment and procedures and use control and measuring techniques under supervision during your 'Design Project' work.

The methods implemented in developing the students' transferable skills are implicit in the programme. The University of Bradford is well known for attracting students from a wide variety of background, experiences and countries. This and the learning facilities available to all students provide the conditions for students to develop and manage their learning. The University of Bradford modus operandi, Making Knowledge Work, is imbedded in the philosophy of this programme, particularly in the area of Engineering, Design and Technology, which is well equipped with practical and computational facilities.

Assessment Strategy

The method of assessment is by formal written examinations, class tests analytical and experimental coursework. The methods of assessment of intellectual skills are implicit in the written examinations, analytical and experimental coursework and more particularly in your final year 'Design Project' work. Practical skills are assessed via individual and group technical reports with the laboratory work linked with the taught modules. The methods of assessment of transferable skills are built in the structure of the examinations, case studies, laboratory demonstrations and the 'Design Project' work.

Assessment Regulations

MEng

This Programme conforms to the standard University Undergraduate Regulations which are available at the link below:

http://www.bradford.ac.uk/aqpo/ordinances-and-regulations/

However, there are the following exceptions to these regulations as listed below:

To progress from stages 1 to 2, 2 to 3 and 3 to 4 of the MEng programme, a stage progression average of 55% or above must be obtained.

If the above requirements are not met, but the University's undergraduate regulations are complied with, then an accredited BEng will be awarded.

Admission Requirements

The University welcomes applications from all potential students and most important in the decision to offer a place is our assessment of a candidate's potential to benefit from their studies and of their ability to succeed on this particular programme. Consideration of applications will be based on a combination of formal academic qualifications and other relevant experience.

The **minimum** entry requirements for the programme are as follows:

A typical offer to someone seeking entry through the UCAS scheme would be UCAS points 136 with Mathematics and Chemistry studied at A levels (minimum grade C in both subjects). On completion of a UCAS form you will be invited to the School for an Open Day when you will have the opportunity to meet staff, view the facilities and discuss "the Bradford experience" with current students. Further entry requirements are as below:

- Must have Chemistry & Mathematics at GCSE or Equivalent
- General Studies will not be accepted
- Must have Chemistry & Mathematics (AS level for Foundation, A level for direct Entry)
- BTEC (Chemical/Process Engineering) with Mathematics for entry to stage 1
- HND (Chemical/Process Engineering) with Mathematics for direct entry to stage 2

The UCAS **tariff** applicable may vary and is published here:

http://www.bradford.ac.uk/study/courses/info/chemical-engineering-meng-4-years

Applications are welcome from students with non-standard qualifications or mature students (those over 21 years of age on entry) with significant relevant experience.

Recognition of Prior Learning

If applicants have prior certificated learning or professional experience which may be equivalent to parts of this programme, the University has procedures to evaluate and recognise this learning in order to provide applicants with exemptions from specified modules or parts of the programme.

Minor Modification Schedule

Version Number	Brief description of Modification	Date of Approval (Faculty Board)
1	Programme Specification written on new template	