UNIVERSITY OF SALFORD FORM PS (2016/17)

PROGRAMME SPECIFICATION

See Programme Specification Guidance for advice and guidance when completing this form. You can also contact the Quality and Enhancement Office for guidance completing this form on QEO-General@salford.ac.uk

This form is available to download from http://www.governance.salford.ac.uk/page/aqa_forms).

Date of completion:	*29/11/2017*
Office Use **Date approved by PARP:**	*21/02/2018*

Stage 1 Business Case Approval Sections 1 – 23				
1	Awarding institution/body		University of Salford	
2	Taught at		University of Salford	
3	Not Used			
4	School(s) responsible for the programme		*Lead School* *School of Computing, Science & Engineering*	*Additional School* Choose an item.
5	Links with partner institutions		None	
6	Externally accredited by		The Institute of Physics	
7	Final award and Intermediate Terminating Qualifications (ITQs)	Final award (s)	BSc (Hons)	
		Programmes for admission	BSc (Hons) Physics BSc (Hons) Physics with Acoustics	
		ITQs	Cert HE Dip HE	
8	FHEQ level of the qualification		*Level 6 - Ord Degree/Hons Degree/GradCert/GradDip*	
9	Programme title		Physics Physics with Professional Experience Physics with Acoustics Physics with Acoustics with Professional Experience	
10	Aims of the programme		The programme aims to give a unified, broadly based training in physics, with an emphasis at a high level on problem solving and the acquisition of general skills such as the ability to communicate. This is achieved through a combination of theoretical and practical modules. Within modules, an emphasis is placed on problem solving skills, both practical and theoretical, applying the laws of physics in a diverse range of settings. The programme amis to provide an education to first degree level for those intending to practise the profession of physics whether it be in academea or industry. More specifically the aims of the programmes are to: • Provide information, informed in part by the forefront, in a broad range of areas in physics; • Develop analytical, critical and problem solving skills using techniques at the forefront of physics; • Develop experimental and computational skills; • Develop communication and study skills; • Expose students to a diverse range of careers paths for physics graduates and to enhance employability The Physics with Acoustics programmes in addition provide information and develop skills in the area of acoustics.	

11	Length of programme (in each mode)	Three years full-time Four years full-time including optional Industrial Placement
12	Mode(s) of attendance/ delivery and intakes	

	Face to face		**E-learning**		**Blended (combination of face to face and e-learning)**		
Intakes	F/T	P/T	F/T	P/T	F/T	P/T	For blended delivery is more than 50% delivered by distance?
September	✓						
October							
November							
December							
January							
February							
March							
April							
May							
June							
July							
August							

13	Language of study	English
14	Month and year of commencement	**BSc Physics** This version with effect from September 2018 for all levels. **BSc Physics with Acoustics:** This version with effect from September 2018 for all levels Original version: September 2012
15	Date teaching starts	*First year of this programme running*

Intakes	**Almanac week number**
September	1
October	
November	
December	
January	
February	
March	
April	
May	
June	
July	
August	

Second year of this programme running

Intakes	**Almanac week number**
September	1
October	
November	
December	
January	
February	
March	
April	
May	
June	
July	
August	

16	Office use Funded by	Funding Council
17	Entrance requirements	Applicants must satisfy both the University's General Entry Requirement and the specific entry requirements as detailed below. **General Entry Academic Requirements** The General Entry Academic Requirements are as per the University's Admissions and Retention Policy detail for CertHE/level 4 of DipHE/Bachelor's Degree/Integrated Master's programmes. **Programme Specific Academic and Other Entry Requirements** Applicants must have the equivalent of:

		• grade C or above physics (GCE Advanced level) and • grade C or above in mathematics (GCE Advanced level) Applicants must have the required number of UCAS points (to be advised by the School). **Accreditation of Prior Learning** An applicant who does not possess one of the qualifications which satisfies the General Academic Entry Requirement may be considered through the Accreditation of Prior Learning (APL) (both Certified Prior Learning and/or one Prior Experiential Learning) as per the University's Admissions and Retention Policy. **English Language Requirements** Applicants must satisfy the University's English Language requirements as per the University's Admissions and Retention Policy .
18	Is a Salford UCAS code required?	*Yes*
19	Responsibility for administration of the programme	School of Computing, Science & Engineering
20	Programme structure	For programme content, please see the module specifications. The programme structure is below:

Programme Structure

All modules are 20 credits unless otherwise stated.

Students on the Physics with Acoustics and Physics with Acoustics with Professional Experience programmes have no optional modules.

For all programmes it is possible to take a placement year following successful completion of level 5.

BSc Physics:

			Intake
Level	**Year**	**Trimester**	**September F/T**
4	**1**	**1**	Mathematics
		1 & 2	Fundamentals of Physics A Fundamentals of Physics B Fundamentals of Physics C Frontiers of Physics and Entrepreneurial Skills
		2	Mathematics and Computing
		3	
5	**2**	**1**	Classical and Quantum Waves Properties of Matter Mathematical Methods and Applications Physics Laboratory Computing Laboratory 20 credits from Option Group A
		2	
		3	
6	**3**	**1**	Nuclear and Particle Physics Maxwell's Equations and Wave Optics Quantum Mechanics of Atoms, Molecules and Solids Project (40 credits) 20 credits from Option Group B
		2	
		3	

BSc Physics with Professional Experience

			Intake
Level	**Year**	**Trimester**	**September F/T**
4	**1**	**1**	Mathematics
		1 & 2	Fundamentals of Physics A Fundamentals of Physics B Fundamentals of Physics C Frontiers of Physics and Entrepreneurial Skills
		2	Mathematics and Computing
		3	
5 **Stage 1**	**2**	**1**	Classical and Quantum Waves Properties of Matter Mathematical Methods and Applications
		2	Physics Laboratory Computing Laboratory 20 credits from Option Group A
5 **Stage 2**		**3**	CSE Industrial Placement (2-4 semesters in length) (60 credits)
	3	**1**	
		2	
		3	
6	**4**	**1**	Nuclear and Particle Physics Maxwell's Equations and Wave Optics Quantum Mechanics or Atoms, Molecules and Solids Project (40 credits) 20 credits from Option Group B
		2	
		3	

Optional Module List

Module Title	Credits	Level	Tri	School of origin	Status	Rules	Prerequisites
Physics of the Universe	20	5	1&2	CSE	Option Group A	Students must select 1 option module from option group A	None
Principles of Acoustics	20	5	1&2	CSE	Option Group A	Students must select 1 option module from option group A	None
Foreign Language	20	5	1&2	Salford Languages	Option Group A	Students must select 1 option module from option group A	None
Speech & Musical Acoustics	20	6	1	CSE	Option Group B	Students must select 1 option module from option group B	None
Photonics & Nanotechnology	20	6	1&2	CSE	Option Group B	Students must select 1 option module from option group B	None
Theoretical Physics	20	6	1&2	CSE	Option Group B	Students must select 1 option module from option group B	None
Foreign Language	20	6	1&2	Salford Languages	Option Group B	Students must select 1 option module from option group B	None

BSc Physics with Acoustics:

			Intake
Level	**Year**	**Trimester**	**September F/T**
4	**1**	**1**	Mathematics
		1 & 2	Fundamentals of Physics A Fundamentals of Physics B Fundamentals of Physics C Frontiers of Physics and Entrepreneurial Skills
		2	Mathematics and Computing
		3	
5	**2**	**1**	Classical and Quantum Waves Properties of Matter Mathematical Methods and Applications
		2	Physics Laboratory Digital Signal Processing Principles of Acoustics
		3	
6	**3**	**1**	Speech & Musical Acoustics
		1&2	Nuclear and Particle Physics Maxwell's Equations and Wave Optics Quantum Mechanics of Atoms, Molecules and Solids 3rd Year Short Project
		2	Computer Simulation for Acoustics L6
		3	

BSc Physics with Acoustics with Professional Experience:

			Intake
Level	**Year**	**Trimester**	**September F/T**
4	**1**	**1**	Mathematics
		1 & 2	Fundamentals of Physics A Fundamentals of Physics B Fundamentals of Physics C Frontiers of Physics and Entrepreneurial Skills
		2	Mathematics and Computing
		3	
5 **Stage 1**	**2**	**1**	Classical and Quantum Waves Properties of Matter Mathematical Methods and Applications
		2	Physics Laboratory Digital Signal Processing Principles of Acoustics
5 **Stage 2**		**3**	CSE Industrial Placement (2-4 semesters in length) (60 credits)
	3	**1**	
		2	
		3	
6	**3**	**1**	Speech & Musical Acoustics
		1&2	Nuclear and Particle Physics Maxwell's Equations and Wave Optics Quantum Mechanics of Atoms, Molecules and Solids 3rd Year Short Project
		2	Computer Simulation for Acoustics L6

21	Requirements for progression at each level, plus the criteria on which the final award is based	Requirements for progression are governed by the Academic Regulations for Taught Programme.
22	HESA subject code	F300 – Physics F384 – Physics with Acoustics
23	Marketing JACS code	F300 F384

Stage 2 Academic Approval Sections 24 – 30

This section should be read in conjunction with module specifications

24	Relevant Subject Benchmarking statements (and any other reference points)	The syllabus has been designed to meet the requirements of the professional accrediting body, The Institute of Physics, as laid out in the "The Physics Degree, Graduate Skills Base and the Core of Physics", Institute of Physics (2014) QAA, UK Quality Code for Higher Education, FHEQ descriptors for BSc (Hons) programmes (20014) QAA Benchmark statements for Physics, Astronomy and Astrophysics (2008)
25	Intended Learning Outcomes NOTE: This section should be repeated for EACH ITQ and the final award.	**Level 4 / Cert HE** <u>Knowledge and Understanding</u> On successful completion of this level/stage the student will be able to demonstrate: L4.1 A knowledge of the fundamental concepts and laws of physics L4.2 The application of the laws of physics to a range of topics L4.3 The ability to frame and solve basic problems in physics L4.4 The application of general mathematical techniques central to physics <u>Practical, Professional or Subject Specific Skills</u> On successful completion of this level/stage the student will be able to: L4.5 Analyse and evaluate experimental data, comparing with established results L4.6 Use computers both to obtain numerical solutions to equations and to analyse data using software packages L4.7 Perform experimental investigations, reporting data with quantified precision L4.8 Apply their knowledge to carry out well-defined projects L4.9 Communicate results and basic concepts through scientific reports and presentations <u>Transferable Skills</u> On successful completion of this level/stage the student will have the following qualities and transferable skills necessary for employment: L4.10 The exercise of some personal responsibility and the ability to interact constructively as a team L**evel 5 / Dip HE** <u>Knowledge and Understanding</u> On successful completion of this level/stage the student will be able to demonstrate: L5.1 A knowledge and critical understanding of the fundamental laws of physics L5.2 The application of the laws of physics to a diverse range of topics L5.3 The ability to frame, model and solve problems in physics L5.4 The application of symbolic and numerical mathematical techniques central to physics <u>Practical, Professional or Subject Specific Skills</u> On successful completion of this level/stage the student will be able to: L5.5 Analyse and evaluate experimental data, critically comparing with established results or theories L5.6 Apply computer programming both to solve open-ended problems in physics and to automate measurement through interfacing L5.7 Set-up and perform experimental investigations, reporting data with quantified precision and critically evaluated accuracy L5.8 Apply their knowledge and understanding to specify and carry out open-ended group projects L5.9 Communicate clearly through extended reports and presentations <u>Transferable Skills</u> On successful completion of this level/stage the student will have the following qualities and transferable skills necessary for employment: L5.10 The exercise of initiative and personal responsibility, the ability to interact constructively as a team, and decision making skills **Level 6 / BSc (Hons)** <u>Knowledge and Understanding</u>

On successful completion of this level/stage the student will be able to demonstrate:

L6.1 A systematic knowledge and understanding of the fundamental laws of physics, some of which are derived from the forefront of the field

L6.2 The application of the laws of physics to a diverse range of topics, some of which are at the forefront of the field

L6.3 The ability to frame, model and solve complex problems in physics

L6.4 The critical selection and application of symbolic and numerical mathematical techniques central to physics

Practical, Professional or Subject Specific Skills

On successful completion of this level/stage the student will be able to:

L6.5 Analyse and evaluate experimental data, comparing with published hypotheses and theories, including a critical appreciation of their applicability

L6.6 Apply computer programming and software packages as an aid to open-ended research

L6.7 Research, design and perform investigations, reporting results with quantified precision and critically evaluated accuracy

L6.8 Communicate clearly through extended scientific reports and through oral presentations with subsequent questioning

L6.9 Apply their knowledge and understanding to specify and execute open ended individual projects

Transferable Skills

On successful completion of this level/stage the student will have the following qualities and transferable skills necessary for employment:

L6.10 The exercise of initiative and some personal responsibility, the ability to interact constructively as part of a team, and decision making skills in complex and unpredictable contexts

L6.11 An ability to manage resources, time and their own learning

The following grid maps modules to programme ILOs:

Level 4	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**		
Fundamentals of Physics A	X	X	X		X	X	X		X			
Fundamentals of Physics B	X	X	X		X		X		X			
Fundamentals of Physics C	X	X	X		X		X		X			
Mathematics				X								
Mathematics and Computing				X		X						
Frontiers of Physics and Entrepreneurial Skills			X		X		X	X	X	X		
Level 5	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**		
Classical and Quantum Waves	X	X	X	X	X							
Properties of Matter	X	X	X	X	X							
Mathematical Methods and Applications	X	X	X	X								
Physics of the Universe	X	X	X	X	X							

Physics Laboratory		X			X		X	X	X	X		
Computing Laboratory		X	X	X		X						
Digital Signal Processing (Acoustics only)	X	X	X	X		X						
Principles of Acoustics	X	X	X	X								
Level 6	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	
Nuclear and Particle Physics	X	X	X	X	X							
Maxwell's Equations and Wave Optics	X	X	X	X								
Photonics and Nanotechnology	X	X	X	X	X							
Quantum Mechanics of Atoms, Molecules and Solids	X	X	X	X	X							
Theoretical Physics	X	X	X	X		X						
Project						X	X	X	X	X	X	
3rd Year Short Project (Acoustics only)						X	X	X	X	X	X	
Speech and Musical Acoustics	X	X	X	X								
Computer Simulation for Acoustics (Acoustics only)	X	X	X	X		X						

Teaching, learning and assessment strategies

Traditionally, physics degrees are heavily knowledge-driven, reflecting the relatively broad range of core topics. The teaching and learning strategy adopted has been designed to accommodate this broad knowledge base, whilst allowing the students plentiful opportunities to apply and develop key topics and skills in a range of different contexts and situations.

Level 4

Core Underpinning Physics: Classroom-based sessions run alongside laboratory-based sessions that are specific to the relevant module, in order to forge a clear link between knowledge and application.
Classroom-based Sessions: Each student is provided with a hard copy of the core text and access to Pearson's 'Mastering Physics', which contains an electronic copy of the core text and a suite of self-learning examples, tutorials and exercises. Before each classroom-based session, specific reading from the core text is given, with the sessions comprising a discussion of the key ideas from the reading supported with a blend of teacher-centred and learner-centred problem solving exercises. Guided Independent Study: Material from each session is reinforced by specific on line self-learning tutorials from mastering physics, which contain hints and interactive feedback. In addition, a series of problem based exercises is given to reinforce the ideas from the classroom-based sessions. Formative feedback is given verbally and through worked solutions.
Laboratory-based sessions: These focus on developing key skills including electronics / computer interfacing, key empirical measurement and reporting skills and computational skills for data analysis. The first semester comprises a series of formative exercises, with verbal and written feedback, followed by summative

assessment in the second semester where the knowledge from the first semester is put into practice.

Mathematics: A strong emphasis is placed on developing a solid platform of mathematical skills, with a third of level 4 dedicated to mathematics, both traditional pen-and-paper-based and computational-based. Teaching and learning is achieved through a blend of teacher-centred presentation and learner-centred problems.

Problem-based Learning and Employability Skills: The Frontiers of Physics and Entrepreneurial Skills Module, which incorporates weekly, heavily tutored problem-based learning classes and regular opportunities for students to meet and listen to the experiences of practising physicists from a range of industries and organisations. The module provides enhanced team building, planning and research opportunities, developing core skills in collaborative team working, presentation, scientific and general report writing and introducing students to the entrepreneurial and competitive environments in which high-technology organisations operate. A key feature is enhanced feedback, with emphasis being placed on instant verbal feedback during hands-on problem-based tasks and following presentations, in addition to rapid feedback on employability skills, including CV development and interview techniques.

Level 5

Core Underpinning Physics: Level 5 adopts a more traditional approach, with the core knowledge base delivered through classroom based lectures and tutorials. A set of problem solving exercises are distributed in support of each classroom-based module, which forms the basis of formative assessment and feedback in dedicated tutorial sessions. Summative assessment in these modules is a combination of a final exam with a portfolio of set exercises and tests.

Application of Knowledge and Transferable Skills: Two modules are offered in support of the core-underpinning physics modules, based in the practical laboratory and the computer laboratory respectively (the latter is replace by a digital signal processing laboratory of the acoustics strands).
Practical Physics Laboratory: In semester 1, students attend laboratory classes every week and are expected to carry out experiments, record data and carry out analysis on the data. A log-book is submitted from each experiment for assessment, in addition to a formal report, in the form of a scientific journal publication for one of the experiments. Verbal feedback is offered in the laboratory sessions, with written feedback being provided in the log-book for each experiment and for draft versions of the report. In semester 2, students work as a group on an open-ended, practically-based project for the whole semester, groups report on a weekly basis to the academic in charge to review the project and update tasks for the coming week. The group makes a formal presentation of the project including a demonstration at the end of the semester. Verbal feedback is offered during the set laboratory sessions to enable students both to gauge their progress and to revise project planning, where necessary. Written feedback is provided for draft versions of the report. Verbal feedback is given for the final project presentation and posters, which are presented at a mock conference at the end of year, building on the formative assessment of presentation skills at level 4.
Computing Laboratory: In semester 1, students perform set exercises concerned with computer interfacing and computer control. In semester 2, students perform set exercises concerned with the implementation of numerical methods to solve problems in physics. In both semesters, verbal feedback is given in the computer laboratory for both formative and summative assessment

Level 6

Core Underpinning Physics: Level 6 has the same structure as level 5, with the core knowledge base delivered through classroom based lectures and tutorials and formative assessment and feedback via problem-solving in dedicated tutorial sessions. Summative assessment in these modules is by examination at the end of each semester.

Application of Knowledge and Transferable Skills: The application of knowledge and transferable skills are developed and assessed through individual research projects. Project work is designed to train the student in guiding their own learning, and the work is carried out by the individual student under the guidance of an individual

		supervisor. The student is required to meet a variety of deadlines, such as providing an interim report, providing an abstract for the external examiner and submitting the final report. Verbal and written feedback is offered by the project supervisor in via the project review reports and associated meetings, submitted at three-week intervals. More detailed feedback is given for the interim progress report, submitted at the end of semester one with an associated interview at the start of semester 2. Feedback is also offered on draft versions of the final report. Assessment is a combination of project outputs, dissertation, presentation and interview.
27	Re-assessment strategy	Re-assessments are made available to students after their individual marks have been considered at the appropriate exam board. Requirements for reassessment are then governed by the Academic Regulations for Taught Programmes.
28	Assessed professional experience	The opportunity to undertake an industrial placement is offered to students who successfully complete the level 5 taught modules and provides an opportunity to spend an extended period of time working in industry in a range of physics-based roles. Placement experience varies in length (i.e. between 9 – 15 months) to reflect the needs of the placement providers. During this time students are managed by an industrial supervisor and monitored by a University Placement Tutor. This optional placement offers students the opportunity to gain valuable industrial experience and improves their employability. The placement is assessed via a written report and presentation. The placement is rated at 60 level 5 credits, and is pass/fail hence is zero weighted for calculation of the level 5 mark. Students who pass the placement module and go on to complete their final year will have their professional experience reflected in their degree title.
29	Special features of programme	Students have access to bespoke physics teaching laboratories. Students have exposure to a diverse range of employers of physics graduates through an external seminar series that is part of the Frontiers of Physics and Entrepreneurial Skills module. Starting in this module and at later points in the programme a focus is placed on associated employability skills. For project/dissertation work students can have supervised access to research level materials characterisation facilities and high performance computing facilities as provided by supervisors through the Materials and Physics Research Centre. Students on the Physics with Acoustics programme have access to the extensive acoustics research facilities in the Newton Building. **Industrial Placement** Finding and applying for an industrial placement will in the majority of cases be the responsibility of the student. Provision of a placement is not guaranteed. The Placement Officer will be able to provide information about vacancies and employers that work with the university. In order to be formally recognised by the University, placements need to be approved by the Placement Tutor prior to acceptance by the student. Placements that do not meet the University's requirements will be classed as a gap year. Once a placement has been secured, students are required to complete a Pre-Placement Agreement (PPA). This document requires information from the students and the placement provider and approval from the Placement Tutor. Placement Tutors will check to see if expected duties are relevant to the student's course of study. In addition to the PPA, it is the responsibility of the placement provider to supply evidence of third party/employers' liability insurance and a risk assessment to cover activities undertaken. International students: Opportunities for international students may be limited as placements must meet the terms of an individual's sponsorship and visa requirements. It should be noted that whilst on placement, international students will need to continue to comply with current United Kingdom Visas and Immigration (UKVI) requirements.
30	Arrangements for student support	The University has a wide range of student support services through Student Life. Services provided by the Library include information literacy, ICT and research skills training, reading list and information resources support for programmes and modules, and a range of student learning spaces. Help and advice is also available from the Academic Support Librarian for the School, and Library enquiry services. Computing support is provided by IT Services (ITS), this includes the ITS Helpdesk and

		management of the University's Virtual Learning Environment (Blackboard). In line with the University's Code of Practice on Personal Tutoring all students have access to a member of staff who can provide personal guidance and suggest other sources of help The School supports Mathscope, which seeks to offer individual mathematics assistance, on a drop-in basis, for students who require it. For students wishing to take an industrial placement, assistance in finding a placement is provided by both School and discipline.

QEO Office Use Only	
Programme Codes:	S/P/F S/P/S S/PAT/F S/PAT/S
Comments:	