

# ES3E6-15 Microwave Engineering and RF Circuits

**20/21**

**Department**

School of Engineering

**Level**

Undergraduate Level 3

**Module leader**

Christos Mias

**Credit value**

15

**Module duration**

10 weeks

**Assessment**

40% coursework, 60% exam

**Study location**

University of Warwick main campus, Coventry

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## Description

### Introductory description

ES3E6-15 Microwave Engineering and RF Circuits

[Module web page](#)

### Module aims

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

- To present specialist microwave engineering and RF circuit theory, enable students to perform microwave measurements and design microwave components and RF circuits.

### 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.

Review of transmission line theory, Smith Chart, impedance matching, EM waves  
General theory of waveguides

Microstrip line  
Scattering parameters  
Microwave resonators, power dividers and filters  
Microwave diodes  
RF Amplifier Design  
RF Oscillators  
RF Mixers

## **Learning outcomes**

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

- Consolidate specialised knowledge in microwave engineering and RF circuit design.
- Experimentally evaluate the performance of microwave components using microwave equipment.
- Design microwave components and RF circuits.
- Perform complex analytical calculations in microwave engineering and RF circuits.

## **Indicative reading list**

1. Microwave and Millimeter-Wave Design for Wireless Communications, N. Somjit, I. Robertson, M. Chongcheawchamnan, 2016, John Wiley and Sons.
2. Microwave Active Circuit Analysis and Design, Clive Poole and Izzat Darwazeh, 2016, Academic Press.
3. Passive and Active RF-Microwave Circuits, Pierre Jarry and Jacques N. Beneat, ISTE Press, Elsevier, 2015.
4. Microwave Engineering, David M. Pozar, Wiley, 2012.

## **Subject specific skills**

Ability to apply relevant practical and laboratory skills

Ability to conceive, make and realise a component, product, system or process

Ability to be pragmatic, taking a systematic approach and the logical and practical steps necessary for, often complex, concepts to become reality

## **Transferable skills**

Numeracy: apply mathematical and computational methods to communicate parameters, model and optimize solutions

Apply problem solving skills, information retrieval, and the effective use of general IT facilities

Plan self-learning and improve performance, as the foundation for lifelong learning/CPD

Exercise initiative and personal responsibility, including time management, which may be as a team member or leader

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## **Study**

## Study time

| Type              | Required                    |
|-------------------|-----------------------------|
| Lectures          | 30 sessions of 1 hour (20%) |
| Seminars          | 2 sessions of 1 hour (1%)   |
| Practical classes | 1 session of 1 hour (1%)    |
| Other activity    | 2 hours (1%)                |
| Private study     | 115 hours (77%)             |
| Total             | 150 hours                   |

## Private study description

Self-study 112 hours

## Other activity description

2x1 hour Revision classes

## 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 D2

|                         | Weighting | Study time |
|-------------------------|-----------|------------|
| Assignment              | 40%       |            |
| Assignment (2250 words) |           |            |
| Online Examination      | 60%       |            |
| QMP                     |           |            |
| ~Platforms - QMP        |           |            |

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- Online examination: No Answerbook required
- Students may use a calculator

## Feedback on assessment

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

[Past exam papers for ES3E6](#)

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## Availability

### Pre-requisites

To take this module, you must have passed:

- All of
  - [ES2C0-15 Analogue Electronic Design](#)

## Courses

This module is Core for:

- Year 3 of UESA-H63W BEng Electronic Engineering
- Year 4 of UESA-H63V BEng Electronic Engineering with Intercalated Year
- Year 3 of UESA-H63X MEng Electronic Engineering

This module is Core optional for:

- Year 4 of UESA-H636 MEng Electronic Engineering with Intercalated Year
- Year 4 of UESA-H63Y MEng Electronic Engineering with Intercalated Year
- Year 3 of UESA-H115 MEng Engineering with Intercalated Year

This module is Optional for:

- Year 3 of UESA-H113 BEng Engineering
- Year 4 of UESA-H115 MEng Engineering with Intercalated Year
- Year 1 of TESA-H641 Postgraduate Taught Communications and Information Engineering

This module is Option list A for:

- Year 4 of UESA-H111 BEng Engineering with Intercalated Year
- UESA-H112 BSc Engineering
  - Year 3 of H112 Engineering
  - Year 3 of H112 Engineering