EXTERNAL REVIEW REPORT OF NEW PROGRAMMES

1.	Title of Programme(s):	BEng (Hons) in Software & Electronic Engineering
		BEng in Software & Electronic Engineering (Exit Award)
		Higher Certificate in Software & Electronic Engineering (Exit Award) (See below re title)
2.	School / Centre:	School of Engineering
3.	Duration:	4 years Level 8
4.	NFQ Level:	Level 8

5.	Type of Review:	New Programme:	Yes:	X	No:	
		Differential Validation:	Yes:		No:	X

6.	Date of Review:					
7.	Delivery Mode:	Full-time	X	Part-time		Blended	

8.	Panel Members:	Dr Joe McGarry, Chair
		Dr Noel Murphy, DCU
		Mr Denis McFadden, Letterkenny IT
		Mr Joe Goggins, Consultant, Aspect Software
		Ms Carmel Brennan, Secretary
9.	Proposing Staff:	Mr Gerard MacMichael
		Mr Des O'Reilly
		Ms Michelle Lynch
		Ms Natasha Rohan
		Mr Paul Dunne
		Mr George Anderson
		Mr Mairtin O'Conghaile
		Mr Sean Coffey
		Mr James Nevin
		Ms Emer Cahill
		Mr Niall O'Keeffe
		Mr Brian O'Shea
		Mr Sean O'Donovan
		Ms Clare Lundon
		Mr Michael Fahy

| 10 | Programme Rationale: | The proposed programme is a four-year full-time Level 8 software and electronic engineering course. It replaces the following existing Level 7 (three year full-time) and Level 8 add-on (two year full-time) courses: BEng in Computer and Electronic Engineering and BEng (Hons) in Computer and Electronic Engineering.

The new programme title is Bachelor of Engineering (Honours) in Software and Electronic Engineering. The new title is designed to effectively communicate the areas of expertise in which the programme sits to industry professionals, to students, to prospective students, and to the public.

Electronic engineering is an overarching construct, which includes hardware technology, software technology, and the integration of both, in application areas including communications, networking, information technology, automotive, medical, entertainment, mobile technologies and the internet of things. The term electronic engineering is universally used to describe similar programmes nationally and internationally, and as a term it has persevered through many iterations of technological development. Engineering emphasises the engineering ethos of the programme, the application of scientific, mathematical, social and economic principles in today's world.

Software engineering is a major stream within this programme, including design methodologies, test methodologies, using industry standard tools, and programming in several of the top programming languages. A major area of opportunities for graduates, is as software engineers, in the field of electronic engineering, in the ICT industry.

A particular strength of the existing programmes has been the strong employment potential for graduates. There is a shortage of qualified software and embedded design engineers in Ireland, with many companies recruiting outside the country. The work placement option, a key element of the programme, has been very attractive to local companies. |

		Many students obtain full-time jobs at companies where they have been placed. The strong employment record of our graduates in the multinational and SME sector demonstrates that industry values the quality and skills of the programme graduates. Work placement is included in the new programme in Year 3.
		The programme is also differentiated by its pedagogy, and its emphasis on laboratory based learning and teaching, where principles and ideas are applied, and practical skills are developed. The programme aims to graduate professional, capable and informed software and electronic engineers who can demonstrate advanced skills in programming, networking, embedded systems development, digital systems, engineering projects, interpersonal communications and teamwork.
11.	Potential Demand for Entry:	Projected student numbers for the first year are 40 students.
12.	Stakeholder Engagement:	In designing the programme, the team considered the evolution of technology and industry since the last time a major programme design or review was undertaken. An industry and graduate network provided input to the design process on current needs and trends. Requirements in the Western, Mid-Western and Midlands regions were analysed. The programme is differentiated by its situation in the region, where the tech industry has evolved to be largely research and development focused, rather than manufacturing based. Many global players in the tech industry reside here, and many local start-ups require electronic engineering and software engineering skills. This programme specifically targets this highly skilled research and development industry.
		Thirty-six companies were consulted and surveyed, researching their requirements for new hires in relation to qualifications, knowledge and skills, and their views on work placement

		Other Institutes of Technology were consulted about their experiences of moving from the two-year add-on to the ab-initio 4-year programme.
13.	Graduate Demand:	Employment potential for graduates from this programme is excellent due to the following factors: • The high demand for graduates with ICT/software/electronic engineering skills • The current programmes are well regarded by local industry • The programme has strong emphasis on lab-based skills • Work placement Per the report 'Ireland's National Skills Strategy 2025' issued by the Department of Education and Skills there is a high demand nationally for graduates with Level 8 ICT/software/electronic skills. 'EGFSN (Expert Group on Future Skills Needs) research indicates a current demand for high-level ICT skills at an average 8,000 new job openings per annum. Of these, it was estimated by the EGFSN that 85% of the job openings would be for high-level ICT professionals at NFQ Level 8 +.'
14.	Entry Requirements:	Students must meet the entry requirements as indicated in GMIT's Academic Code of Practice No. 4 (Access, Transfer and Progression), at any given time. Students will also need a grade C2/O4 or higher in Leaving Certificate ordinary level Mathematics to meet the minimum entry requirements for the programme.
15.	Programme Structure:	The programme includes cognate modules from the following disciplines: • Electrical and Electronic Theory • Programming • Operating Systems • Embedded Systems • Information and Communications Technology • Mathematics

		The knowledge and skills developed in these modules will be supplemented by non-cognate modules in the areas of business and personal development.
		In Semester 3, students select a year-long 5-credit module from Civic Engagement, Peer Assisted Study Sessions or Communication Skills. In Semester 6, students may opt for Work Placement or take alternative modules. Either option carries 30 credits. Project work and work placement offer students the opportunity to develop and apply their skills in a practical and supportive environment.
16.	LTA:	The learning and teaching strategies employed by the programme team aim to help students achieve module and programme learning outcomes. Inevitably, there will be variations in the methodologies employed by lecturers; however certain core principles apply as a generality. These are: o The learning style broadly favoured in all modules is 'learning by doing'. To this end, at a minimum, for every two-hour class time, the student will spend two hours in the laboratory. In some modules, all classes are delivered in a laboratory. o The programme is designed to foster the student's skill at self-learning. Teaching, delivery methods and assessment are all focused on this aim. o Practical work can be set as an individual assignment, paired assignment, or team assignment. o Moodle forms the key platform on which all modules rest. It acts as the repository for module learning material and is the central conduit for the setting and gathering of assessments and assignments. Assessment is a key student motivator and provides employers with indicators as to the quality of our graduates. Its design & implementation is critical to achieving the learning outcomes of the programme. In assessing students, lecturers adhere to *Academic Code of Practice No. 3 (Student Assessment Marks & Standards),* which complies with QQI's Assessment and Standards document.

		Modules are assessed with either 100% continuous assessment or a 50:50 division between continuous assessment and an end of module exam. This is in keeping with the philosophy of the programme which aspires to produce self-directed, knowledgeable graduates with high levels of practical skills. Both continuous assessment and the final exam may be comprised of lab based, practical work and/or written submissions. All methods of assessment are subject to quality assurance in accordance with Code of Practice No. 3. This assessment strategy is prepared by the programme board, and is the subject of continuous review.
17.	ATP:	Students may progress to relevant level 9 qualifications. With the introduction of the BEng in Software and Electronic Engineering, there is also the phasing out of the BEng in Computer and Electronic Engineering (L7 and L8). Plans are in place for the transition phase.
18.	Resource Implications:	The School of Engineering has sufficient lecturer capacity with relevant skill sets to deliver the proposed programme. Whilst no new facilities or equipment is specifically required to deliver this programme, the upgrading envisaged in the School of Engineering Campus Development Plan will be necessary in the future.
19.	Synergies with existing programmes:	None.
20.	Findings and Recommendations:	Special conditions attaching to approval (if any): • The assessment methodology used for the work placement module in year 3 should reflect its 30-credit weighting. The work placement module should be graded, and should be used in the calculation of the award classification for the level 7 exit award. The assessment methodologies should be sufficiently robust that the placement contributes appropriately to the grading of the level 7 exit award.

		Recommendations of the panel in relation to award sought:
		• The selection of students required to undertake an additional module as part of the work placement is not clear to the panel, nor is the timing for this. Review the assessment strategy for the work placement to ensure that the learning outcomes are achievable by all students.
		• The level 6 exit award should be titled in a manner which is consistent with the programme content.
		• The panel recommends that the programme is appropriately resourced to reflect the learning needs of software and electronic engineering students, preparing them for the current graduate work environment.
		• Introduce students to security, protection and preservation of data, and the appropriate legislative context.
		• Design patterns should be introduced in year 1 and carried throughout the programme e.g. the use of the singleton pattern demonstrates the basic principles very early in the programme.
		• The programme content should be relevant to the current industrial environment in areas such as cloud computing, data mining and data structures and algorithms.
		• Ensure that where there is an end of semester/year examination that it is recorded as such on the APS.
		• Staff who have not done so recently should engage in staff development in relation to assessment design in light of the heavy weighting of continuous assessment and project work on this programme.
22.	FAO: Academic Council:	
		Approved:
		Approved subject to recommended changes: X
		Not approved at this time:
23	Signed	Chair Secretary