



UNIVERSITY OF  
PLYMOUTH

# PROGRAMME QUALITY HANDBOOK 2023-24

## HNC Mechanical Engineering

Welcome to HNC Mechanical Engineering delivered at Kings Road Campus by City College Plymouth.

This programme will develop a base knowledge of Mechanical Engineering theory as well as essential skills required in the field of design. Students will carry out work based practical design projects, using proven theory to solve engineering problems.

Throughout many of the course's modules, you will use a range of industry standard software. This will be supplemented by practical activities to allow for evaluation of industry standard design.

Some modules will be delivered within specialist workshop/ laboratory areas.

Mechanical Engineering is an exciting and varied sector, Design Engineers can be responsible for the design, construction and maintenance of many different mechanical systems with manufacture. This HNC programme has been designed to develop your skills and knowledge within core subjects related to Engineering such as Mathematics, Science and Materials. Along with these essential subjects included are topics covering the Managerial aspects of Engineering, a Computer Aided Design Project as well as Applications of Pneumatics and Hydraulics. A HNC is an industry recognised qualification which could lead to further study within Higher Education or indeed a promotion within an existing place of work. Delivery of this programme will be at our Kings Road Campus utilising the engineering facilities and the new STEM centre.

This programme has been designed to equip you with the skills and knowledge base required to work in your chosen specialism or other graduate opportunities. It is also a platform from which you can undertake additional vocational and academic qualifications.

This Programme Quality handbook contains important information including:

The approved programme specification  
Module records

Note: The information in this handbook should be read in conjunction with the current edition of:

- Your Programme Institution & University Student Handbook which contains student support based information on issues such as finance and studying at HE

o available at: <http://hemoodle.cityplym.ac.uk/course/view.php?id=3305>

- Your Module, Teaching, Learning and Assessment Guide

o available at: <http://hemoodle.cityplym.ac.uk/course/view.php?id=3605>

- Plymouth University's Student Handbook

o available at:

<https://www.plymouth.ac.uk/your-university/governance/student-handbook>

# Programme Structure

<b>Final award title</b>	<b>HNC Mechanical Engineering</b>
<b>Level X Intermediate award title(s)</b>	<b>N/A</b>
<b>Level X Intermediate award title(s)</b>	<b>N/A</b>
<b>UCAS code</b>	<b>N/A</b>
<b>JACS code</b>	<b>H300</b>
<b>Awarding Institution:</b>	University of Plymouth
<b>Teaching institution(s):</b>	City College Plymouth
<b>Accrediting body(ies)</b>	

The course is not currently accredited however the intention is to apply for accreditation once we have our first round of graduates in Sept 2019.

The intention is to apply for accreditation of EngTec status through IMechE and the IET.

## Distinctive Features of the Programme and the Student Experience

This programme will develop a base knowledge of Mechanical Engineering theory as well as essential skills required in the field of Engineering. Students will carry out work based practical design projects, using proven theory to solve engineering problems.

Throughout many of the course's modules, you will use a range of industry standard software. This will be supplemented by practical activities to allow for evaluation of industry standard design.

Some modules will be delivered within specialist workshop/ laboratory areas.

The role of a mechanical engineer is to take a product from an idea to the marketplace. In order to accomplish this, a broad range of skills is needed. The mechanical engineer needs to acquire particular skills and knowledge. He/she needs to understand the forces and the thermal environment that a product, its parts, or its subsystems will encounter; to design them for functionality, aesthetics, and the ability to withstand the forces and the thermal environment they will be subjected to. This HNC programme has been designed to develop these skills and knowledge within core subjects related to Engineering such as Mathematics, Science and Materials. Along with these essential subjects included are topics covering the Managerial aspects of mechanical engineering, a Computer Aided Design Project as well as Applications of Pneumatics and Hydraulics. A HNC is an industry recognised qualification that could lead to further study within Higher Education or indeed a promotion within an existing place of work. Delivery of this programme will be at our Kings Road Campus utilising the engineering facilities and the new STEM centre.

## Relevant QAA Subject Benchmark Group(s)

The subject benchmark statement (2015)<sup>1</sup> defines the academic standard expected of graduates with an engineering degree. The defined learning outcomes are those published by the Engineering Council in the UK-SPEC UK standard for professional engineering competence [www.engc.co.uk](http://www.engc.co.uk) Third edition<sup>2</sup>, the QAA Quality Code<sup>3</sup> and the SEEC Higher Education Level Descriptors

1. <http://www.qaa.ac.uk/en/Publications/Documents/SBS-engineering-15.pdf>
2. [http://www.engc.org.uk/engcdocuments/internet/Website/UK-SPEC%20third%20edition%20\(1\).pdf](http://www.engc.org.uk/engcdocuments/internet/Website/UK-SPEC%20third%20edition%20(1).pdf)
3. <http://www.qaa.ac.uk/AssuringStandardsAndQuality/quality-code/Pages/default.aspx>
4. <http://www.seec.org.uk/wp-content/uploads/2016/07/SEEC-descriptors-2016.pdf>

The Programme of study comprises of 120 module credits across level 4. The aim of the programme is to develop skills consistent with Engineering Council and Engineering Subject Benchmarks. Due to our strong links with employers in the city and high number of part time learners who are already employed in industry our programme has been developed to provide for the varied roles across the city as Engineers, as well as provide a solid grounding to our students wishing to further their study.

<b>HNC Full Time</b>			
<b>Module Code</b>	<b>Module Title</b>	<b>No. of Credits</b>	<b>Core / Optional</b>
CITY1077	Engineering Mathematics	20	Core
CITY1078	Engineering Science 1	20	Core
CITY1091	Engineering Materials	20	Core
CITY1092	CAD Techniques & Design	20	Core
CITY1095	Applications of Pneumatics and Hydraulics	20	Core
CITY1098	Management Techniques in Mechanical Engineering	20	Core

<b>HNC Part Time Stage 1</b>			
<b>Module Code</b>	<b>Module Title</b>	<b>No. of Credits</b>	<b>Core / Optional</b>
CITY1077	Engineering Mathematics	20	Core
CITY1078	Engineering Science 1	20	Core
CITY1091	Engineering Materials	20	Core
CITY1092	CAD Techniques & Design	20	Core
<b>Stage 2</b>			
CITY1095	Applications of Pneumatics and Hydraulics	20	Core
CITY1098	Management Techniques in Mechanical Engineering	20	Core

## **Programme Aims**

This programme aims to

1. Develop engineering knowledge and understanding to apply technical and practical skills.
2. Provide an opportunity to 'contribute towards design' via practical and project based work.
3. Provide an opportunity for 'accepting and exercising personal responsibility.'
4. Provide an opportunity to use effective communication and interpersonal skills.

## **Programme Intended Learning Outcomes**

Programme ILOs have been adapted from UK-SPEC

UK STANDARD FOR PROFESSIONAL

ENGINEERING COMPETENCE

Engineering Technician

[www.engc.org.uk](http://www.engc.org.uk)

Third edition

### **Knowledge and understanding**

On successful completion graduates should have developed:

- 1) The ability to review and select appropriate techniques, procedures and methods to undertake tasks.
- 2) The ability to use appropriate scientific, technical or engineering principles.

### **Cognitive and intellectual skills**

On successful completion graduates should have developed:

- 1) The ability to identify problems and apply appropriate methods to identify causes and achieve satisfactory solutions.
- 2) The ability to identify, organise and use resources effectively to complete tasks, with consideration for cost, quality, safety, security and environmental impact.

### **Key and transferable skills**

On successful completion graduates should have developed the ability to:

- 1) Use oral, written and electronic methods for the communication of technical and other information.

### **Employment related skills**

On successful completion graduates should have developed:

- 1) Good student centred learning skills which will promote lifelong learning and a commitment to continuing professional development to achieve flexibility within the work environment.

### **Practical skills**

On successful completion graduates should have developed:

- 1) Undertake engineering work in a way that contributes to sustainable development.

## Admissions Criteria, including APCL, APEL and DAS arrangements

All applicants must have GCSE (or equivalent) Maths and English at Grade C or above or Grade 4 and above on the new grading structure.

Entry Requirements for HNC Mechanical Engineering	
A-level/AS-level	Normal minimum entry requirements are 48 on new UCAS Tariff at A-level to include Grade D in Maths or Physics
BTEC National Diploma/QCF Extended Diploma	Candidates are interviewed before an offer is made. But an equivalent of 48 UCAS points in an Engineering Subject
Access to Higher Education at level 3	Candidates are interviewed before an offer is made. Pass an Access to HE Diploma in Science with an equivalent of 48 UCAS points
Welsh Bacculaureate	Normal minimum entry requirements are an equivalent of 48 on new UCAS Tariff include Maths, Physics or Engineering
Scottish Qualifications Authority	Normal minimum entry requirements are an equivalent of 48 on new UCAS Tariff include Maths, Physics or Engineering
Irish Leaving Certificate	Normal minimum entry requirements are an equivalent of 48 on new UCAS Tariff include Maths, Physics or Engineering
International Bacculaureate	Normal minimum entry requirements are an equivalent of 48 on new UCAS Tariff include Maths, Physics or Engineering
Non Standard Qualifications with experience	All non-standard applicants are interviewed by the tutor and screened centrally to ensure impartial oversight.

## Progression criteria for Final and Intermediate Awards

Students who successfully complete the HNC may progress to:

- City College Plymouth's FdSc Mechanical Design and Manufacture or FdSc Mechanical Engineering.
- Plymouth University's BSc Mechanical Design and Manufacture year 2 or BSc Mechanical Engineering year 2
- Plymouth University's BEng Mechanical Engineering year 1 (Students must score above 60% overall & 60% on maths) year 1

## Exceptions to Regulations

N/A

## Transitional Arrangements

There is currently no HNC provision in this area.

All new students from September 2017 will enrol on the completely new structure.

## Mapping and Appendices:

### ILO's against Modules Mapping

Please see appendix 13.1

### Assessment against Modules Mapping

Please see appendix 13.2

### Skills against Modules Mapping

Please see appendix 13.3



Appendix 13.1 – Learning Outcomes map

LEVEL 4				
FHEQ Descriptors	Subject Benchmark(s)	Programme Aims	Programme Outcomes	Core Modules linked to outcomes
<p><b>Students will have demonstrated:</b> Knowledge of the underlying concepts and principles associated with their areas of study;</p> <p>Ability to evaluate and interpret these within the context of that area of study;</p> <p>Ability to present, evaluate and interpret qualitative and quantitative data;</p>	<p>A) Use engineering knowledge and understanding to apply technical and practical skills.</p>	<p>1. Develop engineering knowledge and understanding to apply technical and practical skills.</p>	<p>8.1.1) The ability to review and select appropriate techniques, procedures and methods to undertake tasks. 8.1.2) The ability to use appropriate scientific, technical or engineering principles.</p>	<p>CITY1077, CITY1078, CITY1091, CITY1092, CITY1095, CITY1098.</p>
	<p>B) Contribute to the design, development, manufacture, construction, commissioning, operation or maintenance of products, equipment, processes, systems or services.</p>	<p>1. Develop engineering knowledge and understanding to apply technical and practical skills. 2. Provide an opportunity to 'contribute towards design' via practical and project based work.</p>	<p>8.1.1) The ability to review and select appropriate techniques, procedures and methods to undertake tasks. 8.1.2) The ability to use appropriate scientific, technical or engineering principles. 8.2.1) The ability to identify problems and apply appropriate methods to identify causes and achieve satisfactory solutions. 8.2.2) The ability to identify, organise and use resources effectively to complete tasks, with consideration for cost, quality, safety, security and environmental impact.</p>	<p>CITY1077, CITY1078, CITY1091, CITY1092, CITY1095, CITY1098.</p>
	<p>D) Use effective communication and interpersonal skills.</p>	<p>1. Develop engineering knowledge and understanding to apply technical and practical skills. 4. Provide an opportunity to use effective communication and interpersonal skills.</p>	<p>8.2.2) The ability to identify, organise and use resources effectively to complete tasks, with consideration for cost, quality, safety, security and environmental impact. 8.3.1) Use oral, written and electronic methods for the communication of technical and other information.</p>	<p>CITY1077, CITY1078, CITY1091, CITY1095.</p>
<p><b>Students will be able to:</b> Evaluate the appropriateness of different approaches to solving problems related to their area of study;</p>	<p>A) Use engineering knowledge and understanding to apply technical and practical skills. B) Contribute to the design, development, manufacture, construction, commissioning,</p>	<p>1. Develop engineering knowledge and understanding to apply technical and practical skills. 2. Provide an opportunity to 'contribute towards design' via practical and project based work.</p>	<p>8.1.1) The ability to review and select appropriate techniques, procedures and methods to undertake tasks. 8.1.2) The ability to use appropriate scientific, technical or engineering principles. 8.2.1) The ability to identify problems and apply appropriate methods to identify causes and achieve satisfactory solutions.</p>	<p>CITY1077, CITY1078, CITY1091, CITY1095.</p>



<p>Communicate the results of their study accurately and reliably and with structured and coherent argument</p>	<p>operation or maintenance of products, equipment, processes, systems or services.</p> <hr/> <p>D) Use effective communication and interpersonal skills.</p>	<p>3. Provide an opportunity for 'accepting and exercising personal responsibility.'</p> <p>4. Provide an opportunity to use effective communication and interpersonal skills</p> <hr/> <p>4. Provide an opportunity to use effective communication and interpersonal skills.</p>	<p>8.2.2) The ability to identify, organise and use resources effectively to complete tasks, with consideration for cost, quality, safety, security and environmental impact.</p> <hr/> <p>8.3.1) Communicate ideas and information; through verbal and written forms using appropriate terminology and presentation of data.</p>	<hr/> <p>CITY1078, CITY1091, CITY1092, CITY1095, CITY1098.</p>
<p>Undertake further training and develop new skills within a structured and managed environment</p>	<p>E) Make a personal commitment to an appropriate code of professional conduct, recognising obligations to society, the profession and the environment.</p>	<p>3. Provide an opportunity for 'accepting and exercising personal responsibility.'</p>	<p>8.4.1) Good student centred learning skills which will promote lifelong learning and a commitment to continuing professional development to achieve flexibility within the work environment.</p>	<p>CITY1077, CITY1078, CITY1091, CITY1092, CITY1095, CITY1098.</p>
<p><b>Students will also have:</b> The qualities and transferable skills necessary for employment requiring the exercise of some personal responsibility</p>	<p>C) Accept and exercise personal responsibility.</p>	<p>2. Provide an opportunity to 'contribute towards design' via practical and project based work.</p> <p>3. Provide an opportunity for 'accepting and exercising personal responsibility.'</p>	<p>8.4.1) Good student centred learning skills which will promote lifelong learning and a commitment to continuing professional development to achieve flexibility within the work environment.</p> <p>8.5.1) Undertake engineering work in a way that contributes to sustainable development.</p>	<p>CITY1077, CITY1078, CITY1091, CITY1092, CITY1095, CITY1098.</p>

## Appendix 13.2 Assessment against modules Map

	CITY1077 Engineering Mathematics (Core)	CITY1078 Engineering Science 1(Core)	CITY1091 Engineering Materials (Core)	CITY1092 CAD Techniques and Design (Core)	CITY1095 Applications of Pneumatics and Hydraulics (Core)	CITY1098 Management Techniques in Mechanical Engineering (Core)
Essay			✓			
Report		✓	✓			✓
Engineering Problem Assignment	✓				✓	
Portfolio				✓		
Exam	✓	✓			✓	
In Class Test						
Practical						
Presentation						✓

## Appendix 13.3 Skills against modules Map

	CITY1077 Engineering Mathematics (Core)	CITY1078 Engineering Science 1 (Core)	CITY1091 Engineering Materials (Core)	CITY1092 CAD Techniques and Design (Core)	CITY1095 Applications of Pneumatics and Hydraulics (Core)	CITY1098 Management Techniques in Mechanical Engineering (Core)
Essay Writing			✓			
Report Writing			✓			✓
Project Planning / Management						
Research		✓			✓	
IT Skills			✓	✓	✓	✓
Team Work						
Evaluation	✓	✓			✓	✓
Data Analysis	✓	✓	✓	✓	✓	✓

**Additional Guidance for Learning Outcomes:** To ensure that the module is pitched at the right level check your intended learning outcomes against the following nationally agreed

Framework for Higher Education Qualifications

<http://www.qaa.ac.uk/Publications/InformationAndGuidance/Documents/FHEQ08.pdf>

Subject benchmark statements <http://www.qaa.ac.uk/ASSURINGSTANDARDSANDQUALITY/SUBJECT- GUIDANCE/Pages/Subject-benchmark-statements.aspx>

SEEC level descriptors <http://www.seec.org.uk/academic-credit/seec-credit-level- descriptors-2010> (scroll to pdf link at bottom of page)

Professional, regulatory and statutory (PSRB) accreditation requirements (where necessary  
e.g. health and social care, medicine, engineering, psychology, architecture, teaching, law)

QAA Quality Code <http://www.qaa.ac.uk/AssuringStandardsAndQuality/quality-code/Pages/default.aspx>

## Module Records

**SECTION A: DEFINITIVE MODULE RECORD.** Proposed changes must be submitted via Faculty Quality Procedures for approval and issue of new module code.

<b>MODULE CODE:</b> CITY1077	<b>MODULE TITLE:</b> Engineering Mathematics
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<b>CREDITS:</b> 20	<b>FHEQ LEVEL:</b> 4	<b>JACS CODE:</b> G160
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<b>PRE-REQUISITES:</b> N	<b>CO-REQUISITES:</b> N	<b>COMPENSATABLE:</b> Y
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<p><b>SHORT MODULE DESCRIPTOR:</b>          To develop the student's mathematical ability, to apply principles to the solution of engineering problems, and to make use of mathematical computer based packages.</p>
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<b>ELEMENTS OF ASSESSMENT</b>					
<b>WRITTEN EXAMINATION</b>		<b>COURSEWORK</b>		<b>PRACTICE</b>	
<b>E1 (Formally scheduled)</b>	50%	<b>C1</b>	50%	<b>P1</b>	
<b>E2 (OSCE)</b>		<b>C2</b>		<b>P3</b>	
<b>T1 (in-class test)</b>		<b>A1</b>			

<b>SUBJECT ASSESSMENT PANEL:</b> Technology
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<b>Professional body minimum pass mark requirement:</b> n/a
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**MODULE AIMS:**

To gain a solid foundation in algebra, trigonometry, functions and calculus in order to associate and recognise the importance of mathematics in the analysis of engineering problems  
 To develop mathematical problem solving simultaneously with other science and engineering modules.

<p><b>ASSESSED LEARNING OUTCOMES:</b> (additional guidance below) At the end of a module the learner <b>will be expected to be able to:</b>          LO1. recognise the essential application of mathematical techniques to solve engineering problems          LO2. apply exact mathematical methods to analyse and solve problems of an engineering and scientific nature          LO3. use complex number theory in practical engineering applications          LO4. understand a variety of techniques of differential and integral calculus and their associated applications in engineering</p>	
<b>DATE OF APPROVAL:</b> June 2017	<b>FACULTY/OFFICE:</b> Academic Partnerships
<b>DATE OF IMPLEMENTATION:</b> Sept 2017	<b>SCHOOL/PARTNER:</b> City College Plymouth
<b>DATE(S) OF APPROVED CHANGE:</b>	<b>TERM:</b> All Year

## SECTION B: DETAILS OF TEACHING, LEARNING AND ASSESSMENT

Items in this section must be considered annually and amended as appropriate, in conjunction with the Module Review Process.

<b>ACADEMIC YEAR: 2023/2024</b>	<b>NATIONAL COST CENTRE: 122</b>
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<b>MODULE LEADER: Owais Raja</b>	<b>OTHER MODULE STAFF: N/A</b>
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<p><b>Summary of Module Content Revision of Algebra and Arithmetic</b> Basic number and arithmetic operations, algebraic techniques including evaluation of formula, rearranging formula, solving simple equations, laws of logarithms, laws of indices, etc. These skills will be built upon throughout the delivery of each individual topic in this module.</p> <p><b>Trigonometric functions and graphs</b> Simple trigonometric functions of sine, cosine, tangent and hyperbolic functions of <math>\sinh</math>, <math>\cosh</math> and <math>\tanh</math>. The applications of these functions in engineering including vectors and waveform combination.</p> <p><b>Complex numbers</b> Addition, subtraction, multiplication and division of complex numbers in Polar and Cartesian form. The Argand diagram. The modulus and argument. Applications in engineering.</p> <p><b>Differential Calculus</b> Basic differentiation techniques of polynomial, trigonometric, exponential and logarithmic functions. Further techniques including the product, quotient and chain rules. Engineering applications to optimisation and higher order differentials.</p> <p><b>Integral calculus</b> Basic integration techniques of polynomial, trigonometric and exponential functions. Further techniques including integration by parts and substitution. The methodical applications of definite and indefinite integration with and without engineering scenarios including the interpretation of areas under a curve.</p>
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SUMMARY OF TEACHING AND LEARNING		
Scheduled Activities	Hours	Comments/Additional Information
Lecture	60	30 x 2 hour lectures
Tutorial	30	Group and individual academic tutorials
Independent Study	110	Guided self-study
<b>Total</b>	<b>200</b>	

Category	Element	Component Name	Component weighting	Comments Include links to learning objectives
Written exam	E1	End of Module Examination	100%	LO1-4 (Covering topics not assessed in coursework)
Coursework	C1	Assignment	100%	LO1-4

<b>Updated by:</b> Owais Raja Date: July 2022	<b>Approved by:</b> L Chatfield Date: July 2022
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**SECTION A: DEFINITIVE MODULE RECORD.** *Proposed changes must be submitted via Faculty Quality Procedures for approval and issue of new module code.*

<b>MODULE CODE:</b> CITY1078	<b>MODULE TITLE:</b> Engineering Science
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<b>CREDITS:</b> 20	<b>FHEQ LEVEL:</b> 4	<b>JACS CODE:</b> H100
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<b>PRE-REQUISITES:</b> N	<b>CO-REQUISITES:</b> N	<b>COMPENSATABLE:</b> Y
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**SHORT MODULE DESCRIPTOR:**  
 An introduction to mechanical principles, energy transfer and AC electrical theory. Mechanical principles including solid mechanics, statics, dynamics and mechanical vibrations. Modes of heat transfer and energy losses. Electrical principles and single phase AC theory.

<b>ELEMENTS OF ASSESSMENT</b>					
WRITTEN EXAMINATION		COURSEWORK		PRACTICE	
<b>E1</b> (Formally scheduled)	50%	<b>C1</b>	50%	<b>P1</b>	
<b>E2</b> (OSCE)		<b>C2</b>		<b>P3</b>	
<b>T1</b> (in-class test)		<b>A1</b>			

**SUBJECT ASSESSMENT PANEL:** Technology

**Professional body minimum pass mark requirement:** n/a

**MODULE AIMS:**

- To investigate the fundamental scientific principles which underpin the design and operation of engineering systems.
- To give a mechanical and electrical overview which will provide the basis for further study in specialist areas of engineering.

**ASSESSED LEARNING OUTCOMES:** (additional guidance below)

At the end of a module the learner **will be expected to be able to:**

- LO1.** Demonstrate an understanding of basic static and dynamic mechanical systems
- LO2.** Investigate energy transfer in thermal and fluid systems
- LO3.** Recognise and recall how DC theory relates to simple electrical machines
- LO4.** Show knowledge and awareness of the fundamental principles of single phase AC theory

<b>DATE OF APPROVAL:</b> June 2017	<b>FACULTY/OFFICE:</b> Academic Partnerships
<b>DATE OF IMPLEMENTATION:</b> Sept 2017	<b>SCHOOL/PARTNER:</b> CCP
<b>DATE(S) OF APPROVED CHANGE:</b>	<b>TERM:</b> All Year

**SECTION B: DETAILS OF TEACHING, LEARNING AND ASSESSMENT**

**Items in this section must be considered annually and amended as appropriate, in conjunction with the Module Review Process.**

<b>ACADEMIC YEAR: 2023-24</b>	<b>NATIONAL COST CENTRE: 114</b>
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<b>MODULE LEADER: Tamal Barman</b>	<b>OTHER MODULE STAFF:</b>
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**Summary of Module Content**  
 Statics and Dynamics: SF and BM, bending stresses. Torsion . Uniform acceleration linear and angular. Newton’s laws of motion, mass moment of inertia, kinetic energy, effects of friction. Vibrations, SHM, forcing and damping. Energy Transfer: Heat transfer: conduction, convection, radiation, thermal conductivity, forced convection, black and grey body radiation. insulated surfaces. Viscosity: boundary layer formation, laminar and turbulent flow, pressure loss in pipes. Energy losses: dynamic viscosity, power loss in bearings. pipe friction losses.  
 Electrical Principles: Conductors, insulators, voltage and current. Ohm’s law, Kirchhoff’s law. Power: Electro-magnetic induction, transformers, Lenz’s and Faraday’s laws. Generator and motor principles. Single Phase AC theory: Non-resonant circuits: R-C-L circuits; Argand diagrams. Resonant circuits, L-C series and parallel, resonant frequency, Power factor correction, Complex waveforms: graphical analysis, odd and even-harmonics, phase shift, non-linear characteristics

<b>SUMMARY OF TEACHING AND LEARNING</b>		
<b>Scheduled Activities</b>	<b>Hours</b>	<b>Comments/Additional Information</b>
Lecture	60	30 x 2hr sessions
Tutorial	30	30 x 1hr
Independent Study	110	A mixture of guided study and self-study.
<b>Total</b>	<b>200</b>	

<b>Category</b>	<b>Element</b>	<b>Component Name</b>	<b>Component weighting</b>	<b>Comments Include links to learning objectives</b>
Written exam	E_	End of Module Examination	100%	LO1, LO2
Coursework	C_	Assignment ( <i>Report on in class experiments</i> )	100%	LO3, LO4

<b>Updated by:</b> Tamal Barman <b>Date:</b> July 2022	<b>Approved by:</b> Lance Chatfield <b>Date:</b> July 2022
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**SECTION A: DEFINITIVE MODULE RECORD.** *Proposed changes must be submitted via Faculty Quality Procedures for approval and issue of new module code.*

<b>MODULE CODE:</b> CITY1091	<b>MODULE TITLE:</b> Engineering Materials
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<b>CREDITS:</b> 20	<b>FHEQ LEVEL:</b> 4	<b>JACS CODE:</b> J500
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<b>PRE-REQUISITES:</b> None	<b>CO-REQUISITES:</b> None	<b>COMPENSATABLE:</b> Yes
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**SHORT MODULE DESCRIPTOR:** *(max 425 characters)*  
Study of Material structure. Appreciation of material properties. Understanding of manufacturing and design considerations for the use of different materials

<b>ELEMENTS OF ASSESSMENT [Use HESA KIS definitions]</b>					
WRITTEN EXAMINATION		COURSEWORK		PRACTICE	
<b>E1</b> (Formally scheduled)		<b>C1</b>	100%	<b>P1</b>	
<b>E2</b> (OSCE)		<b>C2</b>		<b>P3</b>	
<b>T1</b> (in-class test)		<b>A1</b>			

**SUBJECT ASSESSMENT PANEL** Group to which module should be linked: Technology

**Professional body minimum pass mark requirement:** N/A

**MODULE AIMS:**  
To develop students' understanding and knowledge of basic manufacturing and materials technology, enabling them to appreciate why an understanding of the relationships between processing, structure, and properties is a key element in engineering.

<b>ASSESSED LEARNING OUTCOMES:</b> (additional guidance below) At the end of the module the learner will be expected to be able to: LO1. Understand the effects of material structure on material properties. LO2. Appreciate the effect of material choice on manufacturing procedures. LO3. Describe the effects of processing on structure and properties of engineering materials. LO4. Carry out tensile testing and interpret the results.	
<b>DATE OF APPROVAL:</b> May 2017	<b>Academic Partnerships</b>
<b>DATE OF IMPLEMENTATION:</b> September 2017	<b>City College Plymouth</b>
<b>DATE(S) OF APPROVED CHANGE:</b>	<b>TERM:</b> All year

**SECTION B: DETAILS OF TEACHING, LEARNING AND ASSESSMENT** *Items in this section must be considered annually and amended as appropriate, in conjunction with the Module Review Process.*

<b>ACADEMIC YEAR: 2023-24</b>	<b>NATIONAL COST CENTRE: 117</b>
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<b>MODULE LEADER:</b> Owais Raja	<b>OTHER MODULE STAFF:</b>
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**Summary of Module Content**

Shaping processes (solidification processes): mechanics, engineering analysis and practice of metal casting, and plastic moulding.

Shaping processes (bulk deformation processes): mechanics, engineering analysis and practice of rolling, forging, extrusion, bar and wire drawing

Basic engineering metrology including measuring instruments and gauges for linear and angular dimensions

Properties of materials. Interpretation of stress-strain curves. Practical measurement of mechanical properties.

Qualitative description of major differences between generic classes of materials in terms of their microstructure. Influence of atomic bonding on properties. Cast structures and defects in metals. Types of polymers and additives. Polymer glass transition temperature and melting point.

Property modification techniques; relationship between structure, processing, heat treatment, and properties. Metals: plastic deformation; hot and cold working; micro defects and their influence. Polymers: drawing and moulding; directionality of properties; influence of strain rate. Alloying: use of phase equilibrium diagrams in heat treatment; types of alloy. Properties, structure, and uses of the plain carbon steels and the major non-ferrous alloys.

<b>SUMMARY OF TEACHING AND LEARNING [Use HESA KIS definitions]</b>		
<b>Scheduled Activities</b>	<b>Hours</b>	<b>Comments/Additional Information</b>
Lecture	26	26x1hr lectures
Supported Study	16	16x1hr supported engineering problems and lab reporting
Workshop activities	10	Hands on practical activities
Directed Independent Study	20	Identified independent study
Self-Study	105	Coursework and individual reading
Lab Session	8	4x2hr lab sessions
Tutorial	15	A mix of individual and group tutorials
<b>Total</b>	<b>200</b>	<b>(NB: 1 credit = 10 hours of learning; 10 credits = 100 hours, etc)</b>

<b>Category</b>	<b>Element</b>	<b>Component Name</b>	<b>Component weighting</b>	<b>Comments Include links to learning objectives</b>
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Coursework	C1	Lab report Essay	50% 50%	LO1, LO2 LO3, LO4
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Updated by: Owais Raja Date: July 2022

Approved by: Lance Chatfield Date: July 2022

**SECTION A: DEFINITIVE MODULE RECORD.** *Proposed changes must be submitted via Faculty Quality Procedures for approval and issue of new module code.*

**MODULE CODE:** CITY 1092

**MODULE TITLE:** CAD Techniques and Design

**CREDITS:** 20

**FHEQ LEVEL:**4

**JACS CODE:** H130

**PRE-REQUISITES:**

None

**CO-REQUISITES:**

None

**COMPENSATABLE:** Yes

**SHORT MODULE DESCRIPTOR:** *(max 425 characters)*

An Introduction into CAD in the Design Process, progressing swiftly through 2D draughting to explore 3D conceptual design and visualisation. During this module students will take part in a relevant work based design project.

**ELEMENTS OF ASSESSMENT [Use HESA KIS definitions]**

WRITTEN EXAMINATION		COURSEWORK		PRACTICE	
E1 (Formally scheduled)		C1	100%	P1	
E2 (OSCE)		C2		P3	
T1 (in-class test)		A1			

**SUBJECT ASSESSMENT PANEL Group to which module should be linked:** Technology

**Professional body minimum pass mark requirement:** N/A

**MODULE AIMS:**

- Investigation of how formal draughting forms a corner stone of the design process
- Practice of the skills necessary to produce and interpret drawings and computer models to British Standards
- Experimentation in to the use of 3D visualisation as an engineering tool
- Introduce Design techniques and carry out a work based design project.

**ASSESSED LEARNING OUTCOMES:** (additional guidance below)

At the end of the module the learner will be expected to be able to:

**LO1.** Produce 2D detail and assembly drawings and 3D wireframe, surface and solid models using an industry standard CAD package to British Standards.

**LO2.** Produce rendered and animated visualisations to present to employers

**LO3.** Formulate, implement, evaluate and present a work based design project

**LO4.** Report to employers on the sustainability and ecology in design and the product life cycle

**DATE OF APPROVAL:** May 2017

**Academic Partnerships**

**DATE OF IMPLEMENTATION:** Sept 2017

**City College Plymouth**

**DATE(S) OF APPROVED CHANGE:**

**TERM: All year**

## **SECTION B: DETAILS OF TEACHING, LEARNING AND ASSESSMENT**

*Items in this section must be considered annually and amended as appropriate, in conjunction with the Module Review Process.*

<b>ACADEMIC YEAR: 2023-24</b>	<b>NATIONAL COST CENTRE: 143</b>
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<b>MODULE LEADER:</b> Martin Boulter	<b>OTHER MODULE STAFF:</b>
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<p><b>Summary of Module Content</b> CAD &amp; Drawings in the design process Drawing standards and formats The use of 2D CAD drawing and editing commands Conceptual Design and 3D CAD 3D Wireframe, Surface and Solid Modelling commands 3D Visualisation Sustainability and ecology in design and the product life cycle. Material and process selection tools. Functionality, component simulation (free body diagrams, etc.) Design calculation tools - spread sheets. The design process - specifying, creating and evaluating ideas, developing and documenting. Working in a team. System design - team working.</p>
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<b>SUMMARY OF TEACHING AND LEARNING [Use HESA KIS definitions]</b>		
<b>Scheduled Activities</b>	<b>Hours</b>	<b>Comments/Additional Information</b>
Lecture	20	10 x 2 hr lectures
Practical Sessions	40	Application of techniques and methods learnt
Tutorial	15	A mixture of group and personal tutorials
Directed Independent Study	125	Working in groups and independently on their Projects
<b>Total</b>	<b>200</b>	<b>(NB: 1 credit = 10 hours of learning; 10 credits = 100 hours, etc)</b>

<b>Category</b>	<b>Element</b>	<b>Component Name</b>	<b>Component weighting</b>	<b>Comments Include links to learning objectives</b>
Coursework	C1	Portfolio of Evidence Report	75% 25%	LO1, LO2, LO3 LO4

<b>Updated by:</b> Martin Boulter Date: July 2022	<b>Approved by:</b> Lance Chatfield Date: July 2022
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**SECTION A: DEFINITIVE MODULE RECORD.** *Proposed changes must be submitted via Faculty Quality Procedures for approval and issue of new module code.*

<b>MODULE CODE:</b> CITY1095	<b>MODULE TITLE:</b> Applications of Pneumatics and Hydraulics
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<b>CREDITS:</b> 20	<b>FHEQ LEVEL:</b> 4	<b>JACS CODE:</b> H141
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<b>PRE-REQUISITES:</b> None	<b>CO-REQUISITES:</b> None	<b>COMPENSATABLE:</b> Yes
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**SHORT MODULE DESCRIPTOR:** *(max 425 characters)*  
Learners will investigate pneumatic and hydraulic diagrams, examine the characteristics of components and equipment and evaluate the applications of pneumatics and hydraulics.

<b>ELEMENTS OF ASSESSMENT [Use HESA KIS definitions]</b>					
WRITTEN EXAMINATION		COURSEWORK		PRACTICE	
<b>E1</b> (Formally Scheduled)	<b>50 %</b>	<b>C1</b>	<b>50 %</b>	<b>P1</b>	
<b>E2</b> (OSCE)		<b>C2</b>		<b>P3</b>	
<b>T1</b> (in-class test)		<b>A1</b>			

**SUBJECT ASSESSMENT PANEL** Group to which module should be linked: Technology

**Professional body minimum pass mark requirement:** N/A

**MODULE AIMS:**  
The aim of this unit is for the student to develop their knowledge and understanding of fluid power systems, including hydraulics and pneumatics where they will analysis and evaluate circuits, systems and identify specifications for given engineering problems.

**ASSESSED LEARNING OUTCOMES:** (additional guidance below)  
At the end of the module the learner will be expected to be able to:  
**LO1.** Interpret fluid power diagrams  
**LO2.** Analyse the construction and operation of pneumatic and hydraulic components, equipment and plant  
**LO3.** Design pneumatic and hydraulic circuits  
**LO4.** Evaluate industrial applications of pneumatics and hydraulics.

<b>DATE OF APPROVAL:</b> Jan 2017	<b>Academic Partnerships</b>
<b>DATE OF IMPLEMENTATION:</b> September 2017	<b>City College Plymouth</b>
<b>DATE(S) OF APPROVED CHANGE:</b>	<b>TERM:</b> All year

**SECTION B: DETAILS OF TEACHING, LEARNING AND ASSESSMENT** *Items in this section must be considered annually and amended as appropriate, in conjunction with the Module Review Process.*

<b>ACADEMIC YEAR: 2023-24</b>	<b>NATIONAL COST CENTRE: 115</b>
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<b>MODULE LEADER: Owais Raja</b>	<b>OTHER MODULE STAFF:</b>
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**Summary of Module Content**

Investigate fluid diagrams and review either fluid power diagrams and report on the design of either a pneumatic or hydraulic multi-actuator sequential operation using a minimum of four actuators or review fluid power diagrams and report on the design of either a pneumatic or hydraulic reversible rotary actuation with speed control in both directions.

Analyse the construction and operation of pneumatic and hydraulic components, equipment and plant

Design pneumatic and hydraulic circuits (design and draw a circuit for either a pneumatic or hydraulic multi-actuator sequential operation, including emergency stop functions)

Evaluate industrial applications of pneumatics and hydraulic.

<b>SUMMARY OF TEACHING AND LEARNING [Use HESA KIS definitions]</b>		
<b>Scheduled Activities</b>	<b>Hours</b>	<b>Comments/Additional Information</b>
Lecture	40	20 x 2hrs lectures
Tutorial	15	A mix of group and individual tutorials
Directed Independent Study	50	Guided self-study
Self-Study	85	Individual self-study
Workshop time	10	5 x 2hrs workshop sessions
<b>Total</b>	<b>200</b>	<b>(NB: 1 credit = 10 hours of learning; 10 credits = 100 hours, etc)</b>

<b>Category</b>	<b>Element</b>	<b>Component Name</b>	<b>Component weighting</b>	<b>Comments</b> <i>Include links to learning objectives</i>
Written exam	E1	Exam	100%	LO2, LO4
Coursework	C1	Design Assignment	100%	LO1, LO3

<b>Updated by: Owais Raja Date: July 2022</b>	<b>Approved by: Lance Chatfield Date: July 2022</b>
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**SECTION A: DEFINITIVE MODULE RECORD. *Proposed changes must be submitted via Faculty Quality Procedures for approval and issue of new module code.***

<b>MODULE CODE:</b> CITY1098	<b>MODULE TITLE:</b> Management Techniques in Mechanical Engineering
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<b>CREDITS:</b> 20	<b>FHEQ LEVEL:</b> 4	<b>JACS CODE:</b> N210
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<b>PRE-REQUISITES:</b> None	<b>CO-REQUISITES:</b> None	<b>COMPENSATABLE:</b> Yes
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**SHORT MODULE DESCRIPTOR:** On completion of this unit to appraise the main techniques that improve organisations' operations.

<b>ELEMENTS OF ASSESSMENT [Use HESA KIS definitions]</b>					
WRITTEN EXAMINATION		COURSEWORK		PRACTICE	
<b>E1</b> (Formally scheduled)		<b>C1</b>	60%	<b>P1</b>	40%
<b>E2</b> (OSCE)		<b>C2</b>		<b>P3</b>	
<b>T1</b> (in-class test)		<b>A1</b>			

**SUBJECT ASSESSMENT PANEL Group to which module should be linked:** Technology

**Professional body minimum pass mark requirement:** N/A

**MODULE AIMS:**  
Students will be able to explain how application of management techniques can improve the plans, designs, processes or systems for the optimisation of operational activity within an organisation and throughout the supply chain.

**ASSESSED LEARNING OUTCOMES:** (additional guidance below)  
At the end of the module the learner will be expected to be able to:  
LO1 – Discuss contemporary management techniques used to improve and optimise operational activity, including the associated supply chains, within the field of mechanical engineering.  
LO2 – Apply financial analysis and planning control methods to mechanical engineering scenarios.  
LO3 – Analyse the role of modern quality and performance management methods for delivering service excellence and value to the customer.  
LO4 – Investigate the management challenges presented within the field of mechanical engineering as a result of increasing competitiveness, globalisation and environmental issues.  
LO5 – Evaluate and communicate lean enterprise concepts applied to the mechanical engineering sector.

<b>DATE OF APPROVAL:</b> May 2017	<b>Academic Partnerships</b>
<b>DATE OF IMPLEMENTATION</b> September 2017	<b>City College Plymouth</b>
<b>DATE(S) OF APPROVED CHANGE:</b>	<b>TERM: All Year</b>

## SECTION B: DETAILS OF TEACHING, LEARNING AND ASSESSMENT

Items in this section must be considered annually and amended as appropriate, in conjunction with the Module Review Process.

ACADEMIC YEAR: 2023-24	NATIONAL COST CENTRE: 18
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MODULE LEADER: Owais Raja	OTHER MODULE STAFF:
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### Summary of Module Content

Operations management functions; input-transformation-output model; operations management within corporate strategic framework; functional relationship of operations management; challenges facing operations management – globalisation, environmental issues, knowledge management, technology; key performance objectives; design process; differing processes; process technologies; job design; work measurement; quality control; facility location; operations planning & control – scheduling, forecasting demand, JIT; project management; TQM.

### SUMMARY OF TEACHING AND LEARNING [Use HESA KIS definitions]

Scheduled Activities	Hours	Comments/Additional Information
Lectures	30	30 x 1hr lectures
Seminars	30	30 x 1hr seminars
Self study	120	Reading, research, Sim Venture activities
External Visit	3	Visit to manufacturer production line
External Speakers	4	2 guest lectures
Tutorials	13	Group and individual tutorials
<b>Total</b>	<b>200</b>	

Category	Element	Component Name	Component weighting	Comments Include links to learning objectives
Coursework	C	Report	100%	LO1, LO2, LO3
Practice	P	Presentation	100%	LO4, LO5

<b>Updated by:</b> Owais Raja Date: July 2022	<b>Approved by:</b> Lance Chatfield Date: July 2022
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