

# ES2C0-15 Analogue Electronic Design

**21/22**

**Department**

School of Engineering

**Level**

Undergraduate Level 2

**Module leader**

Ryan Montague

**Credit value**

15

**Module duration**

10 weeks

**Assessment**

50% coursework, 50% exam

**Study location**

University of Warwick main campus, Coventry

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## Description

### Introductory description

Analogue electronics

[Module web page](#)

### Module aims

Analogue electronics is one of the core requirements for any electronics and electrical engineer. The module is designed to provide learning on the practical applications of different analogue electronic circuits and devices that are commonly used in modern electronics.

There are four fundamental categories of components that are critical for any electronics or electrical engineer to understand. These are:

- Linear devices;
- Active/passive filters;
- Voltage Regulation/reference;
- Signal conversion.

This module will present tools and techniques of used combinations of these components to create a useful analogue electronic system.

Professional Engineers must appreciate the concept of electronic analogue systems and how they interact with digital systems.

## 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.

Lecture Topics include:

- Diodes, BJTs and FETs transistors as individual devices and in use as simple linear amplifiers. In addition, use of transistors as high/low sided switches and level shifters.
- Analogue Circuit Modelling and Simulation: Schematic capture and simulation of analogue electronic components.
- Voltage regulators (including LDOs), voltage references and current sources. How to construct and deploy these components.
- Digital to Analogue and Analogue to Digital Converters, including SAR, Sigma-delta and flash
- Operational Amplifiers (including internal topology), covering different circuit configuration with focus on single supply (5V, 3.3V and 1.8V) operation. This will include instrumentation amplifiers and comparators
- Sources of electrical noise, passive and active filters, covering operation and design methods
- Signal Selection, processing and conversion (including multiplexing, ADC and DAC converters)
- Analogue oscillators, waveform generation and timers
- Non-linear circuits, including log amplifiers

## Learning outcomes

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

- Understand a range of different analogue electronics systems
- Combine different analogue electronic components to create a system
- Appreciate specifications and design limitations and be able to design analogue electronic systems to fulfil these.

## Indicative reading list

Microelectronics Circuit Analysis and Design, Donald Neaman, 4e 2009.

## Subject specific skills

Ability to apply relevant practical and laboratory skills building and testing analogue electronic circuits

## Transferable skills

Numeracy: apply mathematical, computational and modelling methods in an engineering context

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# Study

## Study time

| Type              | Required                    |
|-------------------|-----------------------------|
| Lectures          | 20 sessions of 1 hour (13%) |
| Seminars          | 2 sessions of 1 hour (1%)   |
| Demonstrations    | 2 sessions of 1 hour (1%)   |
| Practical classes | 5 sessions of 3 hours (10%) |
| Private study     | 111 hours (74%)             |
| Total             | 150 hours                   |

## Private study description

111 hours of guided independent learning

## Costs

No further costs have been identified for this module.

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## Assessment

You must pass all assessment components to pass the module.

### Assessment group C1

|   | Weighting | Study time |
|---|-----------|------------|
| LABORATORY RESULTS REPORTING            | 50%       |            |
| ONLINE QMP LABORATORY RESULTS REPORTING |           |            |
| Online Examination                      | 50%       |            |
| QMP online examination                  |           |            |
| ~Platforms - AEP,QMP                    |           |            |

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- Online examination: No Answerbook required
- Students may use a calculator
- Engineering Data Book 8th Edition
- Graph paper

## Feedback on assessment

- Support through advice and feedback hours.
- Written feedback on marked laboratory reports.
- Cohort-level feedback on final exam.

[Past exam papers for ES2C0](#)

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## Availability

### Post-requisite modules

If you pass this module, you can take:

- ES3E6-15 Microwave Engineering and RF Circuits
- ES3E0-15 Power Electronics
- ES4D4-15 Power Electronic Converters & Devices

## Courses

This module is Core for:

- Year 2 of UESA-H161 BEng Biomedical Systems Engineering
- Year 2 of UESA-H63W BEng Electronic Engineering
- Year 2 of UESA-HH35 BEng Systems Engineering
- Year 2 of UESA-H163 MEng Biomedical Systems Engineering
- Year 2 of UESA-H63X MEng Electronic Engineering
- Year 2 of UESA-HH31 MEng Systems Engineering
- Year 2 of UCSA-G406 Undergraduate Computer Systems Engineering
- Year 2 of UCSA-G408 Undergraduate Computer Systems Engineering
- Year 2 of UESA-H605 Undergraduate Electrical and Electronic Engineering
- Year 2 of UESA-H606 Undergraduate Electrical and Electronic Engineering MEng

This module is Option list A for:

- Year 2 of UESA-H113 BEng Engineering
- Year 2 of UESA-H112 BSc Engineering
- Year 2 of UESA-HN11 BSc Engineering and Business Studies
- Year 2 of UESA-H114 MEng Engineering