

ES434-15 ASICS, MEMS and Smart Devices

26/27

Department

School of Engineering

Level

Undergraduate Level 4

Module leader

Julian Gardner

Credit value

15

Module duration

10 weeks

Assessment

50% coursework, 50% exam

Study location

University of Warwick main campus, Coventry

Description

Introductory description

n/a

[Module web page](#)

Module aims

The course aims to present, mainly through sharing substantial practical experience, the design methodology of Application Specific Integrated Circuits (ASICs) and Micro-Electro-Mechanical Systems (MEMS).

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.

Devices and silicon processing; ASIC (based on analogue/digital VLSI) and MEMS design; silicon micromachining and other emerging process technologies; system design methodology; device

design styles: detailed optimisation (cost and power), principles and applications. Examples include both physical and chemical microsensors, MEMS and microsystems, in the application domains of consumer electronics, automotive, environmental, industrial, and healthcare. Students are expected to read chapters and solve problems taken from the recommended text-book. Written Design Project: ASIC chip, MEMS or smart device to be designed and simulated in laboratories with students working individually.

Learning outcomes

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

- Critique the main principles of ASICs, smart systems and devices. [M4]
- Design ASICs and MEMS through practical experience using typical modern Computer Aided Design software for this task. [M1,M4, M12]
- Understand emerging techniques in ASICs, MEMS and smart sensor systems. [M1]
- Evaluate the principles and processes involved in the implementation of complex VLSI circuits and MEMS devices. [M13]

Indicative reading list

[Reading lists can be found in Talis](#)

Subject specific skills

1. Ability to conceive, design and model a Si CMOS or MEMS component, product, and process.
2. Ability to develop economically viable solutions to ASIC and MEMS components.
3. Ability to seek to achieve ASIC solutions to potential applications and have strategies for being creative and innovative.
4. Ability to be performance, cost and value design conscious, and aware of their environmental, health and safety, and wider professional engineering responsibilities.

Transferable skills

1. Awareness of the nature of business and enterprise in the creation of economic and social value.
 2. Overcome difficulties by employing skills, knowledge and understanding in a flexible manner.
 3. Ability to formulate and operate within appropriate codes of conduct, when faced with an engineering issue.
 4. Appreciation of the international dimensions of engineering, commerce and communication.
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Study

Study time

Type	Required
Lectures	20 sessions of 1 hour (13%)
Seminars	10 sessions of 1 hour (7%)
Practical classes	5 sessions of 3 hours (10%)
Other activity	1 hour (1%)
Private study	104 hours (69%)
Total	150 hours

Private study description

Self-study of 104 hours

Other activity description

1x1 hour Revision Class

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Students can register for this module without taking any assessment.

Assessment group C6

	Weighting	Study time	Eligible for self-certification
Assessment component			
Computer-based Design & Simulation on-campus Examination	50%		No
The exam will be done in the computer room of the department, on-campus, invigilated. The students will need to access the software to design and simulate the given problem and answer related questions.			
Reassessment component			
Computer-based Design & Simulation			Yes (extension)

	Weighting	Study time	Eligible for self-certification
Report - Online submission via Tabula			
The reassessment will be in the form of a word report of up to 2,000 words. The student will need to design and simulate an ASIC device using commercial design software and submit it as a report describing relevant steps.			

Assessment component

Centrally-timetabled examination (On-campus)	50%		No
Examination			

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- Answerbook Green (8 page)
 - Students may use a calculator
 - Engineering Data Book 8th Edition

Reassessment component is the same

Feedback on assessment

Feedback on progress during all laboratory sessions.
Cohort level feedback on computer-based test.
Cohort level feedback on final written examination.

[Past exam papers for ES434](#)

Availability

Courses

This module is Core for:

- Year 4 of UESA-H63X MEng Electronic Engineering
- Year 4 of UESA-H63Z MEng Electronic Engineering with Exchange Year
- Year 5 of UESA-H636 MEng Electronic Engineering with Intercalated Year
- Year 5 of UESA-H63Y MEng Electronic Engineering with Intercalated Year
- Year 4 of UESA-H606 Undergraduate Electrical and Electronic Engineering MEng
- Year 5 of UESA-H607 Undergraduate Electrical and Electronic Engineering with Intercalated Year

This module is Optional for:

- Year 4 of UESA-H116 MEng Engineering with Exchange Year
- Year 5 of UESA-H115 MEng Engineering with Intercalated Year
- RESA-H6P9 Postgraduate Research Wide Bandgap Power Electronics
 - Year 1 of H6P9 Wide Bandgap Power Electronics (EngD)
 - Year 2 of H6P9 Wide Bandgap Power Electronics (EngD)
- Year 1 of TESA-H641 Postgraduate Taught Communications and Information Engineering
- Year 1 of TESA-H642 Postgraduate Taught Energy and Power Engineering

This module is Option list A for:

- Year 4 of UESA-H114 MEng Engineering
- Year 4 of UESA-H311 MEng Mechanical Engineering
- Year 1 of TESA-H644 Postgraduate Taught Electrical and Electronic Engineering

This module is Option list G for:

- Year 4 of UCSA-G408 Undergraduate Computer Systems Engineering
- Year 5 of UCSA-G409 Undergraduate Computer Systems Engineering (with Intercalated Year)