

# ULSTER UNIVERSITY

## REPORT OF A MEETING OF THE REVALIDATION PANEL UNIT 10A1: ENGINEERING (BSc/BEng/MEng)

27 May 2020

### PRESENT:

Professor Brian Murphy, Interim Dean Academic Business Development, Ulster University (Chair)  
Dr David Carey, Head of Department of Electrical and Electronic Engineering, University of Surrey  
Ms Ursula Chaney, Lecturer, School of Nursing, Ulster University  
Professor Conchur O'Bradaigh, Head of School of Engineering, The University of Edinburgh  
Ms Nicole Parkinson-Kelly, VP-Education, Ulster University Students' Union  
Professor Azzam Taktak, Clinical Scientist, Dept. Medical Physics and Clinical Engineering, Royal Liverpool University Hospital  
Professor Tony Ward, Professor in Engineering Management and Deputy Head of Department, Department of Electronic Engineering, University of York

### IN ATTENDANCE:

Mrs Ayla Guarino, Academic Policy and Standards Officer, Academic Office, Ulster University  
Ms Catherine Dynes, Ulster University Students' Union

## 1 INTRODUCTION/BACKGROUND

The Panel was convened to consider the following provision within Revalidation Unit 10A1 Engineering:

### **Provision**

- BSc Hons Technology with Design (with AB and CertHE exit awards) Jordanstown & Belfast
- BEng Hons Biomedical Engineering (with AB and CertHE exit awards) Jordanstown
- BEng Hons Electronic Engineering (with AB and CertHE exit awards) Jordanstown
- BEng Hons Engineering Management (with AB and CertHE exit awards) Jordanstown

- BEng Hons Mechatronic Engineering (with AB and CertHE exit awards) Jordanstown
- BEng Hons Mechanical Engineering (with AB and CertHE exit awards) Jordanstown
- MEng Hons Electronic Engineering [with/without German Master's option (Dual award – Ulster/Augsburg (MEng Mechatronic Systems) or Kempten (MEng Electrical Engineering) (with BEng Hons, AB & CertHE exit awards) Jordanstown (Augsburg or Kempten – Outcentre)
- MEng Hons Engineering Management (with BEng Hons, AB & CertHE exit awards) Jordanstown
- MEng Hons Mechatronic Engineering (with/without German Master's option - Dual award – Ulster/Augsburg – MEng Mechatronic Systems) (with BEng Hons, AB & CertHE exit awards) Jordanstown (Augsburg – Outcentre)
- MEng Hons Mechanical Engineering (with/without German Master's option (Dual award – Ulster/Augsburg - MEng Mechatronic Systems) (with BEng Hons, AB & CertHE exit awards) Jordanstown (Augsburg – Outcentre)

### **Proposed New Provision**

- MEng Hons Biomedical Engineering (with BEng Hons, AB and CertHE exit awards), Jordanstown.

### **Background**

The above provision offers five undergraduate and four postgraduate programmes. All programmes have been developed to meet the needs of local industry and research and are designed around the requirements for accreditation by the Engineering Council. Three of the MEng programmes have been developed to permit full bi-directional credit transfer so that students from the MEng Hons degree can optionally achieve an additional German MEng degree, and selected German students from the German MEng degree can achieve the MEng Hons from Ulster. Ulster students have the option of either studying entirely at Ulster University and graduate with an MEng Hons degree from Ulster, or have a dual award option by spending semester 2 of year 4 at the University of Applied Sciences either in Augsburg, Germany or in Kempten, Germany. Successful students graduate with a German Masters in Mechatronic Systems in addition to the MEng Hons degree from Ulster. Students are offered a preparatory 10-point German language module (MEC525) in the first semester of year 4.

The BEng Hons programmes have partial CEng level accreditation with the Institution of Mechanical Engineers (IMechE) and/or the Institution of Engineering and Technology (IET), and the BSc Hons offering has IEng level accreditation with the IET. These are four-year programmes with a compulsory sandwich year (placement or study abroad year) in year 3. The MEng offerings feature a five-year sandwich programme (two years, a placement /study abroad year, and two further years). These programmes are accredited or seek accreditation at full CEng level. Typically, the programmes take a small number of students directly into first year, while a larger number will transfer from the associated BEng Hons programmes, most often at the end of the placement/study abroad year. BEng Hons students who achieve a module average mark of 60% in year 2 are offered the opportunity to progress to a corresponding MEng Hons programme, where it is

available. Conversely, students enrolled on MEng Hons programmes who do not achieve a module average mark of 60% in year 2 are transferred to a corresponding BEng Hons programme.

All programmes are offered in full-time mode only apart from the BEng (Hons) Mechatronic Engineering which also offers a part-time mode. The provision will be delivered in Jordanstown with the exception of the BSc (Hons) Technology with Design which also delivers some of the modules in Belfast and the three MEng provisions which also offer the option of semester 2 of year 4 in Germany.

### **Indicative student cohort size –**

Indicative intake figures as provided in the course document:

Year	2020/21		2021/22		2022/23		2023/24		2024/25	
	Min	Max								
<b>Biomedical Engineering</b>	60	80	60	80	60	80	60	80	60	80
<b>Electronic Engineering</b>	15	25	20	30	20	30	20	30	20	30
<b>Engineering Management</b>	15	25	15	25	15	25	15	25	15	25
<b>Mechanical Engineering</b>	60	70	60	70	60	70	60	70	60	70
<b>Mechatronic Engineering</b>	30	50	30	50	30	50	30	50	30	50
<b>Technology with Design</b>	15	25	15	25	15	25	15	25	15	25

### **Assessment Rubrics**

Sample assessment rubrics were provided by the course team in the course document shared with the Panel.

## 2 DOCUMENTATION

The Panel received the following documentation:

- Agenda and programme of the meeting;
- Course submission;
- Guidelines for Revalidation Panels;
- Information ‘Curriculum Design at Ulster’;
- UK Quality Code’s Subject Benchmark Statement for Engineering;
- Reports from central University departments on Library and IT resources on the MEng Hons Biomedical Engineering only;
- Preliminary comments from panel members; and
- External examiners’ reports from the last two years.

### 3 MEETING WITH SENIOR MANAGEMENT TEAM

The Panel met with the Senior Management Team comprising Dr Michaela Keenan, Associate Dean (Education) of the Faculty of Computing, Engineering and the Built Environment, Professor James McLaughlin, Head of School of Engineering, Dr Margaret Morgan, Associate Head of School of Engineering, and Dr Alan Brown, Lecturer in Engineering and Revalidation Unit Coordinator.

#### 3.1 Provision Context and Rationale for new provision

At the start of the meeting, Professor McLaughlin, gave an overview of the provision. The Panel noted the following:

- The School of Engineering is an award-winning School and Research Institute with state-of-the-art lab/teaching facilities and over 900 students and 40 members of staff (increased from 28).
- The school offers a mixture of undergraduate courses and ranked well in the UK for teaching quality: 9<sup>th</sup> for Electronic Engineering and UK top 10 for Biomedical Engineering. It also ranked top 20 in Engineering, Materials & Electronic Engineering for REF Research.
- The School of Engineering at Jordanstown is one of only a few Engineering Schools to have achieved Silver Athena SWAN charter status in UK.
- The School has an impressive research funding record with over £50m since 2014 REF Period.
- The School has been offering a unique German Engineering Masters option for over 20 years. It offers a highly valued compulsory industrial placement year, placing 80% of students in the UK and internationally.
- The School provides encompassing academic student support, including an advisor of studies, a robust tutorial system and various scholarships and prizes.

#### 3.2 Student Progression

The Panel asked the senior team how student progression was managed, especially in respect to progression from 1<sup>st</sup> to 2<sup>nd</sup> year. The senior team explained that the main aim was to improve engagement, particularly after the Christmas break in 1<sup>st</sup> year. Assessment strategy of key modules, where failure rates were high, was examined and revised by introducing low stakes assessment items throughout.

#### 3.3 Resources

The Panel was assured that a reduction in the capacity of facilities, as a result of the move to the Belfast campus, was mitigated by the purchase of 200sqm of lab space adjacent to the School of Engineering. This will ensure ample facility space in 2 years' time.

In relation to the staff-student ratio, the Panel noted that improvement of the ratio was a priority for the School. The senior team pointed out the growth in staff numbers in recent years from 28 to 40 staff and the reduction of the staff-student ratio from 25 to 22.

### 3.4 Covid-19 Pandemic Impact

In response to a query from the Panel the senior team detailed the huge impact the pandemic has had across the University, adding that this has been lessened by the fact that the proportion of international students at Ulster was smaller than many other universities in the sector.

### 3.5 Partnership with German Universities

Following a query by the Panel, the senior team discussed the similarities in content delivered by Ulster University and the German degrees, explaining that students that opt for studying Semester 2 of year 4 at the University of Applied Sciences in either Augsburg or Kempten, may receive a dual award from both Ulster University and the partner institution. The Chair explained that the revalidation event only focussed on the award conferred by Ulster and not the additional award.

### 3.6 Placement

In response to a query from the Panel the senior team highlighted the high uptake rate of the compulsory placement year, explaining that around 80% of students partake in placement with the remaining 20% receiving exemptions. The Panel noted that exemptions were normally given on the basis of prior practical or industrial background, or when students had already participated in placement when entering the provision after completing a linked foundation programme.

### 3.7 Software Upgrades

The Panel asked the senior team to explain what processes were in place for upgrades of specialised software, simulators and embedded hardware equipment. The senior team outlined the School's robust mechanism for upgrades implemented by its 18 technicians. This was exemplified by the recent Matlab update.

### 3.8 MEng Final Year Module Sizes

The senior team discussed the rationale for not changing the level 7 modules in the final year of the MEng provision from 15 to 20 credit points. The senior team explained that the decision was taken following an extended period of consultation with the School and Faculty. It was decided, accordingly, that as a significant part of the final year being devoted to the 45-credit point dissertation, in order to develop both the depth and breadth required and to keep an element of choice in each of the MEng programmes, the 15 credit modules should remain the norm at level 7.

## 4 MEETING WITH STUDENTS

The Panel met via Skype with a group of 10 students from different year groups from the existing provision.

The Chair welcomed the students noting that they were an important part of the quality assurance process, helping in assessing the quality of their experiences and to identify

areas where improvement can be made. A wide-ranging discussion took place in areas including student representation, employability and assessment and feedback.

#### 4.1 Student Representation

The Panel explored the students' opportunities to raise any issues they had with the programme or other related matters querying if these were addressed. The students detailed mechanisms by which student feedback and input was obtained, by way of end of module surveys as well as directly from course representatives, all of whom received training from the Student Union. Another avenue available for students to voice concerns was consultation based on course forums. The course forums were carried out twice per semester and were considered highly beneficial as they allowed for more broad issues to be raised and resolved. The Panel noted that any issues identified were filtered through to the course team and have been promptly addressed.

#### 4.2 Employability

The students felt confident in their employability prospects, with some already in employment. The support provided by the School and the Employability Centre (for example in respect to support with placement application and CV preparation) was noted by the Panel. The students believed the various modules equipped them with the skills required for future employment although they agreed that practical 'hands on' experience was insufficient.

#### 4.3 Assessment Load

Some students felt the coursework was not balanced throughout the year, mentioning exam-based pressures, while others felt the assessment was not sufficiently diverse or challenging.

#### 4.4 Covid-19 Teaching Adjustments

The students found the move to online teaching straightforward and beneficial. Advantages mentioned included ease of asking questions during lectures and the option to re-view lectures. Online forums were mentioned as useful tools which should be used more often.

The Panel thanked the students for their engagement and wished them well in their studies and future career.

### 5 MEETING WITH THE COURSE TEAM

The course team was informed by the Panel of the students' feedback. The Panel reported that students felt positive about most aspects of the course, including their workload, employability prospects, and recent online experience. The focus on taught provision and lack of sufficient 'hands on' experience was flagged as a shortcoming by the students.

The provision was discussed in detail with the subject teams.

## 5.1 Mathematics Underpinning

The Panel queried about the programmes' mathematics underpinning, especially as the provision admits students with varied mathematical abilities. Professor Colin Turner, the module coordinator for Engineering Mathematics module (EEE122), explained how this 1<sup>st</sup> year module was designed to bridge any possible gaps aiming to ensure that by the end of the first semester there would be a communality in mathematical literacy among the students. Topics such as algebra, trigonometry, complex numbers, and vectors and matrices are taught to cover fundamental concepts as well as instil a deeper understanding in order to engage students at all levels. In addition, the Panel was assured that mathematics was embedded within the modules throughout the provision, with various levels of difficulty, depending on the pathway chosen. The team provided examples of modules in which students were given the opportunity to deepen their mathematical skills.

The team acknowledged that there was no support for mathematics at an institutional level. However, at a school level, support was provided in various ways. These included accessibility of staff at all times via the School's 'open door' policy, help with mathematical issues given by postgraduate students, and various active learning activities provided such as math quizzes.

The Panel asked whether there was a correlation between students' mathematical abilities and their success in the programme. The team believed that although such a correlation existed in the past, their widening access strategy, including the delivery of the Engineering Mathematics module, has gone a long way to reduce this correlation. Moreover, the team was of the opinion that often students with stronger technical skills rather than those with stronger mathematical abilities succeeded better on the programme.

## 5.2 Revalidation Exercise Process

The Panel asked how the team engaged with the Integrated Curriculum Design Framework (ICDF) during the revalidation exercise. The team outlined the revalidation exercise process which they found to be beneficial as it provided them with an opportunity to reflect on the existing provision and implement changes where needed. The revalidation process, which was supported by CHERP, included a series of workshops engaging with staff and various stakeholders. The curriculum was reviewed and developed in line with ICDF, module learning outcomes were reduced to 4 and, where applicable, assessment items were reduced to 2.

The team explained that as a result of the consultation with stakeholders a decision was made to introduce employability skills throughout the curriculum. Teamwork, leadership, and presentation skills, among others, were introduced from 1<sup>st</sup> year in a scaffolding manner to enable students to develop them as they progress through the programme.

## 5.3 Programme Learning Outcomes

The Panel queried how the team assured all the programme learning outcomes were achieved. The team explained that when designing the programme learning outcomes they had taken in consideration the professional bodies' requirements, and ensured that the UK-SPEC was reflected. Although not all modules contributed in full to the learning outcomes, the mapping matrix in the document shows the overall contribution.

#### 5.4 Module Learning Outcomes

The team explained that cases of compound module learning outcomes with multiple elements were a result of the University's requirement to limit the module learning outcomes to 4. The Panel was assured that the team was aware that all elements of each of the learning outcomes should be achieved and aspire not to allow for gaps in achievement.

The Panel pointed out that similar learning outcomes were listed in both MEng Final Year Dissertation module (EEE840) and Final Year Project B module (MEC528). The team explained that the differentiation is evident in the marking scheme which was available to students.

The Panel asked for clarification in relation to the learning outcomes for the MEng Final Year Dissertation module for students who exit with a BEng exit award. The team explained that, although the learning outcomes remained the same, the pass threshold in these cases would be 40%, which is lower than the level 7 threshold of 50%.

The Panel recommended that the team consult with the professional body on the best way to approach the different learning outcomes in the MEng Final Year Dissertation module (EEE840) and the BEng Final Year Project (MEC528) and balance any conflict that arises in cases of students exiting the MEng with a BEng exit award.

#### 5.5 Student Projects

The Panel noted that there was a mechanism in place to facilitate final year projects based on placement and that this would be developed further going forward. However, in relation to other student projects, there was no structure in place to credit these.

#### 5.6 MEng (Hons) Biomedical Engineering

The Panel queried the start date for the new provision. The team explained that normally, students who achieve 60% or more in 2<sup>nd</sup> year of the BEng (Hons) Biomedical Engineering, will be able, after their sandwich year, to transfer to the MEng Biomedical Engineering from their fourth year, as was the case with the other programmes in the Unit. Accordingly, the team wished to offer this new course from September 2020 to current BEng Biomedical Engineering students on placement who have achieved the 2<sup>nd</sup> year threshold. The first output of the programme will be June 2022.

#### 5.7 Assessment Strategy

In response to the Panel's request the team outlined their assessment strategy. The team explained the assessment was designed to ensure the achievement of the learning outcomes using a 'bottom up' approach. To lower students' stress level during examination period, the team revised many modules to move away from the two exams model to multiple lower stakes class tests. The team acknowledged that normally coursework would produce higher marks than exams, although this was not formally tested, and explained that normally the class tests were found helpful in preparing students for their end of term exams.

The Panel enquired about the use of formative assessment. The team confirmed the use of such assessment but added that experience has taught that the use of lower stake marks has proven to improve students' engagement.

## 5.8 BEng/MEng Transfer

More information was sought on the 60% threshold for transfer between the BEng and the MEng programmes. The team explained that although the professional bodies were content with a 50% threshold, experience has taught that 60% worked well, explaining that the decision was taken during the exam board stage at the end of 2<sup>nd</sup> year. The threshold was rigidly applied and clearly communicated to students. Students on the BEng who fell short of the threshold could still pursue a postgraduate degree via the MSc route.

## 5.9 Inclusivity and Sustainability

The Panel asked how inclusivity and sustainability were embedded in the provision. The team discussed the School's Silver Athena SWAN award, and how the Athena SWAN action plan built on the previously achieved Bronze Award. Examples of inclusivity and achievement of gender balance included: inclusion of student representation on the Athena SWAN Committee to represent issues relating to female students, tracking of School's gender statistics both in relation to progression and attainment, inclusive marketing campaigns and a gender-neutral virtual environment. The Panel noted that unconscious bias training was compulsory to all staff and that any perceived barriers that arose were promptly addressed.

## 5.10 Student Representation

The Panel was informed by the team that all year groups had student representation, all of whom underwent the Student Union's induction and training. Meetings with the student representatives were conducted outside of class times at mutually agreed times. Where possible, meetings were conducted with the full student body, and an open-door policy was in place to allow students the freedom to raise in person any issues they may have. With regard to part-time students on the BEng Mechatronic Engineering provision, as the cohort was small (around 20 students), the team explained that they could feed directly to the course representatives as well as the course team.

The team added that student voice was heard during the revalidation exercise process. Part of the stakeholder engagement included consultation with graduates as well as existing student representatives. The Ulster Society of Student Engineers (USSE) also provided excellent feedback and partnership in the development of enhancements to the curriculum.

## 5.11 Student Support

The Panel noted that, in addition to access to their Course Director, each student was allocated a studies advisor who provided both academic and pastoral support including monitoring of attendance and engagement throughout the year. A studies advisor was also allocated in subsequent years until a project advisor in the final year assumed this role. The school office provided high quality administrative support, and the technical staff offered support to students as well.

## 5.12 Progressive Development

The Panel was of the opinion that the course document did not reflect the progressive development of key skills and recommended this be articulated in section A of the course document and in the module descriptors.

### 5.13 Assessment of Composite Engineering Module

The team agreed to review the assessment of the Composite Engineering Module (MEC866) as the Panel felt students on this module were being heavily assessed.

### 5.14 Professional Body Membership

In response to a query from the Panel the team advised that both staff and students were encouraged to become members of their respective professional bodies, adding that students were also encouraged to continue their membership after graduation.

### 5.15 Contingency Plan for Covid-19 Pandemic

The Panel asked the senior team to outline the University's plan going forward in light of the ongoing pandemic. The senior team explained that the University has been working over the last couple of weeks, at an institutional level, to put plans in place to deal with the crisis. These included alternative forms of teaching and assessment.

In response to the Panel's query regarding lecture capture, they were informed that although there was no official University policy in place, lectures were automatically recorded through Blackboard Collaborate, which gives lecturers the option to publish the lectures on the VLE. The Panel shared with the team their institutions' positive experience with lecture capture, pointing out the various benefits to students.

## 6 CONCLUSIONS

The Panel commended the team on the following aspects evident from the revalidation:

- The impressive achievement of an Athena SWAN Silver Award.
- The design of a state-of-the-art programme which fulfils both local and wider industry needs.
- The quality of the detailed course documentation.
- The positive impact the team's work had on attrition.
- The variety of assessment methods and the use of assessment rubrics.
- The close partnership with the students which was also evident in their engagement with the revalidation process.

The Panel agreed to recommend to the Academic Standards and Quality Enhancement Committee that the provision be approved for a period of five years (intakes 2020/21 – 2024/25) subject to the conditions and recommendations of the Panel being addressed and a satisfactory response and a revised submission being forwarded to the Academic Office by 24 June 2020 for approval by the Chair of the Panel.

### Conditions

- i) That matters of detail and clarification as identified in the notes by Academic Office to the Panel are addressed.

## Recommendations\*

- i) That the team consult with the professional body on the best way to approach the different learning outcomes in the MEng Final Year Dissertation module (EEE840) and the BEng Final Year Project (MEC528) and balance any conflict that arises in cases of students exiting the MEng with a BEng exit award;
- ii) That the team articulate the progressive development of key skills in section A of the course document and in the module descriptors; and
- iii) That the team look at addressing potential resourcing issues and providing students with more 'hands on' experience throughout the provision.

\* The Panel requested the team review the balance of assessment in relation to exam and coursework.

## 7 APPRECIATION

The Chair thanked the Panel members and, in particular, the external members, for their valuable contribution to the validation process.