

Programme Specification

KEY FACTS

Programme name	Innovation and Entrepreneurship in Healthcare Technology
Award	MSc
School	Mathematics, Computer Science and Engineering
Department or equivalent	Electrical and Electronic Engineering
Programme code	ENPIEH
Type of study	Full Time
Total UK credits	180
Total ECTS	90

PROGRAMME SUMMARY

The MSc in Innovation and Entrepreneurship in Healthcare Technology is designed to provide skills, knowledge and understanding of the current technologies used in the growing industry of products and solutions related to healthcare in a broad sense. This includes also fitness, wellbeing, and sports. There are many sensing technologies that are used to monitor body signals, some of these are considered as “wearables”. The programme is suited for new graduates and professionals who want to advance their understanding of the field or are interested in developing a Healthcare-related product.

The programme is unique in its central focus on design, with emphasis both on hardware aspects such as Electrophysiology, Sensor, Embedded Systems, as well as software oriented areas like software development, machine learning and signal analysis. In addition, the MSc offers skills necessary to develop further into commercialisation of a product with modules on Entrepreneurship, medical ethics, health economics and regulatory aspects.

This MSc will provide foundation steps for those interested in creating a company around a working prototype as the modules provide a balance between design and development of a technical solution together with Entrepreneurship covering new venture creation, product development and marketing.

The programme is offered full and part time. The full-time programme follows a normal 12-month pattern with two terms of taught modules followed by a 4-month individual design project/dissertation. The modules consist of 8 core modules.

Aims

This programme aims to prepare you with the knowledge, skills and values needed for a career in the Healthcare Technology Industry by:

- knowledge and skills for designing and creating products and solutions for the Healthcare and associated markets.

- providing you the skills to develop an idea into a commercial product.
- Providing you with postgraduate level understanding of entrepreneurship and business models.

There are three types of awards that you can get.

Postgraduate Certificate in Innovation and Entrepreneurship in Healthcare Technology

For all of you completing the Postgraduate Certificate you will have had the opportunity to examine the theories related to the analysis, design, and evaluation of Healthcare Technologies, and demonstrated sufficient ability in at least four taught modules (60 credits), which can be any combination of modules among the available ones.

Postgraduate Diploma in Innovation and Entrepreneurship in Healthcare Technology

For all of you completing the Postgraduate Diploma, in addition to the above you will have acquired a theoretical knowledge on various aspects of Innovation and Entrepreneurship in Healthcare Technology with an emphasis on technologies, entrepreneurship, business models, data analysis, and devices. You will also have demonstrated practical skills through laboratory-based work during coursework of each module, which equates to passing all eight taught modules, worth 120 credits.

MSc in Innovation and Entrepreneurship in Healthcare Technology

For all of you completing the MSc in Innovation and Entrepreneurship in Healthcare Technology, in addition to the above you will have demonstrated original application of knowledge in the area, through either the analysis, design and evaluation of a Healthcare Technology artefact or the design and implementation of a Healthcare Technology solution, which could be software-based. In either case, you should keep in mind how it fulfils a business or market need, or the critical evaluation and extension of the knowledge in the area through a research-led project, which can involve the development of software artefacts as well. This will be achieved through your individual project, a substantial module worth 60 credits that you can commence once you have successfully passed all your taught modules.

WHAT WILL I BE EXPECTED TO ACHIEVE?

On successful completion of this programme, you will be expected to be able to:

Knowledge and understanding:

- Synthesise and apply knowledge of the general areas of Healthcare, Electrophysiology, and Sensing.
- Propose and formulate advanced techniques and methods applicable to a given Healthcare problem.
- Apply and critically evaluate advanced software techniques, which deal with analysis and design tasks in the general area of App Development as related to Healthcare.

Skills:

- Be able to design software solutions like apps or code that exploit fundamental healthcare technologies.
- Apply analytic and design knowledge through creative and innovative ways.
- Develop and assess concepts and hypothesis in the laboratory.
- Analyse and design innovative techniques, in appropriate module areas, to develop concepts and evaluate them through suitable hardware and/or software platforms.
- Communicate competently the results of analysis and design in extended scientific reports and oral presentations.
- Develop and apply Research Skills and Techniques to develop further knowledge in the field.
- Examine the specific design considerations, which apply to healthcare technology.
- Solve complex engineering problems using advanced scientific software packages
- Apply software or problem solving techniques, analysis and design.
- Create strategies to design and develop new products to meet a market need.
- Critically read and interpret/appraise medical and engineering academic literature.
- Use a range of software packages for app development, data acquisition, signal processing and representation/communication of information.

Values and attitudes:

- Discuss the importance of biomedical technology in the diagnosis and acquisition of human conditions.
- Recognise and take responsibility for their role in the provision of safe and reliable products and solutions.
- Examine the importance of working with others in promoting an effective and innovative learning environment.
- Respect and listen other views.
- Develop and apply techniques to support the appropriate and ethical use of the health-related data sets.

This programme has been developed in accordance with the QAA Subject Benchmark for generic masters' level programmes.

HOW WILL I LEARN?

The teaching and learning strategy is based on lectures, tutorials, laboratory coursework, and seminars. Lectures will provide a solid theoretical understanding of relevant technical and business fields. Seminars will focus on specialised topics related to the subjects of interest of the MSc; Healthcare, Software, Devices, Entrepreneurship, etc. Tutorials and labs will give you opportunities for practical training and experience in: * coding for App development, * Acquisition and analysis of biomedical signals, * Fabrication and Prototyping of devices. Online resources will be available in terms of support material for lectures and other

resources like pointers to relevant literature, technical specification manuals and software code.

Various technical and business seminars will be held throughout the programme, approximately monthly. These seminars will reinforce knowledge in support of the group and individual design projects.

The research project/dissertation aims to provide you with the opportunity to deal with problems in areas where new subject knowledge is required. This involves literature search, assessment of the relevance of previous work, the development of the research task, self-directed research, and the presentation of research results. Online learning will be provided with support documentation, experiments and exercises. Considerable time should be dedicated to develop software and hardware solutions that will lead to prototypes.

WHAT TYPES OF ASSESSMENT AND FEEDBACK CAN I EXPECT?

Assessment and Assessment Criteria

Assessment of the programme modules comprises written examinations and laboratory coursework. Each individual module coursework will require some design activities and will be combined with the written module examination to provide an overall module mark.

The Individual Project is assessed primarily through a dissertation but with contributions from an interim report, work carried out during the project period and oral examination.

Assessment Criteria are descriptions, based on the intended learning outcomes, of the skills, knowledge or attitudes that you need to demonstrate in order to complete an assessment successfully, providing a mechanism by which the quality of an assessment can be measured. Grade-Related Criteria are descriptions of the level of skills, knowledge or attributes that you need to demonstrate in order to achieve a certain grade or mark in an assessment, providing a mechanism by which the quality of an assessment can be measured and placed within the overall set of marks. Assessment Criteria and Grade-Related Criteria will be made available to you to support you in completing assessments. These may be provided in programme handbooks, module specifications, on the virtual learning environment or attached to a specific assessment task.

Feedback on assessment

Feedback will be provided in line with our Assessment and Feedback Policy. In particular, you will normally be provided with feedback within three weeks of the submission deadline or assessment date. This would normally include a provisional grade or mark. For end of module examinations or an equivalent significant task (e.g. an end of module project), feedback will

normally be provided within four weeks. The timescale for feedback on final year projects or dissertations may be longer.

The full policy can be found at:

https://www.city.ac.uk/_data/assets/pdf_file/0008/68921/assessment_and_feedback_policy.pdf

Assessment Regulations

In order to pass your Programme, you should complete successfully or be exempted from the relevant modules and assessments and will therefore acquire the required number of credits.

The pass mark for each module is 50% for both Coursework and Examination combined.

If you fail an assessment component or a module, the following will apply:

1. Compensation: where you fail up to a total of 20 credits at first or resit attempt (15 for a Postgraduate Certificate), you may be allowed compensation if:
 - Compensation is permitted for the module involved (see the module specification), and
 - It can be demonstrated that you have satisfied all the Learning Outcomes of the modules in the Programme, and
 - A minimum overall mark of no more than 10% below the module pass mark has been achieved in the module to be compensated, and
 - An aggregate mark of 50% has been achieved overall.

Where you are eligible for compensation at the first attempt, this will be applied in the first instance rather than offering a resit opportunity.

If you receive a compensated pass in a module you will be awarded the credit for that module. The original component marks will be retained in the record of marks and your original module mark shall be used for the purpose of your Award calculation.

2. Resit: Where you are not eligible for compensation at the first attempt, you will be offered one resit attempt.

If you are successful in the resit, you will be awarded the credit for that module. The mark for each assessment component that is subject to a resit will be capped at the pass for the module. This capped mark will be used in the calculation of the final module mark together with the original marks for the components that you passed at first attempt.

If you do not meet the pass requirements for a module and do not complete your resit by the date specified you will not progress and the Assessment Board will require that you be withdrawn from the Programme.

If you fail to meet the requirements for the Programme, the Assessment Board will consider whether you are eligible for an Exit Award as per table below. If you would like to know more about the way in which assessment works at City, please see the full version of the Assessment Regulations at: http://www.city.ac.uk/_data/assets/word_doc/0003/69249/s19.doc

WHAT AWARD CAN I GET?

Master's Degree:

	HE Level	Credits	Weighting (%)
Taught	7	120	67
Dissertation	7	60	33

Class	% required
With Distinction	70
With Merit	60
Without classification	50

Postgraduate Diploma:

	HE Level	Credits	Weighting (%)
Taught	7	120	100

Class	% required
With Distinction	70
With Merit	60
Without classification	50

Postgraduate Certificate:

	HE Level	Credits	Weighting (%)
Taught	7	60	100

Class	% required
With Distinction	70
With Merit	60
Without classification	50

WHAT WILL I STUDY?

Taught component

The programme consists of 7 taught modules, all of which are core modules. Two modules (Healthcare Technologies) will span two terms and will grant 15 credits each, and the remaining modules will grant 15 credits each.

Module Title	SITS Code	Module Credits	Core/ Elective	Can be Compensated?	Level

Healthcare Technologies: Principles and Design	XXX	15	Core	Y	7
Prototyping and Fabrication of Healthcare Technologies	XXX	15	Core	Y	7
Entrepreneurship	EPM513	30	Core	Y	7
Electrophysiology and Sensors	XXX	15	Core	Y	7
Healthcare Software Development	XXX	15	Core	Y	7
Medical Ethics, Health Economics, Regulatory Aspects	XXX	15	Core	Y	7
Data Analytics	EPM515	15	Core	Y	7

Dissertation component

Module Title	SITS Code	Module Credits	Core/ Elective	Can be Compensated?	Level
Individual Project	XXX	60	Core	N	7

You are normally required to complete all the taught modules successfully before progressing to the dissertation

TO WHAT KIND OF CAREER MIGHT I GO ON?

Innovation and Entrepreneurship in Healthcare Technology graduates can expect to achieve employment in a range of business related to healthcare, from the traditional healthcare industry like Siemens, Philips or General Electric, to new players on the market like Google or Apple. Recent developments in the NHS also provide significant opportunities for a graduate, specifically in the **NHS Digital**. A substantial part of the plan of the NHS digital is the development of Apps for the NHS, both from an in-house team and from external developers:

<https://portal.nhs.net/>

<https://developer.nhs.uk/>

Graduates can work for one of the many start-ups in the UK. The entrepreneurial skills provided in the Entrepreneurship modules will create attractive graduates for employers looking for technical and business skills. In addition, graduates will have the skills to create their own start-up after the products that will be developed in the projects.

Additionally, the skills acquired in the MSc will be attractive for the start-up market seeking to launch new healthcare products into the market.

Graduates starting a new business can benefit from City's London City Incubator and City's links to Tech City, providing support for start-up businesses. If you would like more information on

the Careers support available at City, please go to: <http://www.city.ac.uk/careers/for-students-and-recent-graduates>.

WHAT STUDY ABROAD OPTIONS ARE AVAILABLE?

Study Abroad is not offered in this Programme.

WHAT PLACEMENT OPPORTUNITIES ARE AVAILABLE?

Internships: you can participate in our professional placement programme, which is supported by the Professional Liaison Unit. This will enable you to undertake your dissertation within an industrial or research placement over an extended period compared to regular projects.

The School Professional Liaison Unit provides support to prepare CVs, interviews and application for internships.

WILL I GET ANY PROFESSIONAL RECOGNITION?

HOW DO I ENTER THE PROGRAMME?

To Register for the MSc a minimum admission requirement is a Second Class Hons degree, or equivalent in an Engineering, Scientific or Mathematical discipline will normally be required. Suitable industrial experience will also be considered, such as a few years in related industry or start-ups.

For those students, whose first language is not English, the following qualification is also required:

- IELTS: 6.5 (minimum of 6.0 in all four test components is preferable)

Please note that TOEFL is not accepted as evidence of English language ability for students that require a Confirmation of Acceptance for Studies.

Version:

Version date:

For use from: