



### Module Details

<b>Short Title:</b>	Optical Components for Photonic Systems	<b>APPROVED</b>
<b>Full Title:</b>	Optical Components for Photonic Systems	
<b>Module Code:</b>	EE602	<b>NFQ Level:</b> 10
		<b>ECTS Credits:</b> 5
<b>Valid From:</b>	Academic Session - 2012/13 ( September 2012 )	
<b>Administrator:</b>	Patrick McNally	
<b>Module Coordinator:</b>	Liam Barry	
<b>Description:</b>	The purpose of this module is to introduce new PhD students working in the general optical communications field to all the components that are employed in building a photonics system. The module will introduce the operation of optical sources, detectors, amplifiers, modulators, and filters that are used in optical communications systems.	

### Learning Outcomes:

*On successful completion of this module the learner will be able to*

1. Understand the underlying physics of the components that make an optical system and their roles and limitations
2. Describe the characteristics and performance of optical fibres and their impact on the overall system performance
3. Outline and be able to use the techniques and the technologies that make possible the modulation and demodulation processes in optical systems in order to achieve a required performance
4. Understand the nature of, and be able to use the performance metrics employed in system design, namely BER and S/N ratio
5. Analyse the limitations on system performance imposed by the nonlinear optical behaviour of fibres and be able to use the techniques for the mitigation of these effects
6. Describe the limitations of TDM systems in terms of components and performance, and the advantages of WDM systems and their limitations
7. Outline the concepts of fibre optic networks for TDM and WDM networks and the merits of an all optical fibre network
8. Simulate basic optical systems using design software

### Pre-requisite learning

#### Module Recommendations

*This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed. You may not enrol on this module if you have not acquired the learning specified in this section.*

No recommendations listed

#### Requirements

*This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed. You may not enrol on this module if you have not acquired the learning specified in this section.*

No requirements listed



## Module Content &amp; Assessment

**Indicative Content**• **Topics**

This module will focus on the main components that are used to build modern day optical communication systems. Specifically the course will focus on the following areas; - Laser diodes as optical transmitter - Electro-optical modulators including Mach-Zehnder and electro-absorption modulators - Optical amplifiers including fibre and semiconductor based optical amplifiers - Optical fibre transmission including the effects of dispersion and non-linearity - Optical receivers including pin and apd detectors - Coherent optical receivers - Optical filters including muxes and demuxes such as array waveguide gratings - Optical switches

**Assessment Breakdown**

	<b>%</b>
Course Work	100%
End of Semester Formal Examination	0%

**Coursework Breakdown**

<i>Type</i>	<i>Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Assessment Date</i>
Assignment	The students will be required to write a detailed paper on a specific research topic that will require knowledge of the course content in addition to additional reading of relevant material on their specific topic	1,2,3,4,5,6,7	50	n/a
Group laboratory	The students will undertake a laboratory to develop simulations of different optical communication systems and submit a report on the laboratory and results	1,2,3,4,5,6,7,8	50	n/a

**DCU reserves the right to alter the nature and timings of assessment**



## Module Workload &amp; Resources

Workload	Full-time hours per semester	
	Description	Hours
Lecture	Course Lectures	20
Lab	Laboratory to undertake systems simulations	5
Assignment	Completion of written assignment	25
Group work	Completion of laboratory report	15
Independent learning time	No Description	60
		Total Workload
		125.00

## Resources

## Essential Book Resources

- **John Gowar 1993, *Optical communication systems*, 2nd Ed., Prentice Hall London [ISBN: 978-0136387275]**
- **edited by Ivan P. Kaminow, Thomas L. Koch 1997, *Optical fiber telecommunications III*, Academic Press San Diego, CA [ISBN: 978-0123951700]**
- **Senior 2008, *Optical Fiber Communications: Principles and Practice (3rd Edition)*, 3 Ed., Prentice Hall [ISBN: 978-013032681]**
- **Govind P. Agrawal 2002, *Fiber-optic communication systems*, Wiley-Interscience New York [ISBN: 978-0471215714]**

## Module Managers &amp; Teachers

## Module Coordinators

Semester	Staff Member	Staff Number
Semester 1	Liam Barry	75043394
Semester 2	Liam Barry	75043394
Autumn	Liam Barry	75043394

## Module Teachers

Staff Member	Staff Number
No Teacher Staff Assigned	