1. **Title of the module**

EENG8920 (EL892) - Satellite and Optical Communications

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)**

Spring

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

No formal pre-requisites, but students are expected to have studied basic material on RF communications technology at undergraduate level.

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

MSc/PDip in Advanced Communications Engineering

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

Have:

8.1 An advanced and critical understanding of theory of satellite communication systems.

8.2 An ability to apply their knowledge to the analysis and design of satellite communication systems and the design of certain components for the system.

8.3 An advanced and critical understanding of the theory of modern optical communication systems.

8.4 An ability to apply their knowledge to the design of optical communications systems at a conceptual level.

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 Use ICT.

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

9.4 Show that they can learn independently for CPD, will use critical thinking, reasoning and reflection and demonstrate autonomy in time and resource management.

1. **A synopsis of the curriculum**

Optical Communications:

Optical fibre propagation, attenuation, dispersion including polarization mode dispersion, scattering and nonlinear effects. Sources and source characteristics (spectrum, noise, modulation response): LEDs and Laser Diodes. External modulators. Detectors. Receiver analysis. Optical fibre link budget analyses. Optically amplified systems. WDM systems and component requirements. Polarization and spatial multiplexing. Visible light communications. Microwave photonic and radio over fibre systems. Ultra-high-bit-rate coherent systems.

Satellite Communication Systems:

Introduction to satellite communication systems and sub-systems, orbits, radio propagation, satellite antennas, noise figure analysis, examples.

Satellite link design and analysis, modulation and multiple access, earth station technology, satellite payloads, nonlinear HPA effects, examples.

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

Recommended Reading:

* Satellite Communication Systems, 3rd Ed., B. Evans, IET, 2008, ISBN (10 digit) 0 85296 899 X, ISBN (13 digit) 978-0-85296-899-4
* Satellite Communications, 4th Ed., Roddy, 2006, ISBN-10: 0071462988 | ISBN-13: 978-0071462983
* Optical Fiber Communications, 4th Ed., G. Keiser, 2010, McGraw-Hill ISBN-10: 0073380717, ISBN-13: 978-0073380711

Background Reading:

* Wireless Communications, Rapport, 2nd Edition – 2009, ISBN 813172882X, 9788131728826
* Satellite Communication Systems – Richharia 1999, ISBN-10: 0071342087, ISBN-13: 978-0071342087
* Antennas: From Theory to Practice, Yi Huang and Kevin Boyle ISBN: 978-0-470-51028-5, 2008
* Fiber-Optic Communication Systems, 3rd Ed., G.P. Agrawal, 2002, ISBN-10: 0471215716, ISBN-13: 978-0471215714
1. **Learning and teaching methods**

Total contact hours: 41

Private study hours: 109

Total study hours: 150

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

Assignment (10%)

Assignment (10%)

Examination (80%)

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** |
| *Lectures* | **X** | **X** | **X** | **X** |  |  |  |  |
| *Example classes* |  |  | **X** | **X** |  |  | **X** | **X** |
| *Simulation Labs* |  |  | **X** | **X** | **X** | **X** | **X** | **X** |
| **Assessment method** |  |  |  |  |  |  |  |  |
| *Simulation Labs* |  |  | **X** | **X** | **X** | **X** | **X** | **X** |
| *Coursework assignment* | **X** | **X** |  |  | **X** |  |  | **X** |
| *Examination* | **X** | **X** | **X** | **X** |  |  |  | **X** |

1. **Inclusive module design**

The School 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**

Satellites are used by global wireless communications internationally. Optical communications market is international and the International Telecommunications Union is responsible for many optical communications specifications.

**FACULTIES SUPPORT OFFICE USE ONLY**

**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 the delivery of revised version | Section revised | Impacts PLOs (Q6&7 cover sheet) |
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Revised FSO Jan 2018