The University Of Sheffield.

Electronic & Electrical Engineering.

# EEE360 INDIVIDUAL DESIGN PROJECT

## Credits: 30

## Course Description including Aims

To provide a structured individual design project to enable the student to carry out practical and/or theoretical work which underpins his/her academic studies and allows for the acquisition and demonstration of a wide range of practical skills applied to engineering designs.

## Outline Syllabus

## Time Allocation

18-20 weeks with a minimum of 200 hours (the equivalent of 3 to 4 afternoons per week) in the lab plus a further 100 hours background reading and report writing.

## Recommended Previous Courses

All courses relevant to the particular project.

## Assessment

Continuous assessment. Submission of a design specification, initial plan and risk assessment at week 4. Submission of an interim report at week 12. Submission of a project report and a 15 minute presentation at the end of the allocated period.

## Recommended Books

None

## Objectives

At the end of the project, successful students will be able to

1. Methodically apply engineering principles to the design of devices or systems under the constraint of well-defined specifications.
2. Meet fixed specifications through critical evaluation of methodologies available, demonstration of a prototype and assessment of the quality of the outcome.
3. Extract and critically assess information from a variety of sources.
4. Manage projects and time when working under time constraints
5. Maintain detailed log books as records of their technical planning, design and experimental work.
6. Communicate complex technical ideas effectively both orally and in writing.

## UK-SPEC/IET Learning Outcomes

| Outcome Code | Supporting Statement |
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| **SM1p/SM1m** | A wide variety of design projects are offered broadly falling within the research groupings of Communications, Semiconductor Materials & Devices and Electrical Machines & Drives. The projects reinforce and expand upon scientific principles and methodology, all within an engineering context. The specific details of the principles and methodology will be dependent on the individual project itself. |
| **SM2p/SM2m** | The Design projects involve analytical or computer based models to evaluate prospective design paths. |
| **EA1p**, **EA1m** | Projects will require the students to use engineering principles and apply them as required in their project. For example in semiconductor projects, physical principles and quantitative methods will often be used to develop models for components. In digital projects, number systems may be implemented using combinatorial and sequential logic circuits. In a communications project, antenna theory may be applied to develop an antenna design meeting a predetermined specification, and its measured performance evaluated against simulated results. |
| **EA2p**, **EA2m** | As part of the project, the student must assess the performance of their system and discuss the quality of the result. The methods used will be dependent on the individual project. For example, digital projects often require the determination of speed, area and power dissipation. |
| **EA3p/EA3m** | The design projects require the use of software tools and analytical processes to solve engineering problems. |
| **EA6m** | The design projects will be unfamiliar to the students doing them. They will have to use the literature to find ideas and information that will support their design effort. The student's ability to extract and evaluate pertinent data and to apply suitable analysis techniques forms part of the thesis assessment. |
| **EA4p, EA4m** | A design project needs a systems approach to be adopted if the various parts of the design are to be compatible and completed on time. |
| **D1p**, **D1m** | The supervisor of the design project will act as a client. The student must interpret the needs of the client and form an assessed technical specification. |
| **D1fl** | Being open ended problems, all individual projects require knowledge, understanding and skills to work with information that may be incomplete or uncertain. As part of the design process, students are expected to use theory or experimental research to mitigate these uncertainties and to quantify the effect of this on the design. |
| **D2p, D2m** | Students produce an initial specification for their project in which they identify any constraints. The extent of these constraints will depend upon the individual nature of the project. For all projects, a risk assessment and a project risk register must be performed. |
| **D2fl** | A key objective of the individual design project is to develop the student's knowledge and comprehensive understanding of engineering design processes and methodologies. The ability to apply and adapt these methodologies in unfamiliar situations is essential as the aims of each project is likely to be unfamiliar to each student. |
| **D3i , D3p, D3m** | All individual projects require knowledge, understanding and skills to work with information that may be incomplete or uncertain. As part of the design process, students are expected to use theory or experimental research to mitigate these uncertainties and to quantify the effect of this on the design. |

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| **D4i** | There is plenty of scope in the projects for innovative solutions and this is positively encouraged. |
| **D5p**, **D5m**, **D5i** | Students produce an initial plan for their project including a Gantt chart. They also identify and attempt to mitigate risks to the successful completion of their project. At the project mid-point, students produce a report which refines the specification and details any problems encountered. They produce a new Gant chart at this point to manage the remainder of the project. A log book is kept throughout the project. |
| **D6i**, **D6p**, **D6m** | At the end of the project, students must give an oral presentation of their work to a technical and non-technical audience, comprising their peers and members of academic staff. |
| **ET1p**, **ET1m** | Students are told of the importance of acknowledging all sources on which their work builds - and are expected to act on that advice |
| **ET3p/ET3m** | Project management techniques: risk register, Gantt charts, log book. |
| **ET6p/ET6m** | All students must complete a suitable risk assessment for their project. Additionally, they must complete a risk register of events that could threaten the success of the project. These provide them with knowledge and understanding of risk issues, risk assessment and risk management techniques. |
| **EP2p/EP2m** | All projects will require competence in engineering skills and knowledge of the characteristics of the related subject matter. |
| **EP3p**, **EP3m** | Laboratory skills in the broadest sense will play a large part in design projects. Topic areas can vary from the production of semiconductor devices to the use of electrical machines. |
| **EP4p**, **EP4m** | Students are required to source and interpret technical literature and documentation. |
| **EP6p**, **EP6m** | In all projects, students will learn of the industry standard design approaches used in their specialisation specifications and some may require familiarity with engineering standards. |
| **EP8p**, **EP8m** | All students must complete a risk register of events that could threaten the success of the project. This is one way of dealing with uncertainty. |