

MSc Medical Device Design AD460

PROGRAMME SPECIFICATIONS

Programme title	MSc Medical Device Design	School	School of Design
Resulting awards	Master of Science in Medical Device Design Graduate Diploma in Medical Device Design	Head of School	Alex Milton
Level	Level 9 on the National Framework of Qualifications	ECTS credits¹	90
University award	Masters Degree (taught) Graduate Diploma	Programme type	Postgraduate degree delivered full time over 1 year
Programme Coordinators	Enda O'Dowd Derek Vallence	External Examiner	Prof Richard Bibb, Nottingham School of Art & Design
Programme team	Enda O'Dowd, Derek Vallence, John Butler, Anne McLellan		

1. Programme Aims and Objectives: Purpose, Vision and Values

The aim of this programme is to advance graduates in the discipline of medical design in relation to the development of human-centred devices, products, services and experiences. The medical industry is a rapidly changing one in which the clinical world is rapidly converging with fields such as engineering, biology, chemistry and computing to produce new products and patient experiences. Technological convergence is also taking medical devices out of their usual clinical settings and releasing them into the patient's hands particularly in the area of diagnosis. In this rapidly changing environment these industries need designers who can be the voice of the user understanding the role of people in complex networks.

The programme prepares students for working in industry, independent design consultancy and academic research. In addition to this, graduates from the programme will also be equipped with skills to establish their own design consultancies. The MSc will support graduates to progress to further postgraduate study in order to refine their creative abilities and theoretical understanding, ultimately supporting them in developing a career in academia.

The aims of the programme are:

- To produce graduates who are capable of generating new design ideas while also having the ability to analyse those ideas to the rigorous level necessary in the medical device industry.
- To meet local and international industry demands for human-focused innovators for the medical industry.

¹ European Credit Transfer and Accumulation System, where 60 ECTS credits equate to the workload of a full-time academic year

- To develop industry-ready graduates.
- To support the research agenda of the College by supporting students to progress to PhD level.
- To support the commercialisation and innovation agenda of the College by developing and supporting entrepreneurial graduates.

The objectives of the programme are:

- To allow students to demonstrate the ability to learn and perform at masters level.
- To develop students' knowledge and understanding of the principles and practice of the design process as applied to the design of medical devices.
- To develop the students' understanding of the user and to equip them with the practical skills for identifying user needs, behaviours and values.
- To develop the students' skills in primary and secondary research and the translation of findings into their practical work.
- To provide students with methodologies and techniques that can be applied to the design, development, prototyping and evaluation of interactive products, interfaces, systems and services.
- To provide students with industry connections through sponsored projects and visiting faculty in order to create opportunities for commercialisation and further research.
- To collaborate with industrial, academic and clinical partners in the design of new products and user experiences.

The purpose of the programme is to provide the medical device industry with advocates for the user in the complex process of medical device design. The values of this programme are to promote empathy and advocacy for all patients and users in the complex ecosystem of care. Human-centred innovation requires openness to ideas in a multidisciplinary studio environment while basing all final outcomes on the values of scientific analysis.

The future of medical device design and development will see more complex ecosystems of care evolving. This will involve multidisciplinary teams, a move to the biopsychosocial model of care and more care in non-clinical settings. This complexity will be added to with the move toward digital enhancements and a circular economy for devices. It is envisioned that this programme will continue to provide expertise in the design of these complex ecosystems.

2. Programme Outcomes

MSc in Medical Device Design

On successful completion of the MSc Medical Device Design students will be able to:

- Negotiate the complex process of designing new products, services and experiences in the medical field in a self-directed manner and as part of a team.
- Conduct, analyse and synthesise both primary and secondary research and incorporate findings in their practical work, producing designs and prototypes based on user and needs assessments.
- Create comprehensive user centred solutions for complicated, multi-faceted problems of design in the medical field.

- Design user-centred medical devices through involvement of the user in the design process; from ethnographic user studies to evaluation of prototypes and final product evaluation.
- Appraise new application areas and advanced technologies in order to analyse and evaluate the potential of new and emerging technologies and techniques in the design of medical products.
- Analyse and evaluate the complexity of medical design and how history, culture, legislation and the various medical fields influence it.

Graduates of the MSc Medical Device Design will:

- Work in a self-directed manner and within a team in a problem-oriented, project-oriented and interdisciplinary way.
- Conduct, analyse and synthesise both primary and secondary research and incorporate findings in their practical work to produce prototypes and designs based on user needs assessments.
- Independently learn and apply knowledge and skills responding to ever-changing trends and needs in the medical field.
- Be capable of advocating for the users of medical devices in a scientific and coherent manner ensuring that the human factors qualities of a device are a priority.

Graduate Diploma in Medical Device Design

On successful completion of the programme, students will be able to:

- Negotiate the complex process of designing new products, services and experiences in the medical field in a self-directed manner and as part of a team.
- Analyse and synthesise both primary and secondary research and incorporate findings in their practical work for the production of prototypes based on user and needs assessments.
- Create user centred concepts for multi-faceted problems of design in the medical field.
- Create user-centred design proposals through involvement of the user in the design process; from contextual inquiry and evaluation of prototypes.
- Appraise new application areas and advanced technologies in order to examine the potential of new and emerging technologies and techniques in the design of medical products.
- Examine the complexity of medical design and how history, culture, legislation and the various medical fields influence it.

Graduates of the Graduate Diploma will:

- Work in a self-directed manner and within a team in a problem-oriented, project-oriented and interdisciplinary way.
- Conduct, analyse and synthesise both primary and secondary research and incorporate findings in their practical work to produce prototypes based on user needs assessments.
- Independently learn and apply knowledge and skills responding to ever-changing trends and needs in the medical field.
- Be capable of advocating for the users of medical devices.

3. Admission Requirements

To gain admission to the MSc in Medical Device Design, applicants must have the following:

- Honours degree award of 2.2 or higher, or an equivalent academic or professional qualification in art, design or a related discipline. Appropriate equivalent formal or informal learning will be recognised. Students should apply to the College with evidence of previous successful qualifications, statements of work-related achievement etc. Contact the College Student Services and Admissions for further information
- A portfolio of work (this may not necessarily be design work but must demonstrate experience in a relevant field).
- Candidates will be required to attend for an interview.
- Two references/letters of recommendation (academic or professional).
- Students who have not been educated through English must show proof of achieving IELTS 6.5 (with a minimum of 6 in the writing section on the Academic Version) or an equivalent score in another accepted test.

Applicants who do not meet the required admission requirements, but have other equivalent and relevant certified learning or have equivalent and relevant experience may apply for entry under the College's Recognition of Prior Learning policy, available on the College website. Contact the School for further information.

4. Further Educational Opportunities

There are opportunities to enrol on further postgraduate programmes including PhD programmes on completion of this programme of study.

Careers and skills

At the end of this programme of study graduates will be eligible for various careers in the medical device and broader design industry. In particular, graduates will have skills in human-centred design and be able to apply those skills in highly analytical and regulated environments. Graduates have the creative and communication skills needed to work in any future-facing environment where human-centred innovation is important. Graduates are also well placed to be the human-centred innovation advocate on engineering design teams.

Graduates will have highly developed skills in human-centred design and creativity while being capable of applying those skills in iterative cycles of rigorous analysis and creative synthesis. They will be capable of applying those skills in multidisciplinary teams where communication and interpersonal skills are important.

5. Teaching and Learning

The teaching and learning strategies used in the MSc Medical Device Design are those of experiential learning through studio education in line with the broader ethos of NCAD. Studio-based education allows students from a variety of backgrounds to work together in multidisciplinary teams. This allows for an open creative environment. Iterative cycles of analysis and synthesis are used in all project work and is a

fundamental tenet of the studio. All studio-based project work is underpinned with analytical modules which allow the rigorous analysis needed in the highly-regulated medical device industry. All studio-based work is outward facing and critiqued by medical device industry professionals.

6. Methods of Assessment

A wide variety of assessment methods are used on the various modules and components in the programme. Collaborative project work is assessed by visual and verbal presentation of work at research concept and final design stages. Informal verbal feedback is provided during and after the presentation. Formal written feedback and grading are given at the end of these modules. Analytical modules assessment takes the form of essays, reports and assignments, usually submitted at the end of the module.

7. Programme Review and Evaluation

It is important to NCAD that students inform the development of teaching and learning at NCAD. We encourage all students to communicate their concerns and their observations about their study to members of staff so that any changes can be made in a timely manner. Both formal and informal feedback is appreciated and we value the openness and candour necessary for a studio based learning environment. Industry and clinical facing collaborative project work continually informs what we do and helps us to keep programmes up to date. Our external examiner also evaluates our modules and programme and is important in assuring their quality and relevance to industry.

About two-thirds of the way through the year, a student forum will be convened to gather students' comments about their study and the delivery of the programme. In addition, at the end of Trimester 2, students have the opportunity to complete an online evaluation of their study and experience at NCAD. These evaluation events are important to current and future students, to ensure we can enhance the delivery of programmes at NCAD.

NCAD students also participate in the Irish Survey of Student Engagement, which takes place in the middle of Trimester 2. This international project measures students' engagement with their studies.

In addition, you are invited to discuss your experience on the module with your lecturers at any point during the year. You can also relay your comments to the class student representative who will communicate your comments to the staff.

A major review of this programme will be carried out in the 2024/25 academic year.

8. Modular Provision

Module	Credits	Core or Option	Trimester
Trimester 1			
PGVC1001 An Introduction to Research Methods	5	Core	Autumn
MDD-03 Basic Medical Science (TCD)	5	Core	Autumn
PGDES1005 Human Factors 1	5	Core	Autumn
PGDES1004 Fundamentals of Medical Device Design	5	Core	Autumn
PGDES1012 Design Studio Collaborative Project 1	10	Core	Autumn
Trimester 2			
PGDES1006 Human Factors 2	5	Core	Spring
PGDES1013 Bioinstrumentation	5	Core	Spring
MDD-07 Design Studio Collaborative Project 2	10	Core	Spring
MDD-08 Design Studio Collaborative Project 3	10	Core	Spring
Trimester 3			
MDD-10 Design Studio - Major Thesis Project	30	Core	Summer

9. Programme Structure

The programme is delivered over the course of one calendar year. Studio project work is carried out continuously over the year. The studio modules are supported by analytical modules which support and enable this project work.

Autumn Trimester	
PGDES1005 Human Factors 1 5 Credits	PGDES1004 Fundamentals of Medical Device Design 5 credits
PGVC1001 An Introduction to Research Methods 5 credits	MDD-03 Basic Medical Science (TCD) 5 credits
PGDES1012 Design Studio Collaborative Project 1 10 Credits	
Spring Trimester	
PGDES 1013 Bioinstrumentation 5 credits	PGDES1006 Human Factors 2 5 credits
MDD-07 Design Studio Collaborative Project 2 10 credits	
MDD-08 Design Studio Collaborative Project 3 10 credits	
Summer Trimester	
MDD-10 Design Studio Major Thesis Project 30 credits	

Human Factors 1 is a foundational studio project in which the students learn the skills of contextual inquiry and documentation of task analysis. Over the course of this project the students learn the skills in human-centred research, model making and visual presentation which are needed for subsequent collaborative project work. Analytical modules progressively build knowledge in areas such as medical science, bioinstrumentation and biomechanics throughout Trimester 1 and 2.

Trimester 3 consists of a thesis project in which the student independently designs and develops a medical device. The topic is chosen in consultation with the tutors but will invariably be designed for a clinical or industry client.

NCAD programmes will be face-to-face where possible. The medical device design studio learning environment is one where students from different backgrounds work together on a project brief. Peer-to-peer learning is a vital part of this experience and is positively encouraged. Students from creative and analytical backgrounds come together and learn from one another in a natural experiential learning environment.

10. Exit Points and Credit Requirements

On completion of Trimester 1 and 2 it is possible for students to exit with a Graduate Diploma in Medical Device Design, provided they have successfully completed 60 credits from the modules in Trimesters 1 and 2. If the applicant (for Graduate Diploma) has already commenced study of the Final Thesis Project and wishes to exit with the Graduate Diploma award, they will be considered only under extenuating circumstances, such as leaving the programme due to unforeseen events beyond their control. The Head of School must recommend each candidate to the Exam Board.

Final Award Calculation

Final award grades for this programme are an accumulation of the grades from trimester 1 and 2 in the case of the Graduate Diploma and all 3 trimesters in the MSc.

11. Resources

Staffing

Role	Name	Description
Teaching Staff	Enda O'Dowd	Joint Course Coordinator
	Derek Vallence	Joint Course Coordinator
Administrative staff	David Bramley	Product Design Department Secretary
Technical Support Staff	Paddy O'Kearney	Workshop Technician

Space

The programme is mainly delivered in the Medical Device Design Studio, Room 208 in the School of Design. Seminar rooms will occasionally be used for class teaching while some activities will be delivered off campus with our collaborative partners.

Facilities

Workshops used for this programme will be the Product Design Workshop located on the lower ground floor of the school of design.

**For further information on this programme,
contact Enda O'Dowd odowde@staff.ncad.ie or Derek Vallence vallenced@staff.ncad.ie**