

Periodic Review Report Template

Department and Faculty	Department of Mathematics, Physics and Electrical Engineering Faculty of Engineering and Environment
Date of Review	21/22 February 2019
Review Panel (approved by Academic Registry)	<p>Pam Davies (Chair), Head of Department (Social Sciences), Faculty of Arts, Design, and Social Sciences</p> <p>Suzanne Crozier, QTE Academic member, Academic Registry</p> <p>Alex Hope, Faculty Associate Pro Vice-Chancellor (Learning and Teaching), Faculty of Business and Law</p> <p>Helen King, Senior Lecturer, Faculty of Engineering and Environment</p> <p>Anne Nortcliffe, Head of School of Engineering, Technology and Design, Canterbury Christ Church University</p> <p>Jason Roberts, Head of Mathematics and Associate Professor, University of Chester (IMA assessor)</p> <p>Karl Robson, Vice President Education, Students' Union</p> <p>Jimmy Milligan (Facilitator), Approvals and Review Manager, Quality and Teaching Excellence, Academic Registry</p> <p>Caroline Clark (Secretary), Approvals and Review Coordinator, Quality and Teaching Excellence, Academic Registry</p>
Method of Review	This review was conducted using the periodic review procedure defined by Northumbria University Review Framework
<p>Notes:</p> <ul style="list-style-type: none"> Review reports are expected to be short and succinct, typically 3 to 4 sides of A4 Sections highlighted in blue below, together with the header above, make up the published summary of this review. This will be published on the University's Teaching Quality Information web pages (https://www.northumbria.ac.uk/sd/central/ar/qualitysupport/PQI/) 	

Section 1	Department Context
<ul style="list-style-type: none"> Scope of review: programme areas, staff and students <p>The Department of Mathematics, Physics and Electrical Engineering (MPEE) which sits within the Faculty of Engineering and Environment. There were about 633 students split across programmes from foundation year (75 students), undergraduate (440), post graduate degrees (39), and study abroad provision (79) on submission of the self-evaluation document.</p> <p>Electrical engineering has 231 undergraduate students, and has been running the integrated master's for 5 years (MEng Electrical and Electronic Engineering). The Foundation Year Mathematics and Physics was introduced in 2017/18 and has grown from 36 students to 102 students enrolled for 2018/19. Within Physics there are 107 undergraduate / integrated master's students on BSc / MPhys Physics and BSc / MPhys Physics with Astrophysics programmes. Mathematics provision has 176 undergraduate students on a BSc / MMath degree structure. There is also a new MSc in Statistics introduced for 2018/19, and a PGR community of about 46 PhD students. The student body is a mix of home (73%) and international (27%), with the majority of international students on electrical engineering programmes.</p> <p>The Department has 46 academic staff involved with learning and teaching, and a further 15 post-doctoral research associates, an overall contract FTE headcount 61. The proportion of academic staff in each subject area is about the same (23, 17, 21 for Mathematics, Physics and Electrical Engineering respectively), with academic teaching composed of 25 Senior Lecturers/Lecturers, 11 Associate professors and 11 Professors. 52% have HEA membership, highest in physics (78%), in comparison to maths (42%) and electrical engineering (50%).</p>	

The department are supported by 5 technical staff involved with support to laboratory delivery.

• **Main aims of the Department**

The Department aims to provide a compelling, research-rich experience to all of our students and ensure that our graduates are:

- equipped with appropriate theoretical, practical and computational skills and knowledge related to their programme of study;
- enabled to create new knowledge to the benefit of industry and society through the application of high level critical thought and analysis;
- highly employable and agile in 21st century workplaces through deep subject expertise which is supported by rich and diverse experiences (e.g. industrial placements) and strong transferable skills such as quantitative analysis, computer programming, communicating complex ideas and influencing stakeholders;
- culturally and ethically aware around (but not exclusively) issues of equality, diversity and inclusivity, therefore, able to contribute positively to diverse and global communities.

• **Further contextual information: physical and organisational location**

The Department was created in 2017 when the mathematics subject area was integrated with the Department of Physics and Electrical Engineering. The department is accommodated within Ellison Building (E-block - physics and electrical engineering; D -block -mathematics). In support of the launch of new physics provision, a new UG physics laboratory and project space was installed on the third floor of E-block, following which renovations in 2013/4 using a HEFCE Catalyst award of £1.2M to create Think Physics (now NUSTEM), including the outreach laboratory (Think Lab). Ellison first and ground floors were renovated in 2015-16 as part of a £6.7M HEFCE STEM award to the Faculty to create project and research laboratories which are routinely used by both UG (including integrated masters) and PGT students. These floors include state-of-the-art wet-processing and microscopy labs and co-location of MPEE technicians. The current academic year (2018-19) included the creation of a new social and scholarly activity space for mathematics students on the second floor of D-block. In addition to major investments - for example on the ground floor of D-block (The Zone with 24/7 access) and the University Library, these dedicated MPEE spaces help to create cohort identities, a sense of belonging and inter-cohort interaction.

The department has formed strategic links into Chinese universities with 3+1 style provision into electrical engineering from Nanjing Normal University and study abroad semester with Nanjing Institution of Technology. In addition, there are international collaborative ventures partners in Malaysia with KDU Collage Penang and Singapore with MDIS.

Section 2	Judgement Criteria	
Focus of judgements	Judgements	Outcome
The setting and maintenance of threshold academic standards	• meets UK and NU expectations,	✓
	• requires improvement to meet UK and NU expectations,	
	• does not meet UK and NU expectations.	
The quality of students' learning opportunities	• commended,	
	• meets UK and NU expectations,	✓
	• requires improvement to meet UK and NU expectations or, • does not meet UK and NU expectations.	
Information about higher education provision	• commended,	
	• meets UK and NU expectations,	✓
	• requires improvement to meet UK and NU expectations or, • does not meet UK and NU expectations.	
	• commended, • meets UK and NU expectations,	✓

The enhancement of students' learning opportunities	<ul style="list-style-type: none"> requires improvement to meet UK and NU expectations or, 	
	<ul style="list-style-type: none"> does not meet UK and NU expectations. 	

Section 3	The setting and maintenance of threshold academic standards
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The Panel identified the following strengths:

- The accreditations associated with the programmes.
- The engagement of Physics with HEA qualification.

The Panel made the following recommendations and timescales for further development:

- Not all module evaluations (MEDs) and Programme Enhancement Plans (PEPs) were complete at the point of review, the Department needs to ensure that all annual programme monitoring requirements are complete by institutional deadlines. The quality of the documentation inclusive of action plans needs to be assured by the Department.
- Extend Peer Observation to PGR students and technicians used in academic timetabled delivery.

The Panel made the following observations:
The Panel noted that the majority of engagement was from Maths and Physics, and would have encourage reflection on full departmental engagement with quality assurance processes.

Section 4	The quality of students' learning opportunities
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The Panel identified the following strengths:

- Research informed learning across the provision.
- Benefits from the PGR students and the doctoral community, and the ability of students to progress from undergraduate to postgraduate research.
- The quality of the laboratory space and equipment, and the student based zones open access facilities.
- The Academic staff are very approachable and readily respond to student's queries and issues.

The Panel made the following recommendations and timescales for further development:

- The Department needs to record how it responds to issues raised by students and to communicate outcomes back to all students.

The Panel made the following observations:
The value of the PGR students teaching into programmes is recognised, there is a need to ensure appropriate support is provided.

Section 5	Information about higher education provision
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The Panel identified the following strengths:

- NUSTEM activity with feeder schools in promoting the discipline and the University.
- Maths mapping of module learning through the curriculum.

The Panel made the following recommendations and timescales for further development:

- The department needs to develop a strategy for inclusivity in regards equality and diversity data, inclusive of Juno/Athena Swann timeframe.
- Replicate the Maths thematic analysis mapping of learning across other programmes though all levels, and to communicate mapping to students.

The Panel made the following observations:

The Panel would support developments on the Foundation Year programme to provide greater specific pathways to the Maths and Physics programmes, and to ensure students understand the relevance to the follow on programme, mapping across the 4 year programme. The marketing of the foundation year to the individual subject areas needs to be considered in making the offer distinctive.

The Panel note that the department recognise the challenges with recruitment to the Maths undergraduate programme and the planned efforts to drive awareness at the local level.

Section 6

The enhancement of students' learning opportunities

The Panel identified the following strengths:

- Student Community is a strength, the zoning of space allowing interaction with academic staff and research activity within the department.
- Programme Leaders and Subject Leads engagement with Student Reps, and the recognition by students that they belong to a programme.

The Panel made the following recommendations and timescales for further development:

- Review how employability is embedded within programmes, consideration of how modules and their assessments provide transferable skills and how these are signposted to students. This should be at all levels of study.
- All staff need to understand how employability and placements work on programmes, and to be more effective at promoting these opportunities to students.
- Employer Advisory Board needs to be effective and documented at Departmental level.

The Panel made the following observations:

There is a need to document activity for collation into subject TEF, research bids, and accreditations.

Section 7	Further Quality Assurance Monitoring	
Affirmations ¹	<i>This section is copied from the self-evaluation document to acknowledge actions which the Department/Faculty has already identified and is already actioning.</i>	
	Please list any affirmations identified and accompanying actions (<i>add extra rows as needed</i>)	
	Issue	Action
	Missing / late external examiners reports Electrical engineering 2015-16 (Evans, Conlon)	We have had to chase external examiners for their reports with some success, however in other cases we have looked at the termination of an external and then replacement. Specifically we have missing reports, we therefore have to accept this and ensure it does not happen again. New externals in place 2016-17 and reports in time and actioned.
	Compliance with IOP accreditation Physics 2016-17	Further work in this area was also a requirement for the IOP for full accreditation therefore the issues dovetailed and were clearly actioned with changes. This has rolled into the change of programmes with PFNA, which have just reached level 6 studies. Furthermore reflection on marking profiles aligned to the HESA sector is in action.
	Training of PGR/PDRAs in lab sessions	Many PGR/PDRA are excellent and handle the laboratory or seminar session very well, however on occasion something goes wrong and its more complex for the PGA/PDRA to solve the problem quickly. We are in module training staff to be able to deliver sessions with clear support from Academics or Technical staff.

¹ examples of developments, planned or in train which seek to address issues previously identified

	International recruitment in physics / mathematics low.	We are working with the International Directors of Recruitment and Engagement, along with the HOID for possible developments in LOR/MOU type arrangements to grow this area. We have strong base from electrical to start this process.
	NSS action plan for electrical engineering.	We have a detailed plan for actions to improve the NSS. This is detailed in the NSS SharePoint site, and is composed of, Changing programme leader, more regular contact with students, feedback from SSPC, forming an active academic community, fair assessment defined, and expedient feedback.
Audit Trails	<p>Department had proposed the following audit trails:</p> <ol style="list-style-type: none"> 1. External examiners reports / responses – noting the lack of some in the electrical area, and the improvement with the new externals. 2. The IOP physics accreditation and the following changes that ensued from the challenges made by the PSRB. 3. Thematic analysis throughout the Maths programme from L4,L5, L6, L7 for example in Modelling. 4. Experiential and Skills learning in the department with laboratory work from L4,L5,L6,L7 showing the incremental student journey towards independent learning. (modules from all areas Mathematics, Physics and Electrical). <p>These had not been provided at point of review.</p>	
Compliance Checks	Against item 1d and 2c - not all MEDs and PEPs were complete at the point of review, the Department needs to ensure that all annual programme monitoring requirements are complete by institutional deadlines. The quality of the documentation needs to be assured by the Department.	

Section 8	Department Response to Report
<p>Short summary response by Department on follow up action for inclusion in published report:</p>	