

MODULE DIRECTORY

LEVEL 4

SCHOOL OF ENGINEERING

FACULTY OF SCIENCE AND ART

2026-2027

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INTRODUCTION

This Module Directory includes all the modules for Level 4 within the School of Engineering in the academic year 2026-2027.

This directory accompanies the Programme of Study Handbook, which will provide you with details of which modules you will be studying for your programme this year in the 'Programme of Study' section. This directory may include modules that are running on other programmes of study within your School/Faculty. If you require assistance in identifying the modules for your programme of study, please contact the Programme Manager (whose name and contact details are provided in the accompanying Programme of Study Handbook), or the relevant Faculty Office.

The University has made every effort to make the information as full and as accurate as possible, but you should note that minor changes in the organisation of modules between the planning stage and the actual teaching are inevitable. We shall try to keep any such changes to a minimum, and you will receive plenty of advance warning in the event of any alteration. We would also be grateful if you would let us know about any changes that you think might be helpful if introduced into future handbooks.

MODULES

Module Code	ACHA4004
Title	Vehicle Technology
Date	12/07/2024
Level	4
Credits	20
Pre-Requisites	None

AIM(S)

- To allow the student to acquire knowledge of a range of Automotive powertrain, suspension, control and chassis systems through lectures and practical investigations

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Show a detailed knowledge and understanding of the underlying principles of engine and vehicle technologies and practices for analysis of powertrain and chassis systems in automotive applications
- demonstrate subject specific practical and cognitive skills applied to an automotive problem, obtaining and interpreting data in a laboratory environment and drawing relevant conclusions

INDICATIVE CONTENT

- Tyre construction and performance
- Tyre slip angles
- Car suspension systems design parameters, geometries and performance characteristics
- Vehicle suspension as a kinematic system
- Load transfer under longitudinal and lateral acceleration
- Steering & Braking systems
- Basic aerodynamic principles
- Engine design features
- Engine types and operation
- Cylinder head flow characteristics
- Dynamometer testing
- Measurement of vehicle suspension systems
- Transmission specification using numerical techniques

- Chassis design features
- Chassis construction techniques
- Manufacturing techniques

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Written technical report	2000 words	50%

AHEP3 Version 3 outcomes to be met in this assessment
SM1b, P1, P3

Assessment Component 2

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Practical work	2 Hours Laboratory Based Assessment	50%

AHEP3 Version 3 outcomes to be met in this assessment
SM1b, P1, P3

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	50%
Practical	50%
TOTAL	100%

AHEP3 Version 3 outcomes to be met:
SM1b, P1, P3

INDICATIVE READING LIST

Module Code	ACHA4004	
Module Title	Vehicle Technology	
Classification	Reading List entry	Electronic*
Essential	Stone, R., Introduction to Internal Combustion Engines (Macmillan, 1999)	☐
Essential	Hillier, V., and Coombes, P., Fundamentals of Motor Vehicle Technology (Stanley Thornes, 2004)	☐
Essential	Schüetz, T. (2016). Aerodynamics of road vehicles (Fifth ed.).	☐
Further	Barnard, R. (2001). Road vehicle aerodynamic design: An introduction (2nd ed.). St Albans: Mechaero.	☐
Further	Heywood, J., Internal Combustion Engine Fundamentals (McGraw Hill, 1989)	☐
Further	Pacejka, H. (2006). <i>Tyre and vehicle dynamics</i> (2Rev e. ed.). Oxford: Butterworth-Heinemann.	☐
Further	Smith, C. (1978). Tune to win. Fallbrook, Calif.: Aero.	☐
Further	SAE Mobilus (SAE Journal Papers)	☒

Module Code	ACHA4013
Title	3D CAD & Visualisation
Date	05/05/2021
Level	4
Credits	20
Pre-Requisites	None

AIM(S)

- To introduce the student to the fundamental techniques and industrial design practice of computer aided three-dimensional modelling and two-dimensional concept visualisation using industry standard software..

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Understand ergonomic & anthropometric principles and their relationship to the vehicle design process.
- Execute design projects using an appropriate blend of creative and systematic methods to determine the volume & form of vehicles.

INDICATIVE CONTENT

- 3D CAD – Sub D Modelling (solid modelling) Autodesk Alias (surface modelling).
- 2D CAD – Adobe Photoshop & Illustrator / Autodesk Sketchbook Pro.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Coursework Portfolio	Two elements 1500 words equivalent	50%

Assessment Component 2**(Tick one)**☐ **Written exam**☒ **Coursework**☐ **Practical**

Mode of assessment	Volume	Weighting
Coursework Portfolio	Two elements 1500 words equivalent	50%

Assessment Summary

Activity type	Percentage
Written exam	
Coursework	100%
Practical	
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACHA4013	
Module Title	3D CAD & Visualisation	
Classification	Reading List entry	Electronic*
Essential	https://knowledge.autodesk.com/support/alias-products/learn	☒
Essential	Adobe Creative Team. (2020) <i>Adobe Photoshop Classroom in a Book</i> . Adobe.	☐
Essential	Alias Learning Tools (2006) <i>Learning Design with Alias Studio Tools</i> . John Wiley & Sons.	☐
Further	Design Studio Press, Scott Robertson (2013) <i>How to draw: Drawing and Sketching Objects and Environments</i>	☐
Further	Macey, S (2014) <i>H POINT</i> Design Studio Press,	☐

Module Code	ACHA4014
Title	Automotive Design Techniques 1
Date	05/05/2021
Level	4
Credits	20
Pre-Requisites	None

AIM(S)

- To introduce the student to the vehicle design process and develop core drawing, modelling and design skills for effective design development and communication.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Effectively develop and represent vehicle designs using a range of freehand sketching techniques.
- Safely navigate workshops and use hand tools and machines to create models.

INDICATIVE CONTENT

- Sketching,
- Observational Drawing,
- Orthographic views,
- Perspective,
- Graphical Communication
- Visual Presentation Techniques.
- Basic handcraft skills,
- Safe use of machines,
- Health and Safety,
- Material Identification,
- Material Selection,
- Treatments and Finishes,
- Working with a Variety of Materials
- Introduction to Automotive Clay Modelling

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Portfolio	Two elements, 1500-word equivalent	50%

Assessment Component 2

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Portfolio	Two elements, 1500-word equivalent	50%

Assessment Summary

Activity type	Percentage
Written exam	
Coursework	100%
Practical	
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACHA4014	
Module Title	Automotive Design Techniques 1	
Classification	Reading List entry	Electronic*
Essential	Edsall, L. (2008) <i>Masters of Car Design</i> , White Star	☐
Essential	Taylor, T, Berghoff, K & Hallett, L. (2006) <i>How to Draw Cars Like a Pro</i> . Motorbooks International	☐
Essential	Trudeau, N. (1995) <i>Professional Modelmaking</i> . Phaidon Press	☐
Further	Belker, H. (2004) <i>Introduction to Car Design and Drawing</i> (DVD). The Gnomon Workshop	☐
Further	Eissen, K, Steur, R. (2011) <i>Sketching: The Basics</i> . Bis Publishers	☐
Further	Robertson, S. (2004) <i>Basic Perspective Form Drawing</i> (DVD). The Gnomon Workshop	☐
Further	Robertson, S. (2004) <i>How to Draw Cars</i> (DVD). The Gnomon Workshop	☐
Further	http://www.carbodydesign.com	☒

Module Code	ACHA4015
Title	Automotive Design Techniques 2
Date	05/05/2021
Level	4
Credits	20
Pre-Requisites	None

AIM(S)

- To establish the fundamental practical design and research skills required in conceiving and implementing design projects in the field of vehicle design.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Execute design projects respecting the relation between brand and product and to develop a design through inspirational research.
- Demonstrate appropriate skills and knowledge to successfully execute and present a solution to a given design brief.

INDICATIVE CONTENT

- The Automotive design process
- Executing a design project.
- Research and analysis.
- Identifying Automotive Brand Ethos and DNA.
- Getting inspiration.
- Generating design ideas.
- Tonal and Colour Theory.
- Synthesising and evaluating initial ideas.
- Developing final proposal.
- Realisation.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Portfolio	Two elements, 1500-word equivalent	50%

Assessment Component 2

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Portfolio	Two elements, 1500-word equivalent	50%

Assessment Summary

Activity type	Percentage
Written exam	
Coursework	100%
Practical	
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACHA4015	
Module Title	Automotive Design Techniques 2	
Classification	Reading List entry	Electronic*
Essential	Belker, H. (2006) <i>Car Design & Presentation</i> (DVD). The Gnomon Workshop	☒
Essential	Edsall, L. (2008) <i>Masters of Car Design</i> . White Star	☐
Essential	Lewin, T. (2003) <i>How to Design Cars Like a Pro</i> . Motorbooks	☐
Further	Belker, H. (2004) <i>Introduction to Car Design and Drawing</i> (DVD). The Gnomon Workshop	☒
Further	Eissen, K, Steur, R. (2011) <i>Sketching: The Basics</i> . Bis Publishers	☐
Further	Robertson, S. (2004) <i>How to Draw Cars</i> (DVD) The Gnomon Workshop	☒
Further	http://www.cardesignnews.com/	☒
Further	http://www.carbodydesign.com/	☒

Module Code	ACHA4016
Title	Contemporary Challenges: Making a Difference
Date	25/06/2020
Level	4
Credits	20
Pre-Requisites	None

AIM(S)

- To develop student's awareness and appreciation of contemporary challenges relevant to the discipline facing individuals, organisations, communities and society, from a local, national and global perspective.
- To develop creative problem-solvers through the application of knowledge to real-world problems.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Identify and evaluate historical and contemporary issues and their impact on today's global society.
- Apply appropriate collaborative working practices to manage conflict and support effective decision making.
- Implement Design Thinking techniques to investigate problems in order to generate and evaluate solutions.

INDICATIVE CONTENT

- Visions of the Future including digital transformation 4.0.
- How history, legislation and policy shape the world we live.
- Contemporary global issues, e.g., responsible stewardship, diversity, inclusion, ethics, culture and intercultural awareness.
- 'Wicked problems': the challenge of difficult or impossible problems where the affecting variables are not known or quantifiable.
- Design Thinking to investigate, define, propose and evaluate problem solutions.
- Recognising and overcoming cognitive bias.
- Decision making frameworks and techniques.
- Recognising individual differences and the role of emotional intelligence in the management of conflict.
- The role of diplomacy, persuasion and negotiation in effective collaboration.
- The significance of interdisciplinary thinking in finding effective solutions to problems.
- The role of ethics in identifying solutions.
- Collective decision-making.
- The power of raising awareness

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning		
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
E-Portfolio	Equivalent to 2,000 words	50%

Assessment Component 2

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Group Presentation with supporting material	Each individual in the group to contribute 2 minutes to the presentation and each individual to contribute 1000 words to the supporting materials (max 6 in a group)	50%

Assessment Summary

Activity type	Percentage
Written exam	
Coursework	50%
Practical	50%
TOTAL	100%

INDICATIVE READING LIST

This will be guided by the student's subject area.

Module Code	ACHA4016	
Module Title	Contemporary Challenges: Making a Difference	
Classification	Reading List entry	Electronic*
Essential	Siebel, T.M. (2019) <i>Digital transformation: survive and thrive in an era of mass extinction</i> . New York: RosettaBooks.	☐
Essential	Stickdorn, M. & Schneider, J. (2011) <i>This is service design thinking: basics, tools, cases</i> . The Netherlands: BIS Publishers	☐

Essential	Echavarria, M., 2015. <i>Enabling Collaboration</i> . New York: LID Editorial.	☐
Essential	Well-being of Future Generations (Wales) Act 2015 (Online). Available at http://www.legislation.gov.uk/anaw/2015/2/contents/enacted	☒
Further	Fisher, R., Ury, W.L. and Patton, B. (2011) <i>Getting to yes: Negotiating agreement without giving in</i> . 3 rd edn. New York: Penguin.	☐
Further	Harari, Y. N. (2018) <i>21 Lessons for the 21st Century</i> . London: Jonathan Cape	☐

*Additional specialist books will be listed in module handbooks provided by tutors for Specific Programmes

Module Code	ACHA4017
Title	Learning in the Digital Era
Date	25/06/2020
Level	4
Credits	20
Pre-Requisites	None

AIM(S)

- To develop the student's skills for independent study and life-long learning, which will form the foundations for successful completion of their degree programme and support future employment opportunities.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Demonstrate the foundational skills required to be a resilient and healthy independent learner.
- Practise the principles of learning agility
- Use suitable technology to support and enhance their learning experience within the discipline area

INDICATIVE CONTENT

- Time management, reading, writing, referencing and plagiarism, searching for and evaluating sources of information, working online.
- Critical thinking: issues concerning knowledge, belief, and doubt.
- Critical writing: synthesis, paraphrasing and creating an informed argument, avoiding plagiarism.
- Reflection and self-reflection.
- Identity and sense of place; including values, culture and intercultural awareness, heritage, diversity and inclusion and, multilingualism.
- Skills for a range of assessment modes, including blogs, vlogs, video, presentations, performances, posters, exams and written coursework.
- Skills and attitudes which underpin resilience, health, wellbeing and learning agility; the role of spirit, mind, emotions and body.
- Physical literacy: Consideration of the role of physical activity to the support of physical, mental health, well-being and resilience.
- Digital literacy: using appropriate technology; staying safe online, cyber security, digital identity.
- Team working

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning		
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
E-portfolio	Equivalent to 2,000 words	50%

Assessment Component 2

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Video and Supporting Materials	Individual 3 minute video which incorporates supporting materials	50%

Assessment Summary

Activity type	Percentage
Written exam	
Coursework	50%
Practical	50%
TOTAL	100%

INDICATIVE READING LIST

This will be guided by the student's subject area.

Module Code	ACHA4017	
Module Title	Learning in the Digital Era	
Classification	Reading List entry	Electronic*
Essential	Cottrell, S (2019) <i>The Study Skills Handbook</i> . 5th edn. London: Macmillan International Higher Education.	☒
Essential	Pears, R. and Shields, G.J. (2019) <i>Cite Them Right: the essential referencing guide</i> . 11th edn. London: Macmillan International Higher Education.	☒
Essential	Library Info Skills Sessions	☒
Further	Hopkins, D. and Reid, T., 2018. <i>The Academic Skills Handbook: Your Guide to Success in Writing, Thinking and Communicating at University</i> . London: Sage	☐

Further	Osmond, A., 2016. <i>Academic Writing and Grammar for Students</i> 2 nd edn. London: SAGE.	☒
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Additional specialist books will be listed in module handbooks provided by tutors for Specific Programmes

Module Code	ACHA4018
Title	Automotive Technology
Date	29/07/2025
Level	4
Credits	10
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To allow the student to acquire knowledge of a range of automotive chassis technologies through lectures and practical investigations.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- describe the fundamental principles of vehicle chassis technologies and explain how they are applied in the analysis of automotive systems;
- demonstrate subject specific practical and cognitive skills applied to an automotive application problem, obtaining and interpreting data in a laboratory environment and drawing relevant conclusions.

INDICATIVE CONTENT

- Chassis:
 - Chassis requirements and constructions.
 - Advantages and disadvantages of chassis types.
- Tyres:
 - Construction and performance characteristics.
 - Friction and grip (with load and temperature).
 - Slip angles and an introduction to tyre data.
- Suspension Systems:
 - Design parameters and performance characteristics.
 - Suspension types and layouts, including various geometries.
 - Springs and Dampers.
 - Kinematics including instant centres, roll centres and characteristic responses.
- Load transfer:
 - Introduction to basic load transfer under lateral and longitudinal acceleration.
 - Effect of load transfer on vehicle performance.
- Steering & Braking systems:
 - Steering system requirements and types.
 - Steering geometry including Ackerman principles.
 - Drum Brakes.
 - Disc Brakes.
 - ABS principles.
- Aerodynamics:

- Vehicle Shapes.
- Pressure.
- Bernoulli's Principle.
- Lift and Drag.
- Effect on cornering performance.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Written Technical Report	2000 Words	100%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

Engineering Council AHEP4 Learning Outcomes **developed** in this module:

C1: Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study.

C2: Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science, and engineering principles.

C6: Apply an integrated or systems approach to the solution of complex problems.

C12: Use practical laboratory and workshop skills to investigate complex problems.

C13: Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations.

C17: Communicate effectively on complex engineering matters with technical and non-technical audiences.

INDICATIVE READING LIST

Module Code	ACHA4018	
Module Title	Automotive Technology	
Classification	Reading List entry	Electronic*

Essential	Hillier, V.A.W., Calex UK. and Institute of the Motor Industry (2012) <i>Hillier's fundamentals of motor vehicle technology Book 1</i> . 6th ed. / revised by Calex UK. Cheltenham: Nelson Thornes.	☒
Essential	Schuetz, T. (2016). <i>Aerodynamics of road vehicles</i> (5th ed.). SAE International.	☒
Further	Hillier, V.A.W. et al. (2006) <i>Fundamentals of Motor Vehicle Technology. Bk. 2</i> . Cheltenham. Nelson Thornes Limited.	☒
Further	Barnard, R. (2010). Road vehicle aerodynamic design: An introduction (3rd ed.). St Albans: Mechaero.	☐
Further	Pacejka, H. B., & Besselink, I. (2012). <i>Tire and vehicle dynamics</i> (3rd ed.). Elsevier/BH.	☒
Further	Smith, C. (2004). <i>Tune to Win: The Art and Science of Race Car Development and Tuning</i> . Fallbrook, Calif.: Motorbooks International.	☐
Further	SAE Mobilus (SAE Journal Papers)	☒

Module Code	ACHA4019
Title	Electrical Principles
Date	29/07/2025
Level	4
Credits	10
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To introduce the fundamental concepts of electrical engineering, focusing on the principles that govern the behaviour of electrical circuits. Students will explore the core theories and practical applications of electricity, including circuit analysis, and power systems. The module is designed to provide a solid foundation for further study in electrical and electronic engineering.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- evaluate the appropriateness of different approaches to solving problems related to Electrical Circuits;
- describe and apply the fundamental principles of Ohm's Law, Kirchhoff's laws, and basic network theorems in circuit analysis;
- present, evaluate and interpret quantitative data to make judgements on theories in DC and AC circuits.

INDICATIVE CONTENT

- Basic Concepts of Electricity
 - Understanding charge, current, voltage, and resistance.
 - Introduction to electrical power and energy.
- Ohm's Law and Kirchhoff's Laws;
 - Applying Ohm's Law in circuit analysis.
 - Utilizing Kirchhoff's Voltage Law (KVL) and Kirchhoff's Current Law (KCL) in solving complex circuits.
- Circuit Theorems;
 - Thevenin's and Norton's theorems.
 - Superposition theorem and maximum power transfer theorem.
- DC and AC Circuit Analysis;
 - Analysing series and parallel circuits.
 - Understanding impedance, reactance, and resonance in AC circuits.
- Basics of semi-conductors;
 - Understanding doped regions.
 - Bias principles and voltage drop.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Portfolio, 3 Moodle Quizzes	3 elements	100%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

Engineering Council AHEP4 Learning Outcomes **developed** in this module:

C1: Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study.

C2: Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science and engineering principles.

C6: Apply an integrated or systems approach to the solution of complex problems.

INDICATIVE READING LIST

Module Code	ACHA4019	
Module Title	Electrical Principles	
Classification	Reading List entry	Electronic*
Essential	Bird, J. O. (2021). <i>Bird's electrical and electronic principles and technology</i> (Seventh edition.). London. Routledge.	☐
Essential	Bird, J. O. (2021). <i>Bird's electrical circuit theory and technology</i> (Seventh edition). London. Routledge.	☐
Essential	Ehsani, M. <i>et al.</i> (2018) <i>Modern electric, hybrid electric, and fuel cell vehicles</i> . Third edition. Boca Raton, Fla: CRC Press. Available at: https://doi.org/10.1201/9780429504884 .	☒

Further	Robert Bosch GmbH, issuing body (2022) <i>Automotive handbook</i> . Eleventh edition, revised and extended. Karlsruhe: Robert Bosch GmbH.	☒
Further	Hughes, E. <i>et al.</i> (2016) <i>Hughes electrical & electronic technology</i> . 12th ed. Harlow: Pearson.	☒

Module Code	ACHA4020
Title	Engineering Design
Date	29/07/2025
Level	4
Credits	10
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To introduce students to Computer-Aided Design (CAD) software and familiarity with the engineering design process. The module will enable students to create, modify, and analyse digital designs effectively for diverse engineering and product design applications.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- utilise a range of CAD tools to demonstrate proficiency in 3D modelling techniques such as creating solids, assemblies, and parametric designs;
- understand the fundamentals of geometric dimensioning and tolerancing, to be able to prepare and interpret Engineering Drawings adhering to BS8888.

INDICATIVE CONTENT

- Technical Drawings:
 - Introduction to BS8888.
 - Drawing Symbols and dimensions.
 - Orthographic and isometric views.
 - Introduction to tolerancing.
- Solid Modelling:
 - Sketching commands including: line, arc, circle, fillet, chamfer and spline.
 - Dimension tools.
 - Display commands including: pan, zoom, and rotate.
 - Editing commands including: move, erase, extend, trim, and rotate.
 - Creating 3D geometry including: extrude, revolve, extrude and revolve cut.
 - Creating 3D features including: fillet, chamfer, holes, threads, counterbores and countersinks.
- Parametric Modelling:
 - Design approaches to 2D and 3D geometry.
 - Relations.
 - Reference Geometry including: Planes, centrelines, construction lines.
 - Sketch Patterns and offset entities.
 - 3D Patterns.
- Assemblies
 - Assembly constraints and the relationships between components.
 - Modification to 3D components due to assembly constraints.
 - Bottom up and top down modelling.

- Motion simulation and exploded assemblies.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Practical Assessment	2 hours	100%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	0%
Practical	100%
TOTAL	100%

Engineering Council AHEP4 Learning Outcomes **developed** in this module:

C3: Select and apply appropriate computational and analytical techniques to model complex problems, recognising the limitations of the techniques employed.

C5: Design solutions for complex problems that meet a combination of societal, user, business and customer needs as appropriate. This will involve consideration of applicable health and safety, diversity, inclusion, cultural, societal, environmental and commercial matters, codes of practice and industry standards.

C6: Apply an integrated or systems approach to the solution of complex problems.

C9: Use a risk management process to identify, evaluate, and mitigate risks associated with a particular project or activity.

C13: Select and apply appropriate materials, equipment, engineering technologies, and processes, recognising their limitations.

C14: Discuss the role of quality management systems and continuous improvement in the context of complex problems.

INDICATIVE READING LIST

Module Code	ACHA4020	
Module Title	Engineering Design	
Classification	Reading List entry	Electronic*
Essential	Sugden, J.O. and Manley, J. (2024) <i>Mastering Autodesk Fusion 27 step-by-step 3D modeling projects for 3D printing, prototyping, and making</i> / Jake O. Sugden & Joshua Manley. 2nd edition 2024-2025. Sacramento, Calif: CADclass. up	☐
Essential	Pahl, G. et al. (2007) <i>Engineering design: a systematic approach</i> . 3rd ed. London: Springer.	☒
Essential	Willis, J. and Dogra, S., (2025). <i>Autodesk Fusion 360: A Power Guide for Beginners and Intermediate Users</i> . Seventh Edition. Dekaware. US. CADArtifex.	☐
Further	https://help.autodesk.com/view/fusion360/ENU/?guid=GUID-670346CA-4CF8-4009-9E9B-09FCC6803B61	☒
Further	https://www.autodesk.com/learn/ondemand/collection/self-paced-learning-for-fusion	☒
Further	British Standards Institution (2019) BS 8888:2020: Technical Product Documentation and Specification. British Standards Institution.	☒
Further	https://www.3dexperienceworld.com/website/59830/	☒

Module Code	ACHA4021
Title	Engineering Mathematics
Date	29/07/2025
Level	4
Credits	10
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To provide students with an understanding of the mathematics involved in the Engineering discipline.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- demonstrate an understanding and competency with respect to a range of engineering-based mathematics;
- demonstrate an ability to solve mathematical problems involving a range of engineering-based equation forms.

INDICATIVE CONTENT

- Differential calculus and its relationship with engineering problems.
- Integral calculus and applications.
- Further integral calculus involving advanced techniques such as integration by parts and integration by substitution.
- Complex numbers and their relationship with engineering problems. Manipulation of complex numbers in cartesian and polar form.
- Matrix manipulation.
- Application of matrices in their solution of multivariable equations.
- Partial derivatives.
- An introduction to differential equations.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam	2 hours	100%

Assessment Summary

Activity type	Percentage
Written exam	100%
Coursework	0%
Practical	0%
TOTAL	100%

Engineering Council AHEP4 Learning Outcomes **developed** in this module:

C1: Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study.

C2: Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science, and engineering principles.

C3: Select and apply appropriate computational and analytical techniques to model complex problems.

INDICATIVE READING LIST

Module Code	ACHA4021	
Module Title	Engineering Mathematics	
Classification	Reading List entry	Electronic*
Essential	Smedley, R. and Wiseman, G. (2001) <i>Introducing pure mathematics</i> . 2nd ed. Oxford: Oxford University Press.	☐
Essential	Stroud, K.A. and Booth, D.J. (2020) <i>Engineering mathematics</i> . Eighth edition. London: Red Globe Press.	☐
Essential	Gaulter, B., Gaulter, M., (2001) <i>Further Pure Mathematics</i> Oxford. Oxford University Press	☐
Further	Bird, J.O. (2014) <i>Basic engineering mathematics</i> . Sixth edition. London; Routledge. Available at: https://doi.org/10.4324/9781315858845 .	☒

Further	Bird, J.O. (2021) <i>Bird's higher engineering mathematics</i> . Ninth edition. Abingdon, Oxon ; Routledge, Taylor & Francis Group.	☐
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Module Code	ACHA4022 / ACHA4022A
Title	Engineering Skills
Date	29/07/2025
Level	4
Credits	20
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To develop a reflective, proactive and optimistic attitude towards learning, while assuming ownership of their educational journey. These skills facilitate understanding of program topics, promoting life-long learning and adopting a proportionate approach to the mitigation of security risks relevant to their academic and professional careers. This module will develop students' transferable skills which are valued in the professional industry.
- To introduce students to workshop and laboratory skills alongside safety practices through the media of degree pathway specific technology.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- demonstrate a proficient ability to apply reflective, proactive and responsible learning strategies, fostering a deeper understanding of mitigating security risks, in academia and industry, and also key transferable skills, in terms of presentation of information, personal development, reflective abilities and proficiency in appropriate technical software;
- apply practical technical skills and demonstrate know-how of practices, skills, safety and standards with respect to laboratory and workshops, and key transferable skills in terms of written presentation, personal development, reflective abilities and proficiency in appropriate technical software.

INDICATIVE CONTENT

- Understanding the learning process and identifying skills (e.g. Self-evaluation, skills needed for higher education, transferable skills, action plans for personal development).
- Organising study (e.g. time management, organising space, organising resources).
- Structuring study and sourcing information – effective note taking, using the library and the internet, referencing convention. Revision and examination techniques.
- Developing an appropriate presentation style (e.g planning and structuring essays and reports, presentations, posters, linking ideas together, using facts, opinions or arguments, analytical thinking etc).
- Understanding a holistic and proportionate approach to the mitigation of security risks for engineering (cybersecurity, data privacy, resource risk etc).

- An awareness of and practice in, the use of equipment for the measurement of fundamental quantities.
- Familiarity with basic stream relevant components, laboratory and workshop equipment and their real-world applications and behaviour.
- Health & Safety procedures and legislations, personal protective equipment and safe working practice.
- Develop proficiency of appropriate general and technical specific software (Microsoft Word, Microsoft Excel etc.).

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Written Technical Report	2000 words	50%

Engineering Council AHEP4 Learning Outcomes **assessed** in this assessment:

C10: Adopt a holistic and proportionate approach to the mitigation of security risks.

Engineering Council AHEP4 Learning Outcomes **developed** in this assessment:

C3: Select and apply appropriate computational and analytical techniques to model complex problems.

C4: Select and evaluate technical literature and other sources or information to address complex problems.

C5: Design solutions for complex problems that meet a combination of societal, user, business and customer needs as appropriate. This will involve consideration of applicable health and safety, diversity, inclusion, cultural, societal, environmental and commercial matters, codes of practice and industry standards.

C7 - Evaluate the environmental and societal impact of solutions to complex problems and minimise adverse impacts.

C9 - Use a risk management process to identify, evaluate, and mitigate risks associated with a particular project or activity.

C11 - Adopt an inclusive approach to engineering practice and recognise the responsibilities, benefits, and importance of supporting equality, diversity, and inclusion.

C12: Use practical, laboratory, and workshop skills to investigate complex problems.

C14: Discuss the role of quality management systems and continuous improvement in the context of complex problems.

Assessment Component 2

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Logbook	Equivalent to 2000 words	50%

Engineering Council AHEP4 Learning Outcomes **assessed** in this assessment:

C18: Plan and record self-learning and development as the foundation for lifelong learning / CPD.

Engineering Council AHEP4 Learning Outcomes **developed** in this assessment:

C5: Design solutions for complex problems that meet a combination of societal, user, business and customer needs as appropriate. This will involve consideration of applicable health and safety, diversity, inclusion, cultural, societal, environmental and commercial matters, codes of practice and industry standards.

C9 - Use a risk management process to identify, evaluate, and mitigate risks associated with a particular project or activity.

C12: Use practical laboratory and workshop skills to investigate complex problems.

C14: Discuss the role of quality management systems and continuous improvement

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACHA4022 / ACHA4022A	
Module Title	Engineering Skills	
Classification	Reading List entry	Electronic*
Essential	Cottrell, S. (2024) <i>The study skills handbook</i> . Sixth edition. London: Bloomsbury Academic.	☒
Essential	Van Emden, J. and Becker, L.M. (2018) <i>Writing for engineers</i> . Fourth edition. London: Palgrave.	☒
Essential	Harkins, M. (2016) <i>Managing risk and information security: protect to enable</i> . Second edition. Place of publication not identified: Apress Open.	☒
Essential	Robert Bosch GmbH. (2022) <i>Automotive handbook</i> . 11th edition. Postfach, Karlsruhe: Robert Bosch GmbH.	☒
Essential	Health and Safety Executive www.hse.gov.uk	☒
Essential	Mueller, J. and Sizemore, J. (2021) <i>MATLAB</i> . 2nd edition. Hoboken, New Jersey: John Wiley & Sons, Inc.	☐

Further	Alcón, F., Brzoska, M. and Scheffran, J. (2020) <i>Climate Change, Security Risks, and Violent Conflicts: Essays from Integrated Climate Research in Hamburg</i> . Hamburg: Hamburg University Press. Available at: https://doi.org/10.15460/HUP.208 .	☒
Further	Taebi, B. (2021) <i>Ethics and engineering: an introduction</i> . 1st ed. Cambridge, United Kingdom ; New York, NY, USA: Cambridge University Press.	☒
Further	Nasser, A. (2023), <i>Automotive Cybersecurity Engineering Handbook: The automotive engineer's roadmap to cyber-resilient vehicles</i> Birmingham. Packt Publishing	☒
Further	Cottrell, S. (2021) <i>Skills for success: personal development and employability</i> . 4th edition. London: Red Globe Press.	☒
Further	Marjeh, S. and linkedin.com (2019) <i>Introduction to Mill and Lathe Operation</i> . Carpenteria, CA: linkedin.com.	☒
Further	White, J. (2018) <i>Health and safety management: an alternative approach to reducing accidents, injury, and illness at work</i> . Boca Raton: Taylor & Francis, CRC Press.	☒
Further	Kelly Bennett (2014) <i>MATLAB applications for the practical engineer</i> . Edited by K. Bennett. Rijeka, Croatia: IntechOpen.	☒

Module Code	ACHA4022 / ACHA4022A
Title	Engineering Skills
Date	29/07/2025
Level	4
Credits	20
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To develop a reflective, proactive and optimistic attitude towards learning, while assuming ownership of their educational journey. These skills facilitate understanding of program topics, promoting life-long learning and adopting a proportionate approach to the mitigation of security risks relevant to their academic and professional careers. This module will develop students' transferable skills which are valued in the professional industry.
- To introduce students to workshop and laboratory skills alongside safety practices through the media of degree pathway specific technology.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- demonstrate a proficient ability to apply reflective, proactive and responsible learning strategies, fostering a deeper understanding of mitigating security risks, in academia and industry, and also key transferable skills, in terms of presentation of information, personal development, reflective abilities and proficiency in appropriate technical software;
- apply practical technical skills and demonstrate know-how of practices, skills, safety and standards with respect to laboratory and workshops, and key transferable skills in terms of written presentation, personal development, reflective abilities and proficiency in appropriate technical software.

INDICATIVE CONTENT

- Understanding the learning process and identifying skills (e.g. Self-evaluation, skills needed for higher education, transferable skills, action plans for personal development).
- Organising study (e.g. time management, organising space, organising resources).
- Structuring study and sourcing information – effective note taking, using the library and the internet, referencing convention. Revision and examination techniques.
- Developing an appropriate presentation style (e.g planning and structuring essays and reports, presentations, posters, linking ideas together, using facts, opinions or arguments, analytical thinking etc).
- Understanding a holistic and proportionate approach to the mitigation of security risks for engineering (cybersecurity, data privacy, resource risk etc).

- An awareness of and practice in, the use of equipment for the measurement of fundamental quantities.
- Familiarity with basic stream relevant components, laboratory and workshop equipment and their real-world applications and behaviour.
- Health & Safety procedures and legislations, personal protective equipment and safe working practice.
- Develop proficiency of appropriate general and technical specific software (Microsoft Word, Microsoft Excel etc.).

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Written Technical Report	2000 words	50%

Engineering Council AHEP4 Learning Outcomes **assessed** in this assessment:

C10: Adopt a holistic and proportionate approach to the mitigation of security risks.

Engineering Council AHEP4 Learning Outcomes **developed** in this assessment:

C3: Select and apply appropriate computational and analytical techniques to model complex problems.

C4: Select and evaluate technical literature and other sources or information to address complex problems.

C5: Design solutions for complex problems that meet a combination of societal, user, business and customer needs as appropriate. This will involve consideration of applicable health and safety, diversity, inclusion, cultural, societal, environmental and commercial matters, codes of practice and industry standards.

C7 - Evaluate the environmental and societal impact of solutions to complex problems and minimise adverse impacts.

C9 - Use a risk management process to identify, evaluate, and mitigate risks associated with a particular project or activity.

C11 - Adopt an inclusive approach to engineering practice and recognise the responsibilities, benefits, and importance of supporting equality, diversity, and inclusion.

C12: Use practical, laboratory, and workshop skills to investigate complex problems.

C14: Discuss the role of quality management systems and continuous improvement in the context of complex problems.

Assessment Component 2

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Logbook	Equivalent to 2000 words	50%

Engineering Council AHEP4 Learning Outcomes **assessed** in this assessment:

C18: Plan and record self-learning and development as the foundation for lifelong learning / CPD.

Engineering Council AHEP4 Learning Outcomes **developed** in this assessment:

C5: Design solutions for complex problems that meet a combination of societal, user, business and customer needs as appropriate. This will involve consideration of applicable health and safety, diversity, inclusion, cultural, societal, environmental and commercial matters, codes of practice and industry standards.

C9 - Use a risk management process to identify, evaluate, and mitigate risks associated with a particular project or activity.

C12: Use practical laboratory and workshop skills to investigate complex problems.

C14: Discuss the role of quality management systems and continuous improvement

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACHA4022 / ACHA4022A	
Module Title	Engineering Skills	
Classification	Reading List entry	Electronic*
Essential	Cottrell, S. (2024) <i>The study skills handbook</i> . Sixth edition. London: Bloomsbury Academic.	☒
Essential	Van Emden, J. and Becker, L.M. (2018) <i>Writing for engineers</i> . Fourth edition. London: Palgrave.	☒
Essential	Harkins, M. (2016) <i>Managing risk and information security: protect to enable</i> . Second edition. Place of publication not identified: Apress Open.	☒
Essential	Robert Bosch GmbH. (2022) <i>Automotive handbook</i> . 11th edition. Postfach, Karlsruhe: Robert Bosch GmbH.	☒
Essential	Health and Safety Executive www.hse.gov.uk	☒
Essential	Mueller, J. and Sizemore, J. (2021) <i>MATLAB</i> . 2nd edition. Hoboken, New Jersey: John Wiley & Sons, Inc.	☐

Further	Alcón, F., Brzoska, M. and Scheffran, J. (2020) <i>Climate Change, Security Risks, and Violent Conflicts: Essays from Integrated Climate Research in Hamburg</i> . Hamburg: Hamburg University Press. Available at: https://doi.org/10.15460/HUP.208 .	☒
Further	Taebi, B. (2021) <i>Ethics and engineering: an introduction</i> . 1st ed. Cambridge, United Kingdom ; New York, NY, USA: Cambridge University Press.	☒
Further	Nasser, A. (2023), <i>Automotive Cybersecurity Engineering Handbook: The automotive engineer's roadmap to cyber-resilient vehicles</i> Birmingham. Packt Publishing	☒
Further	Cottrell, S. (2021) <i>Skills for success: personal development and employability</i> . 4th edition. London: Red Globe Press.	☒
Further	Marjeh, S. and linkedin.com (2019) <i>Introduction to Mill and Lathe Operation</i> . Carpenteria, CA: linkedin.com.	☒
Further	White, J. (2018) <i>Health and safety management: an alternative approach to reducing accidents, injury, and illness at work</i> . Boca Raton: Taylor & Francis, CRC Press.	☒
Further	Kelly Bennett (2014) <i>MATLAB applications for the practical engineer</i> . Edited by K. Bennett. Rijeka, Croatia: IntechOpen.	☒

Module Code	ACHA4023
Title	Introduction to Motorsport Business
Date	29/07/2025
Level	4
Credits	20
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To explore and understand the diverse operational levels at which motorsport functions both nationally and internationally, as a dynamic and multifaceted business sector.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- demonstrate an understanding of the relevance of both historical and contemporary motorsport issues regarding business, governance, and society.
- identify the structure, key stakeholders and commercial dynamics of the motorsport industry at national and international levels, demonstrating awareness of current and emerging challenges.

INDICATIVE CONTENT

- The motorsport industry; an historical context.
- Management and industry issues meeting changes in the external environment.
- Technological developments, sustainable motorsport developments, the environment, and future developments.
- Industry analysis; meeting operational and strategic challenges.
- Analysis of topical issues and their political, social, economic, and environmental impact.
- Further subject matter will be based on students' interests and a selection of material from motorsport periodicals and websites.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Written Report	2000 words	50%

Assessment Component 2

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Written Report	2000 words	50%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACHA4023	
Module Title	Introduction to Motorsport Business	
Classification	Reading List entry	Electronic*
Essential	Beck-Burridge, M. and Walton, J. (2000) <i>Britain's winning formula: achieving world leadership in motorsports</i> . Basingstoke: Macmillan Business.	☐
Essential	Couldwell, C. (2003) <i>Formula One - made in Britain: the British influence in Formula One</i> . London: Virgin.	☐
Essential	Naess, H.E & Chadwick, S. (2023) <i>The Future of Motorsports; Business, Politics and Society</i> Oxfordshire: Routledge	☒
Further	Spalding, N. (2019) <i>MotoGP technology</i> . Tunbridge Wells: Phoebus Apollo Publishing Limited.	☐
Further	www.the-mia.com	☒
Further	www.motorsportuk.org	☒
Further	www.fia.com	☒

Module Code	ACHA4024
Title	Introduction to Thermodynamics and Fluids
Date	29/07/2025
Level	4
Credits	10
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To introduce students to the fundamental concepts of thermodynamics and fluid mechanics, essential for various fields of engineering. It aims to provide a solid foundation in the principles governing energy systems, heat transfer, and the behaviour of fluids under various conditions. Through theoretical understanding and practical applications, students will learn to analyse and solve problems related to energy conversion, fluid flow, and thermal systems in engineering.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- describe the basic principles and laws of thermodynamics and their applications to energy systems and processes;
- explain the fundamental concepts of fluid mechanics, including fluid statics, dynamics, and flow through pipes and channels.

INDICATIVE CONTENT

- Introduction to Thermodynamics: Basic concepts, system definitions, and the laws of thermodynamics.
- Heat and Work: Gas Laws Energy conversion processes, energy conversion in engines, fuel efficiency, and thermal management systems.
- Properties of Pure Substances: Phase change, property diagrams, and tables for water, air, and coolant.
- Fluid Properties: Density, viscosity, and compressibility.
- Fluid Dynamics: Continuity equation, Bernoulli's equation.
- Flow in Pipes: Laminar and turbulent flow.
- Heat Transfer: Basic modes of heat transfer, conduction, convection, and radiation principles.
- Practical Applications: Application of thermodynamics and fluid mechanics principles in engineering systems such as ICE, EV & Hybrid powertrains.
- Problem-Solving Sessions: Workshops focused on solving practical thermodynamics and fluid mechanics problems to reinforce theoretical knowledge.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam	1.5 hours	100%

Assessment Summary

Activity type	Percentage
Written exam	100%
Coursework	0%
Practical	0%
TOTAL	100%

Engineering Council AHEP4 Learning Outcomes **developed** in this module:

C1: Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study.

C2: Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science, and engineering principles.

C3: Select and apply appropriate computational and analytical techniques to model complex problems.

C12: Use practical, laboratory, and workshop skills to investigate complex problems.

INDICATIVE READING LIST

Module Code	ACHA4024	
Module Title	Introduction to Thermodynamics and Fluids	
Classification	Reading List entry	Electronic*
Essential	Zammit, S.J. (1987) <i>Motor vehicle engineering science for technicians, level 2</i> . Harlow: Longman.	☐
Essential	Twigg, P. (1996) <i>Science for motor vehicle engineers</i> . Waltham, Mass: Butterworth-Heinemann.	☐
Further	Bird, J. (2019) <i>Science for Engineering</i> Sixth Edition. London. Routledge	☒
Further	Bolton, W. (2021) <i>Engineering science</i> . Seventh edition. Abingdon, Oxon ; Routledge.	☒

Module Code	ACHA4025
Title	Materials and Manufacturing
Date	29/07/2025
Level	4
Credits	10
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To develop the fundamental knowledge and skills required to make informed decisions on material selection and manufacturing methods in engineering design. The module will introduce engineering material science and manufacturing processes; and establish their influence on engineered products.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- describe the classification, structure, characteristics and properties of common engineering materials; and apply basic selection criteria to choose suitable materials for specific engineering applications;
- recognise a range of manufacturing methods and justify a suitable set of manufacturing processes for a given engineered product.

INDICATIVE CONTENT

- The product development cycle.
- Identify and classify different types of engineering materials, including metals, polymers, ceramics, and composites.
- Understand the fundamental properties and characteristics of materials, such as mechanical, thermal, electrical, and chemical properties.
- Interpreting engineering data such as technical data sheets and material property charts.
- Analyse material selection criteria based on application requirements, cost considerations, and environmental sustainability.
- Survey a range of manufacturing processes including: casting, forming, machining, joining, additive manufacturing, and finishing techniques.
- Evaluate the strengths and limitations of each manufacturing method in terms of precision, efficiency, scalability, and material compatibility.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Written Technical Report	2000 words	100%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

Engineering Council AHEP4 Learning Outcomes **developed** in this module:

C4: Select and evaluate technical literature and other sources or information to address complex problems.

C5: Design solutions for complex problems that meet a combination of societal, user, business and customer needs as appropriate. This will involve consideration of applicable health and safety, diversity, inclusion, cultural, societal, environmental and commercial matters, codes of practice and industry standards.

C7 - Evaluate the environmental and societal impact of solutions to complex problems and minimise adverse impacts.

C12: Use practical, laboratory, and workshop skills to investigate complex problems.

C13: Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations.

INDICATIVE READING LIST

Module Code	ACHA4025	
Module Title	Materials and Manufacturing	
Classification	Reading List entry	Electronic*
Essential	Callister, W.D. and Rethwisch, D.G. (2020) <i>Materials science and engineering: an introduction</i> . 10th edition. Hoboken, NJ: Wiley.	☒
Essential	Kalpajian, S., Schmid, S.R. and Sekar, K.S.V. (2023) <i>Manufacturing engineering and technology</i> .	☐

	Eighth edition in SI units. Harlow, United Kingdom: Pearson.	
Essential	Ashby, M.F. (2025) <i>Materials selection in mechanical design</i> . Sixth edition. Amsterdam: Butterworth-Heinemann.	☒
Further	Pahl, G. <i>et al.</i> (2007) <i>Engineering design : a systematic approach</i> . 3rd ed. London: Springer.	☒

Module Code	ACHA4026
Title	Mechanics and Dynamics
Date	29/07/2025
Level	4
Credits	10
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To provide students with a fundamental understanding of the principles of mechanics and dynamics as they apply to engineering problems. It will cover the analysis of static and dynamic systems, the principles of force, motion, energy, and momentum, and their applications in solving real-world engineering challenges. Through theoretical lectures and practical problem-solving sessions, students will develop the ability to model and analyse various mechanical systems.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- use the fundamental concepts of forces, moments, equilibrium, kinematics, and kinetics as they apply to engineering systems;
- apply principles of mechanics and dynamics to analyse and solve problems related to static and dynamic systems in engineering.

INDICATIVE CONTENT

- Introduction to Mechanics: Basic concepts of force, vector operations, moments, and couples.
- Statics: Analysis of structures, forces in beams and trusses, centroids, and moments of inertia.
- Structures: Stress, Strain, Young's Modulus, Torsion, Bending, Shear Force and Bending Moment Diagrams, Buckling.
- Dynamics: Kinematics of particles and rigid bodies, Newton's laws of motion, work and energy principles, impulse and momentum.
- Rigid Body Dynamics: Rotation, angular momentum, and the dynamics of rigid bodies in planar motion.
- Vibrations: Basic concepts of vibrations, natural frequencies, and modes of vibration.
- Practical Applications: Application of mechanics and dynamics principles in solving practical engineering problems.
- Problem-Solving Sessions: Workshop sessions focused on solving practical problems and exercises to reinforce theoretical concepts.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Technical Report	2000 words or equivalent	100%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

Engineering Council AHEP4 Learning Outcomes **developed** in this module:

C1: Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study.

C2: Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science, and engineering principles.

C3: Select and apply appropriate computational and analytical techniques to model complex problems.

C12: Use practical laboratory and workshop skills to investigate complex problems.

INDICATIVE READING LIST

Module Code	ACHA4026	
Module Title	Mechanics and Dynamics	
Classification	Reading List entry	Electronic*
Essential	Zammit, S.J. (1987) <i>Motor vehicle engineering science for technicians, level 2</i> . Harlow: Longman.	☐
Essential	Twigg, P. (1996) <i>Science for motor vehicle engineers</i> . Waltham, Mass: Butterworth-Heinemann.	☐
Essential	Bird, J. (2019) <i>Science for Engineering</i> Sixth Edition. London. Routledge	☒
Further	Bolton, W. (2021) <i>Engineering science</i> . Seventh edition. Abingdon, Oxon ; Routledge.	☒

Module Code	ACHA4027
Title	Motorcycle Technology
Date	29/07/2025
Level	4
Credits	10
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To develop an understanding of motorcycle technology with a focus on the dynamics and performance of motorcycles. The module introduces the fundamental principles of motorcycle systems, and through problem-solving and data interpretation, students' ability to evaluate technical solutions and make informed, evidence-based recommendations.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- describe the key principles of motorcycle dynamics, including suspension setup, kinematics, and geometry, and outline how these influence vehicle behaviour;
- identify and explain fundamental mechanical engineering concepts as they relate to motorcycle systems, using appropriate terminology to support basic analysis and decision-making.

INDICATIVE CONTENT

- Motorcycle Dynamics and Handling:
 - Principles of stability, manoeuvrability, effects of weight distribution, centre of gravity, and wheelbase.
- Motorcycle Kinematics:
 - Motion analysis, effects of motorcycle geometry on performance.
- Suspension Properties and Vehicle Setup:
 - Suspension system types, tuning, and adjustment.
- Geometry Importance:
 - Impact of geometric parameters on dynamics and handling.
- Technical Measurement and Analysis:
 - Techniques for motorcycle data measurement and analysis.
- Motorcycle Modelling and Simulation:
 - Use of computer-aided tools for simulation and optimization.
- Basic Tyre Properties:
 - Influence of tire characteristics on performance, selection criteria.
- Fundamental Motorcycle Design:

- Considerations in design, industry trends, innovations, and sustainability in motorcycle development.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Written Technical Report	2000 words	100%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

Engineering Council AHEP4 Learning Outcomes **developed** in this module:

C1: Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study.

C2: Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science, and engineering principles.

C6: Apply an integrated or systems approach to the solution of complex problems.

C12: Use practical laboratory and workshop skills to investigate complex problems.

C13: Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations.

C17: Communicate effectively on complex engineering matters with technical and non-technical audiences.

INDICATIVE READING LIST

Module Code	ACHA4027	
Module Title	Motorcycle Technology	
Classification	Reading List entry	Electronic*
Essential	Bradley, J., (2003) <i>The Racing Motorcycle: A Technical Guide for Constructors volumes 1 and 2</i> , Malvern Broadband Leisure Publications,	☐
Essential	Spalding, N. (2019) <i>MotoGP technology</i> . Tunbridge Wells: Phoebus Apollo Publishing Limited.	☐
Further	Bradley, J. (2018) <i>The racing motorcycle. Volume 3, An introduction to chassis set up</i> . Malvern Broadland Leisure Publications.	☒
Further	Foale, T. (2002) <i>Motorcycle handling and chassis design : the art and science</i> . England: Tony Foale.	☐
Further	Cocco, G. (2013) <i>Motorcycle design and technology : how and why</i> . Milan: Giorgio Nada.	☐
Further	http://2d-datarecording.com/en/downloads/manuals	☒
Further	https://motochassis.com	☒

Module Code	ACHA4028
Title	Motorsport Technology
Date	29/07/2025
Level	4
Credits	10
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To allow the student to acquire knowledge of a range of motorsport chassis technologies through lectures and practical investigations.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- demonstrate a detailed knowledge and understanding of the underlying principles of vehicle technologies and practices for analysis of chassis systems in a motorsport application;
- demonstrate subject specific practical and cognitive skills applied to a motorsport application problem, obtaining and interpreting data in a laboratory environment and drawing relevant conclusions.

INDICATIVE CONTENT

- Chassis:
 - Chassis requirements and constructions.
 - Advantages and disadvantages of chassis types.
- Tyres:
 - Construction and performance characteristics.
 - Friction and grip (with load and temperature).
 - Slip angles and an introduction to tyre data.
- Suspension Systems:
 - Design parameters and performance characteristics.
 - Suspension types and layouts, including various geometries.
 - Springs and Dampers.
 - Kinematics including instant centres, roll centres and characteristic responses.
- Load transfer:
 - Introduction to basic load transfer under lateral and longitudinal acceleration.
 - Effect of load transfer on vehicle performance.
- Steering and Braking Systems:
 - Steering system requirements and types.
 - Steering geometry including Ackerman principles.
 - Drum Brakes.
 - Disc Brakes.
 - ABS principles.

- Aerodynamics:
 - Vehicle Shapes.
 - Pressure.
 - Bernoulli's Principle.
 - Lift and Drag.
 - Effect on cornering performance.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Written technical report	2000 Words	100%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

Engineering Council AHEP4 Learning Outcomes **developed** in this module:

C1: Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study.

C2: Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science, and engineering principles.

C6: Apply an integrated or systems approach to the solution of complex problems.

C12: Use practical laboratory and workshop skills to investigate complex problems.

C13: Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations.

C17: Communicate effectively on complex engineering matters with technical and non-technical audiences.

INDICATIVE READING LIST

Module Code	ACHA4028	
Module Title	Motorsport Technology	
Classification	Reading List entry	Electronic*
Essential	Hillier, V.A.W., Calex UK, editor and Institute of the Motor Industry. (2014) <i>Hillier's fundamentals of motor vehicle technology. Book 1</i> . Sixth edition / revised by Calex UK. Oxford: Oxford University Press.	☐
Essential	Schüetz, T. (2016) <i>Aerodynamics of road vehicles</i> . Fifth edition. Warrendale: SAE International.	☒
Further	Katz, J. (1995) <i>Race car aerodynamics: designing for speed</i> . Cambridge, Mass: Robert Bentley.	☐
Further	Pacejka, H.B. and Besselink, I. (2012) <i>Tire and vehicle dynamics</i> . 3rd ed. Amsterdam ; Elsevier/BH.	☒
Further	Rowley, W. (2004) <i>An introduction to race car engineering</i> . 3rd ed. Canada. Rowley Race Dynamics.	☐
Further	Smith, C. (2004). <i>Tune to Win: The Art and Science of Race Car Development and Tuning</i> . Fallbrook, Calif.: Motorbooks International.	☐
Further	Staniforth, A. (2006) <i>Competition car suspension</i> . 4th ed. Sparkford: Haynes.	☐
Further	SAE Mobilus (SAE Journal Papers)	☒

Module Code	ACHA4029
Title	Powertrain Technology
Date	29/07/2025
Level	4
Credits	10
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To introduce students to the core principles, components, and operations of internal combustion engine (ICE), electric and hybrid powertrain systems in automotive applications. Focused on the mechanical and thermodynamic aspects of ICE, it seeks to provide a solid foundation in understanding how energy conversion powers vehicles, with attention to performance, efficiency, and basic emission control strategies.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- identify key components of powertrain systems, including engines, electric motors, transmissions, and drivetrains and describe their functions and basic integration within a vehicle;
- explain fundamental principles of thermodynamics and mechanics as they relate to internal combustion engine performance, including fuel types, combustion processes, and energy conversion.

INDICATIVE CONTENT

- Introduction to Internal Combustion Engines
 - Types of ICE (petrol, diesel), basic operation principles, engine components, and terminology.
- Thermodynamics of ICE
 - Fundamentals of thermodynamics as applied to ICE, including energy conversion, efficiency calculations, and basic heat engines cycles (Otto, Diesel).
- Electric and Hybrid Systems
 - Understanding energy storage in batteries and how energy conversion and efficiencies differ in EV and Hybrid vehicles.
- Engine Components and Systems
 - Detailed study of key engine components (cylinder, piston, valves, crankshaft), fuel system, ignition system, cooling system, and exhaust system.
- Transmission and Drivetrain
 - Basics of transmission systems, including the purpose and types of transmissions (manual, automatic), drivetrain components, and their role in vehicle dynamics.
- Engine Performance Parameters

- Understanding power, torque, efficiency, and how they are influenced by engine design and operating conditions.
- Basics of Emission Control
 - Introduction to the sources of automotive emissions, impact on the environment, and basic strategies and technologies for emission control.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Written Technical Report	2000 words	100%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

Engineering Council AHEP4 Learning Outcomes **developed** in this module:

C1: Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study.

C2: Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science, and engineering principles.

C12: Use practical laboratory and workshop skills to investigate complex problems.

C13: Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations.

C17: Communicate effectively on complex engineering matters with technical and non-technical audiences.

INDICATIVE READING LIST

Module Code	ACHA4029	
Module Title	Powertrain Technology	
Classification	Reading List entry	Electronic*
Essential	Stone, R. (2012) <i>Introduction to internal combustion engines</i> . 4th ed. Basingstoke: Palgrave Macmillan.	☐
Essential	Hillier, V.A.W., Calex UK, editor and Institute of the Motor Industry. (2014) <i>Hillier's fundamentals of motor vehicle technology. Book 1</i> . Sixth edition / revised by Calex UK. Oxford: Oxford University Press.	☐
Essential	Hillier, V.A.W. <i>et al.</i> (2006) <i>Fundamentals of Motor Vehicle Technology. Bk. 2</i> . Place of publication not identified: Nelson Thornes Limited.	☐
Further	Heywood, J. (2018) <i>Internal combustion engine fundamentals</i> . 2nd edition. New York, N.Y: McGraw-Hill Education.	☒
Further	SAE Mobilus (SAE Journal Papers)	☒

Module Code	ACHA4030
Title	Pure Mathematics and Statistics
Date	29/07/2025
Level	4
Credits	10
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To introduce students to pure mathematical and statistical techniques necessary for an understanding of the analytical content encountered in further engineering modules.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- demonstrate an understanding and competency with respect to a range of algebraic and mathematical techniques;
- demonstrate an ability to solve mathematical and statistical problems involving a range of equation forms.

INDICATIVE CONTENT

- Transposition of formula.
- Solution of linear, quadratic and simultaneous equations.
- Trigonometry involving both right-angled and non-right-angled triangles.
- Trigonometric functions and solutions of equations involving them.
- Logarithms.
- Measures of central tendency such as mean, mode and median.
- Measures of dispersion such as range and standard deviation.
- Graphing techniques and data analysis.
- Statistics.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam	2 hours	100%

Assessment Summary

Activity type	Percentage
Written exam	100%
Coursework	0%
Practical	0%
TOTAL	100%

Engineering Council AHEP4 Learning Outcomes **developed** in this module:

C1: Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study.

C2: Analyse broadly-defined problems reaching substantiated conclusions using first principles of mathematics, statistics, natural science and engineering principles.

INDICATIVE READING LIST

Module Code	ACHA4030	
Module Title	Pure Mathematics and Statistics	
Classification	Reading List entry	Electronic*
Essential	Smedley, R. and Wiseman, G. (2001) <i>Introducing pure mathematics</i> . 2nd ed. Oxford: Oxford University Press.	☐
Essential	Stroud, K.A. and Booth, D.J. (2020) <i>Engineering mathematics</i> . Eighth edition. London: Red Globe Press.	☐
Essential	Gaulter, B., Gaulter, M.,(2001) <i>FurtherPure Mathematics</i> Oxford. Oxford University Press	☐
Further	Bird, J.O. (2021) <i>Bird's higher engineering mathematics</i> . Ninth edition. Abingdon, Oxon ; Routledge, Taylor & Francis Group.	☐
Further	Mathai, A.M. and Haubold, H.J. (2017) <i>Probability and Statistics : A Course for Physicists and Engineers</i> . 1st	☒

	ed. Berlin ; De Gruyter,. Available at: https://doi.org/10.1515/9783110562545 .	
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Module Code	ACHA4031
Title	Vehicle Electronics
Date	29/07/2025
Level	4
Credits	10
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To provide students with a solid understanding of the core principles of vehicle electronic circuits through a combination of theory and practical work. The module covers component selection, the rapidly evolving nature of electronic technologies, and the use of diagnostic test equipment in automotive applications.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- demonstrate transferable skills relevant to employment, including personal responsibility and engagement with continuing professional development (CPD) activities;
- describe key concepts of security and risk in vehicle electronic design and explain their relevance to industry standards;
- interpret and present quantitative data from circuit schematics to support conclusions based on basic electrical theories.

INDICATIVE CONTENT

- Breadboard circuit prototyping
 - Following circuit schematics to assemble circuits.
 - Designing and creating circuits to solve problems.
- Practical electronics skills
 - Develop skills with oscilloscopes, function generators and digital multimeters.
- Diagnostic electronics skills
 - Interrogate results from tests.
 - Develop logical fault-finding techniques.
- Circuit standards
 - Overview of systems in vehicles.
 - Historical development and future trends.
 - Industry standards.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Laboratory Report	2000 words or equivalent	100%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

Engineering Council AHEP4 Learning Outcomes **assessed** in this module:

C10: Adopt a holistic and proportionate approach to the mitigation of security risks.

C18: Plan and record self-learning and development as the foundation for lifelong learning / CPD.

Engineering Council AHEP4 Learning Outcomes **developed** in this module:

C1: Apply knowledge of mathematics, statistics, natural science, and engineering principles to the solution of complex problems.

C2: Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science and engineering principles.

C6: Apply an integrated or systems approach to the solution of complex problems.

C12: Use practical laboratory and workshop skills to investigate complex problems.

C13: Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations.

INDICATIVE READING LIST

Module Code	ACHA4031	
Module Title	Vehicle Electronics	
Classification	Reading List entry	Electronic*
Essential	Husain, I. (2021). <i>Electric and hybrid vehicles : design fundamentals</i> . Third edition. Boca Raton. CRC Press.	☐
Essential	Denton, T. and Institute of the Motor Industry. (2018) <i>Automobile electrical and electronic systems</i> . 5th edition. Abingdon, Oxon ; Routledge.	☒
Essential	Ehsani, M. <i>et al.</i> (2019) <i>Modern electric, hybrid electric, and fuel cell vehicles</i> . Third edition, International student edition. Boca Raton: CRC Press, an imprint of Taylor & Francis Group.	☒
Further	Hillier, V.A.W. (2012) <i>Hillier's fundamentals of automotive electronics. Book 2</i> . 6th ed. Oxford University Press.	☐

Module Code	ACMA4000
Title	Materials and Introduction to Processing
Date	12/07/2024
Level	4
Credits	20
Pre-Requisites	None

Engineering Council AHEP3 Learning Outcomes Assessed in this Module	
*SM3b	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline
EL4	Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate
P2	Knowledge of characteristics of particular materials, equipment, processes or products

*Only applies to Mechanical Engineering, Mechanical and Manufacturing Engineering, Manufacturing Systems Engineering & Energy and Environmental Engineering programmes.

AIM(S)

- To develop a knowledge base and understanding of the structure, properties and basic selection of all classes of materials
- To develop a knowledge and appreciation of the processes used in the manufacture of components with a view to providing basic process selection parameters using a broad range of industrial applications to illustrate this

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- an understanding of the structure and properties of metals and polymers
- Knowledge of the applications, advantages and limitations of different manufacturing processes and understanding of engineering materials and manufacturing process selection

INDICATIVE CONTENT

- Materials and the environment: corrosion, UV degradation,
- Polymeric processing (Mould design, process parameters and defects)
- Solidification, metals and alloys, polymers and co-polymerisation, glass transition temperature in polymers
- Primary processing, iron and steelmaking, polymer processing, aluminium processing
- Metallic Casting processes, Sand Casting, Gravity Die Casting, Pressure Die Casting, Investment Casting etc
- Introduction to manufacturing processes: casting, moulding, forming, machining, joining, rapid manufacturing and 3D printing.
- Forming processes. Such as Forging (Smith, Drop, Press, Upset), Rolling, Extrusion, Deep Drawing and sheet metal processing
- Secondary processing - machining and cutting (tool/material wear). Forces and energy dissipation: coatings (electro-plating, thermal spraying, powder coating and cladding)
- Thermal equilibrium diagrams. Ferrous and non-ferrous alloys, Heat treatment, Strengthening Mechanisms, work hardening, structure alignment, precipitation hardening, surface and bulk hardening mechanisms
- Joining - Welding processes, joint design, welding procedures and typical defects

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0%	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report with presentation	Technical or Laboratory Report 1500 words and Presentation 15 mins	50%

AHEP3 Version 3 outcomes to be met in this assessment:
SM3b, EL4, P2

Assessment Component 2

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam	2 hours	50%

AHEP3 Version 3 outcomes to be met in this assessment:
P2

Assessment Summary

Activity type	Percentage
Written exam	50%
Coursework	50%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4000	
Module Title	Materials and Introduction to Manufacturing Technology	
Classification	Reading List entry	Electronic*
Essential	Groover, M. P., Principles of Modern Manufacturing - 6 th Edition (Wiley, 2017)	☐
Essential	Callister, W. D.; Rethwisch, D. G., Materials Science and Engineering - 9 th Edition (Wiley, 2014)	☒
Essential	Bolton, W Engineering Science 6 th Edition 2015	☒
Further	Ashby, M. and Johnson, K., (2010) Materials and Design: The Art and Science of Materials Selection in Product Design - 2 nd Edition (Butterworth-Heinemann, 2010)	☐
Further	Ashby, M. and Jones, D., Engineering Materials: An Introduction to Properties, Applications and Design - 4 th Edition (Butterworth Heinemann, 2011)	☐
Further	Chiles, V., Black, S. and Lissaman, A., Principles of Engineering Manufacture - 3 rd Edition (Elsevier, 1996)	☐
Further	Beddoes, J., Principles of Metal Manufacturing Processes (Elsevier Butterworth Heinemann, 1999)	☐
Further	Journal of Manufacturing Processes, the Society of Manufacturing Engineers (SME)	☐

Module Code	ACMA4002
Title	Plant Operations and Performance
Date	01/02/2021
Level	4
Credits	20
Pre-Requisites	None

Engineering Council AHEP3 Learning Outcomes Assessed in this Module	
EL4	Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate
EL6	Knowledge and understanding of risk issues, including health & safety, environmental and commercial risk, and of risk assessment and risk management techniques
P2	Knowledge of characteristics of particular materials, equipment, processes or products
P5	Knowledge of relevant legal and contractual issues
P6	Understanding of appropriate codes of practice and industry standards

AIM(S)

- To provide the student with the understanding to be able to install, commission and monitor equipment performance

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Understand how to undertake commissioning and installation activities to ensure business and operational needs are fulfilled.
- Monitor equipment performance using a range of techniques and understand performance requirements of the plant.

INDICATIVE CONTENT

- Specifications for equipment including development and criteria for installation and commissioning.
- Installation of equipment including planning the project, provision of utilities, environmental issues, health and safety, ergonomics and resources
- Commissioning – understand what it involves and be able to put a proposal forward for commission plant
- Monitoring equipment in terms of reliability, energy performance and operational factors
- Measuring performance of equipment in terms of productivity, downtime, and energy consumption

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Written report	2,000 words	50%

Assessment Component 2

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Poster presentation and marking of poster	20 minutes	50%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	50%
Practical	50%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4002	
Module Title	Plant Operations and Performance	
Classification	Reading List entry	Electronic*
Essential	Kilcross, M (2018) Chemical and Process Plant Commissioning Handbook, Butterworth-Heinemann	☐
Essential	Moran, S (2015) An Applied Guide to Process and Plant Design, Elsevier, Oxford	☒
Essential	Harris, D (2016) A Guide to Energy Management in Buildings, 2 nd Edition, Routledge, Abingdon	☒
Further	Beggs, C (2009) Energy Management, Supply and Conservation, 2 nd Edition, Routledge, Abingdon	☐
Further	Mobley, R. Keith (2014) Maintenance Engineering Handbook 8 th Edition, McGraw Hill, New York	☐
Further	Thorpe, D (2014) Energy Management in Industry, Earthscan, Abingdon	☐
Further	Oung, K (2013) Energy Management in Business: The Manager's Guide to Maximising and Sustaining Energy Reduction, Abingdon	☐

Module Code	ACMA4003
Title	Project Design
Date	01/02/2021
Level	4
Credits	20
Pre-Requisites	None

Engineering Council AHEP3 Learning Outcomes Assessed in this Module	
EA4b	Knowledge and understanding of management techniques, including project management, that may be used to achieve engineering objectives
D1	Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics
D2	Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards
D5	Plan and manage the design process, including cost drivers, and evaluate outcomes
EL3b	Knowledge and understanding of management techniques, including project management, that may be used to achieve engineering objectives
P6	Understanding of appropriate codes of practice and industry standards
P11b	Understanding of, and the ability to work in, different roles within an engineering team

AIM(S)

- To equip the student with the knowledge necessary to effectively participate in operational/industrial projects

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Demonstrate awareness of project design concepts and principles showing how they can be deployed in industry
- Demonstrate the use of design tools and techniques to define projects and make sound judgements in the context of industrial engineering projects

INDICATIVE CONTENT

- Project phases- initiation, planning, execution, monitoring and control, and closure phases
- Project management- time management, resource planning, construction of network diagrams and Gantt charts, data security, quality control
- Team working and group dynamics – leadership styles, Belbin roles in a team, Tuckman's team building phases, managing people
- System engineering- levels of systems engineering, system boundaries, system design methods, validation and verification
- Research techniques- surveys and questionnaires, on-line databases, private communications, collecting data.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report	2000 words	50%

Assessment Component 2

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Presentation	15 minutes	50%

Assessment Summary

Activity type	Percentage
Written exam	0
Coursework	50
Practical	50
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4003	
Module Title	Project Design	
Classification	Reading List entry	Electronic*
Essential	Maylor, H (2010) Project Management, 4 th Edition	☐
Essential	Grit, R (2019) Project Management: A Practical Approach 5 th Edition, Noordhoff	☐
Essential	Mullins, L (2016) Management and Organisational Behaviour, 11 th Edition, Pearson	☐
Further	Leong, M (2019) The Principle of Effective Project Management: The Proven System, Independently Published	☐
Further	Cluster, K (2019) Agile Project Management, Independently Published	☐
Further	Bonnema, G Veenvliet, K and Broenink, J (2015) System Design and Engineering: Facilitating Multidisciplinary Development Project, CRC Press	☐
Further	Journal of Production Economics	☒
Further	Journal of Systems and Software	☒
Further	International Journal of Project Management	☒
Further	Computers & Education	☒
Further	Procedia Manufacturing	☒
Further	Computers in Industry	☒
Further	Learning and Individual Differences	☒
Further	Journal of Engineering and Technology Management	☒
Further	Industrial Marketing Management	☒
Further	Journal of Cleaner Production	☒
Further	www.teamgantt.com	☒
Further	www.mindtools.com	☒
Further	www.managers.org.uk	☒
Further	www.institutelm.com	☒
Further	www.i-l-m.com	☒
Further	www.imeche.org	☒
Further	www.apm.org.uk	☒
Further	www.pmi.org	☒

Module Code	ACMA4004
Title	Quality and Business Improvement
Date	01/02/2021
Level	4
Credits	20
Pre-Requisites	None

Engineering Council AHEP3 Learning Outcomes Assessed in this Module	
P1	Understanding of contexts in which engineering knowledge can be applied (e.g. operations and management, application and development of technology, etc)
P2	Knowledge of characteristics of particular materials, equipment, processes or products
P7	Awareness of quality issues and their application to continuous improvement

AIM(S)

- To provide the student with the ability to use a range of tools and techniques to improve quality of products and services and business performance.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- Apply a range of tools and techniques that can be used to investigate problems, assess risk, and analyse areas for improvement
- Understand the main elements of the six sigma methodology

INDICATIVE CONTENT

- Main elements of six sigma, DMAIC methodology,
- Lean principles for process improvement
- Failure modes effects analysis- process, systems service FMEAs, benefits and continuous improvements
- Quality Function Deployment analysis
- Kano model for quality
- Seven basic quality tools- Pareto Analysis, cause and effects analysis, check sheets, control charts, flow charts, histograms and scatter diagrams
- Error proofing- applications, use of Poka-Yoke techniques and different levels of error proofing

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report	2000 words	50%

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report	2000 words	50%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4004	
Module Title	Quality and Business Improvement	
Classification	Reading List entry	Electronic*
Essential	Dale, B; Van der Wiele, T and Van Iwaarden, J (2016) Managing Quality, Blackwell Publishing	☒
Essential	Jones, E (2017) Quality Management for Organisations Using Lean Six Sigma Techniques, CRC Press, Boca Raton	☐
Essential	Summers, D (2010) Lean Six Sigma Process Improvement Tools and Techniques, Pearson, New Jersey	☐
Further	Besterfield, D (2012) Quality Improvement, 9 th Edition, Pearson Education Limited Harlow	☒

Further	Brook, Q (2017) Lean Six Sigma and Minitab The Complete Toolbox Guide for Business Improvement, 5 th Edition, Opex Resources Ltd	☐
Further	Gitlow, H; Oppenheim, A; Oppenheim, R and Levine, D (2005) Quality Management, 3 rd Edition, McGraw Hill, New York	☐
Further	Altman, H (2017) Six Sigma: Quick Step-by-Step Guide to Improve Quality and Eliminate Defects in any process, Create Space Independent Publishing Platform	☐
Further	Backstrom T., Fundin A. and Johansson P.E., (2019), Innovative Quality Improvements in Operations: Introducing Emergent Quality Management (International Series in Operations Research & Management Science), Springer	☒
Further	George M, Blackwell D. and Rajan D., (2019), Lean Six Sigma in the Age of Artificial Intelligence: Harnessing the Power of the Fourth Industrial Revolution, McGraw-Hill Education	☒

Module Code	ACMA4006
Title	Engineering Mathematics
Date	12/07/2024
Level	4
Credits	20
Pre-Requisites	None

Engineering Council AHEP3 Learning Outcomes Assessed in this Module	
SM2b	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems

AIM(S)

- To introduce the student to the mathematical ideas and techniques necessary for an understanding of the mathematics encountered in further engineering modules

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- demonstrate understanding and competency with respect to a range of algebra and functions mathematical techniques which are the basis of the mathematics required in engineering; calculus, types of integrals, manipulation of matrices and complex number theory, cartesian and polar form and manipulation of complex numbers

INDICATIVE CONTENT

- Solution of linear, quadratic and simultaneous equations
- Transposition of formula
- Solution of indicial and logarithmic equations using the laws of logarithms
- Trigonometry, Sine and Cosine rule, solution of trigonometric equations
- Logarithms and their use in solution of indicial and logarithmic equations
- Statistical methods including standard deviation, averages, sample distribution, standard error, sample variance.
- Differential calculus: standard rules; simple partial differentiation
- Integral calculus: definite and indefinite integrals; standard integrals; integration by parts; integration by substitution;
- Complex numbers: algebra and manipulation; Argand diagram; polar form; De Moivre's theorem
- Differentiation: maxima, minima and points of inflection; standard derivatives and the rules of differentiation;
- Matrix algebra: manipulation of matrices, determinants, solution of simultaneous equations using Cramer's method

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam	1.5 hours	50%

AHEP3 Version 3 outcomes to be met in this assessment:

SM2b

Assessment Component 2

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam	1.5 hours	50%

AHEP3 Version 3 outcomes to be met in this assessment:

SM2b

Assessment Summary

Activity type	Percentage
Written exam	100%
Coursework	0%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4006	
Module Title	Engineering Mathematics	
Classification	Reading List entry	Electronic
Essential	Smedley, R., Wiseman, G., Introducing Pure Mathematics (Oxford, 2001)	☐
Essential	Stroud, K. A., Engineering Mathematics (Red Globe Press, 2020)	☐
Further	Singh, K., Engineering Mathematics through Applications (Red Globe Press, 2011)	☐
Further	Rouvel, J., Automotive Mathematics (Pearson/Prentice Hall, 2005)	☐
Reference	https://www.khanacademy.org/	☒

Module Code	ACMA4007
Title	Engineering Applications and Study Skills
Date	12/07/2024
Level	4
Credits	20
Pre-Requisites	None

Engineering Council AHEP3 Learning Outcomes Assessed in this Module	
SM2b	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems
EA3b	Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action
D6	Communicate their work to technical and non-technical audiences
EL5	Awareness of the relevant legal requirements governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues
P3	Ability to apply relevant practical and laboratory skills
P8	Ability to work with technical uncertainty
G1	Apply their skills in problem solving, communication, information retrieval, working with others and the effective use of general IT facilities
G2	Plan self-learning and improve performance, as the foundation for lifelong learning/CPD

AIM(S)

- To introduce the student to workshop and laboratory skills and safety practices through the media of degree pathway specific technology whilst allowing them to critically evaluate and apply theoretical engineering concepts to specific applications and problem-solving exercises.
- Accelerate their learning process and strategies.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- demonstrate knowledge and understanding of specific engineering concepts and how their theoretical characteristics are used in discipline specific engineering applications;
- apply practical engineering skills and demonstrate know-how of practices, skills, safety and standards with respect to laboratory and workshops, and key transferable skills in terms of written and oral presentation, personal development, reflective abilities and proficiency in appropriate engineering software
- Demonstrate key transferable skills in the creation of a personal development plan, manage their own learning; avoid plagiarism and create independent work; master referencing conventions; communicate information, ideas, problem and solutions to both specialist and non-specialist audiences; apply a range of key transferable study and communication skills to produce assignment work.

INDICATIVE CONTENT

- Understanding the learning process and identifying skills (e.g. self-evaluation, skills needed for higher education, transferable skills, action plans for personal development).
- Organising study (e.g. time management, organising space, organising resources)
- Structuring study and sourcing information - effective note taking, using the library and the internet, referencing convention. Revision and examination techniques.

- Communicating and presenting information (e.g. presentation techniques, styles, the appropriate use of graphs, charts, measures of central tendency)
- Developing an appropriate writing style (e.g. planning and structuring essays and reports, linking ideas together, using facts, opinions or arguments, analytical thinking, etc.)
- Fundamentals of Statistics and Probability.
- Fundamentals of computing language.
- Develop proficiency of appropriate general and engineering specific software.
- Implementation of Matlab to solve statistics practice problems.
- Familiarity with basic electronic and mechanical components, laboratory and workshop equipment and their real-world applications and behaviour.
- Health & Safety procedures and legislations, personal protective equipment and safe working practice.
- Workshop / machine-shop practical exercises

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Series of short exercises, reports and presentations	1,600 words total	40%

AHEP3 Version 3 outcomes to be met in this assessment:

D6, EL5, G1, G2

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report & Logbook documenting engineering applications covered.	2,400 words	60%

AHEP3 Version 3 outcomes to be met in this assessment:
SM2b, EA3b, P3, P8

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	60%
Practical	40%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4007	
Module Title	Engineering Applications and Study Skills	
Classification	Reading List entry	Electronic*
Essential	Bosch Automotive Handbook (Bentley, 2011)	☐
Essential	Cottrell, S., The Study Skills Handbook (Red Glob Press, 2019)	☒
Essential	Van Emden, J., Writing for Engineers (Red Globe Press, 2017)	☒
Essential	Bird, J., Mechanical Engineering Principles (Routledge, 2019)	☐
Essential	Shigley, J., Mechanical Engineering Design - 10th Edition (McGraw Hill, 2014)	☐
Further	Bolton, W., Mechanical Science, Wiley-Blackwell (2006)	☐
Further	Hannah, J. and Hillier, M. J., Mechanical Engineering Science (Prentice Hall, 1999)	☐
Further	Sizemore, J., MATLAB for dummies (John Wiley & Sons, 2015)	☒
Further	Health and Safety Executive www.hse.gov.uk	☒

Module Code	ACMA4015
Title	Business Planning
Date	07/08/2023
Level	4
Credits	10
Pre-Requisites	None

AIM(S)

- To facilitate students' understanding of business planning and project management.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- assess the internal and external business environment using suitable tools and techniques;
- understand the stages of a project and its components;
- use appropriate project planning and management tools.

INDICATIVE CONTENT

- Business Analysis in contemporary logistics systems.
- Business environment.
- Business planning.
- External environment.
- PEST Analysis.
- Linear versus Circular Business Planning.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Business Planning Exercise presented as an Essay	1,500 words	100%

Assessment Summary

Activity type	Percentage
Written exam	0
Coursework	100%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4015	
Module Title	Business Planning	
Classification	Reading List entry	Electronic*
Essential	Coyle, J. J. et al (2016) <i>The Management of Business Logistics: A Supply Chain Perspective</i> 6 th Ed, Mason Ohio: Thompson	☐
Essential	Daniels, J., Radebaugh, L., and Sullivan, D. (2018) <i>International Business Global Edition</i> 16 th Ed, London: Pearson	☐
Essential	Winter, H. (2019) <i>The Business Analysis Handbook: Techniques and Questions to Deliver Better Business Outcomes</i> London: Kogan Page	☐
Further	Bak, O. (2018) <i>E-Business and Supply Chain Integration - Strategies and Case Studies from Industry</i> London: Kogan Page	☐
Further	Finch, B. (2022) <i>How to Write a Business Plan - Win Backing and Support for Your Ideas and Ventures</i> London: Kogan Page	☐
Further	Kerzner, H. (2009) <i>Project Management - A Systems Approach to Planning, Scheduling, and Controlling</i> 10 th Ed, Chichester: Wiley	☒
Further	Project Management Institute (2013) <i>A Guide to the Project Management Body of Knowledge (PMBOK® Guide)</i> Pennsylvania: Project Management Institute	☒

Module Code	ACMA4016
Title	Data Analytics Principles
Date	07/08/2023
Level	4
Credits	10
Pre-Requisites	None

AIM(S)

- To develop the knowledge and skills required to perform basic data analysis.
- To introduce students to data analytics techniques, tools and systems applied to logistics and supply chains.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- understand the fundamental concepts and principles of data analysis, management systems and will be developing practical skills in using data analysis tools and systems in logistics and supply chains.

INDICATIVE CONTENT

- Data, and databases and management systems.
- The role of data in logistics and supply chains.
- Database, warehousing and analysis techniques.
- Data mining systems applied to logistics databases.
- Data analysis tools and systems.
- Logistics data management.
- Data Analytics in logistics and supply chains.
- The future of supply chain analytics.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Coursework including written report and data analysis	1,500 words	100%

Assessment Summary

Activity type	Percentage
Written exam	0
Coursework	100%
Practical	0
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4016	
Module Title	Data Analytics Principles	
Classification	Reading List entry	Electronic*
Essential	Marr, B. (2015) <i>Big Data: Using SMART Big Data Analytics and Metrics to Make Better Decisions and Improve Performance</i> Chichester: Wiley	☐
Essential	Tipi, N. (2021) <i>Supply Chain Analytics and Modelling: Quantitative Tools and Applications</i> London: Kogan Page	☐
Essential	Bag, D. (2016) <i>Business Analytics</i> 1 st Ed, Abingdon: Taylor & Francis	☐
Further	Gupta, D. (2018) <i>Applied Analytics Through Case Studies using SAS and R: Implementing Predictive Models and Machine Learning Techniques</i> Berkeley CA: Apress doi:10.1007/978-1-4842-3525-6	☐
Further	Loth, A. (2019) <i>Visual Analytics with Tableau</i> Chichester: Wiley	☒
Further	Witten, I. H., Elbe, F., Hall, M. A., and Pal, C. J. (2016) <i>Data Mining: Practical Machine Learning Tools and Techniques</i> Cambridge MA: Morgan Kaufmann	☒
Further	Robertson, P. (2020) <i>Supply Chain Analytics</i> 1 st Ed, Abingdon: Taylor & Francis	☐

Module Code	ACMA4017
Title	Finance Management
Date	07/08/2023
Level	4
Credits	10
Pre-Requisites	None

AIM(S)

- To develop an appreciation and understanding of the significance of finance management within a company.
- To apply the theories and methods for managing finance to specific problems in logistics and supply chains.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- demonstrate an understanding of finance management related to the logistics industries and supply chain management;
- evaluate the application of theories and methods of supply chain finance.

INDICATIVE CONTENT

- Costing Managing Budgets and Financial Statements.
- Managing Sustainable Finance.
- Inter-departmental relationships.
- Supply Chain finance and Credit Insurance requirements for suppliers.
- Cost of capital.
- Working capital management including influence from moving / improving payment terms and stock levels.
- Risk and hedging.
- NPV and investment criteria.
- Crypto currencies.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Presentation	15 minutes	100%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	0%
Practical	100%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4017	
Module Title	Finance Management	
Classification	Reading List entry	Electronic*
Essential	Camerinelli, E. (2009) <i>Measuring the Value of Supply Chain Linking Financial Performance and Supply Chain Decisions</i> Farnham: Gower	☒
Essential	Tsai, S-B., Shen, C-H., Song, H. and Niu, B. (2019) <i>Green Finance for Sustainable Global Growth</i> Hershey PA: IGI Global	☐
Essential	McLaney, E. J. (2011) <i>Business Finance: Theory and Practice</i> , 9 th Ed, Harlow: Financial Times Prentice Hall	☒
Further	Weetman, P. (2016) <i>Financial Accounting: An Introduction</i> 7 th Ed, London: Pearson	☒

Module Code	ACMA4018
Title	Introduction to Procurement
Date	07/08/2023
Level	4
Credits	10
Pre-Requisites	None

AIM(S)

- To develop an appreciation and understanding of the application of procurement and purchasing.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- describe and explain procurement and purchasing concepts and definitions and the different types of procurement;
- explain and understand outsourcing, managing and selecting suppliers.

INDICATIVE CONTENT

- Procurement and purchasing definitions, concepts and principles.
- Procurement as a strategic activity.
- Types of procurement.
- Procurement process.
- Outsourcing.
- Supplier selection.
- Procurement and markets.
- The Kraljik Matrix.
- The difference between public and private sector procurement.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Online exam	2 hours	100%

Assessment Summary

Activity type	Percentage
Written exam	100%
Coursework	0
Practical	0
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4018	
Module Title	Introduction to Procurement	
Classification	Reading List entry	Electronic*
Essential	Bailey, P. et al (2008) <i>Procurement, Principles and Management</i> London: FT Prentice Hall	☐
Essential	Mena, C. van Hoek, R. and Christopher, M. (2021) <i>Leading Procurement Strategy - Driving Value Through the Supply Chain</i> London: Kogan Page	☐
Essential	Lysons, K. and Farrington, B. (2020) <i>Purchasing and Supply Chain Management</i> 10 th Ed, London: Pearson	☐
Further	Sabri, E. H. (Ed) (2015) <i>Optimization of Supply Chain Management in Contemporary Organizations</i> Hershey PA: Business Science Reference	☒
Further	<i>Journal of Purchasing and Supply Management</i> (2003-2022) Pergamon	☒
Further	Murphy, P. R. and Wood, D. (2008) <i>Contemporary Logistics</i> 9 th Ed, London: Pearson Prentice Hall	☐

Module Code	ACMA4019
Title	Lean Thinking
Date	07/08/2023
Level	4
Credits	10
Pre-Requisites	None

AIM(S)

- To provide the students with the ability to apply lean thinking tools and systems in order to improve the quality of products, processes or services.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- identify, adapt and use a range of tools and techniques to investigate problems, assess risk, and analyse areas for improvement;
- evaluate the techniques and practices used in lean management to implement and maintain sustainable logistic operations.

INDICATIVE CONTENT

- Main elements of Six Sigma, and DMAIC methodology.
- The Five principles of Lean Thinking :
 - Defining Value.
 - Mapping the Value Stream.
 - Creating Flow.
 - Using a Pull System.
 - Pursuing Perfection.
- The Eight Wastes of Lean Manufacturing, including Muda, Mura and Muri.
- A3 Thinking as part of the problem-solving process.
- Lean Supply Chain management and practices.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Problem-solving exercise	1,500 words	100%

Assessment Summary

Activity type	Percentage
Written exam	0
Coursework	100%
Practical	0
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4019	
Module Title	Lean Thinking	
Classification	Reading List entry	Electronic*
Essential	Rother, M. and Shook, J. (2009) <i>Learning to See</i> . Cambridge, MA: Lean Enterprise Institute,	☐
Essential	Smalley, A. and Sobek, D. (2008) <i>Understanding A3 Thinking</i> London: CRC Press	☐
Essential	Bicheno, J. and Bicheno, J. (2016) <i>The New Lean Toolbox</i> 5 th Ed, Buckingham: PICSIE Books	☐
Further	Roos, D., Womack, J. and Jones, D. (2014) <i>The Machine That Changed The World</i> London: Simon & Schuster	☐
Further	Baudin, M. (2004) <i>Lean Logistics: The Nuts and Bolts of Delivering Materials and Goods</i> New York NY: Productivity Press	☐
Further	Hajdul, M. and Mindur, L. (2015). <i>Lean and Reliable Digital Supply Chains – A Case Study</i> . LogForum 1(11), 15-27	☒
Further	Leite, H. R. and Vieira, G. E. (2015) <i>Lean Philosophy and its Applications in the Service Industry: A Review of the Current Knowledge</i> pdf 25(3), 529-541	☒
Further	Schneider, J. (2017) <i>Understanding Design Thinking, Lean and Agile</i> 1 st Ed Sebastopol: O'Reilly Media	☐

Module Code	ACMA4020
Title	Organisation Management
Date	07/08/2023
Level	4
Credits	20
Pre-Requisites	None

AIM(S)

- To introduce the students to the theory and practice of organisation management as applied to logistics and supply chain management.
- To develop leadership skills for maintaining the competitiveness of the supply chains and logistics companies.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- describe applied knowledge and understanding of the theories of organisation management;
- acquire knowledge of leadership theories and develop leadership skills in Supply Chain Management or Logistics Operations.

INDICATIVE CONTENT

- Project management.
- People management.
- Planning the workforce.
- Leadership.
- Productive working relationships.
- Leadership in Supply Chain Management or Logistics Organisations.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Essay	1,500 words	50%

Assessment Component 2

(Tick one)

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Presentation	15 minutes	50%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	50%
Practical	50%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4020	
Module Title	Organisation Management	
Classification	Reading List entry	Electronic*
Essential	Mullins, L. J. (2016) <i>Management and Organisational Behaviour</i> Harlow: Pearson Education Limited	☐
Essential	Mullins, L. J. and Christy, G. (2013) <i>Management and Organisational Behaviour</i> 10 th Ed, Harlow: Pearson Education Limited	☒
Essential	Mullins, L. J. and McLean, J. E. (2019) <i>Organisational Behaviour in the Workplace</i> 12 th Ed, Harlow: Pearson Education Limited	☐
Essential	Northouse, P.G. (2022). <i>Leadership: Theory and Practice</i> 9 th Ed, Los Angeles: SAGE	☒
Further	Evans, J. R. and Lindsay, W. M. (2019) <i>Managing for Quality and Performance Excellence</i> 10 th Ed, Andover: South-Western Cengage Learning	☐
Further	Sabri, E. H. (Ed) (2015) <i>Optimization of Supply Chain Management in Contemporary Organizations</i> Hershey PA: Business Science Reference	☐
Further	Beardwell, J. and Claydon, T. (eds) (2007) <i>Human Resource Management: A Contemporary Approach</i> Harlow: Pearson Education Limited	☐
Further	Cole, G. A. and Kelly, P. (2001) <i>Management Theory and Practice</i> 7 th (Revised) Ed, Andover: South-Western Cengage Learning	☐

Module Code	ACMA4021
Title	Study and Research Skills
Date	07/08/2023
Level	4
Credits	10
Pre-Requisites	None

AIM(S)

- To provide the students with the essential skills to study, undertake research, and communicate for effective learning.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- identify, adapt and use suitable methods that can support learning through a reflective, active, positive approach to learning, and take responsibility for self-learning;
- evaluate the research and development approaches used in logistics and supply chains.

INDICATIVE CONTENT

- **Study Skills:** Understanding the learning process and identifying the appropriate skills, such as self-evaluation, skills needed for higher education, transferable skills, and action plans for personal development. Organising study, including effective time management and the organising of space and resources. Effective note-taking, use of the library and the internet, and implementation of referencing standards.
- **Research Skills:** Identifying and evaluating the academic literature. Critical and creative thinking, and reviewing of existing literature. Understanding the fundamentals of research methods.
- **Presentation Skills:** Communicating and presenting information (presentation techniques, styles, the appropriate use of graphs, charts, measures of central tendency). Developing the academic writing style (planning and structuring reports, linking ideas together, using facts, opinions or arguments, analytical thinking, etc.).

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Portfolio	2 elements (equivalent of 1,500 words)	100%

Assessment Summary

Activity type	Percentage
Written exam	0
Coursework	100%
Practical	0
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4021	
Module Title	Study and Research Skills	
Classification	Reading List entry	Electronic*
Essential	Cottrell, S. (2010) <i>Skills for Success: The Personal Development Planning Handbook</i> 2 nd Ed, Basingstoke: Palgrave Macmillan	☒
Essential	Cottrell, S. (2019) <i>The Study Skills Handbook</i> 5 th Ed, London: Macmillan International Higher Education/Red Globe Press, an imprint of Springer Nature Limited	☐
Essential	Hopkins, D. and Reid, T. (2018) <i>The Academic Skills Handbook: Your Guide to Success in Writing, Thinking and Communicating at University</i> Los Angeles: SAGE	☐
Further	Sharp, J. A., Howard, K., and Peters, J. (2017) <i>The Management of a Student Research Project</i> Open University Press / London: Routledge / Gower	☐
Further	Open Learn (2022) <i>Skills for Study</i> Available at : https://www.open.edu/openlearn/skills-for-study	☒
Further	Smale, B. and Fowlie, J. (2015) <i>How to Succeed at University: An Essential Guide to Academic Skills and Personal Development</i> Los Angeles: SAGE	☐

Further	Cottrell, S. (2017) <i>Critical Thinking Skills: Effective Analysis, Argument, and Reflection</i> 3 rd Ed, Basingstoke: Palgrave Macmillan	☐
Further	Pears, R. and Shields, G. J. (2019) <i>Cite Them Right: the Essential Referencing Guide</i> . 11 th Ed, London: Macmillan International Higher Education	☒
Further	Well-being of Future Generations (Wales) Act 2015 (Online). Available at http://www.legislation.gov.uk/anaw/2015/2/contents/enacted	☐

Module Code	ACMA4022
Title	Supply Chain Informatics
Date	07/08/2023
Level	4
Credits	10
Pre-Requisites	None

AIM(S)

- To introduce students to supply chain information systems and recognise that the effective and innovative management of information can sustain competitive advantage.
- To develop students' understanding of the application of information technologies systems.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- demonstrate a sound understanding of the application of information technology and systems (i.e. SAP-ERP) in logistics and supply chain management.

INDICATIVE CONTENT

- Information systems in supply chain management and logistics.
- The benefits and challenges of applying information technology in logistics.
- Information systems for product planning, materials management, inventory, transportation and distribution.
- Current information systems (e.g. enterprise systems such as ERP, CRM and SCM, e-Business, e-Marketing, e-HRM, e-Procurement, e-Learning, e-government, mobile commerce).
- Enterprise Resource Planning Systems Implementation and SAP-ERP.
- Analyse complex information in the supply chain.
- Knowledge management in logistics.
- Decision making systems.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report	1,500 words	100%

Assessment Summary

Activity type	Percentage
Written exam	0
Coursework	100%
Practical	0
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4022	
Module Title	Supply Chain Informatics	
Classification	Reading List entry	Electronic*
Essential	Chaffey, D. (2015) <i>Digital Business and E-Commerce Management</i> 6 th Ed, Harlow: Pearson	☒
Essential	Wang, Y. and Pettit, S. (2021) <i>E-Logistics: Managing Digital Supply Chains for Competitive Advantage</i> London: Kogan Page	☐
Essential	Pagano, A. and Liotine, M. (2020) <i>Technology in Supply Chain Management and Logistics : Current Practice and Future Applications</i> Amsterdam: Elsevier	☐
Further	Murphy, P. R. and Wood, D. (2008) <i>Contemporary Logistics</i> 9 th Ed, London: Pearson Prentice Hall	☐
Further	Mangan, J. (2016) <i>Global Logistics and Supply Chain Management</i> 3 rd Ed, Chichester: Wiley	☐
Further	Information Resources Management Association (2013) <i>Enterprise Resource Planning Concepts, Methodologies, Tools and Applications</i> Hershey PA: Business Science Reference	☐
Further	Ferran, C. and Salim, R. (2008) <i>Enterprise Resource Planning for Global Economies - Managerial Issues and Challenges</i> New York: IGI Global	☒

Module Code	ACMA4023
Title	Sustainability
Date	07/08/2023
Level	4
Credits	10
Pre-Requisites	None

AIM(S)

- To provide students with the knowledge and ability to assess sustainability and environmental impact considerations in logistics and supply chains.
- To enable students to understand the benefits of circular versus linear economy.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- describe the requirements needed to evaluate sustainability in logistics and supply chain management;
- understand circular economy concepts and principles.

INDICATIVE CONTENT

- Environmental, social norms and standards for logistics companies and supply chain sustainability evaluation.
- The triple bottom line.
- Corporate social responsibility.
- Circular economy principles.
- Linear versus circular economies.
- The supply chain transformation from linear to circular.
- Innovation in SCM.
- Environmental Impact of logistics operations and reducing packaging.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Sustainability Assessment Exercise presented as an Essay	1,500 words	100%

Assessment Summary

Activity type	Percentage
Written exam	0
Coursework	100%
Practical	0
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4023	
Module Title	Sustainability	
Classification	Reading List entry	Electronic*
Essential	Kovacic, Z., Strand, R. and Völker, T. (2020) <i>The Circular Economy in Europe: Critical Perspectives on Policies and Imaginaries</i> 1 st Ed, London: Routledge https://doi.org/10.4324/9780429061028	☒
Essential	Weenk, E. and Henzen, R. (2021). <i>Mastering the Circular Economy - A Practical Approach to the Circular Business Model Transformation</i> London: Kogan	☐
Essential	Weetman, C. (2020) <i>A Circular Economy Handbook - How to Build a More Resilient, Competitive and Sustainable Business</i> London: Kogan	☒
Further	Kramberger, T., Potočan, V. and Ipavec, V. M. (2016) <i>Sustainable Logistics and Strategic Transportation Planning</i> Hershey PA: IGI Global	☒
Further	Heyzer, J. and Render, B. (2014) <i>Operations Management: Sustainability and Supply Chain Management</i> Harlow: Pearson.	☒
Further	Gupta, H. (2020) <i>Barriers and Overcoming Strategies to Supply Chain Sustainability Innovation</i> Elsevier, Amsterdam	☐

Further	Well-being of Future Generations (Wales) Act 2015 (online). Available at www.legislation.gov.uk/anaw/2015/2/contents/enacted	☒
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Module Code	ACMA4024
Title	Warehousing and Inventory Operations
Date	07/08/2023
Level	4
Credits	20
Pre-Requisites	None

AIM(S)

- To provide students with fundamental knowledge and skills in the development and management of warehouses.
- To understand efficient inventory management and optimisation strategies.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- describe a range of issues that need to be considered as part of warehousing operations;
- explain the role of inventory in businesses and which factors need to be considered when managing inventory.

INDICATIVE CONTENT

- Role of the warehouse.
- Warehouse layouts.
- Inventory control and management.
- Stock control and accountancy.
- Order management.
- Materials handling.
- Customer service.
- Control supplies at storage locations.
- Packaging systems design and management.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Case Study Report	1,500 words	50%

Assessment Component 2

(Tick one)

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Presentation	15 minutes	50%

Assessment Summary

Activity type	Percentage
Written exam	0
Coursework	50%
Practical	50%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4024	
Module Title	Warehousing and Inventory Operations	
Classification	Reading List entry	Electronic*
Essential	Richards, G. (2021), <i>Warehouse Management: A Complete Guide to Improving and Minimising Costs in the Modern Warehouse</i> 4 th Ed, London: Kogan Page	☐
Essential	Mangan, J. (2016). <i>Global Logistics and Supply Chain Management</i> 3 rd Ed, Chichester: Wiley	☐
Essential	Martin, H. (2018) <i>Warehousing and Transportation Logistics Systems, Planning, Application and Cost Effectiveness</i> London: Kogan Page	☐
Further	Murphy, P. R. and Wood, D. (2008) <i>Contemporary Logistics</i> 9 th Ed London: Pearson Prentice Hall	☐
Further	Relph, G. and Milner, C. (2019) <i>The Inventory Toolkit - Business Systems Solutions</i> London: Kogan Page	☐

Module Code	ACMA4029
Title	Data Analysis and Simulation
Date	06/08/2025
Level	4
Credits	20
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To provide students with foundational knowledge and skills in coding and statistics necessary for data analysis and simulation techniques.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- demonstrate knowledge of the key programming concepts;
- apply statistical methods to analyse and interpret data effectively.

INDICATIVE CONTENT

- Introduction to programming languages such as Python, R, or MATLAB.
- Basic concepts of statistics including:
 - descriptive statistics;
 - probability distributions;
 - hypothesis testing.
- Data visualisation techniques.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Programme Code	2000 words or equivalent	50%

Engineering Council AHEP4 Learning Outcomes **developed** in this assessment:

C1: Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study.

C2: Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science, and engineering principles.

C3: Select and apply appropriate computational and analytical techniques to model complex problems.

C12: Use practical laboratory and workshop skills to investigate complex problems.

Assessment Component 2

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report	2000 words	50%

Engineering Council AHEP4 Learning Outcomes **developed** in this assessment:

C1: Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study.

C2: Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science, and engineering principles.

C3: Select and apply appropriate computational and analytical techniques to model complex problems.

C4: Select and evaluate technical literature and other sources or information to address complex problems.

C12: Use practical laboratory and workshop skills to investigate complex problems.

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4029	
Module Title	Data Analysis and Simulation	
Classification	Reading List entry	Electronic*
Essential	Moore, H. (2019) <i>MATLAB® for engineers</i> . Fifth edition. New York: Pearson.	☒
Essential	McKinney, W.(2022) <i>Python for Data Analysis</i> , 3 rd Edition. Delaware. O'Reilly Media. Open Access. Python for Data Analysis, 3E	☒
Essential	Wickham, H.,(2023) <i>R for Data Science: Import, Tidy, Transform, Visualize, and Model Data</i> . 2 nd Edition. Delaware. O'Reilly Media, Open Access. R for Data Science (2e)	☒
Further	Urdan, T., C., (2022) <i>Statistics in Plain English</i> , 5 th Edition. Oxford. Routledge,	☐
Further	Dobrow, R., P.(2016) <i>Introduction to Stochastic Processes with R</i> . New Jersey. Wiley	☐
Further	Spiegelhalter, D.J. (2019) <i>The art of statistics learning from data</i> . UK: Pelican.	☒

Module Code	ACMA4030
Title	Design for Sustainable Engineering Practices
Date	06/08/2025
Level	4
Credits	20
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To present a systematic approach to engineering design from problem definition to design solution whilst considering factors such as feasibility, materials, manufacturing processes, communication, sustainability, and legislation.
- To introduce students to Computer-Aided Design (CAD) software. The course will enable students to create, modify, and analyse digital designs effectively for diverse engineering and product design applications.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- identify a systematic design approach to classify solutions to meet a client brief and recognise a range of materials and manufacturing methods and justify a suitable set of manufacturing processes for a given engineered product;
- utilise a range of CAD tools to demonstrate proficiency in 3D modelling techniques such as creating solids, assemblies, and parametric designs, including explaining the fundamentals of geometric dimensioning and tolerancing, to be able to prepare and interpret Engineering Drawings adhering to BS8888.

INDICATIVE CONTENT

- The product development cycle and associated documentation.
- Sustainability and legislation involved in engineering design.
- Technical drawings and BS8888.
- Solid modelling, assembly construction and technical drawings in CAD.
- Classification and properties of common engineering materials including metals, polymers, ceramics, and composites.
- Interpreting engineering data such as technical data sheets and material property charts.
- Analyse material selection criteria based on application requirements, cost considerations, and environmental sustainability.
- Survey a range of manufacturing processes including casting, forming, machining, joining, 3D printing, and finishing techniques.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Practical Assessment	2 hours	50%

Engineering Council AHEP4 Learning Outcomes **developed** in this assessment:

C3: Select and apply appropriate computational and analytical techniques to model complex problems.

Assessment Component 2

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report	2000 words	50%

Engineering Council AHEP4 Learning Outcomes **developed** in this assessment:

C4: Select and evaluate technical literature and other sources or information to address complex problems.

C5: Design solutions for complex problems that meet a combination of societal, user, business and customer needs as appropriate. This will involve consideration of applicable health and safety, diversity, inclusion, cultural, societal, environmental and commercial matters, codes of practice and industry standards.

C13: Select and apply appropriate materials, equipment, engineering technologies, and processes, recognising their limitations.

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	50%
Practical	50%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4030	
Module Title	Design for Sustainable Engineering Practices	
Classification	Reading List entry	Electronic*
Essential	Callister, W.D. and Rethwisch, D.G. (2020) <i>Materials science and engineering: an introduction</i> . 10th edition. Hoboken, NJ: Wiley.	☐
Essential	Kalpajian, S., Schmid, S.R. and Sekar, K.S.V. (2023) <i>Manufacturing engineering and technology</i> . Eighth edition in SI units. Harlow, United Kingdom: Pearson.	☐
Essential	Ashby, M.F. (2025) <i>Materials selection in mechanical design</i> . Sixth edition. Amsterdam: Butterworth-Heinemann.	☒
Essential	O Sugden, J. et al. (2024). <i>Mastering AutoDesk Fusion</i> , 2nd edition. CADclass.	☐
Essential	British Standards Institution (2019) BS 8888:2020: Technical Product Documentation and Specification. British Standards Institution.	☒
Further	Pahl, G. et al. (2007) <i>Engineering design: a systematic approach</i> . 3rd ed. London: Springer.	☒
Further	Willis, J. and Dogra, S., 2025. <i>Autodesk Fusion 360: A Power Guide for Beginners and Intermediate Users</i> (7th Edition). CADArtifex.	☐
Further	https://help.autodesk.com/view/fusion360/ENU/?guid=GUID-670346CA-4CF8-4009-9E9B-09FCC6803B61	☒

Module Code	ACMA4031
Title	Electrical Principles
Date	06/08/2025
Level	4
Credits	20
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To understand the fundamental operation of common electrical components and circuits.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- analyse specified circuits and networks using appropriate analysis tools;
- define electrical / electronic measurements, record and analyse data and produce a report.

INDICATIVE CONTENT

- Ohm's Law.
- Series/parallel connections for R, L and C.
- KVL and KCL.
- Potential and Current divider networks.
- Voltage and Current sources.
- AC fundamentals.
- Sinusoidal properties.
- Resistance, Reactance and Impedance.
- Complex notation.
- Single phase AC circuits.
- Maximum Power Transfer.
- Tuned Circuits.
- Electromagnetism, Electromagnetic Induction, Faraday's, Lenz's Laws etc.
- Principles of motors and generators.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report	2000 words	50%

Engineering Council AHEP4 Learning Outcomes **developed** in this assessment:

C1: Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study.

C2: Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science, and engineering principles.

C3: Select and apply appropriate computational and analytical techniques to model complex problems.

C4: Select and evaluate technical literature and other sources or information to address complex problems.

C12: Use practical laboratory and workshop skills to investigate complex problems.

Assessment Component 2

(Tick one)

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam	2 hours	50%

Engineering Council AHEP4 Learning Outcomes **developed** in this assessment:

C1: Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study.

C2: Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science, and engineering principles.

C3: Select and apply appropriate computational and analytical techniques to model complex problems.

Assessment Summary

Activity type	Percentage
Written exam	50%
Coursework	50%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4031	
Module Title	Electrical Principles	
Classification	Reading List entry	Electronic*
Essential	Bird, J.O. (2022) <i>Bird's electrical circuit theory and technology</i> . Seventh edition. London: Routledge.	☒
Essential	Floyd, T.L. and Buchla, D.M. (2013) <i>DC/AC fundamentals: a systems approach</i> . Upper Saddle River, N.J: Pearson.	☐
Further	Sinclair, I.R. and Dunton, J. (2007) <i>Practical electronics handbook</i> . 6th ed. Amsterdam ; Newnes.	☐
Further	Warnes, L.A.A. (2003) <i>Electronic and electrical engineering: principles and practice</i> . 3rd ed. Basingstoke: Palgrave Macmillan.	☒

Module Code	ACMA4032
Title	Engineering Mathematics 1
Date	06/08/2025
Level	4
Credits	10
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To introduce students to pure mathematical techniques necessary for an understanding of the analytical content encountered in further engineering modules.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- present an understanding and competency with respect to a range of algebraic and mathematical techniques;
- present an ability to solve mathematical problems involving a range of equation forms.

INDICATIVE CONTENT

- Transposition of formula.
- Solution of linear, quadratic and simultaneous equations.
- Trigonometry involving both right-angled and non-right-angled triangles.
- Trigonometric functions and solutions of equations involving them.
- Logarithms.
- An introduction to matrix algebra and manipulation.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam	2 hours	100%

Assessment Summary

Activity type	Percentage
Written exam	100%
Coursework	0%
Practical	0%
TOTAL	100%

Engineering Council AHEP4 Learning outcomes **developed** in this module:

C1: Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study.

C2: Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science, and engineering principles.

INDICATIVE READING LIST

Module Code	ACMA4032	
Module Title	Engineering Mathematics 1	
Classification	Reading List entry	Electronic*
Essential	Smedley, R. and Wiseman, G. (2001) <i>Introducing pure mathematics</i> . 2nd ed. Oxford: Oxford University Press.	☐
Essential	Stroud, K.A. and Booth, D.J. (2020) <i>Engineering mathematics</i> . Eighth edition. London: Red Globe Press.	☐
Essential	Gaulter, B., Gaulter, M., (2001) <i>Further Pure Mathematics</i> Oxford. Oxford University Press	☐

Module Code	ACMA4033
Title	Engineering Science 1 and Laboratory Skills
Date	06/08/2025
Level	4
Credits	20
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To introduce fundamental engineering science principles.
- To develop practical laboratory skills relevant to mechanical engineering.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- identify and describe basic principles of engineering science;
- present proficiency in using laboratory equipment and techniques.

INDICATIVE CONTENT

- Fundamentals of mechanics:
 - Vectors and Scalars;
 - Statics;
 - Newton's Laws of Motion;
 - Work, Energy, and Power;
 - Conservation Laws;
 - Fluid Mechanics Basics;
 - Simple Harmonic Motion;
 - Mechanics of materials.
- Laboratory sessions covering basic experimental methods in mechanical engineering, including safety protocols, security measures, and secure communication protocols.
- Measurement errors and uncertainties.
- Data analysis and presentation techniques with consideration for security implications.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☒ **Written exam** ☐ **Coursework** ☐ **Practical**

Mode of assessment	Volume	Weighting
Exam	2 hours	50%

Engineering Council AHEP4 Learning Outcomes **developed** in this assessment:

C1: Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study.

C2: Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science, and engineering principles.

Assessment Component 2

(Tick one)

☐ **Written exam** ☒ **Coursework** ☐ **Practical**

Mode of assessment	Volume	Weighting
Laboratory Report	2000 words	50%

Engineering Council AHEP4 Learning Outcomes **developed** in this assessment:

C1: Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study.

C2: Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science, and engineering principles.

C12: Use practical laboratory and workshop skills to investigate complex problems.

Assessment Summary

Activity type	Percentage
Written exam	50%
Coursework	50%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4033	
Module Title	Engineering Science 1 and Laboratory Skills	
Classification	Reading List entry	Electronic*
Essential	Bird, J.O. (2019) <i>Science and mathematics for engineering</i> . 6th edition. London: Routledge. Available at: https://doi.org/10.1201/9780429261701 .	☒
Essential	Bird, J.O. and Ross, C.T.F. (2020) <i>Mechanical engineering principles</i> . Fourth edition. Abingdon, Oxon: Routledge.	☒
Essential	Kirkup, L., (2019) <i>Experimental Methods for Science and Engineering Students: An Introduction to the Analysis and Presentation of Data</i> . 2 nd Edition. Cambridge. Cambridge University Press	☐
Further	Tooley, M., (2020) <i>Engineering Science: For Foundation Degree and Higher National</i> 2 nd Edition. Oxford. Routledge,	☐
Further	Leng, L., G., (2024) <i>Understanding Data Encryption: A Practical Guide to Secure Computing</i> , Independently published	☐
Further	Taylor, J., R., (1997) <i>Introduction to Error Analysis: The Study of Uncertainties in Physical Measurements</i> , 2 nd Edition. Herndon. University Science Books, U.S.,	☐

Module Code	ACMA4034
Title	Introduction to Materials Engineering
Date	06/08/2025
Level	4
Credits	10
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To develop an understanding of the various groups of materials, their structure, properties, and applications in an engineering context

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- define the fundamental atomic structure of materials and their consequent physical and chemical properties with an appreciation of basic chemical reactions that are important in the extraction, preparation and behaviour of materials;
- classify the material groups of metals, ceramics, polymers, and composites and understand their strengths and weaknesses in various applications.

INDICATIVE CONTENT

- Atomic Structure: Atomic structure, atomic numbers and weights, electronic structure of atom. Atomic theory of the elements.
- The principles of inter-atomic bonding and the various types of material properties which may result.
- Thermal properties of materials; heat capacity and thermal conductivity.
- Mechanical properties of materials; strength, ductility, stress and strain.
- Electrical properties of materials; conductivity and electronic band structure.
- Optical properties of materials; reflectance, absorbance, origins of material colour.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam	2 hours	100%

Assessment Summary

Activity type	Percentage
Written exam	100%
Coursework	0%
Practical	0%
TOTAL	100%

Engineering Council AHEP4 Learning Outcomes **developed** in this module:

C13: Select and apply appropriate materials, equipment, engineering technologies, and processes, recognising their limitations.

C15: Apply knowledge of engineering management principles, commercial context, project and change management, and relevant legal matters including intellectual property rights.

INDICATIVE READING LIST

Module Code	ACMA4034	
Module Title	Introduction to Materials Engineering	
Classification	Reading List entry	Electronic*
Essential	Callister, W.D. and Rethwisch, D.G. (2020) <i>Materials science and engineering : an introduction</i> . 10th edition. Hoboken, NJ: Wiley.	☐
Essential	Giancoli, D.C. (2015) <i>Physics : Principles with Applications</i> . 7 th edition. London. Pearson Education Limited	☐
Essential	Shackelford, J. (2022) <i>Introduction to materials science for engineers</i> . 9th. London. Pearson.	☐
Further	Ashby, M.F. and Johnson, K. (2014) <i>Materials and design : the art and science of material selection in product design</i> . Third edition. Oxford: Butterworth-Heinemann.	☒
Further	Schrader, G.F. et al. (2000) <i>Manufacturing processes & materials</i> . Fourth edition. Dearborn, Mich: Society of Manufacturing Engineers.	☒
Further	Creese, R.C. (1999) <i>Introduction to manufacturing processes and materials</i> . New York: Marcel Dekker.	☐
Further	Ashby, M.F. and Jones, D.R.H. (2013) <i>Engineering materials 2 : an introduction to microstructures, processing, and design</i> . 4th ed. Oxford [Oxfordshire] ; Butterworth-Heinemann.	☐
Further	White, M.A. (2019) <i>Physical properties of materials</i> . Third edition. Boca Raton, FL: CRC Press, Taylor & Francis Group.	☐

Module Code	ACMA4035
Title	Laboratory Skills for Materials 1
Date	06/08/2025
Level	4
Credits	10
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To develop an understanding of working with various materials in a laboratory environment and gain practical experience in the testing and analysis of materials and their properties.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- recognise safe working in a laboratory setting by themselves and with others;
- define and perform a suitable test for a material and relate its mechanical properties to its microstructure.

INDICATIVE CONTENT

- Safety in the lab, MSDS and proper PPE usage.
- Metallographic preparation.
- Mounting, polishing, etching.
- Tension and compression testing of metals.
- Hardness testing.
- Optical microscopy of metals.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Laboratory Report	2000 Words	100%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4035	
Module Title	Laboratory Skills for Materials 1	
Classification	Reading List entry	Electronic*
Essential	Callister, W.D. and Rethwisch, D.G. (2020) <i>Materials science and engineering : an introduction</i> . 10th edition. Hoboken, NJ: Wiley.	☐
Essential	Jones, D.R.H. and Ashby, M.F. (2019) <i>Engineering materials 1 : an introduction to properties, applications and design</i> . Fifth edition / David R.H. Jones, Michael F. Ashby. Oxford: Butterworth-Heinemann.	☐
Essential	Ashby, M.F. and Jones, D.R.H. (2013) <i>Engineering materials 2: an introduction to microstructures, processing, and design</i> . 4th ed. Oxford [Oxfordshire] ; Butterworth-Heinemann.	☐
Further	Schrader, G.F. <i>et al.</i> (2000) <i>Manufacturing processes & materials</i> . Fourth edition. Dearborn, Mich: Society of Manufacturing Engineers.	☐
Further	Creese, R.C. (1999) <i>Introduction to manufacturing processes and materials</i> . New York: Marcel Dekker.	☐
Further	White, M.A. (2019) <i>Physical properties of materials</i> . Third edition. Boca Raton, FL: CRC Press, Taylor & Francis Group.	☐

Module Code	ACMA4036
Title	Mechanical Properties of Materials 1
Date	06/08/2025
Level	4
Credits	10
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To develop an understanding of the mechanical properties of various materials, covering the influence of microstructure, temperature, environment, and deformation rate on material response.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- describe the differences between elasticity and plasticity and their relationship to crystallography and slip systems;
- recognise phase diagrams, formation of microstructures through heat treatment and the influence on mechanical properties of materials.

INDICATIVE CONTENT

- Fundamentals of elastic and plastic deformation, the stress-strain curve.
- Crystal structures, points, planes, analysis.
- Dislocations in crystalline materials, edge, screw, mixed dislocations.
- Atomic diffusion and phase diagrams.
- Mechanical testing of metals and ceramics.
- Static fracture in materials.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam	2 hours	100%

Assessment Summary

Activity type	Percentage
Written exam	100%
Coursework	0%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4036	
Module Title	Mechanical Properties of Materials 1	
Classification	Reading List entry	Electronic*
Essential	Callister, W.D. and Rethwisch, D.G. (2020) <i>Materials science and engineering : an introduction</i> . 10th edition. Hoboken, NJ: Wiley.	☐
Essential	Jones, D.R.H. and Ashby, M.F. (2019) <i>Engineering materials 1 : an introduction to properties, applications and design</i> . Fifth edition / David R.H. Jones, Michael F. Ashby. Oxford: Butterworth-Heinemann.	☐
Essential	Ashby, M.F. and Jones, D.R.H. (2013) <i>Engineering materials 2: an introduction to microstructures, processing, and design</i> . 4th ed. Oxford [Oxfordshire] ; Butterworth-Heinemann.	☐
Further	Ashby, M.F. and Johnson, K. (2014) <i>Materials and design : the art and science of material selection in product design</i> . Third edition. Oxford: Butterworth-Heinemann.	☐
Further	Schrader, G.F. <i>et al.</i> (2000) <i>Manufacturing processes & materials</i> . Fourth edition. Dearborn, Mich: Society of Manufacturing Engineers.	☐
Further	Creese, R.C. (1999) <i>Introduction to manufacturing processes and materials</i> . New York: Marcel Dekker.	☐
Further	White, M.A. (2019) <i>Physical properties of materials</i> . Third edition. Boca Raton, FL: CRC Press, Taylor & Francis Group.	☐

Module Code	ACMA4037
Title	Plant Operations and Performance
Date	06/08/2025
Level	4
Credits	20
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To provide students with foundational knowledge and understanding of industrial plant operations and performance, focusing on safe, efficient, and reliable practices that support effective engineering management.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- describe the structure and function of industrial plant systems and apply standard operational procedures to support safe and efficient performance;
- explain basic methods for monitoring and improving plant performance, including the role of maintenance, reliability, and operational decision-making.

INDICATIVE CONTENT

- Introduction to Plant Operations:
 - Role of plant operations in engineering and industrial management;
 - Overview of plant systems and process flows.
- Plant Components and Functions:
 - Mechanical, electrical, and process equipment;
 - Integration of systems in production environments.
- Operational Procedures:
 - Standard operating procedures (SOPs);
 - Start-up, shutdown, and emergency protocols;
 - Communication and shift handovers.
- Health, Safety, and Environmental Considerations:
 - Introduction to risk assessment and hazard control;
 - Safety regulations and compliance;
 - Environmental impact and sustainability in operations.

- Performance Monitoring and Metrics:
 - Key performance indicators (KPIs): uptime, downtime, throughput, efficiency;
 - Introduction to basic data collection and interpretation;
 - Visual inspections and instrumentation.
- Maintenance and Reliability:
 - Preventive and corrective maintenance;
 - Basic reliability concepts (e.g., MTBF, availability);
 - Maintenance as a performance enabler.
- Operational Decision-Making:
 - Introduction to operational planning and resource allocation;
 - Impact of operational decisions on performance and cost;
 - Communication and coordination in plant environments.
- Introduction to Continuous Improvement:
 - Basic concepts of lean operations and process optimisation;
 - Identifying inefficiencies and performance bottlenecks.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam	2 hours	50%

Assessment Component 2**(Tick one)**☐ **Written exam**☐ **Coursework**☒ **Practical**

Mode of assessment	Volume	Weighting
Poster presentation and marking of poster	20 minutes	50%

Assessment Summary

Activity type	Percentage
Written exam	50%
Coursework	0%
Practical	50%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4037	
Module Title	Plant Operations and Performance	
Classification	Reading List entry	Electronic*
Essential	Slack, N. and Brandon-Jones, A. (2019) <i>Operations management</i> . 9th ed. Harlow: Pearson.	☒
Essential	Bradley, E. (2022). <i>Reliability Engineering: A Life Cycle Approach</i> . 2 nd Edition. Boca Raton. CRC Press, Taylor & Francis Group.	☐
Essential	Kelly, A. (2006). <i>Plant Maintenance Management Set</i> . Oxford. Butterworth-Heinemann	☐
Further	Ries, J. (2022). <i>Lean Six Sigma: 3 Books in 1: The Complete Guide to Implementing Six Sigma Methodology for Continuous Manufacturing Process Improvement (Lean Methodology)</i> . Independently published	☐
Further	McWhorter, B. (2017). <i>Introduction to Lean Manufacturing: The Road to Continuous Improvement</i> . CreateSpace Independent Publishing Platform	☐

Module Code	ACMA4038
Title	Quality and Business Improvement
Date	06/08/2025
Level	4
Credits	20
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To equip students with the knowledge and skills necessary to apply various tools and techniques to improve the quality of products, services, and overall business performance.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- select and apply appropriate tools and techniques to investigate problems, assess risks, and analyse potential areas for improvement;
- identify and describe the core elements of the Six Sigma methodology, including its applications in quality management and process improvement.

INDICATIVE CONTENT

- Fundamentals of the Six Sigma methodology: Define, Measure, Analyse, Improve, Control.
- Basic quality tools: check sheets, histograms, Pareto analysis, cause & effect analysis, scatter diagrams, flow charts, control charts.
- Lean principles: 9 wastes, kaizen, stability, standard work, heijunka, respect for people, Just-In-Time (JIT), jidoka, value to the customer.
- Lean tools & strategies: 5S, Plan-Do-Check-Act (PDCA), Kanban, pull systems, value stream mapping, poka-yoke, single-minute exchange of die (SMED).
- Statistical methods for quality improvement: statistical process control, analysis of variation, design of experiments, machine & process capability, regression analysis, evolutionary operation, analysis of means, multivariate analysis.
- The impact of digitalisation on quality improvement: smart automation, Internet of Things (IoT), big data analytics and AI for monitoring and enhancing quality.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	48	24%
Independent learning	152	76%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report	2000 words	50%

Assessment Component 2

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report	2000 words	50%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4038	
Module Title	Quality and Business Improvement	
Classification	Reading List entry	Electronic*
Essential	Pyzdek, T. and Keller, P.A. (2019) <i>The six sigma handbook</i> . Fifth edition. New York: McGraw-Hill Education.	☒
Essential	Bicheno, J. and Holweg, M. (2023) <i>The lean toolbox : a sourcebook for process improvement</i> . Sixth edition. Buckingham: PICSIE Books.	☒
Essential	Ryan, T.P., 2011. <i>Statistical methods for quality improvement</i> . John Wiley & Sons.	☒
Further	Wilson, L. (2015) <i>How to implement lean manufacturing</i> . Second edition. New York: McGraw-Hill.	☒
Further	Tetteh, E., & Chapman, H. (2018). <i>Lean six sigma for optimal system performance in manufacturing and service organizations: emerging research and opportunities</i> . Business Science Reference.	☒

Module Code	ACMA4038	
Module Title	Quality and Business Improvement	
Classification	Reading List entry	Electronic*
Further	Nicholas, J.M. (2018) <i>Lean production for competitive advantage : a comprehensive guide to lean methods and management practices</i> . Second edition. Boca Raton, [Florida] ; CRC Press.	☒
Further	Pažek, K. (ed.) (2021) <i>Lean manufacturing</i> . London, England: IntechOpen.	☒
Further	<i>Expanding the Horizons of Manufacturing: Towards Wide Integration, Smart Systems and Tools</i> . (2022). MDPI - Multidisciplinary Digital Publishing Institute.	☒
Further	<i>Lean Six Sigma in the Age of Artificial Intelligence: Harnessing the Power of the Fourth Industrial Revolution</i> (2019) Assembly (Carol Stream, Ill.). BNP Media, pp. 4-.	☒
Further	International journal of lean six sigma	☒
Further	International Journal of Quality & Reliability Management	☒

Module Code	ACMA4039
Title	Study Skills
Date	06/08/2025
Level	4
Credits	10
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To explore fundamental academic study skills essential for success in Higher Education.
- To develop independence as a learner and the ability to create a personal development plan.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- identify the value of the current skills in connection to the academic work and use personal development planning to enhance them;
- recognise academic writing standards, such as the usage of Harvard referencing and supporting documentation, and apply peer and self-evaluation feedback, as well as identify and build independent learning skills;
- identify the ethical concerns of academic research and gain knowledge of critical thinking and analysis in scholarly work.

INDICATIVE CONTENT

- Skills identification (e.g. self-evaluation, skills needed for higher education, transferable skills, action plans for personal development).
- Study Organisation and Management Exploration of strategies for effective time management, workspace arrangement, and resource organisation to support academic success.
- Information Structuring and Research Techniques Examination of methods for effective note-taking, library and internet research, referencing conventions, and approaches to revision and examination preparation.
- Communication and Data Presentation Study of presentation methods, visual communication tools such as graphs and charts, and statistical measures used to convey information clearly and accurately.
- Academic Writing and Critical Thinking Analysis of writing techniques including essay and report planning, logical structuring, argument development, and the integration of analytical thinking in academic contexts.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report	1400 words total	70%

Engineering Council AHEP4 Learning Outcomes **assessed** in this assessment:

C10: Adopt a holistic and proportionate approach to the mitigation of security risks.

C18: Plan and record self-learning and development as the foundation for lifelong learning / CPD.

Assessment Component 2

(Tick one)

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Video Presentation	5 minutes	30%

Engineering Council AHEP4 Learning Outcomes **assessed** in this assessment:

C10: Adopt a holistic and proportionate approach to the mitigation of security risks.

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	70%
Practical	30%
TOTAL	100%

INDICATIVE READING LIST

Module Code	ACMA4039	
Module Title	Study Skills	
Classification	Reading List entry	Electronic*
Essential	Cottrell, S. (2024) <i>The study skills handbook</i> . Sixth edition. London: Bloomsbury Academic.	☒

Module Code	ACMA4039	
Module Title	Study Skills	
Classification	Reading List entry	Electronic*
Essential	Van Emden, J. and Becker, L.M. (2018) <i>Writing for engineers</i> . Fourth edition. London: Palgrave.	☒
Further	Bird, J.O. and Ross, C.T.F. (2020) <i>Mechanical engineering principles</i> . Fourth edition. Abingdon, Oxon: Routledge.	☐

Module Code	ACMA4040
Title	Sustainable Manufacturing Technology
Date	06/08/2025
Level	4
Credits	10
Pre-Requisites	None
DBS Check	May be required ☐ Not required ☒

AIM(S)

- To develop a knowledge and appreciation of the processes used in the manufacture of components with a view to providing basic process selection parameters using a broad range of industrial applications to illustrate this
- To develop a knowledge base and understanding of sustainability in an industrial context.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- explain the applications, advantages and limitations of different manufacturing processes and understanding of engineering materials and manufacturing process selection;
- classify principles of sustainable design and manufacturing to optimise resource utilisation and minimise waste;
- analyse the economic and social factors influencing the adoption of sustainable manufacturing practices.

INDICATIVE CONTENT

- Polymeric processing (Mould design, process parameters and defects).
- Introduction to manufacturing processes: casting, moulding, forming, machining, joining, rapid manufacturing and 3D printing..
- Introduction to sustainable manufacturing: concepts, principles, and challenges.
- Life cycle assessment (LCA) and environmental impact analysis of manufacturing processes.
- Sustainable materials selection and recycling strategies.
- Energy efficiency and renewable energy applications in manufacturing.
- Design for sustainability: eco-design principles and methodologies.
- Sustainable supply chain management and circular economy concepts.
- Case studies of sustainable manufacturing practices in various industries.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	24	24%
Independent learning	76	76%
Placement learning	0	0%
TOTAL	100	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report	2000 words	100%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

Engineering Council AHEP4 Learning Outcomes **developed** in this module:

C5: Design solutions for complex problems that meet a combination of societal, user, business and customer needs as appropriate. This will involve consideration of applicable health and safety, diversity, inclusion, cultural, societal, environmental and commercial matters, codes of practice and industry standards.

C6: Apply an integrated or systems approach to the solution of complex problems.

C14: Discuss the role of quality management systems and continuous improvement in the context of complex problems.

C17: Communicate effectively on complex engineering matters with technical and non-technical audiences.

INDICATIVE READING LIST

Module Code	ACMA4040	
Module Title	Sustainable Manufacturing Technology	
Classification	Reading List entry	Electronic*
Essential	Groover, M.P. (2013) <i>Principles of modern manufacturing :/bSI version</i> . Fifth edition. Singapore: Wiley.	☐
Further	Seliger, G. & Eysers, P. (2019). <i>Sustainable Manufacturing: Shaping Global Value Creation</i> . New York. Springer.	☐
Further	Dornfeld, D. A. & Takata, S. (2015). <i>Green Manufacturing: Fundamentals and Applications</i> . New York. Springer.	☐

Module Code	ACMA4040	
Module Title	Sustainable Manufacturing Technology	
Classification	Reading List entry	Electronic*
Further	Bonvoisin, J., Seliger, G. and Stark, R. (2017) <i>Sustainable Manufacturing : Challenges, Solutions and Implementation Perspectives</i> . Cham: Springer Open.	☒
Further	Groover, M. P. (2017). <i>Groover's principles of modern manufacturing : materials, processes, and systems</i> . John Wiley & Sons, Inc.	☐
Further	Black, S.C. (1996) <i>Principles of engineering manufacture</i> . 3rd ed. London: Arnold.	☐
Further	Beddoes, J. and Biddy, M.J. (1999) <i>Principles of metal manufacturing processes</i> . Elsevier Butterworth-Heinemann.	☐