Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

MODULE DIRECTORY

LEVEL 7

ACADEMIC DISCIPLINE OF ENGINEERING

WALES INSTITUTE OF SCIENCE AND ART

2025-2026

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INTRODUCTION

This Module Directory includes all the modules for Level 7 within the discipline of Engineering, Wales Institute of Science & Art in the academic year 2025-2026.

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 Academic Discipline/Institute. 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 Institute 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	**ACFB7003 / ACFB7003D**
Title	**Master's Project**
Date	**05/06/2024**
Level	**7**
Credits	**60**
Pre-Requisites	**None**
DBS Check	**May be required ☐ Not required ☒**

AIM(S)

- To allow the student to advance their knowledge and understanding by undertaking and managing a significant project of their own choice, related to the major themes of their Master's programme.

LEARNING OUTCOMES

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

- critically identify and develop an advanced research topic;
- review appropriate literature by contextualising and integrating the study into the continuing development of knowledge and understanding of chosen research topic;
- critically formulate a series of research objectives and devise strategies to support these;
- demonstrate and display advanced critical, analytical, and creative thinking;
- demonstrate advanced professional skills to present information both orally and in a written form.

INDICATIVE CONTENT

The Masters Project is an essential part of the degree; it is the culmination of the Masters programme. As such, it has been designed and conceived as an integral part of the programme. Preparation for the Masters Project begins early in the programme, and students acquire analytical and other research skills throughout part 1. This underpins and enhances the student's ability to undertake research.

- Formulation and rationale for suitable post-graduate research objectives.
- Application of an appropriate methodology for the investigation.
- Collation and communication - recording and organising information, analysis of results, communicating the results, referencing, plagiarism.
- Critical review of appropriate literature within a conceptual/theoretical framework.
- Determination of research results.
- Critical appraisal of the results/solutions of the investigation.
- Project planning - project time scale control.

- Oral/visual critique and presentation of the results of the investigation.
- Written and verbal critique of the research.
- Intellectual property - copyright, trademarks, patents.
- Social and cultural context, and ethical issues including sustainability.
- Intellectual property - copyright, trademarks, patents.
- Social and cultural context, and ethical issues.

Study Time Allocation

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	15	2.5%
Independent learning	585	97.5%
Placement learning	0	0%
TOTAL	**600**	**100%**

ASSESSMENT

Assessment Component 1
(Tick one)

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

Mode of assessment	Volume	Weighting
Masters Project Students will produce a research portfolio of work appropriate to the nature of their project. This will vary slightly according to the nature of the project undertaken. Portfolio elements may include a selection of the following, to be agreed with the external examiner: • Written Report (all students) • Exhibition Board (all students) • Presentation slides Hardware and/or software implementation	15,000 words equivalent.	80%

Assessment Component 2
(Tick one)

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

Mode of assessment	Volume	Weighting
Presentation (Viva Voce)	20 Minutes + Questions	20%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	80%
Practical	20%
TOTAL	**100%**

Professional, Statutory and regulatory Body (PSRB): This module aims to cover the following AHEP4 learning outcomes: M4, M16, M17

INDICATIVE READING LIST

Module Code	**ACFB7003 / ACFB7003D**	
Module Title	**Master's Project**	
Classification	**Reading List entry**	**Electronic***
Essential	McCormac, C., & Davis, J. (2015). *Research Project Success: The Essential Guide for Science and Engineering Students*. Royal Society of Chemistry.	☒
Essential	Greenfield, T. (2016). *Research Methods for Postgraduates*. Arnold.	☒
Essential	Cottrell, S. (2023). *Critical Thinking Skills: Effective Analysis, Argument and Reflection - Palgrave Study Guides* (4th ed.). Palgrave Macmillan.	☒
Essential	Cottrell, S. Dissertations and Project Reports: A Step by Step Guide (Palgrave Study Skills, 2014).	☒
Essential	O'Leary, Z. (2021). *The Essential Guide to Doing Your Research Project* (4th ed.). Sage.	☒
Further	Bell, J. (2018). *Doing Your Research Project: A Guide for First-Time Researchers* (7th ed.). Amacom.	☐
Further	Kranzler, J. H. (2022). *Statistics for the Terrified* (7th ed.). Prentice Hall.	☒
Further	Dawson, C. W. (2015). *Projects in Computing and Information Systems: A Student's Guide* (3rd ed.). Addison-Wesley.	☒
Further	Dipankar, D. (2019). *Engineering Research Methodology: A Practical Insight for Researchers*. Springer.	☐
Further	Tang, H. (2020). *Engineering Research: Design, Methods, and Publication*. Wiley.	☒
Further	Fellows, R., & Liu, A. (2015). *Research Methods for Construction* (4th ed.). Wiley & Sons, Inc.	☐
Further	Few, S. (2012) *Show Me the Numbers: Designing Tables and Graphs to Enlighten*, Burlingame: Analytics Press.	☒
Further	Hughes, B., & Cotterell, M. (2009). *Software Project Management* (5th ed.). McGraw-Hill.	☐

Further	Phillips, J. (2010). *IT Project Management: On Track from Start to Finish*. McGraw-Hill.	☐
Further	Gregoire, T. G., & Valentine, H. T. (2008). *Sampling Strategies for Natural Resources and the Environment*. Chapman.	☐
Further	Baase, S. (2017). *A Gift of Fire: Social, Legal, and Ethical Issues for Computing and the Internet* (5th ed.). Pearson.	☐
Further	Collis, J., & Hussey, R. (2021). *Business Research: A Practical Guide for Undergraduate and Postgraduate Students* (5th ed.). Palgrave Macmillan.	☐
Further	Davies, M. B. (2014). *Doing a Successful Research Project: Using Qualitative or Quantitative Methods* (2nd ed.). Palgrave Macmillan.	☐
Further	Hewson, C., Vogel, C., & Laurent, D. (2016). *Internet Research Methods* (2nd ed.). Sage.	☐
Further	Quinn, M. J. (2017). *Ethics for the Information Age* (7th ed.). Pearson.	☐
Further	Yin, R. K. (2014). *Case Study Research: Design and Methods* (5th ed.). Sage.	☐
Further	Spence, R. (2014). *Information Visualization: An Introduction*. Addison-Wesley.	☐
Further	Thiel, D. V. (2014). *Research Methods for Engineers*. Cambridge UP.	☒
Further	Wheater, C.P. & Cook, P.A. (2015) Using statistics to understand the environment Routledge	☐
Further	Wallace, M., & Wray, A. (2021). *Critical Reading and Writing for Postgraduates* (4th ed.). Sage.	☐
Further	Journals ACM Transactions on Information Systems Behaviour and Information Technology Communications on the ACM International Journal of Electronic Commerce Journal of Strategic Information Systems Journal of Systems Management	☒
Further	ebsites http://www.acm.org http://www.bized.co.uk http://www.managers.org.uk http://www.cbronline.com http://www.eevl.ac.uk http://juno.emeraldinsight.com http://www.ft.chadwyck.co.uk http://www.itwales.com http://www3.gartner.com http://www.silicon.com http://www.mckinseyquarterly.com http://www.zdnetweek.co.uk http://projectmanagement.ittoolbox.com/ http://www.ics.ltsn.ac.uk/resources/projman/index.html http://www.niwotridge.com/Resources /PMSWEResources/PMResources.htm http://www.tickit.org/international.htm http://www.bcs.org/ http://www.uml.org/	☒

	http://www.omg.org/	

Module Code	**ACHA7001**
Title	**Aerodynamics of Ground Vehicles**
Date	**05/06/2024**
Level	**7**
Credits	**10**
Pre-Requisites	**None**
DBS Check	**May be required ☐ Not required ☒**

AIM(S)

- To provide students with the knowledge, skills, and methodologies essential for the design, analysis, and testing of aerodynamic devices for ground vehicle applications.

LEARNING OUTCOMES

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

- demonstrate a comprehensive understanding of aerodynamic principles as applied to ground vehicles;
- through critical evaluation, select and develop appropriate techniques to solve aerodynamic design problems.

INDICATIVE CONTENT

- Fluid dynamics review: Bernoulli's Equation, boundary layer development, turbulence, separation.
- Aerodynamic effects on road vehicles: Downforce, Drag, Stability and other considerations.
- Aerodynamic Testing: Wind tunnel design. Instrumentation. The role of Computational Fluid Dynamics (CFD) in the design and evaluation process.
- Measurement of aerodynamic loadings generated by a vehicle in a real-world environment.
- Development of aerodynamic devices for specific applications, within target design parameters.
- Principles and design of aerodynamic devices such as wings, diffusers, splitters, compound wing elements, ground effect devices, canards, flow management devices.

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 Report	2,500 words	100%

Assessment Summary

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

Professional, Statutory and Regulatory Body (PSRB): This module aims to cover the following AHEP4 learning outcomes: M2, M3

INDICATIVE READING LIST

Module Code	**ACHA7001**	
Module Title	**Aerodynamics of Ground Vehicles**	
Classification	**Reading List entry**	**Electronic***
Essential	Schüetz. (2016). *Aerodynamics of Road Vehicles* (Fifth edition). SAE International.	☒
Essential	McBeath. (2017). *Competition Car Aerodynamics* (3rd ed.). Veloce.	☒
Essential	Barnard. (2009). *Road Vehicle Aerodynamic Design: An Introduction* (3rd ed.). MechAero.	☐
Essential	Katz. (1995). *Race Car Aerodynamics: Designing for Speed*. Robert Bentley.	☒
Essential	Segers. (2014). *Analysis Techniques for Racecar Data Acquisition* (Second Edition). SAE International.	☒
Further	Vehicle Aerodynamics Design and Technology. (2001).	☐
Further	Smith. (1978). *Tune to Win*. Aero Publishers.	☐
Further	Chung. (2010). *Computational Fluid Dynamics* (Second edition). Cambridge University Press.	☒
Further	Mair. (1994). *Aerodynamics for Engineering Students*. *Proceedings of the Institution of Mechanical Engineers. Part G, Journal of Aerospace Engineering*, 208(1), 68–.	☒
Further	Versteeg, Malalasekera, W., & Malalasekera, W. (Weeratunge). (2007). *An Introduction to Computational*	☒

	Fluid Dynamics: The Finite Volume Method (2nd ed.). Pearson Prentice Hall.	
Further	Bertin, J., & Cummins, R. (2022). *Aerodynamics for Engineers* (6th ed.). Cambridge University Press.	☐
Further	Katz, J. (2021). Aerodynamics in Motorsports. *Journal of Sports Engineering & Technology*, 235, 324-338.	☐
Further	SAE mobilus. (n.d.). SAE International.	☒
Further	Science Direct	☒

Module Code	**ACHA7002**
Title	**Alternative Fuels and Combustion Modelling**
Date	**05/06/2024**
Level	**7**
Credits	**20**
Pre-Requisites	**None**
DBS Check	**May be required ☐ Not required ☒**

AIM(S)

- To provide students with an advanced understanding of alternative fuels and combustion modelling for automotive applications. Students will develop practical skills in modelling combustion systems and assessing the performance of alternative fuels in internal combustion engines and hybrid-electric powertrains and will gain experience in the selection and optimization of fuel and combustion systems for automotive applications.

LEARNING OUTCOMES

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

- critically evaluate the key alternative fuels used in automotive combustion systems, including biofuels, hydrogen, and synthetic fuels;
- develop and use combustion models to predict the performance of alternative fuels in internal combustion engines and hybrid-electric powertrains.

INDICATIVE CONTENT

- Introduction to alternative fuels and combustion modelling for automotive applications.
- Properties and characteristics of alternative fuels, including biofuels, hydrogen, and synthetic fuels.
- Fuel and ignition strategies and their impact on combustion efficiency.
- Emissions control technologies, including aftertreatment systems.
- Combustion modelling techniques, including thermodynamics and computational fluid dynamics (CFD).
- Simulation tools for modelling combustion and performance of alternative fuels.
- Selection and optimization of fuel and combustion systems for both automotive and competition applications.
- Safety and regulatory considerations for alternative fuels in automotive and competition applications.

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	2,500 words	50%

Assessment Component 2
(Tick one)

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

Mode of assessment	Volume	Weighting
Practical Assessment	2,500 words or Equivalent	50%

Assessment Summary

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

Professional, Statutory and regulatory Body (PSRB): This module aims to cover the following AHEP4 learning outcomes: M2, M3, M5, M7

INDICATIVE READING LIST

Module Code	ACHA7002	
Module Title	Alternative Fuels and Combustion Modelling	
Classification	Reading List entry	Electronic*
Essential	Heywood, J. (2018). *Internal Combustion Engine Fundamentals* (2nd ed.). McGraw-Hill Education.	☐
Essential	Simulating Combustion: Simulation of combustion and pollutant formation for engine-development. (2008). Springer Berlin Heidelberg.	☐
Further	Warnatz, J., Maas, V., & Dibble, R. W. (2006). *Combustion* (4th ed.). Springer.	☐
Further	Blair, G. P. (1998). *Design and Simulation of Four-Stroke Engines*. SAE International.	☐
Further	*Thermodynamics: Concepts and Applications* (2006). Cambridge University Press.	☐
Further	Kirkpatrick, A. (2021). *Internal Combustion Engines: Applied Thermosciences* (4th ed.). Wiley.	☐
Further	K Biernat. Biofuels: State of Development. 1st Ed. 2018. IntertechOpen. (online).	☐
Further	S Bhattacharyya. Applications of Computational Fluid Dynamics Simulation & Modelling. 1st Ed. 2022. IntertechOpen.	☐
Further	SAE, ImechE	☒
Further	ANSYS User Documentation 2021 – Current	☒
Further	Homepage – Vehicle Certification Agency (vehicle-certification-agency.gov.uk)	☒
Further	UK-HyRES – Driving the growth of low carbon hydrogen and alternative liquid fuels. UK-HyRES aims to define and tackle the research challenges blocking the wider use of low carbon fuels in the UK – funded by UK Research and Innovation (UKRI) through the Engineering and Physical Sciences Research Council (EPSRC) (ukhyres.co.uk)	☒
Further	Use of Alternative and Advanced Fuels in Combustion Systems | Frontiers Research Topic (frontiersin.org)	☒

Module Code	**ACHA7003**
Title	**Automotive Sector Management and Business**
Date	**05/06/2024**
Level	**7**
Credits	**10**
Pre-Requisites	**None**
DBS Check	**May be required ☐ Not required ☒**

AIM(S)

- To provide students with an understanding of the business challenges within the automotive sector and the knowledge to be able to evaluate the importance of good leadership practices, supply chain management and logistical operations in the optimization of automotive sector operations.

LEARNING OUTCOMES

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

- ascertain some of the unique challenges faced by the modern automotive industry and apply suitable approaches to planning a business strategy best suited to ensuring a sustainable and robust entry;

- evaluate and tackle commercial and operational aspects of automotive business operations such as, logistics, media relations/marketing, sponsorship, intellectual property/technology transfer and management of technical personnel and departments.

INDICATIVE CONTENT

- Appreciation of the general business environment and management approaches.

- Specific business considerations for motorsport operations.

- Project management for technical businesses.

- Financing considerations of projects.

- Marketing, media relations and sponsorship/sponsor relations applicable to automotive companies.

- Intellectual property rights, technology transfer.

- Personnel management techniques.

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 (Group)	10 minutes per person	100%

Assessment Summary

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

Professional, Statutory and regulatory Body (PSRB): This module aims to cover the following AHEP4 learning outcomes: M5, M16, M17

INDICATIVE READING LIST

Module Code	ACHA7003	
Module Title	**Automotive Sector Management and Business**	
Classification	**Reading List entry**	**Electronic***
Essential	Krietner, R. (2012). *Principles of Management* (12th ed.). South Western College.	☐
Essential	Maylor, H. (2022). *Project Management* (5th ed.). Pearson.	☒
Essential	Mullins, L. J. (2013). *Management and Organisational Behaviour*. Pearson Education.	☒
Essential	Herold, D. (2022). *Managing Global Sports Events: Logistics & Coordination* (1st ed.). Emerald Publishing Ltd. Retrieved from [link to the online source].	☒
Further	Bowen, R. (2014). *Engineering Ethics*. Springer International Publishing.	☒
Further	Masterman, G. (2007). *Sponsorship – for a Return on Investment*. Butterworth Heinemann.	☒
Further	Kotler, P. (2018). *Principles of Marketing* (17th ed.). FT Prentice Hall.	☒
Further	Dyson, J. (2017). *Accounting for Non-Accounting Students* (9th ed.). FT Prentice Hall.	☐
Further	General Management www.mindtools.com	☒
Further	Sustainable Business http://www.edie.net/index.asp	☒

Module Code	**ACHA7004**
Title	**Body in White Structures**
Date	**05/06/2024**
Level	**7**
Credits	**10**
Pre-Requisites	**None**
DBS Check	**May be required ☐ Not required ☒**

AIM(S)

- To provide students with an advanced understanding of Body in White (BIW) structure, including its design, materials, manufacturing and joining techniques, and its impact on vehicle performance, safety, and comfort. Students will develop practical skills in designing and analysing BIW structures and will gain experience in selecting appropriate materials and joining techniques.

LEARNING OUTCOMES

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

- critically evaluate the key design considerations and materials used in BIW structures, including their impact on vehicle performance, safety, and comfort;

- develop and analyse BIW structures using appropriate materials and joining techniques for a given application.

INDICATIVE CONTENT

- Introduction to BIW structures.

- Design considerations, including stiffness, strength, crashworthiness, and NVH (Noise, Vibration, and Harshness).

- Materials used in BIW structures, including steel, aluminium, and composites.

- Manufacturing techniques for BIW structures, including stamping, casting, and extrusion.

- Joining techniques for BIW structures, including spot welding, adhesive bonding, and mechanical fastening.

- Analysis methods for BIW structures, including finite element analysis (FEA) and crash simulations.

- Selection and optimization of materials and joining techniques for BIW structures.

- Safety and regulatory considerations for BIW structures.

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 Report	2,500 words	100%

Assessment Summary

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

Professional, Statutory and regulatory Body (PSRB): This module aims to cover the following AHEP4 learning outcomes: M2, M3

INDICATIVE READING LIST

Module Code	**ACHA7004**	
Module Title	**Body in White Structures**	
Classification	**Reading List entry**	**Electronic***
Essential	Brown, J., Robertson, A., & Serpento, S. (2002). *Motor Vehicle Structures: Concepts & Fundamentals* (1st ed.). Butterworth-Heinemann.	☐
Essential	EuroNCAP website (https ://www.euroncap.com/).	☒
Essential	Gillespie, T. D. (1992). *Fundamentals of Vehicle Dynamics*. Warrendale, PA: Society of Automotive Engineers.	☐
Essential	Hillier, V., & Coombes, P. (2004). *Fundamentals of Motor Vehicle Technology*. Stanley Thornes.	☐
Essential	Schüetz, T. (2016). *Aerodynamics of Road Vehicles* (5th ed.). SAE International.	☐
Essential	Ashby, M., Shercliff, H., & Cebon, D. (2019). *Materials: Engineering, Science, Processing & Design* (4th ed.). Butterworth-Heinemann.	☐
Further	Zheng, Y. (2018). *Automotive Power Transmissions*. Wiley.	☐
Further	Jacobson, Bengt. Vehicle Dynamics Compendium. 2017. Web.	☒
Further	Automotive Steel Design Manual (American Iron and Steel institute, 2002).	☐
Further	The Aluminium Automotive Manual (European Aluminium Association, 2013).	☐
Further	Stone, R. (1999). *Introduction to Internal Combustion Engines*. Macmillan.	☐

Module Code	**ACHA7005**
Title	**Business Analytics**
Date	**05/06/2024**
Level	**7**
Credits	**10**
Pre-Requisites	**None**
DBS Check	**May be required ☐ Not required ☒**

AIM(S)

- To provide students with the necessary skills to critically analyse a business with regards to improving performance in terms of leadership, management, business and financial measures.

LEARNING OUTCOMES

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

- develop and critically analyse a range of techniques to evaluate a business' performance and where appropriate to propose improvements.

INDICATIVE CONTENT

- Leadership including models of leadership, empowerment of employees, understanding cultural and organisation roadblocks, SWOT and PESTLE analysis.

- Team management: roles and responsibilities, team formation and group dynamics, motivational techniques, approaches to communication and team working.

- Change management – need for change, managing change, how to deal with resistance, reasons for change management failures.

- Business and financial measures such as – Key Performance Indicator's (KPI's) development and applications, performance measurement, costing, investment analysis, profitability, critical-to-cost and Schedule and balanced scorecard.

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
Assignment	2,500 words	100%

Assessment Summary

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

INDICATIVE READING LIST

Module Code	**ACHA7005**	
Module Title	**Business Analytics**	
Classification	**Reading List entry**	**Electronic***
Essential	Paul, D., & Cadle, J. (2020). *Business Analytics* (4th ed.). Chartered Institute for IT, Swindon.	☐
Essential	Cameron, B., & Green, M. (2019). *Making Sense of Change Management* (5th ed.). Kogan Page, London.	☐
Essential	Mullins, L., & Rees, G. (2023). *Management and Organisational Behaviour* (12th ed.). Pearson, Harlow.	☐
Further	Northouse, P. (2021). *Leadership: Theory & Practice* (9th ed.). Sage Publications.	☐
Further	Hayes, J. (2022). *The Theory and Practice of Change Management* (6th ed.). Macmillan, London.	☐
Further	Armstrong, M., & Taylor, S. (2023). *Armstrong's Handbook of Human Resource Management, Practice* (16th ed.). Kogan Page, London.	☐
Further	Journal of Business Research	☒
Further	The International Journal of Management	☒
Further	European Journal of Operational Research	☒
Further	European Management Journal	☒
Further	Journal Of International Management	☒
Further	Journal of Economics and Business	☒

Module Code	**ACHA7007**
Title	**Energy Storage and Control Systems**
Date	**05/06/2024**
Level	**7**
Credits	**20**
Pre-Requisites	**None**
DBS Check	**May be required ☐ Not required ☒**

AIM(S)

- To provide students with an advanced understanding of energy storage and control systems for vehicles, including electric and hybrid-electric vehicles. Students will develop practical skills in designing, modelling, and testing energy storage and control systems, and will gain experience in the selection and integration of components.

LEARNING OUTCOMES

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

- critically evaluate the key energy storage technologies used in vehicles, including batteries, ultracapacitors, and fuel cells;

- utilise mathematical evaluation models to specify energy storage and control systems for vehicles, and select appropriate components for a given application; evaluate the environmental and societal impact of the entire life cycle of energy storage solutions.

INDICATIVE CONTENT

- Introduction to energy storage and control systems for vehicles.

- Energy storage technologies, including batteries, ultracapacitors, and fuel cells.

- Energy management strategies, including battery management systems and power electronics.

- Modelling and simulation of energy storage and control systems.

- Testing and validation of energy storage and control systems.

- Selection and integration of components, including motors, inverters, and DC/DC converters.

- Investigating the differences between System in the loop, Model in the Loop, and Hardware in the loop.

- Safety and reliability considerations.

- Emerging technologies and future directions in vehicle energy storage and control systems.

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 Exam	2 hours	50%

Assessment Component 2
(Tick one)

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

Mode of assessment	Volume	Weighting
Practical	Equivalent to 2,500 words	50%

Assessment Summary

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

Professional, Statutory, and regulatory Body (PSRB): This module aims to cover the following AHEP4 learning outcomes: M1, M2, M7

INDICATIVE READING LIST

Module Code	ACHA7007	
Module Title	Energy Storage and Control Systems	
Classification	Reading List entry	Electronic *
Essential	Eshani, M., Gao, Y., Longo, S., & Ebrahimi, K. (2019). *Modern Electric, Hybrid Electric, and Fuel Cell Vehicles* (3rd ed.). CRC Press.	☒
Further	Rahn, C., & Wang, C.-Y. (2013). *Battery Systems Engineering*. Wiley.	☒
Further	Miller, M. (2010). *Propulsion Systems for Hybrid Vehicles* (2nd ed.). IET.	☐
Further	Hoboken, N. (2008). *Environmentally Conscious Transportation*. Wiley.	☐
Further	Larminie, J., & Lowry, J. (2012). *Electric Vehicle Technology Explained* (2nd ed.). Wiley.	☐
Further	Hu, H., Smaling, R., & Baseley, S. (2021). *Advanced Hybrid Powertrains for Commercial Vehicles* (2nd ed.). SAE.	☒
Further	Husain, I. (2021). *Electric and Hybrid Vehicles: Design Fundamentals*. CRC Press.	☐
Further	Mi, C., & Masrur, M. A. (2018). *Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives*. Wiley.	☒
Further	Dicks, A. L., & Rand, D. A. J. (2018). *Fuel Cell Systems Explained*. Wiley.	☒
Further	Jaing, J., & Zhang, C. (2015). *Fundamentals and Applications of Lithium-ion Batteries in Electric Drive Vehicles*. Wiley.	☒
Further	**Websites** https://www.electrichybridvehicle technology.com https://www.electricautosprt.com https://onlinelibrary.wiley.com/journal/25666223 https://batteryuniversity.com/ https://www.shell.co.uk/make-the-future/cleaner-mobility/the-great-travel-hack/usa/fuels-and-vehicles.html?gclid=EAIaIQobChMInPrrya-b4gIVhbTtCh08bAK6EAAYAiAAEgI2l_D_BwE&gclsrc=aw.ds https://www.carbonbrief.org/ http://www.ieahev.org/	☒

Module Code	**ACHA7008**
Title	**Engineering Design and Simulation**
Date	**05/06/2024**
Level	**7**
Credits	**20**
Pre-Requisites	**None**
DBS Check	**May be required ☐ Not required ☒**

AIM(S)

- To provide the student with the necessary skills required to implement relevant computer systems and simulations to the analysis and solution of complex engineering problems.

LEARNING OUTCOMES

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

- demonstrate a critical understanding of the usage of suitable analysis packages for specific problems and competence in the application of the packages studied to specific engineering problems;

- demonstrate an ability to analyse a range of engineering design problems using appropriate scientific and mathematical principles to make engineering design judgements based on the outputs of the analysis and generate appropriate design solutions.

INDICATIVE CONTENT

- Finite Element Analysis (FEA): Review fundamental Modelling and FEA techniques building to explore more complex simulation situations such as vibrational or thermal analysis.

- Optimisation: Finite Element Method (FEM) optimisation methodology applied to specific engineering problems. Optimisation techniques, topology, topography, topometry, sizing optimisation, fibre orientation and lay-up optimisation in composite materials.

- Matlab / SciLAB: use of advanced mathematical modelling for a variety of mathematical and engineering specific problems.

- Design methodology – approaches and techniques for problem analysis and the generation of design solutions. Product design specifications. Concept generation to the production of detailed engineering designs. Product data management.

- Sustainability and product life cycle analysis. Ethical, social, economic, and human factors affecting design.

- Three-dimensional solid modelling and computer aided design – application of appropriate 3D solid modelling software in the generation of design models and engineering drawings.

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
Assignment	2,500 words	50%

Assessment Component 2
(Tick one)

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

Mode of assessment	Volume	Weighting
Assignment	2,500 words	50%

Assessment Summary

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

Professional, Statutory and regulatory Body (PSRB): This module aims to cover the following AHEP4 learning outcomes: M1, M3, M5

INDICATIVE READING LIST

Module Code	**ACHA7008**	
Module Title	**Engineering Design and Simulation**	
Classification	**Reading List entry**	**Electronic***
Essential	Nisbett, K., & Budynas, R. (2020). *Shigley's Mechanical Engineering Design* (11th ed.). McGraw Hill.	☐
Essential	Cross, N. (2021). *Engineering Design Methods: Strategies for Product Design* (5th ed.). Wiley.	☐
Essential	Martins, J., & Ning, A. (2021). *Engineering Design Optimization*. Cambridge University Press.	☐
Further	Egenhoefer, B. (2017). *Routledge Handbook of Sustainable Design*. Routledge.	☐
Further	Kurowski, P. (2022). *Finite Element Analysis for Design Engineers* (3rd ed.). SAE International.	☐
Further	Moaveni, S. (2015). *Finite Element Analysis: Theory and Application with ANSYS* (4th ed.). Pearson.	☐
Further	Materials Today	☒
Further	Engineering Failure Analysis	☒
Further	Journal of Manufacturing Processes	☒
Further	Computer Aided Design	☒
Further	Materials Science and Engineering	☒

Module Code	**ACHA7013**
Title	**Lean Six Sigma**
Date	**05/06/2024**
Level	**7**
Credits	**20**
Pre-Requisites	**None**
DBS Check	**May be required ☐ Not required ☒**

AIM(S)

- To enable students to critically evaluate problems and apply a range of analytical and statistical techniques that can be used to improve operational performance while developing a culture of continuous improvement.

LEARNING OUTCOMES

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

- critically evaluate and deploy an appropriate range of lean six sigma tools and techniques that will help to improve operational performance while understanding their limitations;

- demonstrate a systematic understanding and application of a range of improvement methodologies (Six Sigma) and critically analyse statistical techniques in developing a culture of continuous improvement while considering ethical, environmental and legal issues.

INDICATIVE CONTENT

- Concepts of Lean and Six Sigma.

- Value Stream Mapping, value adding and 5S.

- Creating a customer focus.

- Define, Measure, Analyse, Improve, and Control (DMAIC) and Define, Measure, Analyze, Design, and Verify (DMADV) approaches.

- Costs of Quality.

- Kaizen and Error Proofing.

- Statistical Process Control Techniques.

- Process/Machine Capability Studies.

- Failure Mode Effects analysis in product, process, services.

- Design of Experiments.

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
Assignment	5,000 words	100%

Assessment Summary

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

Professional, Statutory and regulatory Body (PSRB): This module aims to cover the following AHEP4 learning outcomes: M2.

INDICATIVE READING LIST

Module Code	**ACHA7013**	
Module Title	**Lean Six Sigma**	
Classification	**Reading List entry**	**Electronic***
Essential	Ries, J. (2022). *Lean Six Sigma: The Complete Guide to Implementing Six Sigma Methodology for Manufacturing Process Improvement*. Independently Published.	☐
Essential	Edge, J. (2018). *Lean Six Sigma: The Ultimate Guide to Lean Six Sigma, Lean Enterprise and Lean Manufacturing*. Create Space Publishing Platform.	☐
Essential	Dale, B., Bamford, D., & Van der Wiele, T. (2016). *Managing Quality: An Essential Guide and Resources Gateway* (6th ed.). Wiley.	☐
Essential	Summers, C. (2011). *Lean Six Sigma: Process Improvement Tools and Techniques*. Pearson.	☐
Further	Morgan, J. (2007). *The Lean Six Sigma Improvement Journey*. Catalyst Consulting.	☐
Further	Bicheno, J., & Holweg, M. (2016). *The Lean Toolbox: A Handbook for Lean Transformation* (5th ed.). Piscie Books.	☐
Further	Evans, J., & Lindsay, L. (2019). *Managing for Quality and Performance Excellence* (11th ed.). Southwestern College Publishing.	☐
Further	Foster, S. (2016). *Managing Quality: Integrating the Supply Chain* (6th ed.). Pearson.	☐
Further	International Journal of Production Economics	☒
Further	Journal of Operations Management	☒
Further	International Journal of Quality and Reliability Management	☒
Further	International Journal of Quality Science	☒
Further	Measuring Business Excellence	☒
Further	Operations Research Perspective	☒
Further	Computers in Industry	☒

Module Code	**ACHA7018**
Title	**Materials and Life Cycle Analysis**
Date	**05/06/2024**
Level	**7**
Credits	**10**
Pre-Requisites	**None**
DBS Check	**May be required ☐ Not required ☒**

AIM(S)

- To provide students with an advanced understanding of materials and their impact on the environment through life cycle analysis (LCA). Students will develop practical skills in evaluating materials using LCA and will gain experience in selecting appropriate materials and manufacturing processes that minimize environmental impact.

LEARNING OUTCOMES

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

- critically evaluate the environmental impact of materials throughout their life cycle, including extraction, processing, use, and disposal;

- select and optimize materials and manufacturing processes that minimize environmental impact through LCA.

INDICATIVE CONTENT

- Introduction to materials and their properties.

- Life cycle analysis, including methodology and tools.

- Environmental impact of materials, including resource depletion, global warming, acidification, and eutrophication.

- Sustainable materials, including bio-based and recycled materials.

- Material selection for specific applications, including structural and functional materials.

- Manufacturing processes and their environmental impact, including casting, forming, machining, and additive manufacturing.

- Design for sustainability, including design guidelines and case studies.

- Sustainability standards and regulations, including ISO 14001 and REACH (Registration, Evaluation, Authorisation, and Restriction of Chemicals).

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%**

Professional, Statutory and regulatory Body (PSRB): This module aims to cover the following AHEP4 learning outcomes: M1, M5, M7

INDICATIVE READING LIST

Module Code	**ACHA7018**	
Module Title	**Materials and Life Cycle Analysis**	
Classification	**Reading List entry**	**Electronic***
Essential	Springer. (1996 - Present). *The International Journal of Life Cycle Assessment*. Landsberg, Germany.	☒
Essential	Petrillo, A., & De Felice, F. (Eds.). (2019). *New Frontiers on Life Cycle Assessment: Theory and Application*. London, England: IntechOpen.	☒
Essential	Callister, W. D., & Rethwisch, D. G. (2014). *Materials Science and Engineering* (9th ed., SI version). Hoboken, NJ: Wiley.	☐
Further	Jolliet, O., Saade-Sbeih, M., Shaked, S., Jolliet, A., & Crettaz, P. (2016). *Environmental Life Cycle Assessment*. CRC Press.	☒
Further	Baumann, H., & Tillman, A.-M. (2004). *The Hitch Hiker's Guide to LCA: An Orientation in Life Cycle Assessment Methodology and Application*. Lund, Sweden: Studentlitteratur AB.	☐
Further	Sadiq, N., & Khan, A. H. (2011). *ISO14001 Step by Step: A Practical Guide*. Ely, Cambridgeshire: IT Governance Pub.	☒
Further	Elsevier Science Ltd. (1993 - Present). *Journal of Cleaner Production*. Oxford.	☒
Further	Elsevier Sequoia. (1988 - Present). *Materials Science & Engineering B, Solid-State Materials for Advanced Technology*. Lausanne.	☒
Further	Thanigaivelan, R., Rajan, N., & Arul, T. G. (Eds.). (2022). *Advanced Manufacturing Techniques for Engineering and Engineered Materials*. Hershey, Pennsylvania: IGI Global.	☐

Module Code	**ACHA7019**
Title	**Mechanisms of Materials Failure**
Date	**05/06/2024**
Level	**7**
Credits	**20**
Pre-Requisites	**None**
DBS Check	**May be required ☐ Not required ☒**

AIM(S)

- To develop an advanced conceptual understanding of materials failure mechanisms and an ability to apply those concepts in the analysis and evaluation of various mechanisms of materials failure, their causes and effects.

LEARNING OUTCOMES

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

- critically examine the causes, effects and mechanisms of fracture, fatigue and creep and apply appropriate analytical techniques to model and predict behaviour;

- critically examine the causes, effects, and mechanisms of environmental degradation of materials and apply appropriate scientific models to analyse behaviour.

INDICATIVE CONTENT

- Review of stress and strain – three-dimensional stress systems, hydrostatic stress, deviatoric stress.

- Fracture mechanics – ductile and brittle failure, analysis of fractographs, effect of temperature, chemistry and microstructure. Design against fracture. Fracture toughness, stress concentration and stress intensity factor. Critical crack size and Griffith's equation. Applications of linear elastic fracture mechanics.

- Fatigue – three stages of fatigue. S-N and S-N-P curves. Factor affecting fatigue.

- Creep – effects of temperature, micro mechanisms of creep. Deformation mechanisms. Tertiary creep and rupture. Damage processes. Design against creep. Creep resistant materials.

- Environmental failure of materials – The role of protective films on metal surfaces; aggressive ions and corrosion inhibitors; galvanic, pitting and bacterial corrosion; stress-corrosion cracking, hydrogen embrittlement and liquid-metal embrittlement; designing against corrosion. Chemical and thermal degradation of polymers and the effects of degradation on polymer properties, including environmental stress cracking.

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
Assignment	2,500 words	50%

Assessment Component 2
(Tick one)

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

Mode of assessment	Volume	Weighting
Examination	2 hours	50%

Assessment Summary

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

Professional, Statutory and regulatory Body (PSRB): This module aims to cover the following AHEP4 learning outcomes: M1, M5

INDICATIVE READING LIST

Module Code	**ACHA7019**	
Module Title	**Mechanisms of Materials Failure**	
Classification	**Reading List entry**	**Electronic***
Essential	Vachtsevanos, G., Natarajan, K., & Rajamani, R. (2020). *Corrosion Processes: Sensing, Monitoring, Data Analytics, Prevention/Protection, Diagnosis/Prognosis and Maintenance Strategies*. Springer, Switzerland.	☐
Essential	Callister, W. D., & Rethwisch, D. G. (2020). *Callister's Materials Science and Engineering* (10th ed.). Wiley, Boston.	☐
Essential	Ashby, M., Shercliff, H., & Cebon, D. (2018). *Materials: Engineering, Science, Processing and Design* (4th ed.). Butterworth Heinemann, Oxford.	☐
Further	Talbot, D., & Talbot, J. (2020). *Corrosion Science and Technology* (3rd ed.). CRC Press, Boca Raton.	☐
Further	Ritchie, R., & Liu, D. (2021). *Introduction to Fracture Mechanics*. Elsevier, Oxford.	☐
Further	Betten, J. (2013). *Creep Mechanics*. Springer, Switzerland.	☐
Further	Christensen, R. (2016). *The Theory of Materials Failure*. Oxford University Press, Oxford.	☐
Further	Engineering Fracture Mechanics	☒
Further	Theoretical and Applied Fracture Mechanics	☒
Further	Mechanics of Materials	☒
Further	Journal of Materials Research and Technology	☒
Further	International Journal of Mechanical Sciences	☒
Further	Materials Science and Engineering	☒
Further	Corrosion	☒

Module Code	**ACHA7023**
Title	**Non-Destructive Testing**
Date	**05/06/2024**
Level	**7**
Credits	**10**
Pre-Requisites	**None**
DBS Check	**May be required ☐ Not required ☒**

AIM(S)

- To provide students with an advanced understanding of non-destructive testing (NDT) techniques and their applications. Students will develop practical skills in performing and interpreting NDT inspections, as well as evaluating and reporting inspection results in compliance with industry standards.

LEARNING OUTCOMES

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

- critically evaluate the principles, advantages, and limitations of various NDT techniques used in different industries;
- apply NDT techniques to perform inspections, interpret results, and report findings in compliance with industry standards.

INDICATIVE CONTENT

- Introduction to non-destructive testing (NDT) principles and techniques.
- NDT techniques for different materials, such as metals, composites, and ceramics.
- Ultrasonic testing (UT), including pulse-echo, phased array, and time-of-flight diffraction (TOFD).
- Radiographic testing (RT), including X-ray and gamma-ray radiography.
- Eddy current testing (ECT), including conventional and array-based methods.
- Magnetic particle testing (MPT) and liquid penetrant testing (LPT).
- Visual inspection and optical methods, such as remote visual inspection (RVI) and borescopes.
- Thermographic and infrared testing techniques.
- Advanced NDT techniques, including guided wave testing and computed tomography (CT).
- Interpretation and analysis of NDT results.
- NDT reporting and documentation in compliance with industry standards.
- Safety, ethics, and regulatory considerations in NDT inspections.

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
Lab Based Assessment	Equivalent to 2,500 words	100%

Assessment Summary

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

Professional, Statutory and regulatory Body (PSRB): This module aims to cover the following AHEP4 learning outcomes: M1.

INDICATIVE READING LIST

Module Code	**ACHA7023**	
Module Title	**Non-Destructive Testing**	
Classification	**Reading List entry**	**Electronic***
Essential	Slater, J. C. (2013). *Vibration Testing, with Modal Testing and Health Monitoring*. John Wiley.	☐
Essential	Müller, G. (2012). *Handbook of Engineering Acoustics*. Springer.	☐
Essential	Alten, F. (2003). *Fundamentals of Structural Integrity*. Wiley.	☐
Essential	Mix, P. E. (2004). *Introduction to Non-Destructive Testing: A Training Guide*. John Wiley.	☐
Further	Papaelias, M., & Zaman, N. (2016). *Non-Destructive Testing* (1st ed.). IntechOpen.	☒
Further	Cavalcanti, W. L., et al. (2021). *Adhesive Bonding of Aircraft Composite Structures: Non Destructive Testing and Quality Assurance Concepts*. Springer Nature.	☒
Further	Sahoo, P., & Sahoo, P. (2020). *Handbook of Research on Developments and Trends in Industrial and Materials Engineering*. Hershey, PA: IGI Global.	☒
Further	Journals International Journal of Materials and Structural Integrity; Journal of Sound and Vibration; Journal of Materials Processing Technology; NDT&E International; Infrared Physics and Technology	☐
Further	Websites www.ndt.net; www.ndt-ed.org; Science Direct	☒

Module Code	**ACHA7024**
Title	**Procurement and Supply Chain Management**
Date	**05/06/2024**
Level	**7**
Credits	**20**
Pre-Requisites	**None**
DBS Check	**May be required ☐ Not required ☒**

AIM(S)

- To develop a comprehensive understanding of procurement in commercial operations and to critically analyse the roles and issues associated with achieving success in supply chain operations.

LEARNING OUTCOME

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

- critically evaluate the key areas of procurement, such as sourcing, supplier assessment and development, and performance management and supplier relationships;

- critically analyse key supply chains roles, evaluate risks and vulnerability in supply chains and take measures to develop more resilient supply chains through the use of technology and evaluation.

INDICATIVE CONTENT

- Supply chain management issues that relate to what supply chains are, supply chain vulnerability, fragility, and resilience.

- Cost versus price argument and use of total acquisition costs.

- Consideration of environmental, sustainability issues and health & safety implications of procurement.

- Sourcing strategies to include single, dual, and multiple sourcing, global versus local sourcing.

- Supplier Selection processes to include supplier appraisal, supplier assessment, measuring supplier performance and development.

- The strategic role of the supplier including partnerships, strategic alliances, management of relationships and to assess and develop supplier relationships.

- The measurement of supply chain performance and how to assess the performance of procurement operations.

- Consideration of ethical policies, circular economy, sustainable procurement, and measures to prevent fraud, corruption, and bribery.

- The role of technology in supply chains and procurement.

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 Assessment	2 elements, comprising of 2,000-word report (50%) and a poster presentation (50%)	100%

Assessment Summary

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

INDICATIVE READING LIST

Module Code	ACHA7024	
Module Title	**Procurement and Supply Chain Management**	
Classification	**Reading List entry**	**Electronic***
Essential	Van Weele, A., & Rozemeijer, F. (2022). *Procurement and Supply Chain Management* (8th ed.). Cengage Learning, Boston.	☐
Essential	Handfield, R., & Giunipero, C. (2020). *Purchasing and Supply Chain Management* (7th ed.). Cengage Learning, Boston.	☐
Essential	Hutchins, G. (2018). *Supply Chain Risk Management: Competing in the Age of Disruption*. Certified Enterprise Risk Manager, Portland.	☐
Essential	Harrison, A., Skipworth, H., Van Hoek, R., & Aitken, J. (2019). *Logistics Management and Strategy: Competing Through the Supply Chain* (6th ed.). Pearson, Harlow.	☐
Essential	O'Sullivan, S. (2019). *Supply Chain Disruption: Aligning Business Strategy and Supply Chain Tactics*. Kogan Page, London.	☐
Further	Ashby, S. (2022). *Fundamentals of Operational Risk Management: Understanding and Implementing Effective Tools, Policies and Frameworks*. Kogan Page, London.	☐
Further	Carnovale, S., & Yeniyurt, S. (2021). *Cybersecurity and Supply Chain Management: Risks, Challenges and Solutions*. World Scientific Publishing, Denver.	☐
Further	O'Brien, J. (2022). *Supplier Relationship Management* (3rd ed.). Kogan Page, London.	☐
Further	Barr, P. (2022). *Effective Strategic Sourcing*. Kogan Page, London.	☐
Further	Gattorna, J. (2015). *Dynamic Supply Chains* (3rd ed.). Pearson.	☐
Further	International Journal of Logistics and Supply Chain Management	☒
Further	International Journal of Production Economics	☒
Further	Journal of Purchasing and Supply Management	☒
Further	Journal of Business Ethics	☒
Further	Business Strategy and the Environment	☒
Further	Journal of Cleaner Production	☒
Further	Computers and Operations Research	☒

Module Code	**ACHA7025**
Title	**Project Management**
Date	**05/06/2024**
Level	**7**
Credits	**20**
Pre-Requisites	**None**
DBS Check	**May be required** ☐ **Not required** ☒

AIM(S)

- To critically evaluate the dynamics and methodologies of project management, while cultivating a comprehensive understanding of various key project management tools and techniques.

LEARNING OUTCOMES

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

- critically analyse project life cycle(s), the structure and organisation of projects, project planning, governance, and the project environment;
- critically evaluate project risk and apply a range of techniques that can be used to support successful project delivery.

INDICATIVE CONTENT

- Role of communication and conflict management in projects.
- Project life cycles and analysis.
- Organisational and project structure.
- Scheduling and resource optimisation.
- Risk management in projects.
- Project Scope Management.
- Project Planning.
- Project Management tools and techniques.
- Agile, scrum, hybrid in project 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
Assignment	2,500 words	50%

Assessment Component 2
(Tick one)

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

Mode of assessment	Volume	Weighting
Assignment	2,500 words	50%

Assessment Summary

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

INDICATIVE READING LIST

Module Code	**ACHA7025**	
Module Title	**Project Management**	
Classification	**Reading List entry**	**Electronic***
Essential	Maylor, H., & Turner, N. (2012). *Project Management* (5th ed.). Pearson, Harlow.	☐
Essential	Wysocki, J. (2019). *Effective Project Management: Traditional, Agile, Extreme* (8th ed.). Wiley, New Jersey.	☐
Essential	Project Management Institute. (2021). *A Guide to the Project Management Body of Knowledge* (7th ed.). Project Management Institute.	☐
Further	Kerzner, H. (2023). *Project Management Metrics, KPIs and Dashboards: A Guide to Measuring and Monitoring Project Performance* (4th ed.). Wiley, New Jersey.	☐
Further	Sammons, A. (2019). *Agile Project Management with Scrum and Kanban*. Independently Published.	☐
Further	Ries, J. (2022). *Agile Project Management: The Complete Guide to Agile Project Management, Methodology and Software Development*. Independently Published.	☐
Further	Dionisio, C. (2021). *Hybrid Project Management*. Wiley, New Jersey.	☐
Further	International Journal of Project Management	☒
Further	Project Leadership and Society	☒
Further	European Journal of Operational Research	☒
Further	Journal of Industrial Information	☒
Further	Journal of Engineering Research	☒
Further	Journal of Business Research	☒

Module Code	**ACHA7027**
Title	**Research Methods**
Date	**05/06/2024**
Level	**7**
Credits	**10**
Pre-Requisites	**None**
DBS Check	**May be required ☐ Not required ☒**

AIM(S)

- To provide students with an advanced understanding of research methods, including the various quantitative and qualitative research methodologies, as well as their strengths and limitations. Students will develop practical skills in designing, planning, and executing research projects, and will gain experience in using appropriate data analysis techniques.

LEARNING OUTCOMES

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

- critically evaluate the strengths and limitations of different research methods and their applications in different research contexts;

- develop and implement a research project, including appropriate data collection and analysis techniques.

INDICATIVE CONTENT

- Introduction to research methods and the research process.

- Epistemology and research design.

- Quantitative research methods, including experimental, quasi-experimental, and survey research.

- Qualitative research methods, including case studies, ethnography, and grounded theory.

- Data collection techniques, including surveys, interviews, focus groups, and observation.

- Data analysis techniques, including descriptive statistics, inferential statistics, and thematic analysis.

- Ethics in research.

- Research project design and implementation.

- Reporting and presenting research findings.

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 Report	2,000 words	70%

Assessment Component 2
(Tick one)

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

Mode of assessment	Volume	Weighting
Presentation	10 Minutes + Questions	30%

Assessment Summary

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

Professional, Statutory and regulatory Body (PSRB): This module aims to cover the following AHEP4 learning outcomes: M4, M16

INDICATIVE READING LIST

Module Code	ACHA7027	
Module Title	Research Methods	
Classification	Reading List entry	Electronic*
Essential	Cottrell, S. (2011). *Critical Thinking Skills: Developing Effective Analysis and Argument - Palgrave Study Guides* (2nd ed.). London: Palgrave Macmillan.	☒
Essential	Cottrell, S. (2014). *Dissertations and Project Reports: A Step by Step Guide*. Palgrave Study Skills.	☒
Essential	O'Leary, Z. (2013). *Doing Your Research Project* (2nd ed.). SAGE Publications Ltd.	☒
Essential	Bergstrom, C., & West, J. (2020). *The Art of Scepticism in a Data-Driven World*. Penguin.	☒
Essential	Thiel, D. (2014). *Research Methods for Engineers*. Cambridge University Press.	☐
Further	Dawson, C. W. (2009). *Projects in Computing and Information Systems: A Student's Guide* (2nd ed.). Boston: Addison-Wesley.	☒
Further	Dipankar, D. (2019). *Engineering Research Methodology: A Practical Insight for Researchers*. Springer.	☐
Further	Fellows, R., & Liu, A. (2015). *Research Methods for Construction*. Oxford: Blackwell.	
Further	Few, S. (2012). *Show Me the Numbers*. Burlingame: Analytics Press.	☐
Further	Gregoire, T. G., & Valentine, H. T. (2008). *Sampling Strategies for Natural Resources and the Environment*. London: Chapman.	☐
Further	Hart, C. (1998). *Doing a Literature Review*. Sage.	☒
Further	Hewson, C., Vogel, C., & Laurent, D. (2015). *Internet Research Methods*. London: Sage.	☐
Further	Kranzler, J. H. (2011). *Statistics for the Terrified* (5th ed.). Upper Saddle River: Prentice Hall.	☐
Further	Leedy, P. D., & Ormrod, J. E. (2012). *Practical Research Planning and Design* (10th ed.). Boston: Pearson Education.	☒
Further	Maylor, H. (2010). *Project Management*. Boston: Pearson Education.	☐
Further	Oppenheim, A. (1992). *Questionnaire Design, Interviewing and Attitude Measurement*. London: Continuum.	☒
Further	Spence, R. (2014). *Information Visualization: An Introduction*. Boston: Addison-Wesley.	
Further	Thiel, D. V. (2014). *Research Methods for Engineers*. Cambridge University Press.	☒
Further	Wheater, C. P., & Cook, P. A. (2015). *Using Statistics to Understand the Environment*. Routledge.	☒

Module Code	**ACHA7028**
Title	**Resourcing and Financial Management for Projects**
Date	**05/06/2024**
Level	**7**
Credits	**20**
Pre-Requisites	**None**
DBS Check	**May be required ☐ Not required ☒**

AIM(S)

- To develop a critical and analytical understanding of the evolving landscape of Human Resource Management (HRM) in a global context, transitioning from supporting line managers to a specialised focus on delivering sustainable organisational capability and performance. Additionally, to provide students with an in-depth exploration of financial techniques and processes essential for strategic decision-making within competitive international environments.

LEARNING OUTCOMES

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

- demonstrate a systematic understanding of current issues in HRM within a variety of engineering organisations so to enable them to effectively manage the design and implementation of fair, efficient and effective policies and procedures that serve to deliver upon the strategic aims of the organisation;

- research, apply and evaluate a variety of financial assessment techniques for application to given projects.

INDICATIVE CONTENT

- Role of Leadership, motivation and team performance in project performance.

- Leadership styles and management of change.

- Factors that influence development and leadership of teams using appropriate models (Belbin, Myers Briggs, Tuckman).

- Resource planning, succession planning and recruitment.

- Costing and budgetary control.

- Earned value analysis and investment appraisal techniques.

- Stakeholder engagement.

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
Assignment	2,500 words	50%

Assessment Component 2
(Tick one)

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

Mode of assessment	Volume	Weighting
Assignment	2,500 words	50%

Assessment Summary

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

INDICATIVE READING LIST

Module Code	ACHA7028	
Module Title	**Resourcing and Financial Management for Projects**	
Classification	**Reading List entry**	**Electronic***
Essential	Frohnhoefer, R., Hussen, I., & Pangilinen, L. (2022). *Project Cost Management: Principles, Tools, Techniques and Best Practices for Project Finance*. PPC Group.	☐
Essential	Tayles, M., & Drury, C. (2020). *Management and Cost Accounting* (11th ed.). Cengage Learning EMEA.	☐
Essential	Carberry, R., & Cross, C. (2018).*Human Resource Management* (2nd Ed.). Red Globe Press.	☐
Further	Wanner, R. (2020). *Earned Value Management: The Most Important Methods and Tools for Effective Project Control*. CreateSpace Independent Publishing Platform.	☐
Further	Torrington, D., Hall, L., Taylor, S., & Atkinson, C. (2020). *Human Resource Management* (11th ed.). Pearson, Harlow.	☐
Further	International Journal of Project Management	☒
Further	Project Leadership and Society	☒
Further	European Journal of Operational Research	☒
Further	Journal of Industrial Information	☒
Further	Journal of Engineering Research	☒
Further	Journal of Business Research	☒

Module Code	**ACHA7029**
Title	**Robotics and Automation in Operations**
Date	**05/06/2024**
Level	**7**
Credits	**20**
Pre-Requisites	**None**
DBS Check	**May be required ☐ Not required ☒**

AIM(S)

- To provide a comprehensive understanding of the implications of sustainable manufacturing factors for automated production systems, alongside equipping students with the skills, tools, and techniques to implement robotics systems for optimising operational performance.

LEARNING OUTCOMES

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

- critically analyse a range of operational-related considerations and apply these in the generation of appropriate solutions;

- demonstrate a critical awareness of the requirements for other factors relevant to the design of automated systems.

INDICATIVE CONTENT

- Introduction to robotics - Definition and scope of robotic systems, historical development and evolution of robotics, key drivers for the adoption of robotics & automation within sustainable operations, design of robotic/automated system.

- Introduction to automation technologies - Sensors, actuators, control systems, Programmable Logic Controllers (PLCs) and Distributed Control Systems (DCS).

- Supervisory Control and Data Acquisition (SCADA) systems, Manufacturing Execution Systems (MES), and Human-Machine Interface (HMI) design and implementation.

- Integration of robotics & automation in operations - Warehouse automation and logistics systems, Industrial robotics in manufacturing, assembly processes and other industries.

- Impacts of automation on sustainable operations - Increased productivity, efficiency, reduction in errors/variability, improved product quality, cost implications, return on investment, environmental implications and impacts on the human workforce.

- Safety measures in robotic operations – Human-robot Interaction, cybersecurity challenges and safeguards, ethical considerations in the use of automation, legal and regulatory aspects of robotics & automation for operations.

- Emerging trends and technologies – Simulation, artificial intelligence and machine learning, collaborative robots, swarm robotics and autonomous systems, the impact of robotics & automation on future operations.

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
Assignment	5,000 words	100%

Assessment Summary

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

Professional, Statutory and regulatory Body (PSRB): This module aims to cover the following AHEP4 learning outcomes: M2.

INDICATIVE READING LIST

Module Code	ACHA7029	
Module Title	**Robotics and Automation in Operations**	
Classification	**Reading List entry**	**Electronic***
Essential	Luo, Z. (2015). *Robotics, automation, and control in industrial and service settings*. Engineering Science Reference.	☒
Essential	Arámburo-Lizárraga, J., & Ramirez, A. (2008). *Advances in robotics, automation and control*. IntechOpen.	☒
Essential	Dekoulis, G. (2017). *Robotics: Legal, ethical and socioeconomic impacts*. IntechOpen.	☒
Further	Petrillo, A. (Ed.). (2021). *Operations management: Emerging trend in the digital era*. IntechOpen.	☒
Further	West, D. M. (2018). *The future of work: Robots, AI, and automation*. Brookings Institution Press.	☒
Further	Dima, I. C. (2013). *Industrial production management in flexible manufacturing systems*. IGI Global.	☒
Further	Habib, M. K. (Ed.). (2020). *Advanced robotics and intelligent automation in manufacturing*. IGI Global.	☒
Further	Duro, R., & Kondratenko, Y. (2015). *Advances in intelligent robotics and collaborative automation*. Taylor & Francis.	☒
Further	Nee, A. Y. C. (Ed.). (2015). *Handbook of manufacturing engineering and technology* (1st ed.). Springer London.	☒
Further	Morriss, S. B. (1995). *Automated manufacturing systems: Actuators, controls, sensors, and robotics*. Glencoe.	☐
Further	Soldatos, J. (2018). *The digital shopfloor - Industrial automation in the Industry 4.0 era: Performance analysis and applications*. Taylor & Francis.	☒
Further	Cheng, F.-T. (Ed.). (2022). *Industry 4.1: Intelligent manufacturing with zero defects*. John Wiley & Sons, Inc.	☒

Module Code	**ACHA7030**
Title	**Structural Component Analysis**
Date	**05/06/2024**
Level	**7**
Credits	**10**
Pre-Requisites	**None**
DBS Check	**May be required ☐ Not required ☒**

AIM(S)

- To develop skills in utilising computational methods for solving structural cases, facilitating the assessment and development of automotive components. Additionally, to apply suitable computational approaches to analyse the structural response of components under different loading conditions, encompassing thermal, kinematic, and fatigue considerations.

LEARNING OUTCOMES

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

- apply knowledge to critically assess and deploy relevant techniques to solve complex component analysis problems;
- through interpretation of generated data, apply understanding to draw conclusions about the structural integrity of components.

INDICATIVE CONTENT

- The role of Finite Element Analysis (FEA) in the lifecycle.
- Analysis types.
- Overview of FEA and creating an FE model.
- Mesh quality checks.
- 1D v 2D v 3D elements.
- Thermal effects on structures.
- Common design issues.
- Design Failure Mode and Effects Analysis (DFMEA).
- Application of commercial software.
- Apply relevant selection criteria to determine the best material for a scenario using a software such as EduPak.
- Design of metallic and non-metallic products.

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
Timed Practical Assessment	Within 8 hour period	100%

Assessment Summary

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

Professional, Statutory and regulatory Body (PSRB): This module aims to cover the following AHEP4 learning outcomes: M1, M2, M3

INDICATIVE READING LIST

Module Code	ACHA7030	
Module Title	**Structural Component Analysis**	
Classification	**Reading List entry**	**Electronic***
Essential	Versteeg, H. K., & Malalasekera, W. (2007). *An introduction to computational fluid dynamics: The finite volume method* (2nd ed.). Pearson Prentice Hall.	☐
Essential	Hearn, E. J. (1997). *Mechanics of materials* (Vols. 1 & 2). Butterworth-Heinemann.	☐
Essential	Sifakis, E., & Barbic, J. (2016). *Finite element method simulation of 3D deformable solids*. Morgan & Claypool.	☒
Essential	Goodno, B. J., & Gere, J. M. (2016). *Mechanics of materials* (9th ed.). Cengage Learning.	☐
Essential	Ferziger, J. H., & Perić, M. (2002). *Computational methods for fluid dynamics*. Springer.	☐
Essential	Mac Donald, B. J. (2011). *Practical stress analysis with finite elements* (2nd ed.). Glasnevin.	☐
Further	Sifakis, E., & Barbic, J. (2016). Finite element method simulation of 3D deformable solids. *Synthesis Digital Library of Engineering and Computer Science*.	☐
Further	Vanderplaats, G. N. (2007). *Multidiscipline design optimizations*. VR&D.	☐

Module Code	**ACHA7031**
Title	**Sustainable Operations Management**
Date	**05/06/2024**
Level	**7**
Credits	**20**
Pre-Requisites	**None**
DBS Check	**May be required ☐ Not required ☒**

AIM(S)

- To develop an in-depth, critical understanding of the importance of sustainability within operations management and the business environment.

LEARNING OUTCOMES

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

- demonstrate a critical and systematic understanding of the principles and practices of operations management in the analysis and design of sustainable operations;

- critically analyse operations using appropriate analytical and simulation techniques to assess opportunities for improvement and develop appropriate solutions to problems that put sustainability at the forefront.

INDICATIVE CONTENT

- Sustainable operations strategy and sustainable operations management perspectives.

- Operational performance monitoring and measurement that considers the impact of climate change.

- Process design and facilities layout issues that incorporate sustainable practices such as waste reduction and energy efficiency and utilisation of renewable energy.

- Human factors in operations management.

- Planning and control to encourage sustainable practices.

- Capacity management.

- Inventory 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
Assignment	2,500 words	50%

Assessment Component 2
(Tick one)

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

Mode of assessment	Volume	Weighting
Examination	2 hours	50%

Assessment Summary

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

Professional, Statutory and regulatory Body (PSRB): This module aims to cover the following AHEP4 learning outcomes: M7, M17

INDICATIVE READING LIST

Module Code	**ACHA7031**	
Module Title	**Sustainable Operations Management**	
Classification	**Reading List entry**	**Electronic***
Essential	Slack, N., Brandon-Jones, A., & Burgess, N. (2022). *Operations management* (10th ed.). Pearson.	☐
Essential	Nunes, B., Batista, L., Masi, D., & Bennett, D. (2022). *Sustainable operations management: Key practices and cases*. Routledge.	☒
Essential	Russell, R., & Taylor, B. (2021). *Operations and supply chain management* (10th ed.). Wiley.	☐
Further	Reid, R., & Sanders, N. (2020). *Operations management: An integrated approach* (7th ed.). Wiley.	☐
Further	Heizer, J., & Render, B. (2023). *Operations management: Sustainability and supply chain management* (14th ed.). Pearson.	☒
Further	Paton, S., Clegg, B., Hsuan, J., & Pilkington, A. (2020). *Operations management* (2nd ed.). McGraw Hill.	☐
Further	The International Journal of Management	☒
Further	International Journal of Production Economics	☒
Further	Journal of Operations Management	☒
Further	Sustainable Production and Consumption	☒
Further	European Journal of Operational Research	☒
Further	International Journal of Operations and Production Management	☒

Module Code	**ACHA7032**
Title	**Vehicle Dynamics and NVH**
Date	**05/06/2024**
Level	**7**
Credits	**10**
Pre-Requisites	**None**
DBS Check	**May be required ☐ Not required ☒**

AIM(S)

- To develop advanced understanding of ride and NVH (Noise, Vibration, and Harshness) analysis principles and methodologies in automotive engineering, enabling students to apply this knowledge to real-world problems and critically assess and interpret the results.

LEARNING OUTCOMES

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

- critically evaluate the principles, methods and tools used in ride and NVH analysis in automotive engineering;

- develop advanced skills in applying and interpreting ride and NVH analysis results in practical engineering problems.

INDICATIVE CONTENT

- Introduction to ride and NVH analysis in automotive engineering.

- Vehicle ride analysis: linear and non-linear dynamics of suspensions, ride comfort metrics and subjective evaluation methods.

- NVH analysis: noise sources and transmission, vibration isolation, and control techniques.

- Advanced ride analysis techniques: optimization of suspension design and dynamic characteristics.

- Advanced NVH analysis techniques: analysis and control of noise and vibration transmission paths.

- Experimental methods in ride and NVH analysis: data acquisition, signal processing, and analysis techniques.

- Case studies: practical applications of ride and NVH analysis in automotive engineering.

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 Exam	2 hours	100%

Assessment Summary

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

Professional, Statutory and regulatory Body (PSRB): This module aims to cover the following AHEP4 learning outcomes: M1

INDICATIVE READING LIST

Module Code	ACHA7032	
Module Title	Vehicle Dynamics and NVH	
Classification	Reading List entry	Electronic*
Essential	Gillespie, T. D. (1992). *Fundamentals of Vehicle Dynamics*. Society of Automotive Engineers.	☐
Essential	Guiggiani, M. (2018). *The Science of Vehicle Dynamics* (2nd ed.). Springer.	☐
Essential	Pang, J. (2018). *Noise and Vibration Control in Automotive Bodies*. Wiley-Blackwell.	☐
Essential	Brandt, A. (2011). *Noise and Vibration Analysis*. John Wiley and Sons.	☐
Further	Bastow, D., Howard, G., & Whitehead, J. (2004). *Car Suspension and Handling* (4th ed.). Society of Automotive Engineers.	☐
Further	Dixon, J. (1996). *Tires, Suspension and Handling* (2nd ed.). Society of Automotive Engineering.	☐
Further	Schüetz, T. (2016). *Aerodynamics of Road Vehicles* (5th ed.). SAE International..	☐
Further	Blundell, M., & Harty, D. (2014). *The Multibody Systems Approach to Vehicle Dynamics*. Elsevier Butterworth-Heinemann.	☐
Further	Jacobson, B. (2017). *Vehicle Dynamics Compendium*. Retrieved from http://publications.lib.chalmers.se/records/fulltext/225751/local_225751.pdf	☒
Further	Day, A. (2014). *Braking of Road Vehicles*. Butterworth Heinemann.	☐
Further	Thompson, J. K. (2011). *Brake NVH: Testing and Measurements*. SAE International.	☒
Further	The Engineering Integrity Society http://e-i-s.org.uk/	☐
Further	Fuchs, A. (2015). *Automotive NVH Technology*. Springer.	☐
Further	Rao, S. S. (2014). *Mechanical Vibrations in SI units* (6th ed.). Pearson.	☐
Further	Sinha, J. K. (2014). *Vibration Analysis, Instruments and Signal Processing*. CRC Press.	☐
Further	Tuma, J. (2014). *Vehicle Gearbox Noise and Vibration*. Wiley.	☐