UNIVERSITY CENTRE TRURO & PENWITH

LEARNING TEACHING AND ASSESSMENT HANDBOOK

HNC MECHANICAL ENGINEERING

2023-24

TRURO COLLEGE PENWITH COLLEGE Pearson BTEC

WELCOME TO THE COURSE TITLE

Welcome to Truro and Penwith college (T&PC) and to your course. This handbook is designed to give you a general overview of the College. We hope that you will enjoy your time of study with us and that the course will provide a stimulating experience – assisting both your personal development and future progression to higher levels of study and employment in one of the most exciting and vibrant areas of endeavour available.

This is your LTA handbook. It is a guide to all of the learning, teaching and assessment related to your study on programme. This LTA handbook contains information about what you are going to learn, how you are going to learn and how you will be assessed. Two other important sources of information that link to the LTA handbook are the University Centre Student Handbook and Pearson Course Specification.

The purpose of Pearson BTEC Higher Nationals in Engineering is to develop students as professional, self-reflecting individuals able to meet the demands of employers in the Engineering sector and adapt to a constantly changing world.

The qualifications aim to widen access to higher education (HE) and enhance the career prospects of those who undertake them. The Pearson BTEC Higher National qualifications in Engineering, were developed in collaboration with a wide range of students, employers, HE providers, colleges and subject experts to ensure that the new qualifications meet their needs and expectations.

Naomi Johns-Dyer, Programme Team Leader (PTL)

DISTINCTIVE FEATURES

There are many aspects of the HNC Mechanical programmes including:

• A range of core and specialist units, each with a clear purpose.

• Content that is closely aligned with the needs of employers, professional bodies, vendors and higher education for a skilled future workforce.

• The opportunity to develop transferable skills useful for work and for higher education (HE), including research skills, the ability to meet deadlines and communication skills' .

• Assessments and projects chosen to help students progress to the next stage (this means some are set by the centre to meet local needs, while others are set by Pearson); students are required to apply their knowledge to a variety of assignments and activities, with a focus on the holistic development of practical, inter-personal and higher-level thinking skills.

• An approach to demand at Level 4 and Level 5 which is aligned with the Framework for Higher Education Qualifications (FHEQ).

COURSE CONTACT LIST

PROGRAMME LEADER: Dave John, davidjohn@truro-penwith.ac.uk

What does your programme leader do?

Your programme leader organises, teaches, and completes all of the quality assurance paperwork associated with your programme.

MODULE LEADERS:

Dave John has degrees in Mechanical Engineering and Business, with industry experience covering manufacturing, materials and automation technology. His teaching experience covers a range of subjects including engineering science, mechanical principles, materials & manufacturing, thermodynamics & fluids, business studies and project management.

John Richards has a BA honours in Industrial Design and Technology with over 25 years of teaching experience in Education up to and including Post Graduate. His areas of expertise are Engineering Design, Creative Design, Modern Manufacturing Processes, Design for Additive Manufacturing, Computer Aided Design, Computer Aided Manufacture, Rapid Product Development and Motivational Sports Psychology.

Leslie Nickola has a Masters degree in Electrical engineering with extensive experience in industry and the education sector. He is also curriculum lead for Cornwall Space and Aerospace Technology Training, responsible for developing curricula to meet the needs of this growing sector.

PERSONAL TUTOR: Dave John

what does your personal tutor do?

Your personal tutor should be the first person at the College that you speak to if you are having any personal difficulties that are affecting your work. These could be academic, financial, health-related or another type of problem.

Your Personal Tutor is there to support your learning needs and he or she can offer advice or recommend that you enrol on a study skills course. Your main support for academic issues relating to specific modules will be the lecturer who is teaching that module.

Your tutor will be the person who, if the College is asked, will write a personal reference for you during, or on completion of course.

PEARSON QUALITY ADMINISTRATOR: Ashleigh Warren, ashleighw@truro-penwith.ac.uk

What does the Pearson Quality Administrator do? The Pearson Quality Administrator is your first point of contact for all administrative paperwork to do with the programme.

HE STUDENT SUPPORT: Joceline Nason and Jackie Harrison hestudentsupport@truro-penwith.ac.uk 01872 267585

What does HE Student Support do:

HE Student support helps you if need any advice on finance or if you need a laptop loan. You may also contact them if you need support with your mental health or need any support for if you have learning difficulties/disabilities.

PROGRAMME STRUCTURE AND DELIVERY

Level 4/Year 1				
Module Code	Module Title	No. of Credits	Core / Optional	Term / Semester
1	Engineering Design	15	Core	
2	Engineering Maths	15	Core	
3	Engineering Science	15	Core	
4	Managing a Professional Engineering Project	15	Core	
8	Mechanical Principles	15	Optional	1,2,3
12	Engineering Management	15	Optional	1,2,3
13	Fundamentals of Thermodynamics and Heat Engines	15	Optional	1,2,3
23	Computer Aided Design and Manufacture	15	Optional	1,2,3

PROGRAMME RESOURCES

The HNC/HND Mechanical and Manufacturing Engineering utilises an extensive range of facilities including:

- brand-new, dedicated £7m engineering and technology building
- Well-equipped laboratories, classrooms, workshops and project rooms
- Advanced analytical equipment and instrumentation
- Industry standard design and simulation software
- A wide range of physical and electronic resources

ENHANCEMENT ACTIVITIES

What enhancement activities does the programme provide?

An important aspect of this degree is its vocational nature. All students are encouraged to seek relevant employment or work-based experience during their studies – that is why the actual 'teaching' timetable leaves you with some free time during the week. But additionally, many of the modules have vocational elements, such as practical experience, visits to and from individuals and organisations in your vocational area and simulations.

One such trip is a visit to the St Denis Energy from Wast facility which supports the delivery of Unit 13 Fundamentals of Thermodynamics and Heat Engines.

EMPLOYMENT AND PROGRESSION OPPORTUNITIES

As a student of University Centre Truro Penwith you have access to the Career Connect Platform that gives you access to job and career opportunities whist you study here.

Additionally, the system is available to you for three years after you graduate, this service is unique. You will need to create a profile and work-based learning you undertake can be recorded on this platform. Please make use of this system as it will help support you in career. For more information, please contact Louise Clarke our dedicated HE careers support officer.

louiseclarke@truro-penwith.ac.uk

EMPLOYMENT OPPORTUNITIES

Currently engineering knowledge and skills are in high demand across a range of industrial sectors in the UK. On completion of the HNC/HND in Mechanical or Manufacturing Engineering students could expect to gain employment in roles such as:

- Research Engineer/Technician
- Design and Development Engineer/Technician
- Process Engineer/Technician
- Maintenance Engineer/Technician
- Project Engineer/Technician

PROGRESSION OPPORTUNITIES

Following completion of the HNC students can progress onto the HND in Mechanical Engineering and then possibly progress onto top-up BSc Engineering programmes with a number of universities.

TUTORIAL SCHEME OF WORK

SESSION	TUTORIAL SCHEME LEVEL 4
1	Welcome to course – key info, LTA handbook
2	LRC induction (book with Fal LRC)
3	Student Rep info and election (start of year)
4	Resilience and Time Management
5	Referencing and Academic Writing (Reports, Essays, Presentations…)
	READING WEEK
6	How to Plan & Write an Assessment ***& 20 minute 1:1 tutorial***
7	Plagiarism and Extenuating Circumstances ***& 20 minute 1:1 tutorial***
8	HE Student Support ***& 20 minute 1:1 tutorial***
9	***One to Ones (3 Individual tutorial meetings)***
10	***One to Ones (3 individual tutorial meetings)***
11	***One to Ones (3 Individual tutorial meetings)***
	XMAS
12	Employability activities (Skills Audit and Employability Action Plan)
13	Effective Literature Researching Techniques
14	eSPQ (Spring term)
15	Study Skills Audit and Action Planning ***& 20 minute 1:1 tutorial***
16	Placement/Employability talk ***& 20 minute 1:1 tutorial***
17	Reflection & Development Planning***& 20 minute 1:1 tutorial***
	HALF TERM
18	Reviewing progress on Study Skills Action Plan ***& 20 minute 1:1 tutorial***
19	Planning and Delivering Presentations ***& 20 minute 1:1 tutorial***
20	Study Skills Clinic (Course specific Requirements) ***& 20 minute 1:1 tutorial***
21	***One to Ones (3 Individual tutorial meetings)***
22	***One to Ones (3 Individual tutorial meetings)***
	EASTER
23	Revision Techniques/ guidance relating to online time constrained assessments
24	Role of EE and previous year's EE report ***& 20 minute 1:1 tutorial***

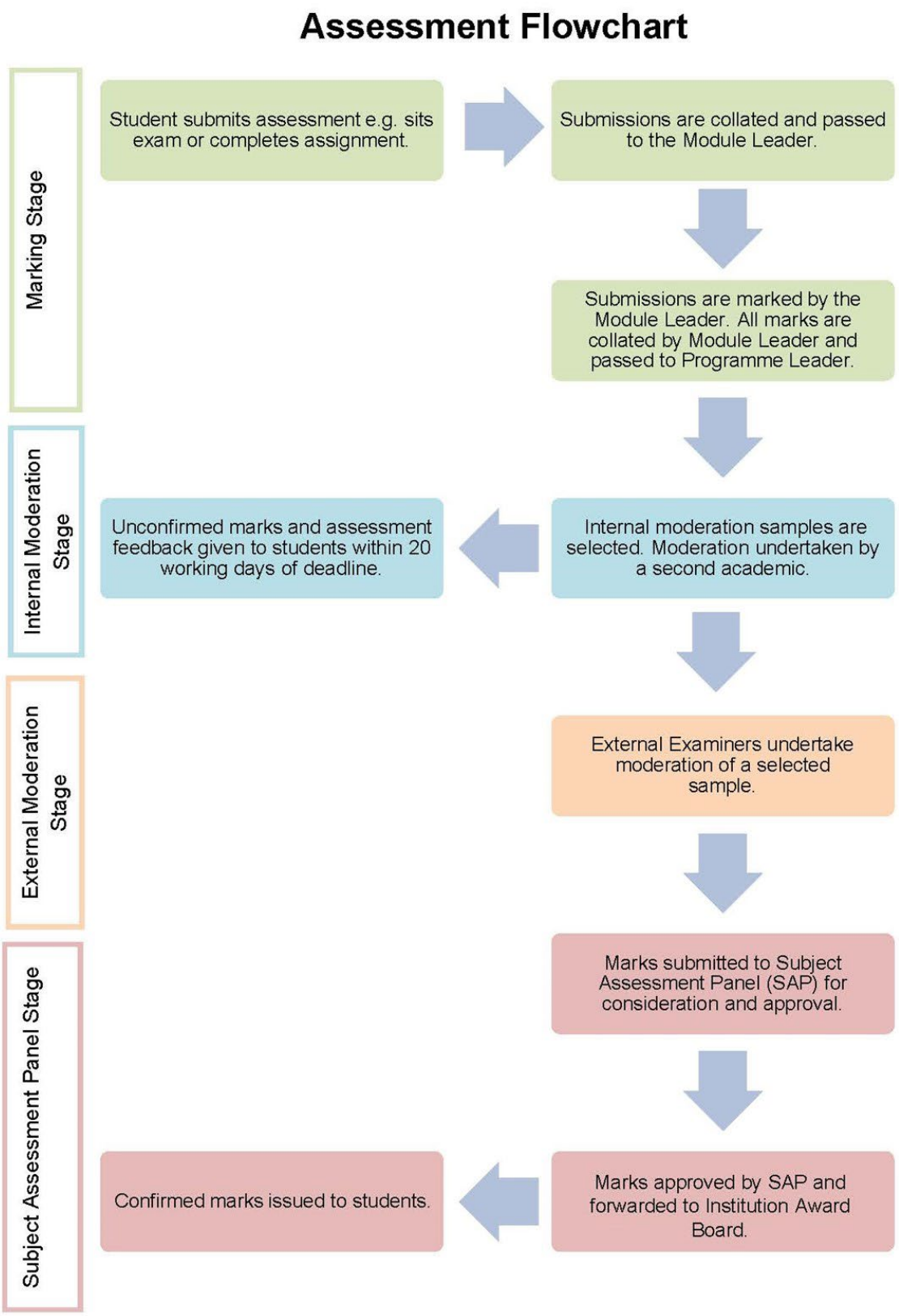
25	Review and updating of Employability and Study Skills Action Plans
26	Results Transcript explanation ***& 20 minute 1:1 tutorial***
27	Level 5 overview – course and expectations ***& 20 minute 1:1 tutorial***
28	Results day and information on passing / consequences of failure
	READING WEEK
29	Support with Summative Assessments

ASSESSMENT SCHEDULE AND HAND-IN PROCESS

The following calendar outlines your assessment schedule for the year. You should adhere to the assignments on this schedule as the definitive assignments hand-in dates for your programme. ***All assessed work is to be electronically submitted via Turnitin before Midnight on Sunday indicated below.*** If you cannot make the deadline dates there is an extenuating circumstances process and details of this can be found on the University Centre Student Handbook

Date Wk Beg	Unit 8 Mechanical Principles	Unit 12 Engineering Management	Unit 13 Fundamentals of Thermodynamics and Heat Engines	Unit 23 Computer Aided Design and Manufacture
1. 18 Sep				
2. 25 Sep				
3. 2 Oct				
4. 9 Oct				
5. 16 Oct				
6. 30 Oct				
7. 6 Nov				Assignment 1
8. 13 Nov	Assignment 1			
9. 20 Nov				
10. 27 Nov				
11. 4 Dec		Assignment 1		
12. 3 Jan			Assignment 1	
13. 8 Jan				
14. 15 Jan				
15. 22 Jan				
16. 29 Jan				
17. 5 Feb				
18. 19 Feb				
19. 26 Feb				
20. 4 Mar				
21. 11 Mar				
22. 18 Mar				
23. 25 Mar				
24. 15 Apr				
25. 22 Apr				
26. 29 Apr		Assignment 2		
27. 6 May	Assignment 2			
28. 13 May				Assignment 2
29. 19 May			Assignment 2	
30. 3 Jun				

ASSESSMENT FLOWCHART



NOTE: The sample for the internal moderation process comprises of moderating any piece above 70% and below 40%, as well as a work across the range of achievement (at least 10 pieces of assessed work must be moderated per module).

INTRODUCTION TO MICROSOFT TEAMS

Microsoft Teams is a centralised hub for communication and collaboration within a team, department or student group. If require, this will allow you to join lectures and interact within your group.

Microsoft Teams integrates directly with all Office 365 applications such as SharePoint and Planner, making it easy for you to communicate and collaborate securely wherever you are.

Get Microsoft Teams on your device

Microsoft Teams is available to all Truro & Penwith College Students and Staff.

- Download for Windows, macOS, or Linux
- Use the web version, which has the same features as the desktop version
- Get Teams on your iOS and iPadOS or Android device.

Simply enter your Truro & Penwith College username and password and you're ready to go
EXAMPLE: jb12345@truro-penwith. ac.uk

Features of teams

- Chat with text, audio, video, and file sharing
- Store all your files, docs, and more in one place
- Automatically integrate with your existing Outlook calendar
- Meet with up to 250 people at the same time
- Share your desktop, applications, or a whiteboard during meetings
- Automatically record and upload video, audio, and shared content from meetings to Microsoft Stream

How Teams can help you work together

Chat-based team workspaces

- **Chat** instantly with peers and staff from on or off-campus
- Quickly get in touch using **video calls**

Desktop and mobile apps

- Stay connected from your **Windows** or **Mac** computer, or on the go with the **Android** and **iOS** mobile apps
- Configure your **notifications**, so you never miss a message or project update

Integrated Office apps and OneDrive

- Work together on documents with integrated **Office 365** apps, like Word and Excel
  Easily access and **share files** from your OneDrive account, right from the app

Indirect Referencing (In text citations)

As the verb in the main clause, followed by a 'that' clause

Rees (2004) argues that …

Rees (2004) observes that …

as the verb in a 'comment' clause, followed by the main clause:

As Rees (2004) argues, …

As Rees (2004) observes, …

as a noun in the main clause

Rees (2004) uses the argument that …

Rees (2004) makes the observation that …

Direct Referencing (In text citations)

For quotation only

In the words of Rees (2004:6), '…'.

To quote Rees (2004:6), '…'.

With regard to … , Rees (2004:6) has the following to say: '…'.

If the suggestion that '…' (Rees, 2004:6), then a question must be asked about…

As noted by Weare (2005:3), 'the phenomenon observed is dramatic', which suggests that…

More Than Two Authors (In text citations)

On the first occurrence all authors should be listed. After that…..

If there are more than two authors, the surname of the first author only should be given, followed by '*et al*.' (Latin for 'and others', preferably in *italics* and followed by a full stop as it is an abbreviation), for example:

Chavez *et al.* (1997) conclude that the solution lies in improved education to promote sustainability literacy...

Secondary Sources (In text citations)

For a secondary source (i.e. if you refer to a source quoted in another work) ideally you should aim to trace the original source. If you are unable to check it, you need to cite both in the text, for example:

A study by French (1984, cited in Saunders, 1995:24) showed that...

(Note that you need to list the work you have used, i.e. Saunders, in the list of references section at the end of the essay and in the bibliography)

Repitition of Findings (In text citations)

If a number of different authors are essentially saying the same thing or agree on a particular issue, you can include all the different authors in one reference for example:

Many studies suggest (Smith and Stafford, 2006; Hassan, 2005; George, 1999; Bertelli, 1997) that...

Diagrams, photos, charts, maps and other illustrations

Diagrams, photos, charts, maps and other illustrations should be cited like quotations with the author and date given alongside the illustration and full details included in the list of references.

Reference List (Books)

If you are referring to a book, you should give the following information:

Surname, Initials. (year of publication). *Title*. Edition (if not the first). Place of publication: Name of publisher.

Soper, K. (1995). *What is nature? Culture, politics and the non-human* (2nd edn). Oxford: Blackwell.

Reference List (Articles)

If you are referring to an article, you should give the following information:

Surname, Initials. (year). 'Title of article', *Name of Journal* (with capitals as they appear in the journal), volume number (part number), pages.

Reference List (Websites)

What you need in order to use a website……

Author of the information (a person, group or organisation), if there is one

year (most web pages have a date at the bottom of the page)

Title

URL (i.e. whole web address including numbers, slashes etc.)

the date you accessed the web page.

> **Hayes, M. J. (2001). *Intellectual property rights*. Available at: www.jisclegal.ac.uk/ipr/IntellectualProperty.htm (Accessed: 8 June 2004).**

UNIT 8: MECHANICAL PRINCIPLES

Unit code F/615/1482
Unit level 4
Credit value 15

Introduction

Mechanical principles have been crucial for engineers to convert the energy produced by burning oil and gas into systems to propel, steer and stop our automobiles, aircraft and ships, amongst thousands of other applications. The knowledge and application of these mechanical principles is still the essential underpinning science of all machines in use today or being developed into the latest technology.

The aim of this unit is to introduce students to the essential mechanical principles associated with engineering applications. Topics included in this unit are: behavioural characteristics of static, dynamic and oscillating engineering systems including shear forces, bending moments, torsion, linear and angular acceleration, conservation of energy and vibrating systems; and the movement and transfer of energy by considering parameters of mechanical power transmission systems. On successful completion of this unit students will be able to explain the underlying principles, requirements and limitations of mechanical systems.

Learning Outcomes

By the end of this unit students will be able to:

1. Identify solutions to problems within static mechanical systems.
2. Illustrate the effects that constraints have on the performance of a dynamic mechanical system.
3. Investigate elements of simple mechanical power transmission systems.
4. Analyse natural and damped vibrations within translational and rotational mass-spring systems.

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
LO1 Identify solutions to problems within static mechanical systems		**D1** Calculate the magnitude of shear force and bending moment in cantilever and encastré beams for a variety of applications
P1 Calculate the distribution of shear force, bending moment and stress due to bending in simply supported beams **P2** Justify the selection of standard rolled steel sections for beams and columns **P3** Determine the distribution of shear stress and the angular deflection due to torsion in solid and hollow circular shafts	**M1** Determine the material of a circular bar from experimental data of angle of twist obtained from a torsion test	
LO2 Illustrate the effects that constraints have on the performance of a dynamic mechanical system		**D2** Calculate solutions of velocities and accelerations within planar mechanisms using trigonometric methodology
P4 Explain the effects of energy transfer in mechanical systems with uniform acceleration present **P5** Identify the magnitude and effect of gyroscopic reaction torque	**M2** Construct diagrams of the vector solutions of velocities and accelerations within planar mechanisms	

Pass	Merit	Distinction
LO3 Investigate elements of simple mechanical power transmission systems		**D3** Examine the cause of a documented case of mechanical power transmission failure and the steps taken to correct the problem and rectify any design faults
P6 Determine the velocity ratio for compound gear systems and the holding torque required to securely mount a gearbox **P7** Calculate the operating efficiency of lead screws and screw jacks **P8** Explain the conditions required for a constant velocity ratio between two joined shafts	**M3** Examine devices which function to store mechanical energy in their operation	
LO4 Analyse natural and damped vibrations within translational and rotational mass-spring systems		**D4** Identify the conditions needed for mechanical resonance and measures that are taken to prevent this from occurring
P9 Explain the natural frequency of vibration in a mass-spring system	**M4** Determine the amplitude and phase angle of the transient response within a mass-spring damper system	

UNIT 12: ENGINEERING MANAGEMENT

Unit code Y/615/1486
Unit level 4
Credit value 15

Introduction

Managing engineering projects is one of the most complex tasks in engineering. Consider the mass production of millions of cars, sending a man or women into space or extracting oil or gas from deep below the surface of the earth. Bringing the materials and skills together in a cost effective, safe and timely way is what engineering management is all about.

This unit introduces students to engineering management principles and practices, and their strategic implementation. Topics included in this unit are: the main concepts and theories of management and leadership, fundamentals of risk management, operational management, project and operations management theories and tools, the key success measures of management strategies, and planning tools. On successful completion of this unit students will be able to investigate key strategic issues involved in developing and implementing engineering projects and solutions, and explain professional codes of conduct and the relevant legal requirements governing engineering activities.

Learning Outcomes

By the end of this unit students will be able to:

1. Examine the application of management techniques, and cultural and leadership aspects to engineering organisations.
2. Explore the role of risk and quality management in improving performance in engineering organisations.
3. Investigate the theories and tools of project and operations management when managing activities and optimising resource allocation.
4. Perform activities that improve current management strategies within an identified element of an engineering organisation.

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
LO1 Examine the application of management techniques, and cultural and leadership aspects to engineering organisations		**D1** Propose recommendations for the most efficient application of management techniques
P1 Explain management and leadership theories and techniques used within engineering organisations	**M1** Justify different management techniques with emphasis on cultural and leadership aspects and their applications to engineering organisations	
LO2 Explore the role of risk and quality management in improving performance in engineering organisations		**D2** Provide supported and justified recommendations for the most efficient and effective risk and quality management practices
P2 Describe the role and importance of risk and quality management processes and their impact on engineering organisations	**M2** Explain how risk and quality management strategies encourage performance improvements within engineering organisations	
LO3 Investigate the theories and tools of project and operations management when managing activities and optimising resource allocation		**D3** Analyse the relative merits of theories and tools of project and operations management, with a focus on their relevance when managing activities and optimising resource allocation
P3 Identify project and operations management tools used when managing activities and resources within the engineering industry	**M3** Analyse the most effective project and operations management tools used when managing activities and optimising resource allocation	

Pass	Merit	Distinction
LO4 Perform activities that improve current management strategies within an identified element of an engineering organisation		**D4** Conduct a full analysis of the management processes within an engineering organisation (or case study) and make fully justified recommendations for improvements to the management strategies
P4 Define the range of processes available to improve management processes within an engineering organisation	**M4** Explore activities that will improve management strategies within an engineering organisation	

UNIT 13: FUNDAMENTALS OF THERMODYNAMICS AND HEAT ENGINES

Unit code D/615/1487
Unit level 4
Credit value 15

Introduction

Thermodynamics is one of the most common applications of science in our lives, and it is so much a part of our daily life that it is often taken for granted. For example, when driving your car you know that the fuel you put into the tank is converted into energy to propel the vehicle, and the heat produced by burning gas when cooking will produce steam which can lift the lid of the pan. These are examples of thermodynamics, which is the study of the dynamics and behaviour of energy and its manifestations. This unit introduces students to the principles and concepts of thermodynamics and its application in modern engineering. On successful completion of this unit students will be able to investigate fundamental thermodynamic systems and their properties, apply the steady flow energy equation to plant equipment, examine the principles of heat transfer to industrial applications and determine the performance of internal combustion engines.

Learning Outcomes

By the end of this unit students will be able to:

1. Investigate fundamental thermodynamic systems and their properties.
2. Apply the Steady Flow Energy Equation to plant equipment.
3. Examine the principles of heat transfer to industrial applications.
4. Determine the performance of internal combustion engines.

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
LO1 Evaluate the performance and operation of heat pumps and refrigeration systems		**D1** Conduct a cost-benefit analysis on the installation of a ground source heat pump on a smallholding to make valid recommendations for improvements
P1 Using didactic sketches, evaluate the operating principles of both heat pumps and refrigeration systems **P2** Use refrigeration tables and pressure/enthalpy charts to determine COP, heating effect and refrigeration effect of reversed heat engines	**M1** Assess the limiting factors that impact on the economics of heat pumps **M2** Illustrate the contradiction between refrigeration cycles and the second law of thermodynamics	
LO2 Review the applications and efficiency of industrial compressors		**D2** Critically evaluate volumetric efficiency formula for a reciprocating compressor
P3 Assess the different types of industrial compressor and identify justifiable applications for each **P4** Discuss compressor faults and potential hazards **P5** Determine the volumetric efficiency of a reciprocating compressor	**M3** Evaluate isothermal efficiency by calculating the isothermal and polytropic work of a reciprocating compressor	

Pass	Merit	Distinction
LO3 Determine steam plant parameters and characteristics using charts and/or tables		**D3** Critically evaluate the pragmatic modifications made to the basic Rankine cycle to improve the overall efficiency of steam generation power plants
P6 Discuss the need for superheated steam in a power generating plant **P7** Apply the use of charts and/or tables to establish overall steam plant efficiencies in power systems	**M4** Justify why the Rankine cycle is preferred over the Carnot cycle in steam production plants around the world	
LO4 Examine the operation of gas turbines and assess their efficiency		**D4** Critically analyse the practical solutions manufacturers offer to overcome problematic areas in gas turbines, such as burner ignition continuation and self-starting capabilities
P8 Investigate the principles of operation of a gas turbine plant **P9** Assess the efficiency of a gas turbine system	**M5** Compare and evaluate the actual plant and theoretical efficiencies in a single shaft gas turbine system, accounting for any discrepancies found	

UNIT 23: COMPUTER AIDED DESIGN AND MANUFACTURE (CAD/CAM)

Unit code J/615/1497

Unit level 4

Credit value 15

Introduction

The capacity to quickly produce finished components from a software model is now essential in the competitive world of manufacturing. Businesses now invest heavily in Computer Aided Design (CAD) software, Computer Aided Manufacture (CAM) software and Computer Numerical Control (CNC) machines to facilitate this, thus reducing product lead times. CAD gives design engineers the platform to creatively model components that meet the specific needs of the consumer. When these models are combined with CAM software, manufacturing is made a reality. This unit introduces students to all the stages of the CAD/CAM process and to the process of modelling components using CAD software specifically suitable for transferring to CAM software. Among the topics included in this unit are: programming methods, component set-up, tooling, solid modelling, geometry manipulation, component drawing, importing solid model, manufacturing simulation, data transfer, CNC machine types and inspections. On successful completion of this unit students will be able to illustrate the key principles of manufacturing using a CAD/CAM system; produce 3D solid models of a component suitable for transfer into a CAM system; use CAM software to generate manufacturing simulations of a component; and design a dimensionally accurate component on a CNC machine using a CAD/CAM system.

Learning Outcomes

By the end of this unit students will be able to:

1. Describe the key principles of manufacturing using a CAD/CAM system.

2. Produce 3D solid models of a component suitable for transfer into a CAM system.

3. Use CAM software to generate manufacturing simulations of a component.

4. Design and produce a dimensionally accurate component on a CNC machine

using a CAD/CAM system

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
LO1 Describe the key principles of manufacturing using a CAD/CAM system		**D1** Critically evaluate, using illustrative examples, the impact of different machining conditions and specifications on component manufacturing
P1 Describe the hardware and software elements of a typical CAD/CAM system **P2** Describe, with examples, the inputs and outputs of the CAD/CAM process **P3** Explain the different methods of component set-up, work-holding and tooling available on CNC machines	**M1** Analyse the suitability of different programming methods of CNC machines	
LO2 Produce 3D solid models of a component suitable for transfer into a CAM system		**D2** Critically evaluate the effectiveness of using a CAD/CAM system and solid modelling to manufacture components
P4 Design and produce a CAD solid model of a component to be manufactured on a CNC machine **P5** Design a working drawing of a component containing specific manufacturing detail	**M2** Assess the importance of using different geometry manipulation methods for efficient model production	

Pass	Merit	Distinction
LO3 Use CAM software to generate manufacturing simulations of a component		**D3** Analyse the effect of applying different manufacturing techniques and modifications to achieve an optimised production time
P6 Use CAM software to generate a geometrically accurate CAD solid model of a component	**M3** Using CAM software, generate cutter tool path simulations	
LO4 Design and produce a dimensionally accurate component on a CNC machine using a CAD/CAM system		**D4** Critically analyse, giving illustrative examples, the different methods of data transfer through a CAD/CAM system
P7 Detail a part program for a component using CAM software and transfer the part program to a CNC machine and manufacture a component **P8** Describe the structural elements of a CNC Machining Centre **P9** Review a component manufactured on a CNC machine to verify its accuracy	**M4** Analyse different methods of component inspection used in manufacturing	

APPENDIX A: ASSESSMENT GUIDANCE

Pearson HN Assessment Process

The assessment of Pearson HN students on RQF courses at University Centre Truro & Penwith aligns with the guidelines applied to students at T&PC who are studying UoP programmes enabling the Centre to follow a standard procedure to avoid confusion and demonstrate a fair and equitable process for all HE students.

Internal verification & moderation

Internal Verification (of Assignment Briefs)

All assignment briefs, are internally verified every year, prior to release to the students. The process will follow that outlined in the Guide to Higher National Centre Guide to Quality Assurance and Assessment 2019-20 p66.

Internal Verification (of Assessment decisions) also referred to as Moderation

Verification of the grades awarded to a sample of work from each assessment will be undertaken during the year, prior to the return of any grade to the student cohort. This will mirror the existing Moderation process followed internally on other HE programmes with a pass, merit and distinction level assignment sampled (when possible) plus at least 10% of the assignments or a total of 10 whichever is the larger.

Mitigating circumstances

Students who have mitigating circumstances at the time of assessment that will lead to the late submission of an assignment will be able to self-certify (5 day extension) or provide evidence for decision by the Mitigating Circumstances (MC) Panel. The MC Panel comprises staff who sit or have sat on the colleges Extenuating Circumstances (EC) panel. The same criteria and information will apply to the MC process as the existing EC process. *The college will normally operate a standard EC/MC policy and students will be able to use an online submission form to apply. In the light of external circumstances that impact students and the college (such as the Covid 19 pandemic) changes to EC/MC will be applied to ensure fairness across all programmes unless guidance from different awarding bodies diverges in which case students will be made aware of the differences.*

If you need to claim extenuating circumstances claim email heenquiry@truro-penwith.ac.uk

Grading of higher national units

The grading of BTEC Higher National qualifications is at the unit and the qualification level Each successfully completed unit will be graded as a Pass, Merit or Distinction.

• A Pass is awarded for the achievement of all outcomes against the specified assessment criteria

• Merit and Distinction grades are awarded for higher level achievement.

For Higher National (RQF) qualifications, Pearson has produced specific Merit and Distinction criteria that are linked to every Pass criterion.

Grading Higher National units (RQF)

• To achieve a Pass, a student must have satisfied all the Pass criteria for the learning outcomes, showing coverage of the unit content and therefore attainment at Level 4 or 5 of the national framework.

• To achieve a Merit, a student must have satisfied all the Merit criteria (and the Pass criteria) through high performance in each learning outcome.

• To achieve a Distinction, a student must have satisfied all the Distinction criteria (and the Pass and Merit criteria), and these define outstanding performance across the unit as a whole.

The award of a Pass is a defined level of performance and cannot be given solely on the basis of a student completing assignments. Students who do not satisfy the Pass criteria should be reported as Unclassified.

Late submission of work

If work is submitted late without evidence of MC (above) a student will have the work graded 'without penalty' with the late submission recorded. The student will be made aware at the return of the graded work that the assignment grade will be capped at pass level. Should there be subsequent evidence of Mitigating circumstances submitted, the MC panel will decide and advise the Award Assessment Board of whether the MC are considered valid. The final decision on whether late work will be capped will be taken at the Award Assessment Board. To conform with HE practice at T&PC, if a student identifies prior Mitigating Circumstances that lead to the non-submission of work linked to a unit, the evidence will be presented to the Award Assessment Board and, if accepted at the board, there will be an opportunity for the student to repeat that work as a resubmission, over the summer, without a cap at pass level (following the guidance on resubmission below).

Resubmission of work

A student is allowed one resubmission of work if a pass level is not achieved on first submission. Students will normally be given the same assignment to repeat as a resubmission over the summer

period so as to not impact on the remainder of their work during the academic year. A reassessment will result in the unit being capped at Pass level.

If the Programme Leader or Assessment Board does authorise a resubmission, the following conditions apply:

• The resubmission must be recorded in the relevant assessment documentation

• The student must be given a clear and realistic deadline for resubmission that is consistent across all students granted a resubmission (within 15 working days of the student being notified that a resubmission has been authorised during term time).

• The resubmission must be undertaken by the student with no further guidance

• Only one opportunity for reassessment of each assessment criterion and Merit and Distinction descriptor (QCF only) will be permitted

• The original evidence submitted for the assessment can remain valid and be extended, or may need to be replaced partially or in full

• Arrangements should be made for resubmitting the assessment in such a way that does not adversely affect other assessments and does not give the student an unfair advantage over others.

The decision of whether to allow substantial resubmission work will be made at the Award Assessment Board and will consider the number of overall resubmissions for an individual and the likelihood of their being able to complete the work in the allocated time (normally 15 days from resubmission). The work will normally be a repeat of the original submission but if the Subject Panel feels that resubmission work could create an environment where a student may gain an advantage over others, a new assessment may be set.

Resubmission work will be reviewed by a Resubmission Award Board (normally in September/October)

Repeating a unit

If a student has failed to achieve a pass for any unit following a resubmission opportunity, they may be provided with an opportunity to Repeat the Unit. The students must repeat with full attendance and (if required) payment of the Unit fee. The overall grade for the unit is capped at pass. A student will only have one opportunity to Repeat a unit.

The following applies to a student who, for the first assessment opportunity and resubmission opportunity, still failed to achieve a Pass for that unit specification:

• At the centre's discretion and Assessment Board, decisions can be permitted to repeat a unit

• The student must study the unit again with full attendance and (if required) payment of the unit fee

• The overall unit grade for a successfully completed repeat unit is capped at a Pass for that unit

• Units can only be repeated once.

A student who, for the first assessment opportunity within a repeated unit, has failed to achieve a Pass for that unit specification shall be expected to undertake a reassessment. This reassessment will be subject to the standard RQF resubmission rules and regulations as stated above.

If a student repeats an RQF unit and still does not achieve a Pass in neither their first submission nor resubmission, they will be required to either complete a different unit in full or take the unit as compensation following guidance form the Programme Lead and HE PTL.

Higher national award assessment board

The Award Assessment Board will consist of the HE Programme team lead (Chair), the Programme Lead and Unit leads on the programme. The Award Assessment Board for each course will review the anonymised grades for each module and reflect on the number of passes, merits and distinctions awarded, any assessment issues that apply to any module, comments from internal verifiers and from the external examiner and will consider the distribution of grades awarded on every module with regard to other modules on the course to ensure parity of assessment and grading is in place. The Unit grades are then agreed and taken forward to the second part of the Award Assessment Board.

The Board will consider the overall grades for each student and determine whether resubmission is appropriate and whether capping for late submission should be upheld. Decisions on whether a student has to repeat a unit will also be taken at the Board or the Resubmission Board.

Compensation

Compensation provisions for the HNC

Students can still be awarded an HNC if they have not achieved a Pass in one of the 15 credit units completed but have completed and passed the remaining units.

Compensation provisions for HND

Students can still be awarded an HND if they have attempted but not achieved a Pass in one of the 15 credit units completed at Level 4 and similarly if they have attempted but not achieved one of the 15 credit units at Level 5. However, they must complete and pass the remaining units for an HNC or HND as per the unit rules of combination of the required qualification.

Appeals

If a student wishes to appeal their grade they can do so using the College appeals procedure or may choose to follow the College complaints procedure depending on the nature of the issue they want to raise. Appeals may be made against decisions regarding such matters as:

- Access to a programme of study
- Assessment gradings • Interpretation of performance criteria
- Payment of fees
- Operation of the Equality of Opportunity policy
- Non-completion of course/elements

- Non-accreditation of previous units/achievement
- Complete withdrawal from a course

Where a learner is dissatisfied with the assessment of their work, an informal appeals procedure is available.

(i) The learner should, in the first instance, ask the member of staff who has assessed the work for an explanation of why it has been graded in the way that it has.

(ii) If the learner is still unhappy, and wishes to challenge the grading, they may ask the appropriate Programme Leader to assess the work in question and moderate the grade.

(iii) Where the work in question was first marked by the Programme Leader, the moderation will be done by another member of the Programme Team. Alternatively, or where a learner feels that there is still a case to answer, they may invoke the College HE Appeals Procedure,

Students have a final right of appeal to Pearson, but only if the procedures in place at the centre have been fully utilised or if the student is dissatisfied with the outcome. Further details are given in the Enquiries and appeals about Pearson vocational qualifications policy. If students are not satisfied with the result of their appeal after following their centre's processes, they can also request that the Office of the Independent Adjudicator (OIA) review their complaint. The OIA will not deal with complaints about academic judgment but will look at academic appeals. Centres can check if they are a member of the OIA scheme in the list of providers covered in the OIA scheme. Following the OIA process does not prevent students from pursuing a complaint or appeal with Pearson and they may choose whichever route(s) they feel is the most appropriate.

Malpractice and academic offences

This section should be read alongside the T&PC Malpractice and Maladministration Policy 2021.

Malpractice is any act, omission or practice that breaches Pearson's rules or compromises:

- the process of internal and external assessments
- the integrity of Pearson qualifications
- the validity of results or qualifications
- the reputation and credibility of Pearson or of Truro & Penwith College.

The rules for Pearson Qualifications include regulations agreed with other awarding organisations through the Joint Council for Qualifications (JCQ), published policies and requirements set out in our qualification specifications.

Malpractice includes maladministration, which is any act, omission or practice that results in a school, college, learning provider or learner failing to comply with the Pearson administrative regulations and requirements. Malpractice and maladministration can be deliberate or the result of negligence.

<u>Examples of learner malpractice / Academic Offences include:</u>

- Altering or falsifying results documents, including certificates
- Copying from another learner or allowing work to be copied
- Plagiarism of any nature
- Bringing unauthorised material or instruments into an examination room or assessment
- Failure to abide by the instructions of an invigilator or supervisor
- Making inappropriate or offensive written comments in an examination or test
- Collusion - unauthorised collaboration of students (or others) in producing a submitted assessment. The offence of collusion occurs if a student copies any part of another student's work, or allows their own work to be copied. Collusion also occurs if other people contribute significantly to work that a student submits as their own
- Contract cheating, often called 'ghost writing', which occurs when another person or people are commissioned or otherwise engaged to undertake an assessment, totally or in part, and the assessment is submitted as the student's own work
- Misrepresenting or fabricating the outcomes and results of research, investigations, or experiments
- Making false declarations in an attempt to obtain special consideration in assessment. Examples include falsely claiming a need for modified assessment provision or making false extenuating circumstances claims.
- he inclusion in an assessment (other than an examination or test) of material which is identical or substantially similar to material which has already been submitted for any other assessment
- Persuading or attempting to persuade another member of the College to participate, in any way, in actions which would be in breach of these regulations

Examples of staff malpractice at a Pearson approved school, college or learning provider include:

- Providing Pearson with incorrect information during the centre or qualification approval process
- Failing to register genuine learners or registering learners who do not exist with the intention of financial gain
- Falsifying or fabricating learners' marks, assessment evidence, observation records, certification claims or results documentation
- Providing assistance to learners, beyond that which is permitted by the specification, which results in a potential or actual advantage in an examination or assessment
- Breaching the confidentiality of question papers, materials or learners' scripts
- Failing to report any instances of malpractice or suspected malpractice

Cases of alleged academic offence / malpractice by a student will follow the 2 stage procedure identified in the T&PC Policy:

- An initial counselling stage
- An investigation and report

Recognition of prior learning

RPL is about using a learner's evidence of earlier learning and achievement towards part of a qualification.

An assessor reviews whether the evidence is enough to show that a learner has met the assessment requirements for a current qualification. The learner needs to show that through knowledge, understanding or skills they already have, they do not need to complete a unit or complete extra assessment activity

If there is evidence that the learner has previously shown the knowledge, skills or understanding required by a qualification, this may be used towards achieving that qualification. The evidence must be:

- •valid;
- •current;
- •reliable;
- •authentic and
- •sufficient.

RPL is not normally used to provide evidence against achievement for an entire qualification. Further gudiance is available within our RPL policy.

Calculation of awarded grade

Conditions for the award of the HNC

To achieve a Pearson BTEC Higher National Certificate qualification, a student must have:

• Completed units equivalent to 120 credits at Level 4

• Achieved at least a pass in 105 credits at Level 4.

Conditions for the award of the HND

To achieve a Pearson BTEC Higher National Diploma qualification, a student must have:

• Completed units equivalent to 120 credits at Level 5

• Achieved at least a pass in 105 credits at Level 5

• Completed units equivalent to 120 credits at Level 4

• Achieved at least a pass in 105 credits at Level 4.

Calculation of the overall qualification grade

The calculation of the overall qualification grade is based on the student's performance in all units. Students are awarded a Pass, Merit or Distinction qualification grade using the points gained through all 120 credits, at Level 4 for the HNC or Level 5 for the HND, based on unit achievement.

The overall qualification grade is calculated in the same way for the HNC and for the HND. All units in valid combination must have been attempted for each qualification. The conditions of award and the compensation provisions will apply as outlined above.

All 120 credits count in calculating the grade (at each level, as applicable). The overall qualification grade for the HND will be calculated based on student performance in Level 5 units only.

Units that have been attempted but not achieved, and subsequently granted compensation, will appear as 'Unclassified'; i.e. a 'U' grade, on the student's Notification of Performance, that is issued with the student certificate.

	Points per credit
Pass	4
Merit	6
Distinction	8

	Point boundaries
Pass	420 – 599
Merit	600 – 839
Distinction	840 +

Reasonable adjustment of assessment

We will support access to our vocational qualifications for learners who are eligible for reasonable adjustment and/or special consideration in assessments, without compromising the assessment of the skills, knowledge, understanding or competence being measured.

Reasonable adjustment should be put in place **before** the learner **starts** the **assessment**. You should identify whether any action is needed to help reduce the effect of a disability or difficulty, which will place a learner at a substantial disadvantage in the assessment. Reasonable adjustments must not, however, affect the reliability1 or validity2 of assessment outcomes or give a learner an advantage over other learners undertaking the same or similar assessments.

Reasonable adjustment must not affect the validity or reliability of assessment, influence the outcome of assessment or give the learner(s) an unfair assessment advantage, but may involve:

- Changing usual assessment arrangements.
- Adapting assessment materials.

- Providing assistance during assessment.
- Re-organising the assessment physical environment.
- Changing or adapting the assessment method.
- Alternative ways of presenting responses.
- Using assistive technology.

Any reasonable adjustment is recorded using the RA1 form, and stored with the learner records for three years.

APPENDIX B: DESCRIPTOR FOR A HIGHER EDUCATION QUALIFICATION:

AT LEVEL 4

The descriptor provided for this level is for any Certificate of Higher Education which should meet the descriptor in full. This qualification descriptor can also be used as a reference point for other level 4 qualifications (adapted from the Framework for Higher Education Qualifications).

LEVEL 4 IS ACHIEVED BY STUDENTS WHO HAVE DEMONSTRATED:

- Knowledge of the underlying concepts and principles associated with their area(s) of study, and an ability to evaluate and interpret these within the context of that area of study.
- an ability to present, evaluate and interpret qualitative and quantitative data, in order to develop lines of argument and make sound judgements in accordance with basic theories and concepts of their subject(s) of study.

STUDENTS WHO ACHIEVE AT LEVEL 4 WILL BE ABLE TO:

- Evaluate the appropriateness of different approaches to solving problems related to their area(s) of study and/or work.
- Communicate the results of their study/work accurately and reliably, and with structured and coherent arguments
- Undertake further training and develop new skills within a structured and managed environment.

STUDENTS WHO ACHIEVE AT LEVEL 4 WILL HAVE:

- The qualities and transferable skills necessary for employment requiring the exercise of some personal responsibility.
- Students who achieve at Level 4 will have a sound knowledge of the basic concepts of a subject, and will have learned how to take different approaches to solving problems.
- They will be able to communicate accurately and will have the qualities needed for employment requiring the exercise of some personal responsibility.
- Students who achieve at Level 4 should have the ability to progress to Level 5 study

GENERIC ASSESSMENT CRITERIA AT LEVEL 4

The criteria set out in this handbook are in accordance with the requirements of Level 4 study at Truro & Penwith College. Students successfully completing their course of study at Level 4 should have **knowledge of the underlying concepts and principles in relation to their areas of study, and an ability to evaluate and interpret these within context.**

Students should also display the ability to **present, evaluate, and interpret data in order to develop coherent argument and make sound judgements in accordance with theories and concepts of their subject of study.**