ES3H7-30 Group Project

24/25

Department
School of Engineering
Level
Undergraduate Level 3
Module leader
Rodolpho de Oliveira Leo
Credit value
30
Assessment
100% coursework
Study location
University of Warwick main campus, Coventry

Description

Introductory description

Group Project for Electromechanical Engineering students will synthesise work-based and off-the-job learning in the course and enable students to demonstrate a range of transferable and subject skills.

Module aims

The aim of the group project is to give students experience of working within a team, and parallels the way engineers often work in industry. Students will integrate their knowledge (some of which will be at the forefront of electromechanical engineering) and understanding in order to specify and solve a complex electromechanical engineering problem, through the creation and development of a product, process or system. The project also allows students to develop their understanding of project management, quality management systems, time management, ethics, sustainability, health and safety, risk and intellectual property rights. Students will develop effective communication, teamworking and leadership skills. A project handbook will be developed in collaboration with employers contextualising the elements of learning to be covered by the project.

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. Many 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 students. Tasks will be predetermined by the School of Engineering Project Director in conjunction with industry (employers) each year to match the skills and mix of the students.

Depending on the product selected, consideration will be given to design concept, mechanical and/or structural design, materials selection, stress analysis, dynamic performance, electrical/electronic design, control theory, actuator selection, sensors, computer interfacing, signal processing, control software, process planning, facilities planning, process design and development, production economics, customer needs, scheduling, quality control, materials control, tooling requirements, sales and marketing, management structure, programming, manufacturing, procurement, financial planning and management.

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 an agreed responsibility within their own specialisation, but 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 engineer’s ability to think and communicate in terms of integrated systems.

A member of staff is appointed as Project Director, will provide guidance on technical and organisational matters. Usually a student member of the group will be appointed as the Project Manager. Regular meetings take place with formal minutes to provide a record of decisions. The project be communicated via an academic poster, testing the students’ ability to rapidly communicate complicated ideas, systems, or processes. Furthermore it will require a formal write-up describing it’s delivery in detail, and a reasoned financial cost-benefit analysis. An oral presentation will takes place at the start of term 3 where the whole team will describe the project to an academic audience and answer question on its delivery.

Finally students will be required to maintain a log book and record their professional development.

Learning outcomes

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

- Analyse complex electro-mechanical engineering problems to reach substantiated conclusions by applying knowledge of first principles of mathematics, statistics, natural science and engineering principles.
- Select and apply appropriate computational and analytical techniques to model complex electro-mechanical engineering problems, recognising the limitations of the techniques employed.
- Apply an integrated or systems approach to design solutions for complex electro-mechanical engineering 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, ethical concerns, codes of practice and conduct, technical literature and industry standards and other sources of information.
- Evaluate the environmental and societal impact of solutions to complex electro-mechanical engineering problems and minimise adverse impacts.
- Use a risk management process to identify, evaluate and mitigate risks (the effects of uncertainty) associated with the project and adopt a holistic and proportionate approach to the mitigation of security risks.
- Select and apply appropriate materials, equipment, engineering technologies and processes, (recognising their limitations), and use practical laboratory and workshop skills to investigate and develop solutions for complex electro-mechanical engineering problems.
- Apply knowledge of engineering management principles, (commercial context, project and change management, and relevant legal matters including intellectual property rights) and discuss the role of quality management systems and continuous improvement in the context of complex electro-mechanical engineering problems.
- Function effectively as an individual, and as a member or leader of a team.
- Communicate effectively on complex engineering matters with technical and non-technical audiences.
- Plan and record self-learning and development as the foundation for lifelong learning/CPD.

Subject specific skills

Communicate technical information with others at all levels, including technical reports and the use of digital tools.
Follow a methodical approach to engineering problem solving.
Establish and report engineering design briefs.
Produce mechanical and electrical designs / drawings / sketches using Computer Aided Design(CAD) and manual systems.
Model real-world mechanical systems efficiently.
Select the design solution for a given electro-mechanical engineering application and environment using data to inform their decisions.
Integrate electrical and mechanical engineering systems, considering new and emerging technologies.
Use appropriate equipment to develop and execute test plans to support electro-mechanical product validation and approval.
Design functional electronic systems and circuits from component level.
Write and document structured programming code for electro-mechanical systems.
Fabricate engineering components and assemblies using specialist manufacturing methods and hand fitting techniques.
Assemble, wire, program and test electrical equipment, motors and control systems.
Plan, manage and lead engineering projects.
Perform risk management for engineering activities.
Comply with statutory and organisational safety requirements.

Transferable skills

Hold paramount the health and safety of themselves and others, and model health and safety conscious behaviour.
Self-motivated, work independently and take responsibility for their actions. Set themselves challenging personal targets and make own decisions.
Communicate confidently to create and maintain working relationships. Be respectful.
Work collaboratively as a team player. Able to work effectively within a team and interact with /help others when required.
Prioritise quality. Follow rules, procedures and principles in ensuring work completed is fit for purpose, and pay attention to detail / error checks throughout activities.
Adjust to different conditions, technologies, situations and environments and to new and emerging technologies.
Exercise responsibilities in an ethical manner, with openness, fairness and honesty.
Respect the environment and the public good. Consider sustainability and the adverse effects of projects and tasks on the wider world, in the short and longer term.
Commit to personal learning and professional development.
Commit to professional standards (or codes of conduct) of their employer and the wider industry.

Study

Study time

Type	Required
Supervised practical classes	18 sessions of 1 hour (7%)
Work-based learning	204 sessions of 1 hour (82%)
Other activity	28 hours (11%)
Total	250 hours

Private study description

50 hours guided independent learning (including VLE use).

Other activity description

28 hours of group tutorials

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	Eligible for self-certification
Peer Assessment and Individual Reflection	15%		No
Peer Assessment of Team. Individual reflection on personal contribution, teamworking and professional development. Contribution agreed by Project Director.			
Group Portfolio Assignment	85%		No
Group Portfolio: containing a range of professional and engineering documents submitted at stages throughout the project as required by electromechanical engineers			

Feedback on assessment

Verbal feedback during group meetings with Project Director, milestone report feedback and feedback on the formal presentation. Written feedback on remaining portfolio items in the submissions.

Availability

Courses

This module is Core for:

- Year 4 of DESA-H360 Undergraduate Electromechanical Engineering (Degree Apprenticeship)