ES9ZD-15 Mechanical Engineering Group Design

20/21

Department
School of Engineering
Level
Taught Postgraduate Level
Module leader
Chris Purssell
Credit value
15
Module duration
10 weeks
Assessment
100% coursework
Study location
University of Warwick main campus, Coventry

Description

Introductory description

Mechanical Engineering Group Design

Module aims

The design projects aim to give students experience of working within a team, and parallels the way engineers often work in industry. Students will integrate their knowledge and understanding in order to specify and solve a substantial Mechanical Engineering problem (or user need), through the creation and development of a product, process or system. The project also allows students to develop their understanding of project management, time management, ethics, sustainability, health and safety, risk, regulatory requirements, and intellectual property rights. Students will develop effective communication and leadership skills.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Projects will vary in nature. Some will be ‘design and make’ type projects. In this case small unit manufacture of prototype solutions may be possible and if required will be specified as part of the project briefing. Other projects will be more focussed on design and proof of concept stage, and might include no realization of the design in a physical form. Yet more projects may be evaluation exercises using proprietary software. Others may be restoration or re-commissioning projects, whilst others will be design evolutions of high-technology / high-complexity systems.

In each case the project will normally involve groups of 6. Projects may have industrial backing or a ‘customer’ where possible or at least be able to demonstrate application.

Students will be encouraged assume the positions of design engineers, development engineers, production engineers, test engineers, project managers, etc. in the delivery of the project. Each student will have to interact with other disciplines and hence appreciate the complexities of complete systems from both the technical and organisational point of view. This will develop the student engineer’s ability to think and communicate in terms of integrated systems.

Member(s) of staff will provide guidance on technical and organisational matters. Regular meetings take place with minutes recorded by individuals in logbooks to provide a record of decisions and actions between meetings/seminars.

Learning outcomes

By the end of the module, students should be able to:

- • Create and develop a product, process or system to solve a complex Mechanical Engineering problem and overcome technical challenges by integrating existing and new technical knowledge and experience to produce an innovative solution to the satisfaction of a customer/end user.
- Critically evaluate relevant data (including incomplete and uncertain data) so as to apply engineering analysis and advanced problem solving skills in order to quantify the impact of these findings on the solution and, using theory or research, to mitigate deficiencies.
- • Evaluate environmental and societal impact of design solutions (to include the entire life cycle of the product or process) and minimise adverse affects.
- Consider the wider context of the project, including risk, health and safety, ethics, environmental and sustainability limitations, intellectual property rights, codes of practice and standards, product safety and liability(as appropriate), to inform the project solution.
- Plan and manage a project from the design process to a deliverable outcome, including managing a budget and costs, and understand the commercial, economic and social environment of the project.
- Demonstrate effective communication, both verbal and written, to a technical and non-technical audience.
- Demonstrate the ability to work as a member of a team to achieve shared objectives and project management goals within the scope of the project, then monitor and adjust a personal programme of work on an on-going basis.

Research element

Research purposes: research goals and questions;
Hypotheis and assumption: paradigm perspective, methodological choice, validity and credibility;

Design procedures: conceptual design, theoretical modeling and analysis, and fabrication; Research outocmes: synthesis of conculsions and inferences.

Subject specific skills

1. Ability to conceive, make and realise a component, product, system or process;
2. Ability to develop economically viable and ethically sound sustainable solutions;
3. Ability to be pragmatic, taking a systematic approach and the logical and practical steps necessary for, often complex, concepts to become reality;
4. Ability to seek to achieve sustainable solutions to problems and have strategies for being creative and innovative;
5. Ability to be risk, cost and value-conscious, and aware of their ethical, social, cultural, environmental, health and safety, and wider professional engineering responsibilities;

Transferable skills

1. Numeracy: apply mathematical and computational methods to communicate parameters, model and optimize solutions;
2. Apply problem solving skills, information retrieval, and the effective use of general IT facilities;
3. Communicate (written and oral; to technical and non-technical audiences) and work with others;
4. Plan self-learning and improve performance, as the foundation for lifelong learning/CPD;
5. Exercise initiative and personal responsibility, including time management, which may be as a team member or leader;
6. Awareness of the nature of business and enterprise in the creation of economic and social value;
7. Overcome difficulties by employing skills, knowledge and understanding in a flexible manner;
8. Ability to formulate and operate within appropriate codes of conduct, when faced with an ethical issue;
9. Appreciation of the global dimensions of engineering, commerce and communication;
10. Be professional in their outlook, be capable of team working, be effective communicators, and be able to exercise responsibility and sound management approaches.

Study

Study time

Type	Required
Lectures	10 sessions of 2 hours (13%)
Private study	130 hours (87%)
Total	150 hours

Private study description

Students are expected to contribute a total of 130 hours to the project in addition to the 20 hours of facilitated seminars leading to a total of 150 hours work per student

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group A

	Weighting	Study time
Group Report	70%	
Group poster presentation	15%	
Group Presentation		
Individual logbook and viva Peer assessment	15%	
Individual logbook and viva Peer assessment		

Feedback on assessment

Verbal formative feedback during weekly seminars
Written feedback on the formal presentation
Written feedback on report
Written feedback on logbook and viva

Availability

Courses

This module is Core for:

- Year 1 of TESA-H341 Postgraduate Taught Advanced Mechanical Engineering