

**Information  
Booklet  
2022/23**



**DEGREE  
APPRENTICESHIP**  
in Manufacturing  
& Engineering



Department for the  
**Economy**  
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# Engineering a Better Future for Northern Ireland



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## WHAT IS A DEGREE APPRENTICESHIP?

Degree Apprenticeships provide an opportunity to gain a full honours bachelor's degree (Level 6).

These programmes are being developed by employers, universities and professional bodies working in partnership. Degree Apprenticeships combine working with part-time study at a university. Apprentices are employed throughout the programme and spend part of their time at university and the rest with their employer. This can be on a day-to-day basis or in blocks of time, depending on the year of delivery. Degree Apprenticeships are already popular amongst other industries such as construction, financial services and IT. Large firms such as **Deloitte**, **EY**, **ICE** and **Kainos** have successful Degree Apprenticeships that have been running in Northern Ireland for a number of years.

## HOW IS IT FUNDED?

Degree Apprenticeships have two aspects, **learning** and **working**. The cost of learning is paid for by the Department for the Economy NI. The apprentice is **paid from day one** of the programme by the employer for both working on site and their learning at university.

## WHAT IS THE MEGA DEGREE APPRENTICESHIP IN CONJUNCTION WITH ULSTER UNIVERSITY?

Working collaboratively, MEGA with its industry network and Ulster University, School of Computing & Intelligent Systems at Magee campus as the Education Provider, together launched Northern Ireland's first **Industry Approved Manufacturing Engineering Degree Apprenticeship** in 2021.

This Apprenticeship provides the apprentice with an abundance of real-time industry experience together with relevant training and skills acquired through the degree programme which has been created with industry needs at its epicentre, resulting in relevant highly skilled apprentices, ready for **local employment** within **international companies**. Its duration is 4 years, the same time commitment as a traditional sandwich-year degree.



**MANUFACTURING  
& ENGINEERING  
DEGREE  
APPRENTICESHIP**

## APPLICATION PROCESS

1st October 2021	Applications Open
31st March 2022	Applications Close
Apply here: <a href="https://bit.ly/3uhDvfH">https://bit.ly/3uhDvfH</a>	
April 2022	Company Shortlisting and Interviews
May 2022	Conditional Industry offers of employment
Apply to Ulster University to receive a conditional offer	
August 2022	Industry Confirmed offers – confirm results with UU
September 2022	Start Ulster University Year 1



**Delivering  
Excellence  
in the  
Workplace**



**MANUFACTURING  
& ENGINEERING  
DEGREE  
APPRENTICESHIP**



I am glad to have chosen the MEGA Degree Apprenticeship as it has given me an alternative approach to my degree. What I do within University immediately became relevant to what I was doing within work and likewise, what I am doing within work has helped me with the theory aspects in class. What I have been doing within Nugent has been very engaging and has challenged me from day one.

**CONOR BRATTIN**  
Nugent Engineering

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## WHO ARE MEGA?

MEGA stands for Manufacturing, Engineering, Growth & Advancement. It's an **industry-led collaborative network** of Engineering & Manufacturing companies of all sizes in Mid Ulster working together with Mid Ulster Council, Invest NI and Education Providers towards a common goal. Their main aim is to tackle the diminishing labour pool by implementing ways to attract and retain talent in the Engineering & Manufacturing industry.

The industry is changing and companies are struggling to employ graduates with the right skills to help them embrace technological advancements. MEGA, representing industry, along with Ulster University have designed Northern Ireland's first Manufacturing & Engineering **Industry Approved Degree**. This Degree Apprenticeship will be open to all Manufacturing & Engineering companies as well as students across the province.

## WHY ULSTER UNIVERSITY?

The School of Computing, Engineering and Intelligent Systems (SCEIS) has a long history of engagement with all levels of the education landscape. They enhance the exposure of young people to careers in Engineering. The MEGA Degree Apprenticeship Scheme represents another opportunity for Ulster University to support this brand of learning.

The team at Ulster University have bid for funding under the City Deal programme to build the **Centre for Industrial Digitalisation Robotics and Automation (CIDRA)**. This industry-facing 4.0 development centre will greatly enhance NI industry in terms of **technology and skills development**. Ulster University sees Apprenticeships as essential to providing a pipeline of suitably educated individuals to support the growing use of **advanced technologies** in local manufacturing.



**DEGREE APPRENTICESHIP**  
in Manufacturing & Engineering



## MODEL OF DELIVERY

### YEAR 1

SEPT	OCT, NOV, DEC	JAN	FEB, MAR, Mid APR	Mid APR, MAY, JUN, JUL, AUG	JUNE, JUL, AUG
INDUSTRY	UNIVERSITY	INDUSTRY	UNIVERSITY	INDUSTRY	INDUSTRY
Modules: Maths, Manufacturing, Mechanical Science				Modules: Design CAD, Electronics, Fluids and Thermo, Energy Systems	

### Year 2 Onwards - 4 Days Industry / 1 Day University

#### YEAR 2

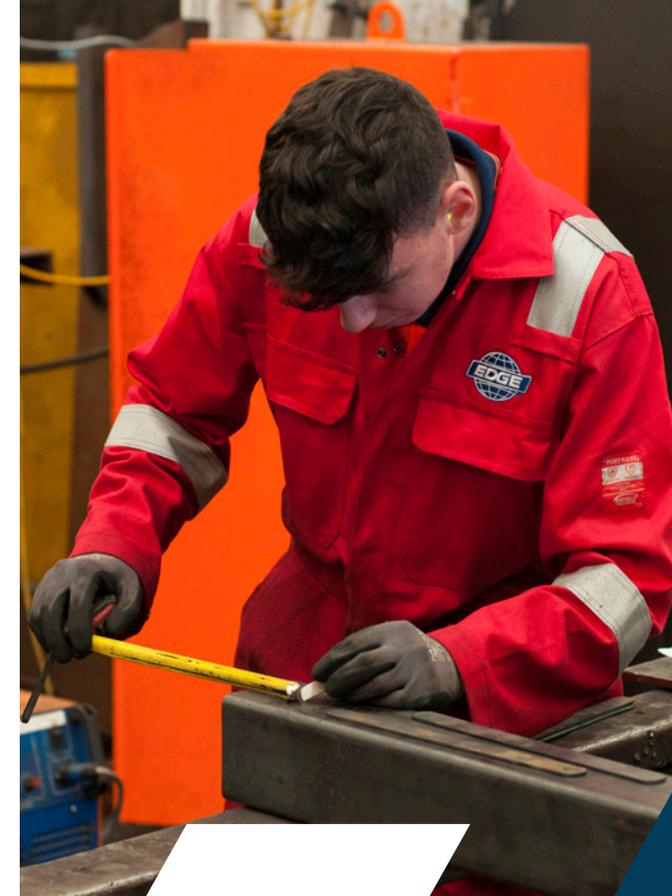
SEPT - DEC	FEB - MAY
1 Day per week Modules: Maths, Materials	1 Day per week Modules: Mechanical Science, Electronics

#### YEAR 3

SEPT - DEC	FEB - MAY
1 Day per week Modules: Electrical Control systems, Design and CAD	1 Day per Week Modules: Mechanical Science, Manufacturing Technology

#### YEAR 4

SEPT - DEC	FEB - MAY
1 Day per week Modules: Project, Design and CAD	1 Day per week Modules: Project, Computer Aided Engineering



The manufacturing and engineering sector is a huge driver of the economy in the Mid Ulster region



## WHY SHOULD THIS INTEREST COMPANIES?

Companies who are currently working with or plan to work with **robotics**, **automation** and **digitalisation** will directly benefit from their involvement with this Degree Apprenticeship Programme. The apprentice will be instrumental in assisting their host company develop and implement **strategic plans** and **embrace advancing technologies**. Ulster University Magee Campus is set to become the specialist centre for Industry 4.0. Companies with MEGA Degree Apprentices will gain exposure and avail of the range of innovative projects and programmes offered at the university alongside benefiting from the degree itself.

First year of the degree is a year of **accelerated learning**. The apprentice will be in university for **24 weeks in the first year** of the Degree. This is in two blocks of learning, 12 weeks in each block with the remaining time based in industry. Delivered this way, the apprentice can maximise their performance in industry with a strong base of knowledge to work from. In 2nd, 3rd & 4th year, the mode of delivery switches to 4 days in industry and 1 day per week in university.

Companies that sign up to the programme become part of the **Industry Education Initiative (IEI)**, a support group for mentors within the participating companies to make sure they understand and comply with the requirements of the NI Apprentice Scheme NI, their role in supporting the student through their learning, and provide open and honest feedback so industry have direct communication with university on the Degree to ensure it remains relevant.

## WHY SHOULD THIS INTEREST POTENTIAL PARTICIPANTS?

In the same time period as a traditional degree (4 years) the apprentice will have an *impressive CV, degree and no debt*; in fact, you *earn while you learn!*

The MEGA Degree Apprenticeship provides an exciting learning experience. Each apprentice will be supported in their industry placement with a *qualified mentor* who can help them apply their theory into practice in *real-time*. This enables the apprentice to see and experience the impact of their work on the entire business operation and exposes them to working with a variety of departments and people in high-level positions within the company.

*MEGA Life Skills* is delivered as part of the Degree Programme. In the future, MEGA Degree Apprentices will hold key industry positions. MEGA Life Skills aims to ensure the MEGA alumni are conscious of their opportunity to *positively impact the world around them*, helping the industry shift towards a greater awareness of its *environmental and corporate responsibilities*. The key areas of focus are:

### CORPORATE SOCIAL RESPONSIBILITY

Paying attention to how business practices impact marginalized groups, the environment, and society as a whole. They will learn how corporations can *help the world become a healthier, happier place*.

### LEADERSHIP & TEAMWORK

### MONEY MANAGEMENT

This is delivered on an annual 2-day residential. It's an opportunity for apprentices to establish their professional network and foster responsible practices for the future of the industry.

The MEGA Degree Apprenticeship provides an abundance of *extra skills* and *experiences that can't be replicated in a lecture hall*.

It will provide apprentices with the most *desirable industry academia* as well as helping to *develop high-functioning business skills* making these graduates stand apart. It provides *an amazing starting point* to build their career on.



“

The Mega Degree Apprenticeship, even in its infancy, is already starting to demonstrate the positive affect it can have within the manufacturing sector. The students are already starting to combine the studies of what they are learning in the classroom and bringing that knowledge to industry, but more interestingly they are beginning to bring the challenges and difficulties they face in the industry back to the classroom where they seem to be working with other students and mentors to come up with solutions which immediately benefit the manufacturing organisation.

I am excited to see what these students can bring to the industry, and they truly are a credit to their mentors and lecturers with the University of Ulster.

**LEIGH FALLS**  
Operations Manager  
Nugent Engineering



## WHAT'S THE DIFFERENCE IN COST?

The cost of opting for a traditional degree:

Students not living with parents	Tuition Fee NI	Tuition Fee UK	Maintenance Grant (not paid back)	Maintenance Loan (repayable)	Total Cost Full-time study NI (minimum approx.)	Total Cost Full-time study UK (minimum approx.)
Parents earn <£19,203	£4,530 x 4 years = £18,120	£9,250 x 4 years = £37,000	£3,475 x 4 = £13,900	*£2,953 x 4 = £11,812 *The lowest amount quoted	£29,932	£48,812
Parents earn >£41,540	£4,530 x 4 years = £18,120	£9,250 x 4 years = £37,000	£0	£4,840 x 4 = £19,360	£37,570	£56,360

The cost of a Degree Apprenticeship:

Cost of Tuition (Paid for by DfE)	Apprenticeship Wages	Total cost of Degree Apprenticeship
£0 x 4 years = £0	£15 - 18k in Year 1 increases each year of study over the 4 years	£0

## WHAT ARE THE ENTRY REQUIREMENTS FOR THE APPRENTICESHIP?

### GCSE

Grade B in Maths and Grade C in English - Essential  
Technology & Design and Physics - Desired but not essential

### A Level

Grades BBB to include one from:

GCE A Level Mathematics, Further Mathematics, Physics, Technology and Design, Double Award Science / Applied Science, Engineering, or Electronics. Desirable Subject Offer: BCC

For applicants offering Maths, Further Maths or Physics in GCE A Level, a two grade reduction will be applied at the time of offer.

**BTEC** Level 3 QCF Extended Diploma in a relevant Engineering subject area with overall award profile of DDD. This also requires a Merit in either Mathematics for Engineering Technicians or Further Mathematics for Engineering Technicians, AND Merit in Mechanical Principles and applications.

OR

**BTEC** Level 3 RQF National Extended Diploma in a relevant Engineering subject area with DDM overall award grades to include a Merit in Engineering Principles and Merit in Calculus to Solve Engineering Problems.

The following are acceptable in particular combinations or with A-Level (s) -  
NB Subject requirements apply (see above and A-level section).

**BTEC** Level 3 QCF Subsidiary Diploma, BTEC RQF National Extended Certificate,

**BTEC** Level 3 QCF 90-credit Diploma, BTEC Level 3 RQF National Foundation Diploma,

**BTEC** Level 3 QCF Diploma, BTEC Level 3 RQF National Diploma.

## CAREER OPTIONS FOR GRADUATES FROM MEGA DEGREE APPRENTICESHIP

**Design Engineer** - Office based and client facing

**Quality Engineer** - Office / Production floor

**Manufacturing Engineer** - Shop floor working with the production teams

**Project Manager** - Engineering or related

**Production Engineer** - Liaison between design and production teams

**Project Engineer** - Design and production specialist / prototyping projects

**Sales and Service Engineer** - International work and travel

**Other Jobs** - Graduates will be qualified for a range of jobs that require Maths and Physics. Students could go on to work for Formula 1, develop Nuclear Weapons, work within the Energy Industry, Oil Fields, or within Banking/ Trading.



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The mega degree apprenticeship has given me the opportunity to gain invaluable work experience whilst also developing my academic studies simultaneously which is brilliant because I find the hands on experience helps so much with learning, they both go hand in hand and this way I get to experience both. So far this degree course is has been tailored brilliantly to show us new and innovate ideas to bring into our workplace and I am excited to continue this journey.

**ZARA CHAMBERS**  
Spectrum Engineering



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## DEGREE APPRENTICESHIP AT ULSTER UNIVERSITY

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### YEAR 1

#### **MEC109 Manufacturing Processes (Semester 1)**

This module provides an integrated programme of lectures and workshop practicals introducing students to engineering manufacture. Students will examine many manufacturing processes such as milling, turning, CNC machining and robotics, metal cutting and folding, marking out metal casting, polymers and composites.

#### **EEE107 Maths for Engineering 1 (Semester 1)**

The module will develop the student's mathematical ability and provide the student with all the necessary techniques, concepts and methods for the analysis of problems in engineering related disciplines. Students will study Algebra, Trigonometry, Vectors, Matrices and Calculus.

#### **MEC105 Design and Cad 1 (Semester 2)**

The aims of the module are to enable students to gain a basic level of proficiency in the use of a modern 3-D CAD software, communicate design information in an appropriate way, and become familiar with the engineering design process and its application to simple design problems. Students will be introduced to computer aided control for CNC operation including robotic cell design – using software – Visual Studio/Robot Studio.

#### **EEE201 Circuits Analysis 1 (Semester 2)**

The main aim of this module is to introduce the fundamental concepts of electrostatic and electromagnetic fields, related rules, electric and magnetic materials and their characteristics, and their applications in physical systems. Students will study DC Circuits, Circuit analysis techniques, Op Amps and Non-Linear devices, e.g. semi conductors. This is a key module to outline the basis for electronic measurement and control.

#### **MEC102 Introduction to Statics and Dynamics (Semester 1)**

This module aims to ensure that students have a knowledge of the basic technological principles in statics, strength of materials and dynamics relevant to engineering. On completion of this module the student should be provided with the elements of the tools essential to analyse basic mechanical systems and mechanisms. Students will study beams bending, torsion, kinematics, motion and work energy principals.

#### **ENE135 Introduction to Renewable Energy (Semester 2)**

This module is designed to equip students with an understanding of the fundamental drivers underpinning the need for change and the issues of energy systems and energy conversion in relation to conventional and alternative energy systems. This module includes a basic introduction to the principles behind fluid mechanics and thermodynamics. Emphasis is placed on the application of this theory to everyday items, ranging from bicycles to motor cars.

### YEAR 2

#### **EEE406 Maths for Engineering 2 (Semester 1)**

This module builds on the learning of EEE107 and encourages the development of a higher level of mathematical literacy and aims to generate an inherent mathematical curiosity for investigation and discovery. Students will study Calculus, differential equations, Laplace transforms, matrices and complex numbers and statistics. Additionally students will study Matlab software for automations of calculation.

#### **MEC308 Materials for Engineering (Semester 1)**

The aim of this module is to educate on the properties, science and application of engineering materials dealing with a broad range of classifications of engineering materials, namely, metals and their alloys, engineering ceramics, polymers, elastomers and composites.

#### **MEC341 Manufacturing Technology (Semester 2)**

This module will equip the student with the knowledge and understanding of the key manufacturing processes, including automation found in the mechanical manufacturing industries and how these processes are used in a systematic way to bring about highly-engineered artefacts in a productive, high-quality and cost-competitive way. Students will study Lean manufacturing and continuous improvement, manufacturing systems and processes as well as in-depth study of subtractive and additive manufacture casting and deformation (forming) processes.

#### **MEC360 Statics and Dynamics 2 (Semester 2)**

This module continues to build and consolidate the core of engineering static strength of materials and dynamics required by a professional engineer. The academic theories and core principles of thermodynamics are introduced.



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## DEGREE APPRENTICESHIP AT ULSTER UNIVERSITY

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### YEAR 3

#### **MEC363 Design and CAE 2 (Semester 1)**

This module synthesises both design and manufacturing within a real industrial environment and utilises the application of computers in the analysis and presentation of product designs.

#### **EEE409 Engineering of Control Systems and Signals (Semester 1)**

This module will present the core theoretical elements necessary to design control systems and signal filters and illustrate how these are applied to real problems according to some specifications and given real world limitations.

#### **EEE601 Industry 4.0 (Semester 2)**

This module advances the understanding of Internet of Things in an industrial context as Industry 4.0, encapsulating the trends and technologies that are transforming the way manufacturing and production operations manage their processes. It focuses on how data is produced, stored, processed, analysed and exchanged between operational systems inside industrial plants and in the cloud.

#### **MEC510 Mechanical Science (Semester 2)**

Building on MEC 102, this module equips students with the technological principles relevant to the practice of engineering to demonstrate the application of these principles in stress systems, three-dimensional dynamics, vibration and thermodynamic systems performance.

### YEAR 4

#### **EEE521 Project Thesis (Semesters 1 & 2)**

Students are required to undertake an individual project during the final year of the course. Its purpose is to provide an experience of developing a solution to a real problem. This work combines skills and knowledge acquired previously on the course with those acquired during the project.

#### **MEC520 Design and CAD 3 (Semester 1)**

This module completes the engineering design suite of modules and provides opportunity for students to apply their knowledge within the context of real, industrially originated project work. This module is based on the execution of an industrially generated major design project through multi-disciplinary team activity involving aspects of project management, market analysis, specification, concept design, budget costing, decision making, detail design, production planning, manufacturing requirements and product costing.

#### **MEC521 CAD/CAM AND Simulation (Semester 2)**

This module provides a practical, hands-on treatment of Computer-aided Engineering in the context of application in design practice or manufacturing company. It majors on the more advanced part modelling techniques, assembly modelling, good modelling practice, collaboration and interoperability, design documentation, 3D printing, surface modelling, rendering, mechanism simulation and Finite Element Analysis.



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