

Programme Title: BEng FT Polymer Materials Science and Engineering (with NPU)



## Programme Specification (UG)

|   |  |
|---|--|
| Awarding body / institution:                | Queen Mary University of London  |
| Teaching institution:                       | Queen Mary University of London  |
| Name of final award and programme title:    | Bachelor of Engineering (BEng) Polymer Materials Science and Engineering |
| Name of interim award(s):                   |  |
| Duration of study / period of registration: | 4 years  |
| QMUL programme code / UCAS code(s):         | J5C2   |
| QAA Benchmark Group:                        |  |
| FHEQ Level of Award :                       | Level 6  |
| Programme accredited by:                    | Institute of Materials, Minerals and Mining                              |
| Date Programme Specification approved:      |  |
| Responsible School / Institute:             | School of Engineering & Materials Science                                |

Schools / Institutes which will also be involved in teaching part of the programme:

Collaborative institution(s) / organisation(s) involved in delivering the programme:

Northwestern Polytechnical University, Xi'an, China (NPU)

### Programme outline

QMUL's Joint Programme (JP) in Materials Science and Engineering, under the umbrella of the JEI (Joint Educational Institute), delivered in partnership with NPU in China's Shaanxi province, draws on the academic expertise of both institutions and on the strengths of two distinct educational cultures. The programme – which is taught entirely in English has been running successfully for 4 years, and leads to the award of both a Queen Mary University of London BEng and a BEng from NPU. The jointly-planned programme has been approved by the Chinese Ministry of Education and accredited by the IoM3.

### Aims of the programme

The JP will create graduates equipped for employment in scientific/engineering research in China or around the world (including the UK, Europe and US), and leads to the award of two degrees: a Queen Mary University of London BEng and a BEng from NPU. In the first of these, students will be provided with a strong background in materials and polymer science, including subject areas

such as structure and properties of materials, chemistry for materials, polymer physics, composite materials, polymer chemistry, environmental properties of materials, polymer synthesis, processing and design. Students will also receive a thorough practical training in these subjects, with particular emphasis on engineering techniques in research and other research skills. Together, these two parts of the JP will equip students with the skills needed for (i) progression to graduate degree courses and professions allied to engineering and polymer and materials science; (ii) academic research; (iii) employment in engineering and other scientific-based industries.

The programme aims to provide a rational, flexibly structured and coherent programme of study which is relevant to the needs of employers, facilitates the professional development of the student and lays the foundations for a successful career to the benefit of society. It will provide a sound knowledge base in the fields studied and develop key transferable skills in the areas of communication, numeracy, information technology, leadership, working with others, problem solving, time and task management. It will foster the development of an enquiring, open-minded and creative attitude, tempered with scientific discipline and social awareness, which encourages lifelong learning.

### What will you be expected to achieve?

Students who successfully complete the programme will have knowledge and understanding of the topics outlined immediately below, as well as the skills and attributes described in the subsequent sections.

### Please note that the following information is only applicable to students who commenced their Level 4 studies in 2017/18, or 2018/19

In each year of undergraduate study, students are required to study modules to the value of at least 10 credits, which align to one or more of the following themes:

- networking
- multi- and inter-disciplinarity
- international perspectives
- enterprising perspectives.

These modules will be identified through the Module Directory, and / or by your School or Institute as your studies progress.

#### Academic Content:

|    |  |
|----|--|
| A1 | Knowledge of a broad-range of topics in materials science including: engineering materials, structure and properties of materials, processing and applications and understanding of materials to a molecular level                                 |
| A2 | Knowledge to an advanced level in more specialised areas of materials and polymer science including: surfaces and interfaces, polymer physics, polymer chemistry, environmental properties of materials, polymer synthesis, processing and design. |
| A3 | Experimental and computing techniques in engineering and polymer and materials science.  |

| Disciplinary Skills - able to: |   |
|--------------------------------|---|
| B 1                            | Apply materials and polymer science knowledge and principles, together with problem solving skills, in a wide range of theoretical and practical situations. Understand the importance of materials science to engineering and other technical applications |
| B 2                            | Conduct practical work efficiently and with due regard for safety   |
| B 3                            | Use a wide range of laboratory, testing and analytical equipment  |
| B 4                            | Analyse and evaluate/interpret the results of controlled experiments  |
| B 5                            | Retrieve, filter and collate materials data from a variety of information sources   |
| B 6                            | Prepare scientific/technical reports  |

| Attributes: |   |
|-------------|---|
| C 1         | Communicate effectively by written and verbal means   |
| C 2         | Capacity for independent learning, and to work independently  |
| C 3         | Able to participate constructively as a member of a group/team, with skills to influence, negotiate and lead    |
| C 4         | Assess the relevance, importance and reliability of the ideas of others and of different sources of information |
| C 5         | Competent in the use of computer-based technology, and in the manipulation and analysis of quantitative data    |
| C 6         | Awareness of the role and impact of science and engineering in society, including the global perspective        |
| C 7         | Use information for evidence-based decision-making and creative thinking  |

### How will you learn?

Knowledge and skills are developed in a progressive way throughout the programme.

#### Academic Content

The programme includes scheduled lectures, practical classes, workshops, seminars, tutorials and practical demonstrations. Students are also expected to use independent and self-directed learning to consolidate the lecture material, for completion of coursework and in-preparation for follow-on sessions. Support for learning is provided through the Library, QMUL's online learning environment (QMplus), by teaching and administrative staff at NPU and via QMUL's staff in China and in the UK.

#### Practical and Problem-oriented Disciplinary Skills

Practical skills will be taught as part of organised practical classes, during the first, second and third years of the programme. Workshops reinforce knowledge acquired in lectures and provide opportunities for application of such knowledge to the solution of real problems. Advanced practical skills and specialised analytical skills are then developed during the project component of the final year.

#### Graduate Attributes

QMUL's graduate attributes are developed in a progressive fashion throughout the programme. The personal development plan modules provides further opportunities for the development of transferable skills and other aspects of these attributes.

### How will you be assessed?

Assessment of knowledge is through a combination of unseen written examinations and assessed coursework. The exact nature of the coursework varies from module to module and may include practical reports, mini-tests, essays, problem sheets and group coursework delivered through written reports, wiki pages or video presentation. The coursework mark may also include a contribution from online and computer-based assessments. Specific modules may include assessed oral examinations, oral presentations and extended reports/dissertations. Prompt feedback is provided on elements of coursework to provide an iterative learning experience, in which both knowledge and skills can be gradually developed and strengthened.

Transferable skills are developed in a contextual manner throughout the teaching and learning programme, and are indirectly assessed as part of the normal assessment processes for the programme. For example, the assessment of the projects includes consideration of data-retrieval skills, report-writing skills and presentational skills.

Practical skills are assessed through in-class observation and through written laboratory reports, which often include attention to quantitative accuracy. The assessment of the final year practical research project also addresses the majority of the professional disciplinary skills that students of this programme are expected to acquire.

### How is the programme structured?

Please specify the structure of the programme diets for all variants of the programme (e.g. full-time, part-time - if applicable). The description should be sufficiently detailed to fully define the structure of the diet.

Subject to successful completion, students will graduate with two degrees: a Queen Mary University of London BEng and a BEng from NPU. Students must complete both degrees: it is not possible to graduate with one or the other alone.

All the modules listed in the following section of this programme specification contribute directly to the BEng award. All modules are core modules - this means that they must be taken and must also be passed.

The modules constituting the BEng programme are primarily the responsibility of QMUL. The exceptions are the following modules, which are the responsibility of NPU: Advanced Mathematics 1; General Physics; Linear Algebra; Advanced Mathematics 2; Mathematical Modelling and Computing;

Engineering Design Methods; Introduction to Functional Materials; Thermodynamics and fluid mechanics; Mechanical Modelling - solid mechanics; Polymer Characterisation; Elastomer Materials; Polymer Degradation; Polymer Processing; Failure of Polymers; Polymer Product Design. For the avoidance of doubt, the NPU-taught modules have been given codes beginning with NXC.

In addition to these modules, NPU will teach various modules which contribute towards their degree, but do not contribute to the classification of the BEng award. These additional modules are comprised of a number of social/political/cultural modules, taught in years 1-4, which all Chinese students are required to take. This suite of topics are captured in NXC6000 Chinese Compulsory Topics to record when a student has completed and passed all of these modules in the NPU system. Although they do not count towards BEng classification, all these additional modules must be passed in order for students to be awarded both degrees.

#### Academic Year of Study FT - Year 1

| Module Title                    | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester        |
|---------------------------------|-------------|---------|-------|-------------------------|------------------------|-----------------|
| English Language 1              | QXU3101     | 15      | 3     | Core                    | 1                      | Semester 1      |
| Personal Development Planning 1 | QXU3111     | 0       | 3     | Core                    | 1                      | Semesters 1 & 2 |
| English Language 2              | QXU3102     | 15      | 3     | Core                    | 1                      | Semester 2      |

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| Module Title                          | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester        |
|---------------------------------------|-------------|---------|-------|-------------------------|------------------------|-----------------|
| Introduction to Engineering Materials | QXU4011     | 15      | 4     | Core                    | 1                      | Semesters 1 & 2 |
| Advanced Mathematics 1                | NXC3000     | 15      | 4     | Core                    | 1                      | Semester 1      |
| General Physics                       | NXC3001     | 15      | 3     | Core                    | 1                      | Semester 1      |
| Linear Algebra                        | NXC3002     | 15      | 3     | Core                    | 1                      | Semester 1      |
| Advanced Mathematics 2                | NXC3004     | 15      | 3     | Core                    | 1                      | Semester 2      |
| Mathematical Modelling and Computing  | NXC3005     | 15      | 3     | Core                    | 1                      | Semester 2      |

Academic Year of Study FT - Year 2

| Module Title                                      | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester        |
|---|-------------|---------|-------|-------------------------|------------------------|-----------------|
| Materials Science 1 - Structure and Properties    | QXU4000     | 15      | 4     | Core                    | 2                      | Semester 1      |
| Personal Development Plan 2                       | QXU4111     | 0       | 4     | Core                    | 2                      | Semesters 1 & 2 |
| Experiments in Materials 1                        | QXU4007     | 15      | 4     | Core                    | 2                      | Semester 1      |
| Polymer Chemistry                                 | QXU4003     | 15      | 4     | Core                    | 2                      | Semester 2      |
| Materials Science 2 - Processing and Applications | QXU4006     | 15      | 4     | Core                    | 2                      | Semester 2      |
| Mechanical Modelling - Solid Mechanics            | NXC4012     | 15      | 4     | Core                    | 2                      | Semester 2      |
| Thermodynamics and Fluid Mechanics                | NXC4122     | 15      | 4     | Core                    | 2                      | Semester 2      |
| Engineering Design Methods                        | QXU4016     | 15      | 4     | Core                    | 2                      | Semester 1      |
| Molecules to Materials                            | QXU4001     | 15      | 4     | Core                    | 2                      | Semester 1      |

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Academic Year of Study FT - Year 3

| Module Title                    | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester        |
|---------------------------------|-------------|---------|-------|-------------------------|------------------------|-----------------|
| Personal Development Plan 3     | QXU5111     | 0       | 5     | Core                    | 3                      | Semesters 1 & 2 |
| Physical properties of polymers | QXU5032     | 15      | 5     | Core                    | 3                      | Semester 1      |
| Surfaces and Interfaces         | QXU5010     | 15      | 5     | Core                    | 3                      | Semester 1      |
| Composite Materials             | QXU5030     | 15      | 5     | Core                    | 3                      | Semester 2      |
| Functional Materials            | NXC5010     | 15      | 5     | Core                    | 3                      | Semester 1      |
| Polymer Degradation             | NXC5028     | 15      | 5     | Core                    | 3                      | Semester 1      |
| Elastomer Materials             | NXC5014     | 15      | 5     | Core                    | 3                      | Semester 2      |
| Polymer Characterisation        | NXC5013     | 15      | 5     | Core                    | 3                      | Semester 2      |
| Experiments in Materials 2      | QXU5017     | 15      | 5     | Core                    | 3                      | Semester 2      |

Academic Year of Study FT - Year 4

| Module Title                              | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester   |
|---|-------------|---------|-------|-------------------------|------------------------|------------|
| Materials Selection in Engineering Design | QXU6004     | 15      | 6     | Core                    | 4                      | Semester 1 |
| Advanced Polymer Chemistry                | QXU6033     | 15      | 6     | Core                    | 4                      | Semester 1 |
| Polymer Engineering Project               | QXU6035     | 15      | 6     | Core                    | 4                      | Semester 2 |
| Polymer Devices                           | QXU6028     | 15      | 6     | Core                    | 4                      | Semester 2 |
| Failure of Polymers                       | NXC6019     | 15      | 6     | Core                    | 4                      | Semester 1 |

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| Module Title                 | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester   |
|------------------------------|-------------|---------|-------|-------------------------|------------------------|------------|
| Polymer Product Design       | NXC6020     | 15      | 6     | Core                    | 4                      | Semester 2 |
| Materials and Sustainability | QXU6008     | 15      | 6     | Core                    | 4                      | Semester 2 |
| Chinese Compulsory Topics    | NXC6000     | 0       | 6     | Core                    | 4                      | Semester 2 |
| Polymer Processing           | NXC6018     | 15      | 6     | Core                    | 4                      | Semester 1 |

### What are the entry requirements?

Candidates must be able to satisfy the general admissions requirements of Northwestern Polytechnical University, in line with regulations from the Chinese Ministry for Education. This programme is limited to being able to recruit from the top 10% of school leavers taking the national examination, the gaokao (for Chinese participating students). In addition, candidates must demonstrate sufficient English skills to ensure that they can meet the demands of studying a degree programme which is taught in English. All non-Chinese participating students must have achieved a qualification regarded as equivalent to that for Chinese participating students.

### How will the quality of the programme be managed and enhanced? How do we listen to and act on your feedback?

The Student-Staff Liaison Committee (SSLC), closely modelled on the equivalent body within SEMS, provides a formal means of communication and discussion between the JEI staff and its students. The committee consists of student representatives from each year of the JEI, together with appropriate representation from staff from QMUL and NPU. It is designed to respond to the needs of students, as well as act as a forum for discussing programme and module developments. The Student-Staff Liaison Committee meets regularly throughout the year.

SEMS' Education and Learning Committee advises the JEI directors on all matters relating to the delivery of taught programmes at School level, including monitoring the application of relevant QMUL policies and reviewing proposals for module and programme approval and amendment before submission to Taught Programmes Board. Student views are incorporated in the committee's work in a number of ways, such as through consideration of student surveys and input from the SSLC.

All QMUL schools operate an Annual Programme Review of their taught undergraduate and postgraduate provision. APR is a continuous process of reflection and action planning which is owned by those responsible for programme delivery; the main document of reference for this process is the Taught Programmes Action Plan (TPAP) which is the summary of the School's work throughout the year to monitor academic standards and to improve the student experience. Students' views are considered in this process through analysis of various programme surveys and the module evaluations.

### What academic support is available?

Each student is provided with a personal academic guidance tutor (or 'advisor') who is their main point of contact for advice regarding academic matters and for assistance with pastoral concerns, throughout their whole programme. Students can see their advisors in their office hours at NPU or arrange an appointment during these hours via email, or arrange to be seen by other members of QMUL staff at NPU at that time. NPU staff also have a pastoral responsibility for students on the programme, and it is these staff who will deal with enquiries from parents and other Chinese-specific issues.

## How inclusive is the programme for all students, including those with disabilities?

Specific support for disabled students is provided by NPU in accordance with provincial and national regulations in China. All taught material is developed using the guidance of QMUL for Disability and Dyslexia.

## Programme-specific rules and facts

- a) a requirement to pass all modules, including the Chinese political/social modules
- b) graduation after 4 years, when both degrees that comprise the Joint Programme have been completed
- c) the following regulations regarding attempts:
  - two resit attempts are permitted within the normal study period;
  - a further resit attempt is permitted in the 6 months period after the normal study period.

It should be further noted that:

- a) the QMUL provisions for Aegrotat degrees shall not apply
- b) the credits listed by NPU are a measure of load in the Chinese system that is related to the contact hours
- c) different marking scales are used at QMUL and NPU, and the procedures for conversion between these marking scales is defined in the regulations
- d) the award of a number of certificates within the NPU regulations is specified

## Links with employers, placement opportunities and transferable skills

The JEI will create graduates equipped for employment in scientific and engineering research in China or around the world (including the UK, Europe and US).

Potential employers include:

- university research laboratories
- engineering companies
- manufacturers
- government agencies

Two placement weeks are organised in Semester 2, Year 2. The first week aim is to introduce students to industry and jobs in the wide area of materials engineering and polymer science in the Shanxii and nearby areas during the month of April. During June, a second week focused in experience in companies outside the local areas. During the placements, the students get taught processes and techniques, listen to company experts and research staff in talks and discussions and attend training.

## Programme Specification Approval

**Person completing Programme Specification:**

Dr Maria Romero-Gonzalez

**Person responsible for management of programme:**

Prof Andrew Bushby

**Date Programme Specification produced / amended by School / Institute Learning and Teaching Committee:**

12/01/22



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**Date Programme Specification approved by Taught  
Programmes Board:**