1. **Title of the module**

EENG8910 (EL891) – Smart RF Systems and Antennas

1. **School or partner institution which will be responsible for management of the module**

Engineering and Digital Arts

1. **The level of the module (Level 4, Level 5, Level 6 or Level 7)**

Level 7

1. **The number of credits and the ECTS value which the module represents**

15 credits (7.5 ECTS)

1. **Which term(s) the module is to be taught in (or other teaching pattern)**

Autumn

1. **Prerequisite and co-requisite modules**

None

1. **The programmes of study to which the module contributes**

MSc/PGDip in Advanced Communications Engineering

MSc/PGDip in Advanced Electronic Systems Engineering

1. **The intended subject specific learning outcomes.
On successfully completing the module students will be able to:**

8.1 Comprehensively and critically understand physical layer communications principles as applied in links.

8.2 Apply their knowledge to the analysis and design of passive and active antennas and supporting RF transmission devices.

8.3 Understand conceptually the requirements of matching and balancing in transmission.

8.4 Apply their knowledge to the design of microwave and RF transmission line and wireless systems.

1. **The intended generic learning outcomes.
On successfully completing the module students will be able to:**

9.1 Show ability to deal with complex issues systematically and creatively and make judgements in the absence of complete data, and show self-direction in tackling and solving problems.

9.2 Effectively use ICT.

9.3 Demonstrate effective communication to specialist (and non-specialist) audiences.

9.4 Learn independently for CPD, use critical thinking, reasoning and reflection and demonstrate autonomy in time and resource management.

1. **A synopsis of the curriculum**

This module will provide the knowledge and skills to analyse and design microwave electronic systems as used in modern fixed and mobile communications. Passive and active circuit based technologies will be covered as well as free space transmission. The module will provide simulation skills using electromagnetic design software.

1. **Reading list (Indicative list, current at time of publication. Reading lists will be published annually)**

Recommended Reading:

* Pozar, D. Microwave Engineering 4th edition, Wiley, 2012, 978-0-470-63155-3
* Kogure, H. Introduction to Antenna Analysis Using EM Simulators, Artech House, 2011, 978-1-60807-157-9
* Collier, R.J. Transmission Lines - Equivalent Circuits, Electromagnetic Theory, and Photons, Cambridge University Press, 2013, 978-1107026001
* Betoni, H.L. Radio Propagation for Modern Wireless Systems, 1999, Prentice Hall, 0130263737

Background Reading:

* Kraus, J.D. Antennas for All Applications 3rd edition, 2002, 978-007232-103-6
* Wireless Communications, Rappaport, 2nd Edition – 2002, 978-0130422323
* Antennas and Propagation for Wireless Communication Systems – Saunders and Aragon-Zavala, 2007, 978-0-470-84879-1
1. **Learning and teaching methods**

Total contact hours: 44

Private study hours: 106

Total study hours: 150

1. **Assessment methods**
	1. Main assessment methods

Practical (8.3%)

Workshop (16.7%)

Examination (75%)

13.2 Reassessment methods

Like-for-like

1. ***Map of module learning outcomes (sections 8 & 9) to learning and teaching methods (section12) and methods of assessment (section 13)***

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Module learning outcome** | 8.1 | 8.2 | 8.3 | 8.4 | 9.1 | 9.2 | 9.3 | 9.4 |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |
| **Private Study** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| *Simulation Workshops* |  | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| *Lectures* | **x** | **x** | **x** | **x** |  |  |  |  |
| *Assessed Simulation Labs* | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| **Assessment method** |  |  |  |  |  |  |  |  |
| *Simulation Labs* | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| *Examination* | **x** | **x** | **x** | **x** |  |  |  | **x** |

1. **Inclusive module design**

The School/Collaborative Partner *(delete as applicable)* recognises and has embedded the expectations of current equality legislation, by ensuring that the module is as accessible as possible by design. Additional alternative arrangements for students with Inclusive Learning Plans (ILPs)/declared disabilities will be made on an individual basis, in consultation with the relevant policies and support services.

The inclusive practices in the guidance (see Annex B Appendix A) have been considered in order to support all students in the following areas:

a) Accessible resources and curriculum

b) Learning, teaching and assessment methods

1. **Campus(es) or centre(s) where module will be delivered**

Canterbury

1. **Internationalisation**

The technologies and systems covered in this module are globally adopted for domestic and international communications. The textbooks are internationally used. Consideration is made in the design aspects of this module to include international variations in system requirements. For instance, the differing frequency bands used in different legislative regimes.

**If the module is part of a programme in a Partner College or Validated Institution, please complete sections 18 and 19. If the module is not part of a programme in a Partner College or Validated Institution these sections can be deleted.**

1. **Partner College/Validated Institution**
2. **University School responsible for the programme**

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**Revision record – all revisions must be recorded in the grid and full details of the change retained in the appropriate committee records.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date approved | Major/minor revision | Start date of delivery of revised version | Section revised | Impacts PLOs (Q6&7 cover sheet) |
| 03/12/19 | Major | Sep 2020 | 1, 8 | No |
|  |  |  |  |  |