

1.	Title of Programme(s): (incl. Award Type and Specify Embedded Exit Awards)	Certificate in Drones and Smart Agricultural Sensors Special Purpose Award
2.	NFQ Level(s)/ No. ECTS:	Level 6 20 ECTS
3.	Duration:	2 Semesters (26 weeks)
4.	ISCED Code:	
5.	School / Centre:	School of Engineering
6.	Department:	Mechanical & Industrial Engineering
7.	Type of Review:	New Programme
8.	Date of Review:	8 th December 2021
9.	Delivery Mode:	Blended, Part-time
10	Proposed Student Intake:	20
11.	Proposed Start Date:	January 2022
12.	Panel Members:	Dr Dermot O'Donovan (Chair) Dr Ian Mc Loughlin Dr Katie O'Dwyer Mr Martin Nee Mr Hugh Mc Bride, GMIT (Secretary)
13.	Proposing Staff:	Prof Graham Heaslip Dr Carine Gachon Ms Edna Curley Mr Stephen Foy Mr Gerry Lohan
14.	Programme Rationale:	<p>The use of smart technologies is becoming necessary to support efficient and sustainable agriculture. Both smart-agri sensors and Unmanned Aerial Vehicles (UAVs or drones) can be used to make data driven decisions as well as support leaner agriculture. For example, small drones/UAVs are employed in agriculture for crop observation, crop monitoring, field analysis and map generation through aerial surveys.</p> <p>With access to technology ever-increasing, and with the growing market of available software and 'mission planning tools', there is also a growing demand for knowledge and understanding of the capabilities and limitation of drones and remote sensor technologies. The proposed certificate will give learners the knowledge and understanding about their usage and limitations in agriculture. Students will learn how to implement smart-agri sensors and plan an end-to-end mission (from image acquisition to data visualisation) for</p>

		<p>specific drone applications. They will gain an understanding of aerial mapping workflow and the use of in-field sensor technology.</p> <p>The focus of the proposed programme is on the use and regulation of sensors and drones for data collection, including health and safety risks. Students will gain a basic introductory knowledge about how to operate and fly drones. They will be encouraged and facilitated by the programme team to obtain a drone licence (subcategory A2) for use in Irish/European airspace by undertaking an additional training programme with a company, Avtrain, who are approved and accredited by the Irish Aviation Authority. The cost of undertaking the additional optional training programme is included in the fees for the proposed Certificate.</p> <p>Sustainability is an important component of any agricultural programme. The proposed Certificate will contribute to the sustainability of agriculture in Ireland by introducing technologies that can support more efficient and responsible agriculture.</p> <p>The proposed inter-disciplinary programme was developed in a collaboration between GMIT's School of Engineering and Mountbellew Agricultural College. It will further develop the relationship between the two entities and will strengthen GMIT's position as a provider of agricultural engineering programmes.</p> <p>There are no similar comparable programmes available in Ireland.</p> <p>The programme is part of the Springboard offering.</p>
15.	Stakeholder Engagement:	<p>The programme design team consulted with a number of key stakeholders who subsequently provided letters of support, indicating their desire to support an application towards the use of new technologies to aid in understanding the effects of land-based activities and to mitigate against any potential loss to ensure a sustainable future. Stakeholder consulted included Bord na Móna, Aurivo and Grasstec Ltd.</p> <p>The design team also researched the technology available and consulted with practitioners to develop the learning outcomes. In particular, Avtrain contributed to the development of the Drones for Agriculture module.</p>
16.	Graduate Demand/Employment:	<p>The coming agricultural revolution, Agriculture 4.0, will be led by science and technology. Agriculture 4.0 will look to both the demand and the value chain/supply side of the food-shortage equation, using technology to improve and address the real needs of consumers and re-evaluate the value chain. The Irish agri-industry recognises this shift and the subsequent training needs of future graduates.</p> <p>The proposed programme addresses a current gap in the market, providing necessary upskilling in the use of drones and remote sensor technology in precision agriculture for agriculture technicians,</p>

		<p>researchers, graduate students from multidisciplinary technical fields and learners that wish to use drones for commercial purposes.</p> <p>As part of the Springboard offering it will give access to the wider community and enhance the employability of the graduates.</p>
17.	Entry Requirements, Access, Transfer & Progression:	<p>The entry requirement for the programme is either:</p> <p>A pass in any FETAC/QQI Award at Level 5/6.</p> <p>A grade O6/H7 or better in five Leaving Certificate subjects including Mathematics and English or Irish with a minimum of 160 point.</p>
18.	Programme Structure:	<p>The proposed 20 Credit programme comprises three modules, all at Level 6: Smart Agricultural Sensors (5 Credit); Drones for Agriculture (5 Credit); Smart-agri Professional Practice Project (10 Credit).</p> <p>The programme will be delivered over 2 semesters (26 weeks). Two taught modules, Smart Agricultural Sensors (5 Credit) and Drones for Agriculture (5 Credit), will be delivered in Semester 1. The Smart-agri Professional Practice Project (10 Credit) module involves the student undertaking a supervised project in Semester 2 in which they will apply the knowledge and skills acquired in the taught modules.</p> <p>The Engineering Award Standards at Level 6 were used as a reference in specifying the minimum intended programme learning outcomes.</p>
19.	Learning, Teaching & Assessment Strategies:	<p>Delivery will involve a collaboration between GMIT's School of Engineering and Mountbellew Agricultural College.</p> <p>The delivery mode for the taught modules in Semester 1 will be blended, involving a mix of online and on-site delivery.</p> <p>The Smart Agricultural Sensors and Drones for Agriculture modules each require a total of 39 contact hours per student. This comprises 13 hours of online synchronous lectures (1 hour per week per module) and 26 hours on-site practical sessions (4 hours every second week per module).</p> <p>The 2 hours of weekly online lectures (1 hour per module) will be delivered through MS Teams one evening per week. The practical element will require students to attend on-site for 8 hours (4 hours per module) every second Friday. The on-site laboratories will give students hands-on experience of technologies available in the field.</p> <p>The first lecture will be held on-site to help students get set-up with IT access and the student HUB.</p> <p>The professional practice project undertaken in Semester 2 will be work-based where possible. Each student will have an assigned supervisor who will meet the student weekly for 0.2 hours to help scope the project, agree milestones, monitor progress and discuss any issues encountered.</p>

		<p>Assessment will be entirely by continuous assessment, including practical assessments in a laboratory and Moodle based assessments. The practice project assessment will include a progress logbook, a report and a presentation.</p> <p>Students who fail the taught modules will be given the opportunity to repeat the practical elements of assessment during the next delivery of the programme. Students can resubmit the project if necessary.</p> <p>The assessment strategy was designed with academic integrity in mind. Students will be reminded of academic integrity when given their assessment brief and all assignments will be checked for plagiarism.</p>
20.	Resource Implications:	<p>The teaching resource required for 20 students averages at 5 hours per week over the academic year.</p> <p>No additional staffing resource is required to deliver the proposed programme. The School of Engineering currently has two staff members knowledgeable in the area. Staff will be supported in undertaking any necessary additional training or accreditation relevant to programme delivery.</p> <p>Software licences costing €1,000 and equipment costing €6,000 will be required. These costs will be met from within existing School of Engineering resources.</p> <p>The programme is approved for funding through Springboard.</p>
21.	Synergies with Existing Programmes:	<p>The programme design team is currently developing a full award in the field of smart agricultural technologies. It is the intention of the design team to include the two 5 credit taught modules, Smart Agricultural Sensors and Drones for Agriculture, in the proposed new program.</p>
22.	Findings and Recommendations:	<p>The Panel commends the programme team for the collaborative and inter-disciplinary nature of the initiative, for its 'cutting-edge' application of digital technologies to agriculture, and for their open and constructive engagement with the Panel.</p> <p>The Panel recommends approval of the proposed programme subject to the conditions and recommendations outlined below.</p> <p>Conditions:</p> <ol style="list-style-type: none"> 1. Clarify that the aim and focus of the programme is on data collection and not on operating and flying drones. 2. Explain the relationship with Avtrain, and the opportunity for students to obtain a drone licence as an additional option that is included as part of their programme fee. 3. Expand on the statement of intended programme learning outcomes to include outcomes related to sustainability,

		<p>transversal skills enhancement, and learning from the practice project.</p> <ol style="list-style-type: none"> 4. Provide greater visibility for the contribution to sustainability in agriculture in module intended learning outcomes and indicative content. 5. Clarify the nature of the collaboration between the School of Engineering and Mountbellew Agricultural College for delivery, co-ordination and management of the programme. In particular, clarify where the on-site delivery element will be provided - on the Dublin Road Campus, at Mountbellew or on both sites. 	
		<p>Recommendations:</p> <ol style="list-style-type: none"> 1. Reconsider the title of the module Drones for Agriculture. For example, whether the title Drone Technology in Agriculture might be more reflective of the module aim and intended learning outcomes. 2. Provide further clarification of the target learner cohort and the entry requirements. For example: referencing learners who hold a Teagasc Green Certificate; indicating particular prior competencies (if any) that entrants are expected to have; stating that candidates not holding a formal qualification can be assessed for entry through RPL. 3. Expand on the programme Teaching & Learning Strategy (section 9.1) to include reference to plans for addressing the challenges posed by a diverse student cohort, including the application of UDL principles. 4. Expand on the narrative in the programme document re sustainability (section 6.7) and EDI (section 6.8). 5. Reconsider the Teaching & Learning strategy for the Smart-agri Professional Practice Project module, ensuring it is appropriate to Level 6 learning. In particular, consider the inclusion of scheduled initial framing lectures and of subsequent scheduled group sessions to provide an opportunity for peer-learning. 6. Clarify that the Smart-agri Professional Practice Project is a field experiment rather than a research project. Identify any partner organisations prepared to facilitate students in carrying out their projects. 7. Tailor the Assessment Strategy (section 9.2) to the programme, including clarification of the provision for repeat assessments. 8. Clarify the Assessment Strategy in the module descriptors for the taught modules, explaining the nature of 'Moodle based assessment'. 9. Expand on the reading book list, journal and online resources particularly in the Project module descriptor, including reference to case study examples of agricultural-related applications. 	
22.	FAO: Academic Council:	<p>Approved:</p> <p>Approved subject to recommended changes:</p> <p>Not approved at this time:</p>	<p></p> <p>√</p> <p></p>

	Signed:		
		Chair	Secretary