

# DUBLIN CITY UNIVERSITY FACULTY OF ENGINEERING AND COMPUTING

## SCHOOL OF MECHANICAL AND MANUFACTURING ENGINEERING

## Masters (MEng) in Mechanical and Manufacturing Engineering

### **Information Booklet for Prospective Students**



## Masters in Engineering (MEng) in Mechanical and Manufacturing Engineering

#### **Programme Overview**

This Masters programme allows the students to specialise in the widely established area of Mechanical and Manufacturing Engineering or to widen their knowledge from their undergraduate studies. It enables graduates to apply MEng Level 9 learning outcomes using computer—based technology to solve mechanical and manufacturing engineering problems. This programme introduces the use of advanced Computer Aided Engineering tools and, by experiencing these advanced techniques and software, the graduate will gain a vital edge. It allows the candidate to keep up with the rapidly changing manufacturing and design sectors. In addition, students can opt for a specialist Major in one of four areas: Simulation-driven Design, Advanced Manufacturing, Sustainable Systems and Energy, or Biomedical Engineering.

Depending on the student's entry qualification, a number of entry routes to the MEng programme are possible: Direct entry, through an Access Course, through a Qualifier Programme, or through the International Foundation Programme.

#### **EI Accreditation**

The MEng in Mechanical and Manufacturing Engineering programme is accredited by Engineers Ireland at level 9.

#### **Programme Listing**

#### **MEng in Mechanical and Manufacturing Engineering (DC814/DC816)**

The *MEng* programme is a one-year (full-time) level 9 Master programme. It is also offered in part-time mode (typically over two years).

#### Access Course to the MEng in Mechanical and Manufacturing Engineering (DC812)

The Access Course is an alternative entry route to the MEng programme for students who do not have a primary degree in Mechanical and/or Manufacturing Engineering, but have a level 8 Bachelor degree in a science/technology/other engineering based area. It is a one-year part-time course.

## Qualifier Programme B for the MEng in Mechanical and Manufacturing Engineering (DC838)

The *Master Qualifier Programme B* is an alternative entry route to the MEng programme for students who have a level 8 H3 degree in Mechanical and/or Manufacturing Engineering. It is a one-year part-time course.

#### **International Foundation Programme (DC827,DC671)**

The *International Foundation Programme* is an alternative entry route to the MEng programme for students who are non-native English speakers and do not meet DCU's English language requirements. It is a one-year full-time course.

<u>Note</u>: The International Foundation Programme for all Master programmes is managed by the School of Applied Language & Intercultural Studies (SALIS).

#### **Entry Requirements**

#### Direct Entry to the M.Eng in Mechanical and Manufacturing Engineering

• H2.2 level 8 (NFQ level 8 qualification) Honours degree in Mechanical and/or Manufacturing Engineering

#### **Access Course**

- A level 8 (NFQ level 8 qualification) Honours degree in a Science/Technology based degree (Applied Physics, Mathematics, Computer Science, etc.), **OR**
- A level 8 (NFQ level 8 qualification) Honours degree in other areas of engineering (Electrical/Electronic Engineering, Mechatronic Engineering, Civil Engineering, etc.)

#### **Qualifier Programme B**

• H3 level 8 (NFQ level 8 qualification) Honours degree in Mechanical and/or Manufacturing Engineering

#### Note:

NFQ – National Framework of Qualifications (see www.nfq.ie).

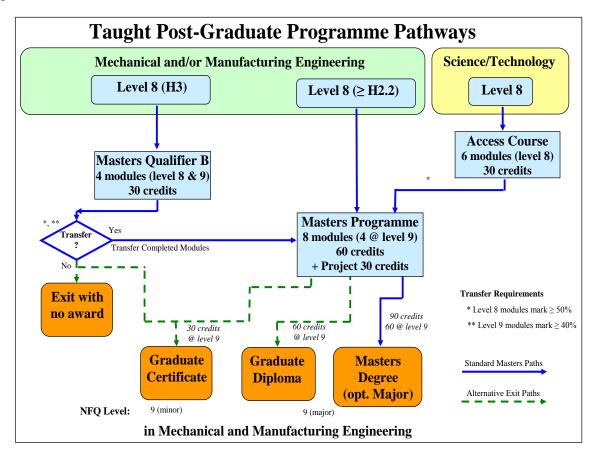
#### **International Applications:**

International candidates are expected to have educational qualifications of a standard equivalent to those outlined above. In addition, where such candidates are non-native speakers of the English language they must satisfy DCU's English language requirements. For further information on international applications see:

http://www.dcu.ie/international/index.shtml

#### **Programme Structure, Pathways**

The graph below shows the various entry and exit routes and possible pathways of the MEng programme.



#### **Alternative Exit Awards**

Regardless of the entry route, the normal exit qualification from the programme is an MEng in Mechanical and Manufacturing Engineering, with an optional Major. However, there exist two alternative exit awards:

#### Graduate Diploma in Mechanical and Manufacturing Engineering

The Graduate Diploma (GD) is an alternative exit from the MEng programme for students who are not eligible for the MEng award (not enough credits and/or not enough level 9 credits). If a student has accumulated 60 credits from level 9 modules (excluding the Project), he/she may be awarded a Graduate Diploma in Mechanical and Manufacturing Engineering. The necessary 60 credits can be accumulated by passing eight level 9 modules (8 x 7.5 credits)

<u>Note</u>: for the GD the number of credits from level 8 modules is irrelevant; only credits from level 9 modules are counted.

The GD is at level 9 (major award) according to the NFQ.

<u>Note</u>: students can not apply for GD directly through PAC, nor can they register for it. It is an alternative exit from the MEng programme.

#### Graduate Certificate in Mechanical and Manufacturing Engineering

The Graduate Certificate (GC) is an alternative exit from the MEng or Masters Qualifier B programmes for students who are not eligible for the MEng or GD awards (not enough credits and/or not enough level 9 credits). If a student has accumulated 30 credits from level 9 modules (excluding the Project), he/she may be awarded a Graduate Certificate in Mechanical and Manufacturing Engineering. The necessary 30 credits can be accumulated by passing four level 9 modules (4 x 7.5 credits)

<u>Note</u>: for the GC the number of credits from level 8 modules is irrelevant; only credits from level 9 modules are counted.

The GC is at level 9 (minor award) according to the NFQ.

<u>Note</u>: students can not apply for GC directly through PAC, nor can they register for it. It is an alternative exit from the MEng programme.

#### **Modes of Study, Programme Duration**

#### Full-time/Part-time mode

The programmes/courses can be studied in Full-time or Part-time mode (depending on the course). In full-time mode, the student registers for modules with a total of 30 credits per semester. In part-time mode, the student (usually) registers for modules with a total of 15 credits per semester.

Below is the duration and distribution of modules per semester/year:

#### MEng in Mechanical and Manufacturing Engineering (DC814/DC816)

The MEng programme is available in full-time or part-time mode.

MEng			Year 1				
TVILLING		Semester 1	Semester 2	Summer	Semester 1	Semester 2	Summer
	Taught	30 credits	30 credits				
Full-time	modules	(4 modules	(4 modules				
		at level 9)	at level 9)				
	Project	30 cred	its, level 9 (yea	ar-long)			
	Taught	15 credits	15 credits		15 credits	15 credits	
	modules	(2 modules	(2 modules		(2 modules	(2 modules	
Part-time		at level 9)	at level 9)		at level 9)	at level 9)	
	Project				30 credits, level 9 (year-long)		

#### Access Course to the MEng in Mechanical and Manufacturing Engineering (DC812)

Access Course		Year 1				
1100000 00		Semester 1 Semester 2 Summer				
Part-time	Taught	15 credits	15 credits			
	modules	(3 modules	(3 modules			
		at level 8)	at level 8)			

Note: Module credits from the Access Course are not carried over to the MEng programme.

### Qualifier Programme B for the MEng in Mechanical and Manufacturing Engineering (DC838)

Masters Qualifi	er B		Year 1		Year 2		
		Semester 1	Semester 2	Summer	Semester 1	Semester 2	Summer
Masters	Taught	15 credits	15 credits				
Qualifier B	modules	(2 modules	(2 modules				
		at level 8/9)	at level 8/9)				
	Taught				15 credits	15 credits	
MEng	modules				(2 modules	(2 modules	
					at level 8/9)	at level 8/9)	
	Project				30 credits, level 9 (year-long)		

Note: Module credits from the qualifier programme are carried over to the MEng programme.

<u>Note:</u> the maximum number of academic sessions during which the student is registered for a programme (including repeated and deferred years) is <u>four</u>. This means that the programme/course has to be completed within four academic sessions.

#### On-campus/Off-campus mode

In order to provide greater flexibility for students, each of the programmes/courses can be studied in either on-campus or off-campus mode.

#### On-campus mode:

On-campus mode is the preferred mode of study for full-time students. It means that the student attends all classes (lectures, tutorials, labs).

#### Off-campus mode:

Off-campus mode is usually preferred by part-time students who have a part-time job, or due to other restrictions (remote location, etc.) are unable to attend classes regularly. In off-campus mode students would mainly study independently (from module notes and textbooks provided by the module lecturer) without attending lectures. However, they would be required to attend some labs (depending on the module).

<u>Note</u>: off-campus students sit their exams at Dublin City University together with the on-campus students.

#### **Programme Start Dates**

The MEng programme and all its linked courses start at the beginning of the academic year in Semester 1 (usually at the end of September). Only one entry/start in each academic year is offered.

**Applications / Deadlines** 

**Applications** 

All applications (for both EU and non-EU students) should be made online through the Postgraduate Application Centre (PAC) (www.pac.ie). On the PAC web site, find the entries of

Dublin City University (DCU), and then the programme you are interested in.

**Deadlines** 

The usual deadline for applying for the MEng programme and associated courses in each academic

year is:

EU students: 31 August

Non-EU students: 15 July

Actual deadlines can be found on the Postgraduate Application Centre (PAC) web pages

(www.pac.ie).

Applicants who require a study visa for the purposes of gaining entry into Ireland are advised to

apply as early as possible.

**Fees** 

Up-to-date information on fees for EU and non-EU students is available on the university's Finance

Office web pages:

https://www.dcu.ie/finance

7

#### **Detailed Programme Information**

#### MEng in Mechanical and Manufacturing Engineering (DC814/DC816)

#### **General Information**

The *MEng* programme is a one-year (full-time) level 9 Master programme. It is also offered in part-time mode (typically over two years).

For the MEng award, modules with a total of 90 credits should be accumulated, out of which at least 60 credits should be from level 9 modules, and the remaining 30 credits can be from level 8 modules. The project is worth 30 credits (at level 9), so for the MEng qualification eight 7.5 credit modules have to be selected.

Level 9 modules (with module code MM5\*\*) are specifically developed for the masters programme. It is recommended that MEng students only select level 9 modules. However, in some cases (for example when a level 9 module has a pre-requisite module and a student had not studied that module or an equivalent one, which can happen with external applicants), the pre-requisite level 8 module can be selected instead of a level 9 module. Level 8 modules (with module code MM4\*\*) are from year 4 of existing undergraduate programmes offered by the School.

#### **Modules**

#### **Semester 1:**

<b>Module Code</b>	CORE module (MUST take it)	Level	Credit
MM533	Research Practice and Methodology	9	7.5

<b>Module Code</b>	Optional modules (select THREE modules)	Level	Credit
MM421*	Finite Element Analysis	8	7.5
	(pre-requisite for MM524)		
MM432*	Heat Transfer and Fluid Mechanics	8	7.5
	(pre-requisite for MM532)		
MM523	Product Design, Development and Value Analysis	9	7.5
MM530	Surface Engineering and Tribology	9	7.5
MM584	Manufacturing Systems Simulation	9	7.5
EE535	Energy System Decarbonisation: Technology & Policy	9	7.5
MM535	Energy Auditing and Energy Management	9	7.5

<sup>\*</sup> Select MM421 and MM432 if you had not studied them or similar modules, as they are prerequisites for modules in semester 2.

#### **Semester 2:**

<b>Module Code</b>	Optional modules (select FOUR modules)	Level	Credit
MM524	Advanced FEA	9	7.5
	(pre-requisite: MM421 Finite Element Analysis or		
	similar)		
MM532	Computational Thermo-Fluid Dynamics	9	7.5
	(pre-requisite: MM432 Heat Transfer and Fluid		
	Mechanics or similar)		
MM555	Manufacturing Process Analysis & Tool Design	9	7.5
EE507	Entrepreneurship for Engineers	9	7.5
MM536	Advanced Sustainable Energy Systems	9	7.5
MM537	Whole Life Cycle Analysis	9	7.5
MM517	Appl. Biomaterials, Tissue Eng. and Artificial Organ	9	7.5
	Tech.		
MM515	Advanced Biomechanics	9	7.5

#### Year-long module:

<b>Module Code</b>	CORE module (MUST take one of these); Code depends		Credit
	on major!		
MM542	Project in Mechanical and Manufacturing Engineering	9	30
MM543	Project in Simulation Driven Design	9	30
MM544	Project in Sustainable Systems and Energy	9	30
MM546	Project in Biomedical Engineering	9	30
MM547	Project in Advanced Manufacturing	9	30

#### **Majors**

The MEng in Mechanical and Manufacturing Engineering programme offers four majors:

- Major in Simulation-driven Design
- Major in Advanced Manufacturing
- Major in Biomedical Engineering
- Major in Sustainable Systems and Energy

In order to get a Major, the student must select an appropriate set of modules, otherwise no Major is awarded.

<u>Note</u>: the PAC code does not depend on the Major the student may select. The student selects a Major (optional) when they register for the appropriate project and modules.

<u>Note</u>: the title of the degree is MEng in Mechanical and Manufacturing Engineering regardless of the Major.

#### No Major

#### Select these modules:

Code	Module title	Sem.	Level	Credit
MM533	Research Practice and Methodology	1	9	7.5
MM542	Project in Mechanical and Manufacturing Engineering	YL	9	30

Select the remaining 7 modules (7.5 credits each) from the full list of modules.

#### **Major in Simulation-driven Design**

Simulation-driven design implements advanced computer aided engineering software and techniques form the very beginning of the product development cycle. The simulation technology can drastically lower the time that product development takes. Instead of simply analysing and testing existing products and systems, simulation can pre-validate designs at an early stage. This is a required trend in Industry 4.0-enabled manufacturing and design.

#### Select these modules:

Code	Module title	Sem.	Level	Credit
MM533	Research Practice and Methodology	1	9	7.5
MM584	Manufacturing Systems Simulation	1	9	7.5
MM555	Manufacturing Process Analysis & Tool Design	2	9	7.5
MM524	Advanced FEA	2	9	7.5
MM532	Computational Thermo-Fluid Dynamics	2	9	7.5
MM543	Project in Simulation-driven Design	YL	9	30

Select the remaining 3 modules (7.5 credits each) from the full list of modules.

#### **Major in Advanced Manufacturing**

Advanced manufacturing deals with the developments in the manufacturing field during the last decades. It includes high tech, innovative processes, clean and green processes, and flexible manufacturing. Advanced manufacturing makes extensive use of specialised computer software and information technologies. Advanced manufacturing industries integrate new innovative technologies in both products and processes. This major prepares students to design, operate, and manage advanced manufacturing processes and systems.

#### Select these modules:

Code	Module title	Sem.	Level	Credit
MM533	Research Practice and Methodology	1	9	7.5
MM523	Product Design, Development and Value Analysis	1	9	7.5
MM530	Surface Engineering and Tribology	1	9	7.5
MM584	Manufacturing Systems Simulation	1	9	7.5
MM555	Manufacturing Process Analysis & Tool Design	2	9	7.5
MM547	Project in Advanced Manufacturing	YL	9	30

Select the remaining 3 modules (7.5 credits each) from the full list of modules.

#### Major in Sustainable Systems and Energy

Sustainable systems and energy engineering prepares graduates with the knowledge and competence to meet the changing world of sustainability and the growing global challenge of transitioning to zero carbon, environmentally sound, reliable, affordable and sustainable energy systems.

There is a growing international market for Engineers in sustainable energy and development, ecoinnovation, resource efficiency and clean—tech sectors. There are lots of career opportunities in the growing fields of Energy/Renewable Energy (wind, wave, solar, biomass etc.); a national priority area for Ireland.

#### Select these modules:

Code	Module title	Sem.	Level	Credit
MM533	Research Practice and Methodology	1	9	7.5
EE535	Energy System Decarbonisation: Technology and Policy	1	9	7.5
MM535	Energy Auditing and Energy Management	1	9	7.5
MM536	Advanced Sustainable Energy Systems	2	9	7.5
MM537	Whole Life Cycle Analysis	2	9	7.5
MM544	Project in Sustainable Systems and Energy	YL	9	30

Select the remaining 3 modules (7.5 credits each) from the full list of modules.

#### **Major in Biomedical Engineering**

This discipline integrates the necessary aspects of biology and medicine with the technical engineering aspects required to engineer medical devices. The world of medicine is evolving and expanding rapidly, with new treatments and new diseases appearing all the time. As Ireland is a major player in bioengineering, this Major provides graduates with specialisms required by industry.

#### Select these modules:

Code	Module title	Sem.	Level	Credit
MM533	Research Practice and Methodology	1	9	7.5
MM514	Appl. Biomaterials, Tissue Eng. and Artificial Organ Tech.	2	9	7.5
MM515	Advanced Biomechanics	2	9	7.5
MM524	Advanced FEA	2	9	7.5
MM532	Computational Thermo-Fluid Dynamics	2	9	7.5
MM546	Project in Biomedical Engineering	YL	9	30

Select the remaining 3 modules (7.5 credits each) from the full list of modules.

#### **Masters Project**

Each student on the MEng programme must complete a Masters Project (worth 30 credits at level 9). The project is a year-long module and spans over the summer as well.

Depending on the (optional) type of Major the student wants to achieve, a project in that area has to be developed.

The project always starts in September and finishes in August the following year (within the same academic year).

The student needs to make sure that they are registered for the correct project module. Once registered, they need to contact the project coordinator and select a suitable project in the correct area.

#### Access Course to the MEng in Mechanical and Manufacturing Engineering (DC812)

#### **General Information**

The Access Course provides an alternative entry route to the MEng programme for students who do not have a primary degree in Mechanical and/or Manufacturing Engineering but have a Science/Technology based degree or a degree in other areas of engineering (Electronic Engineering, Civil Engineering, etc.). It aims at equalising the student's knowledge to level 8 Mechanical/Manufacturing Engineering by providing core Level 8 modules from existing undergraduate programmes. The Access Course itself does not carry an award.

The Access Course is a part-time, one year programme. It includes six five credit level 8 core (compulsory) modules with a total credit of 30. The student must pass each module with a minimum mark of 50%. The credits from the Access Course are not carried over to the MEng programme. After successful completion of the Access Course the student is eligible to register for the MEng in Mechanical and Manufacturing Engineering programme. They can register for MEng in September of the next academic year.

#### **Modules**

<b>Module Code</b>	Module Title (MUST take ALL modules)	Level	Credit	Semester
EM201	Engineering Mathematics III	8	5	1
MM252	Manufacturing Processes 1	8	5	1
MM306	Mechanics of Machines 2	8	5	1
EM202	Engineering Mathematics IV		5	2
MM212	Strength of Materials II	8	5	2
MM227	Thermofluid Mechanics	8	5	2

## Qualifier Programme B for the MEng in Mechanical and Manufacturing Engineering (DC838)

#### **General Information**

The Master Qualifier Programme B is an alternative entry route to the MEng programme for students who do not meet the normal MEng entry requirements but have a level 8 H3 degree in Mechanical and/or Manufacturing Engineering and several years of relevant work experience. Its aim is to give students the knowledge, experience and skills required to study level 8 and 9 modules at sufficient level and to enter the Masters programme in Mechanical & Manufacturing Engineering. It is also useful for students who had not studied some of the pre-requisite modules of the modules in the MEng programme. It is a one-year part-time course. Successful completion of the Qualifier B programme allows the student to progress to the MEng programme. The Qualifier programme itself does not carry an award, but the credits from it are transferred to the MEng programme.

The Qualifier Programme B is a part-time, one year programme. It includes four 7.5 credit modules at level 8 or 9 with a total credit of 30. The student must pass each level 8 module with a minimum mark of 50%, and each level 9 module with a minimum mark of 40%. After successful completion of the Qualifier Programme the student is eligible to register for the MEng in Mechanical and Manufacturing Engineering programme. They can register for MEng in September of the next academic year.

The module listing is the same as for the MEng programme, but only four modules are selected (two per semester). Students selecting level 8 modules need to be aware that after transferring to MEng at least 60 credits have to be accumulated from level 9 modules (including the project).

#### **Modules**

#### **Semester 1:**

<b>Module Code</b>	Optional modules (Select TWO modules)	Level	Credit
MM533	Research Practice and Methodology	9	7.5
MM421*	Finite Element Analysis	8	7.5
	(pre-requisite for MM524)		
MM432*	Heat Transfer and Fluid Mechanics	8	7.5
	(pre-requisite for MM532)		
MM523	Product Design, Development and Value Analysis	9	7.5
MM530	Surface Engineering and Tribology	9	7.5
MM584	Manufacturing Systems Simulation		7.5
EE535	Energy System Decarbonisation: Technology & Policy	9	7.5
MM535	Energy Auditing and Energy Management		7.5

<sup>\*</sup> Select MM421 and MM432 if you had not studied them or similar modules, as they are prerequisites for modules in semester 2.

#### **Semester 2:**

<b>Module Code</b>	Optional modules (select TWO modules)	Level	Credit
MM524	Advanced FEA	9	7.5
	(pre-requisite: MM421 Finite Element Analysis or		
	similar)		
MM532	Computational Thermo-Fluid Dynamics	9	7.5
	(pre-requisite: MM432 Heat Transfer and Fluid		
	Mechanics or similar)		
MM555	Manufacturing Process Analysis & Tool Design	9	7.5
EE507	Entrepreneurship for Engineers 9		7.5
MM536	Advanced Sustainable Energy Systems		7.5
MM537	Whole Life Cycle Analysis	9	7.5
MM517	Appl. Biomaterials, Tissue Eng. and Artificial Organ	9	7.5
	Tech.		
MM515	Advanced Biomechanics	9	7.5

Note: when selecting modules take into account what Major you may want to select in the MEng programme.

#### **Detailed Module Information**

The module descriptors with detailed information for each module (indicative content, assessment, etc.) can be found at:

http://www.dcu.ie/registry/module\_school.shtml

From the menu select (with the slider bar) School Mechanical Engineering; this brings up all modules taught by the school.

#### **Programme Codes**

DCU	PAC Code	Programme/Course	
Code			
MMME	DC814 (FT)	MEng in Mechanical and Manufacturing Engineering	
	DC816 (PT)		
MMAC	DC812 (PT)	Access Course to MEng	
MMQA	DC832 (PT)	Qualifier A for MEng (for Level 7 graduates in Mech./Manuf. Eng)	
MMQB	DC838 (PT)	Qualifier B for MEng (for Level 8 H3 graduates in Mech./Manuf. Eng)	
IFPCME	DC827 (YL)	International Foundation Programme (Year-long, and Single-semester)	
IFPSCM	DC671 (SS)		

#### **Contact Information**

#### Chairperson of the MEng in Mechanical and Manufacturing Engineering Programme:

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