Programme Specification

MSc Optical Fibre and Photonic Engineering (2018-19)

This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities that are provided.

Awarding Institution	University of Southampton
Teaching Institution	University of Southampton
Mode of Study	Full-time
Duration in years	1
Accreditation details	None
Final award	Master of Science (MSc)
Name of award	Optical Fibre and Photonic Engineering
Interim Exit awards	Postgraduate Certificate in Higher Education
	Postgraduate Diploma in Higher Education
FHEQ level of final award	Level 7
UCAS code	N/A
Programme code	8243
QAA Subject Benchmark or other external reference	QAA Framework for Higher Education Qualifications (FHEQ) 2008
Programme Lead	William Brocklesby (wsb)

Programme Overview

Brief outline of the programme

This MSc programme offers an advanced postgraduate education covering the fundamental concepts of optical fibres and of photonics, and their application in real-world engineering settings. The range of modules that make up this program includes modules which look at the underlying theory and engineering applications of lasers, of optical fibres, and optical materials, and a wide range of more specialist modules covering optical telecommunications, optical fibre sensors, active fibre devices such as fibre lasers & amplifiers, silicon photonics, and nonlinear applications of optical fibres. A notable feature of the programme is that students will gain experience of working in our advanced research laboratories, including the new Mountbatten Clean Room complex.

The programme is taught by staff from the Zepler Institute for Photonics and Nanoelectronics, previously known as the Optoelectronics Research Centre (ORC). The Zepler Institute for Photonics and Nanoelectronics has a leading international reputation for its research in optical fibres, lasers, and other areas of photonics. Our research in these areas ranges across solid state lasers, silicon photonics, optical fibre design and fabrication, passive fibre devices, fibre lasers, and application of these fibre-based technologies in areas as diverse as optical sensing, manufacturing, medicine, defence and telecommunication.

Your contact hours will vary depending on your module/option choices. Full information about contact hours is provided in individual module profiles.

Learning and teaching

The program consists of eight taught modules over the first two semesters of the year, and a research project in the third semester. Each module included in the programme consists of weekly lectures and tutorials by the module lecturers. Teaching methods include; directed reading, lectures, problem-solving activities and private/guided study. There are also practical laboratory sessions to directly demonstrate and put into context the taught technologies, including live demonstrations of, for example, fibre preform manufacturing and fibre drawing. The final project will involve hands-on training and working on your chosen topic area of optical fibres and photonics. Submodules such as the Industrial Showcase in OPTO6012 will involve visits to local photonics-based companies and direct learning from, and interaction with, entrepreneurs and company executives.

Assessment

The taught material will typically be assessed via a number of fortnightly problem sheets covering the material in each module, via group presentations, via a written examination of 2-2.5 hour duration at the end of each semester, via case-studies following visits to offsite companies and businesses (typically ~3000 words) and short reports (~1500 words), and via a final project dissertation (~15000 words) and conference-style final project presentation to all the students on the programme.

Special Features of the programme

A further feature of the programme is a 1-week Industry Showcase event, where executives from specialist companies in the field of optical fibre and other photonics technologies will provide information about the workings of running their particular businesses, and also the employment opportunities in them, and you have the opportunity to put together a presentation on the optical fibre and photonics market relevant to the individual companies discussing product development and sales opportunities.

Please note: As a research-led University, we undertake a continuous review of our programmes to ensure quality enhancement and to manage our resources. As a result, this programme may be revised during a student's period of registration; however, any revision will be balanced against the requirement that the student should receive the educational service expected. Please read our Disclaimer to see why, when and how changes may be made to a student's programme.

Programmes and major changes to programmes are approved through the University's programme validation process which is described in the University's Quality handbook.

Educational Aims of the Programme

The aims of the programme are to:

1. Provide you with advanced knowledge of optical fibre and photonic technologies.
2. Give you the opportunity to work in a research-led environment using state of the art facilities.
3. Develop your research skills applicable to a career in research and development.
4. Stimulate your interest in the subject using a variety of teaching and learning methods

Programme Learning Outcomes

Knowledge and Understanding

On successful completion of this programme you will have knowledge and understanding of:

A1. Scientific and engineering principles underlying a range of optical fibre and photonics technologies.

A2. Specialist tools and techniques used to design, construct, measure, analyse a range of optical systems, including lasers and optical fibre-based devices.

A3. Current research relevant to optical fibres and photonics.

Teaching and Learning Methods

You will have a variety of opportunities to achieve these learning outcomes. Learning and teaching methods include:

- Staff-led lectures, demonstrations, and seminars.
- Directed reading.
- Student-led seminars and presentations.
- Technical reports, including literature searches and surveys.
- Specification, design, analysis, implementation and verification exercises.
- Group design exercises, presentations and reports.
- Revision for written examinations.
- Staff and post-graduate supervision of your research project.

Assessment Methods

Your achievement is assessed as follows. In the case of staff-led lectures and seminars, your knowledge and understanding (outcomes A1-3) is assessed through written examinations and technical reports. Your understanding of research issues and your ability to locate and present technical information (outcome C) is assessed through student-led presentations, technical reports and written examinations, and additionally your dissertation. The research project (outcome A3) is assessed through your dissertation, which must include a significant literature survey to set the context for your work, a review of your progress relative to your initial plan, and a critical evaluation and reflection.

Subject Specific Intellectual and Research Skills

On successful completion of this programme you will be able to:

B1. Use specialist tools and techniques to design, construct, measure, and analyse design, construct,

measure, analyse a range of optical systems, including lasers and optical fibre-based devices.

B2. Model, simulate and analyse the behaviour of (sub-) systems at an appropriate level of detail.

B3. Acquire new knowledge and understanding through critical reading of research material.

B4. Apply such knowledge and understanding to specialist design problems.

Teaching and Learning Methods

- Staff-led lectures, demonstrations, and seminars.
- Directed reading.
- Student-led seminars and presentations.
- Technical reports, including literature searches and surveys.
- Specification, design, analysis, implementation and verification exercises.
- Group design exercises, presentations and reports.
- Revision for written examinations.
- Staff and post-graduate supervision of your research project.

Assessment Methods

Your achievement is assessed as follows. Your understanding of research issues and your ability to locate and present technical information (outcome B3) is assessed through student-led presentations, technical reports and written examinations, and additionally your dissertation. Your ability to design and implement photonic systems, perhaps using novel technologies, (outcomes B1, B2, B4) is developed through design exercises, and additionally your research project, and assessed through technical reports and your dissertation. These reports are expected to include a rationale for your design and implementation decisions and evidence of verification activities. The research project (outcomes B3, B4) is assessed through your dissertation, which must include a significant literature survey to set the context for your work, a review of your progress relative to your initial plan, and a critical evaluation and reflection.

Transferable and Generic Skills

On successful completion of this programme you will be able to:

C1. Use printed and on-line catalogues and databases to locate relevant technical information.

C2. Present specialist technical information in written and verbal forms.

C3. Work efficiently and effectively as a member of a project team.

C4. Work independently on a significant research project.

Teaching and Learning Methods

- Directed reading.
- Student-led seminars and presentations.

- Technical reports, including literature searches and surveys.
- Specification, design, analysis, implementation and verification exercises.
- Group design exercises, presentations and reports.
- Staff and post-graduate supervision of your research project.

Assessment Methods

Your achievement is assessed as follows. Your understanding of research issues, and your ability to locate and present technical information (outcomes C1, C2) is assessed through student-led presentations, technical reports and written examinations, and additionally your dissertation. Students are expected to maintain log-books that demonstrate their contribution to group projects (outcome C3), and these may also be assessed. The research project (outcomes C1, C2, C4) is assessed through your dissertation, which must include a significant literature survey to set the context for your work, a review of your progress relative to your initial plan, and a critical evaluation and reflection.

Subject Specific Practical Skills

On successful completion of this programme you will be able to:

D1. Work competently with lasers, optical fibres and related technology to gather experimental data.

D2. Be familiar with a range of optical systems, including lasers and optical fibre-based devices, and their applications in real-world settings.

D3. Process, analyse, and display data from optical experiments.

D4. Perform practical tasks such as fusion splicing and fibre characterisation using recognised techniques.

D5. Be familiar with recognised techniques for analysing and characterising optical systems.

Programme Structure

The programme structure table is below:

Information about pre and co-requisites is included in individual module profiles.

Part I

The programme has a number of compulsory and optional taught modules. Each successfully completed module is worth 7.5 ECTS/15 CATS credits. The MSc requires you to complete 60 ECTS/ 120 CATS credits of taught modules. You then undertake a research project leading to a dissertation worth a further 30 ECTS/ 60 CATS credits.

The normal pattern of study is as follows:

Semester 1: Three compulsory modules covering the basics of lasers, basics of optical fibres, and an optics laboratory module. Assessment of the lecture-based modules is through a mixture of coursework and written examinations. The third compulsory module is a lab-based course covering practical topics important to photonic systems such as fibres or lasers. This module is assessed through laboratory sessions, a conference-style group presentation, coursework and a written examination. There are also optional modules to be chosen between modules related with signal processing techniques, the basics of MEMS, and modules covering more fundamental aspects of the light and matter, and silicon photonics.

Semester 2: There are three compulsory modules providing deeper understanding of specialist areas of optical fibres and photonics: one covering fibre telecommunications, one covering advanced lasers, including optical fibre lasers, and a third on optical fibre sensors. There are also optional modules on topics including MEMS, Wireless and Mobile communications, or nanotechnology.

Semester 3: Following the successful completion of the taught component in the first two semesters of the programme, you will undertake a research project lasting around 15 weeks involving cleanroom and optical laboratory work. This project is assessed by a midterm (7-week) progress report on ~2,500 words, a ~15,000 word dissertation, and a conference-style group presentation.
Examinations are held at the end of Semester 1 (January) and at the end of Semester 2 (May) together with a conference-style presentation on the topic of your research project at the end of Semester 3 (Mid-September).

The project builds on the taught courses and hands-on practical sessions from Semester 1 and 2. It provides training in methodology, techniques and skills essential for carrying out independent research and development tasks. Towards the end of Semester 2, you will be allocated a project supervisor with whom you will meet and agree a project brief and plan. These must be submitted to, and agreed by, the project coordinator. During the summer you will have weekly meetings with your supervisor or, if your supervisor is unavailable, a delegated deputy. Your dissertation is due by the middle of September and late submissions will be penalised, unless an extension to this deadline has been agreed beforehand in writing by the project coordinator. Immediately following the submission of the dissertation you will present the main achievement of your research project work to your fellow course student colleagues in a conference-style setting.

Students who have successfully completed 30 ECTS/60 CATS or 60 ECTS/120 CATS credits worth of taught material may exit the programme with a Postgraduate Certificate or Postgraduate Diploma respectively.

Part I Compulsory

Code	Module Title	ECTS	Type
OPTO6010	Advanced Fibre Telecommunication	7.5	Compulsory

OPTO6002	Advanced Lasers	7.5	Compulsory
PHYS6024	Lasers	7.5	Compulsory
OPTO6011	Optical Fibre Sensors	7.5	Compulsory
OPTO6008	Optical Fibres	7.5	Compulsory
OPTO6023	Photonics Laboratory and Study Skills	7.5	Compulsory

Part I Core

Code	Module Title	ECTS	Type
OPTO6012	Project	30	Optional

Part I Optional

Code	Module Title	ECTS	Type
OPTO6007	An Introduction to Silicon Photonics	7.5	Optional
ELEC6208	Bio/Micro/Nano Systems	7.5	Optional
PHYS3003	Light and Matter	7.5	Optional
ELEC6201	Microfabrication	7.5	Optional
ELEC6203	Microsensor Technologies	7.5	Optional
PHYS6014	Nanoscience: technology and advanced materials	7.5	Optional
ELEC6218	Signal Processing	7.5	Optional
ELEC6219	Wireless and Mobile Networks	7.5	Optional

Progression Requirements

The programme will follow the University's regulations for ***Progression, Determination and Classification of Results: Undergraduate and Integrated Masters Programmes*** or the University's regulations for ***Progression, Determination and Classification of Results: Standalone Masters***

Programmes as set out in the General Academic Regulations in the University Calendar: http://www.calendar.soton.ac.uk/sectionIV/sectIV-index.html

Support for student learning

There are facilities and services to support your learning some of which are accessible to students across the University and some of which will be geared more particularly to students in your particular Faculty or discipline area.

The University provides:

- library resources, including e-books, on-line journals and databases, which are comprehensive and up-to-date; together with assistance from Library staff to enable you to make the best use of these resources
- high speed access to online electronic learning resources on the Internet from dedicated PC Workstations onsite and from your own devices; laptops, smartphones and tablet PCs via the Eduroam wireless network. There is a wide range of application software available from the Student Public Workstations.
- computer accounts which will connect you to a number of learning technologies for example, the Blackboard virtual learning environment (which facilitates online learning and access to specific learning resources)
- standard ICT tools such as Email, secure filestore and calendars.
- access to key information through the MySouthampton Student Mobile Portal which delivers timetables, Module information, Locations, Tutor details, Library account, bus timetables etc. while you are on the move.
- IT support through a comprehensive website, telephone and online ticketed support and a dedicated helpdesk in the Hartley Library.
- Enabling Services offering support services and resources via a triage model to access crisis management, mental health support and counselling. Support includes daily Drop In at Highfield campus at 13.00 – 15.00 (Monday, Wednesday and Friday out of term-time) or via on-line chat on weekdays from 14.00 – 16.00. Arrangements can also be made for meetings via Skype.
- assessment and support (including specialist IT support) facilities if you have a disability, long term health problem or Specific Learning Difficulty (e.g. dyslexia).
- the Student Services Centre (SSC) to assist you with a range of general enquiries including financial matters, accommodation, exams, graduation, student visas, ID cards
- Career and Employability services, advising on job search, applications, interviews, paid work, volunteering and internship opportunities and getting the most out of your extra-curricular activities alongside your degree programme when writing your CV
- Other support that includes health services (GPs), chaplaincy (for all faiths) and 'out of hours' support for students in Halls and in the local community, (18.00-08.00)
- A Centre for Language Study, providing assistance in the development of English language and study skills for non-native speakers.

The Students' Union provides

- an academic student representation system, consisting of Course Representatives, Academic Presidents, Faculty Officers and the Vice-President Education; SUSU provides training and support for all these representatives, whose role is to represent students' views to the University.
- opportunities for extracurricular activities and volunteering
- an Advice Centre offering free and confidential advice including support if you need to make an academic appeal
- Support for student peer-to-peer groups, such as Nightline.

Associated with your programme you will be able to access:

· Tutorials - you will have a personal tutor whom you can meet on request for advice on your programme and choice of options, or for pastoral support
· A mentor (usually a postgraduate student who has previously taken the course) that sees you weekly
· Laser labs, and optical fibre clean room, and other research facilities, with a range of manuals
· A web site for each taught module, typically with teaching materials

Methods for evaluating the quality of teaching and learning

You will have the opportunity to have your say on the quality of the programme in the following ways:

· Completing student evaluation questionnaires for each module of the programme
· Acting as a student representative on various committees, e.g. Staff: Student Liaison Committees, Faculty Programmes Committee OR providing comments to your student representative to feed back on your behalf.
· Serving as a student representative on Faculty Scrutiny Groups for programme validation
· Taking part in programme validation meetings by joining a panel of students to meet with the Faculty Scrutiny Group

The ways in which the quality of your programme is checked, both inside and outside the University, are:

· Regular module and programme reports which are monitored by the Faculty
· Programme validation, normally every five years.
· External examiners, who produce an annual report
· A national Research Excellence Framework (our research activity contributes directly to the quality of your learning experience)
· Higher Education Review by the Quality Assurance Agency

Further details on the University's quality assurance processes are given in the *Quality Handbook.*

Career Opportunities

In completing an MSc degree at the Zepler Institute for Photonics and Nanoelectronics, you will work alongside some of the world's leading optical fibre technology scientists, and spend time conducting novel research in our state-of-the-art facilities, keeping up-to-date with current research-trends in optical fibre technology and photonics. Our students receive a solid grounding for their future careers in photonics related topics; over 600 of the Zepler Institute for Photonics and Nanoelectronics alumni work in strategic positions in the Photonics industry worldwide. MSc students are ideally suited to continuing in research PhD studies, or moving directly into the growing photonics industry, some of which you will experience directly during the Industry Showcase event as part of your MSc training.

External Examiner(s) for the programme

Name: Professor David Webb - Aston University

Students must not contact External Examiner(s) directly, and external examiners have been advised to refer any such communications back to the University. Students should raise any general queries about the assessment and examination process for the programme with their Course Representative, for consideration through Staff: Student Liaison Committee in the first instance, and Student representatives on Staff: Student Liaison Committees will have the opportunity to consider external examiners' reports as part of the University's quality assurance process.

External examiners do not have a direct role in determining results for individual students, and students wishing to discuss their own performance in assessment should contact their Personal Academic Tutor in the first instance.

Please note: This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities that are provided. More detailed information can be found in the programme handbook.

Appendix 1:

Students are responsible for meeting the cost of essential textbooks, and of producing such essays, assignments, laboratory reports and dissertations as are required to fulfil the academic requirements for each programme of study. In addition to this, students registered for this programme also have to pay for:

Additional Costs

Type	Details
Stationery	You will be expected to provide your own day- to-day stationary items, e.g. pens, pencils, notebooks, etc). Any specialist stationery items will be specified under the Additional Costs tab of the relevant module profile.
Textbooks	Where a module specifies core texts these should generally be available on the reserve list in the library. However due to demand, students may prefer to buy their own copies. These can be purchased from any source. Some modules suggest reading texts as optional background reading. The library may hold copies of such texts, or alternatively you may wish to purchase your own copies. Although not essential reading, you may benefit from the additional reading materials for the module.
Approved Calculators	Candidates may use calculators in the examination room only as specified by the University and as permitted by the rubric of individual examination papers. The University approved models are Casio FX-570 and Casio FX-85GT Plus. These may be purchased from any source and no longer need to carry the University logo.
Printing and Photocopying Costs	In the majority of cases, coursework such as essays; projects; dissertations is likely to be submitted on line. However, there are some items where it is not possible to submit on line and students will be asked to provide a printed copy. A list of the University printing costs can be found here: [insert link to relevant page].

In some cases you'll be able to choose modules (which may have different costs associated with that module) which will change the overall cost of a programme to you. Details of such costs will be listed in the Module Profile. Please also ensure you read the section on additional costs in the University's Fees, Charges and Expenses Regulations in the University Calendar available at www.calendar.soton.ac.uk.