Nottingham Trent University Course Specification

	Basic Course Information	
1.	Awarding Institution:	Nottingham Trent University
2.	School/Campus:	Science & Technology, Clifton Campus
3.	Final Award, Course Title and Modes of Study:	BEng (Hons) Biomedical Engineering
4.	Normal Duration:	3 years FT, 4 years SW
5.	UCAS Code:	

6. Overview and general educational aims of the course

BEng (Hons) Biomedical Engineering is designed to provide you with a multidisciplinary approach to biomedical engineering through the study of aspects of mathematics, physics, chemistry and biology relevant to this rapidly developing area of engineering. You will study biomedical engineering in practical, theoretical and industrial contexts and utilise these when considering engineering solutions for intervening in complex health issues. There is an emphasis on developing knowledge and understanding such that you acquire the skills, qualities and attributes expected by employers or for postgraduate studies and research.

Biomedical engineers (also called bioengineers) use their knowledge of science and mathematics to help solve health problems. Biomedical engineers develop materials, processes, and devices that help prevent or treat disease or rehabilitate patients. The areas of specialisation for biomedical engineers include biomaterials; bioinstrumentation; biomechanics; medical imaging; rehabilitation; and cellular, tissue, and genetic engineering.

Biomedical engineering is a very diverse field which is also very rapidly developing. It is important that your course is both current and relevant to your future career. We will work closely with industry to ensure that at the end of your studies you are as well-prepared as possible for a career in this exciting and rewarding industry. It is likely that planned content of modules may have to change to keep abreast of the latest research and developments in the industry.

As a Biomedical Engineering student, you will develop the skills necessary to follow a career as a Biomedical Engineer. This will require you to gain the ability to follow the problem-solving steps called the engineering design process. This process consists of the following eight steps:

1. Identify the need or problem
2. Research the problem
3. Develop possible solutions
4. Select the best possible solution
5. Construct a prototype
6. Test and evaluate
7. Communicate the solution
8. Redesign

This course is offered in full time mode (3 years) and sandwich mode (4 years). In the sandwich mode, you will spend a period of one year, between the 2nd and 3rd years of academic study, in a placement in a Biomedical Engineering role.

7. **Course outcomes**

Course outcomes describe what you should know and be able to do by the end of your course if you take advantage of the opportunities for learning that we provide.

Knowledge and understanding

By the end of the course you should be able to:

1. Apply and integrate knowledge of scientific and mathematical principles to solve engineering problems, with consideration for limitations, risks, and new and existing technologies.
2. Evaluate scientific and mathematical literature to analyse and solve engineering problems.
3. Apply and integrate theory and knowledge of design processes and methodologies to develop rigorous and creative solutions that are fit for purpose.
4. Demonstrate understanding of engineering principles and techniques and their applications in Biomedical engineering.
5. Evaluate business, customer and user needs to establish solutions that are fit for purpose.
6. Integrate the commercial, economic and social context into the engineering process.
7. Apply professional and ethical conduct in engineering.

These statements are aligned to the QAA subject benchmark statements for engineering (2015) and have been developed to fully meet the academic accreditation requirements of the Institute of Engineering and Technology for Incorporated Engineer registration and to partially meet the academic accreditation requirements of the Institute of Engineering and Technology for Chartered Engineer registration.

Skills, qualities and attributes

By the end of the course you should be able to:

8. Proficiently apply mathematical, statistical and computational methods, tools and notations in the analysis and evaluation of data.
9. Identify, classify and describe systems using analytical and modelling techniques.
10. Plan and manage the design process by defining problems, identifying industry relevant constraints and communicating ideas effectively.
11. Apply practical and laboratory skills using appropriate equipment and processes.
12. Work effectively as part of an engineering team.
13. Demonstrate the ability to evaluate risk throughout the engineering process.

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8. Teaching and Learning Methods

In most modules you will focus on problem solving and project work either using real industrial case studies or by working with industry directly. Much of the time you will be working on real world problems and with students from other engineering disciplines. In addition you will have lectures supported by practical, laboratory classes and workshops. Much of the theory introduced in lectures is consolidated through these laboratory sessions and through small group seminars. Course material is supported through e-resources. The University Virtual Learning Environment (NOW) is widely used to post workshop data, summary slides of lectures, resources such as articles and recent research papers and information about

the organization of modules and the course.

Opportunities will exist for you to enhance your communication skills by writing reports in various formats and by giving oral presentations to your colleagues. Seminars and tutorials are used to offer a small group teaching environment, often led by students' needs, to review, discuss and consider aspects of taught material from case studies, lectures, workshops or laboratory classes.

Laboratory classes focus on hands-on acquisition of practical skills in the application of key principles, concepts and methods of Biomedical Engineering. These will involve you examining, developing and troubleshooting current biomedical devices. Laboratory sessions involve problem solving, data collection and observation. Further time is allocated to the analysis, interpretation and evaluation of the results both inside and outside these practical classes. In this way you will develop your skills to undertake self-directed study and to become an autonomous, independent learner. You will also be expected to carry out supplementary reading and research to consolidate taught material. All of these practices are combined in your final year where you will undertake an individual period of research which will be laboratory or industry based.

During the course of your studies, you will assemble a Professional Portfolio, which you can use to reflect on the skills and attributes which you acquire. This Portfolio will prove useful when completing your CV, and when applying for jobs at the end of the course.

9. Assessment Methods

The course uses a variety of assessment methods to enable you to demonstrate achievement of the learning outcomes. Subject knowledge and understanding are mainly tested through tests and examinations, preparation of case studies, write-ups of laboratory practical work, technical reports and oral presentations.

Laboratory investigations are used to assess a range of intellectual and practical skills. Your ability to test hypotheses, observe, collate, present, interpret and evaluate findings of investigations is assessed through the preparation of laboratory reports.

Your communication skills, in written and oral formats are assessed at numerous points throughout the course. Case study reports, laboratory reports, technical reports and examinations provide you with opportunities to demonstrate your writing skills. Oral presentations and verbal defences offer ways for you to demonstrate your verbal communication skills.

You will receive written feedback on all your assessed work to help you to develop as a learner and to ensure you achieve both your personal goals and the standards expected by industry.

10. Course structure and curriculum

The BEng (Hons) Biomedical Engineering degree is a 3-year full time or 4 year sandwich course. The academic year comprises 30 weeks divided into 3 terms. Teaching and learning take place for 26 weeks with the final 4 weeks of each year being set aside for examinations. In the first year (level 4) you will study six modules which are a mix of engineering and biomedical engineering modules. In the second year (level 5) again you study six modules. In your third year (level 6) you will work on an individual project. In addition you will study one engineering module, two biomedical engineering modules and one optional specialised module relevant to

biomedical engineering.

If you are on the sandwich course you will spend a year on placement between levels 5 and 6. Preparation for placement applications begins early in year 2. Members of the Employability Team work individually with you to develop your CV and to complete application forms and letters etc. The Employability Team also provide placement presentations, group workshops, webinars and resources to support you in your search for a placement.

While you are on placement you will be allocated a visiting tutor from the Engineering academic staff. Your tutor will contact you each term and, if you are in the UK, will visit you at your workplace at least once during your placement. If you are overseas your tutor will contact you via video-conferencing. Towards the end of your placement year you will be invited to a call-back event to reintroduce you to NTU, the campus and your course, and provide an opportunity for you to discuss ideas regarding your individual project.

The BEng Biomedical Engineering degree is modular and addresses key aspects of biomedical engineering with particular relevance to the biomedical engineering industry. The modules selected on the degree are designed to meet the course learning outcomes.

The course structure is shown below.
Modules are 20cp unless otherwise stated.

Level 4.
Engineering Science Fundamentals
Engineering Mathematics and Technical Computing
Laboratory Analysis and Product Case Studies
Practical and Project Skills for Engineering
Anatomy, Physiology and Biomechanics
Chemistry of Materials

Level 5.
Digital Systems and Computer Engineering
Engineering Modelling and Simulation Techniques
Industrial Design and Product Case Studies
Integrated Group Design Projects
Tissue Engineering, Biomaterials and Biocompatibility
Biomedical Imaging and Sensing

Level 6
Performance Engineering
Individual Engineering Project (40 credit points)
Medical Ethics, Regulation and Clinical Trials
Current Developments in Bioengineering

Level 6 options – choose one from:
Sensors and Embedded Electronics
Fluid Dynamics in Physiology and Medical Devices
Medical Applications of Smart Materials

A BEng Honours degree is awarded to students who successfully complete 360 credit points; 120 credit points at each of levels 4-6. A BSc Ordinary Degree is awarded to a student who successfully completes 300 credit points at levels 4-6. A Diploma of Higher Education is awarded to a student who successfully completes 240 credit points; a Certificate of Higher Education is awarded to students who successfully

complete 120 credit points.

11. Admission to the course

For current information regarding all entry requirements for this course, please see the 'Applying' tab on the course information web page.

The full UCAS entry profile for this course can be found at: http://www.ucas.com/

12. Support for Learning

We will work with you to ensure that you settle into your new academic environment and that your studies go well.

All students at Nottingham Trent University have full access to Student Support Services. In addition, School-based support networks are in place to offer you support, guidance and advice on academic and personal issues. Within the course, students experience the full support of their Course Leader, Module Leaders, and Tutors, who take responsibility for student support and guidance. The Module Leader will offer guidance and support to students taking each specific module.

Academic staff can be contacted by e-mail, telephone, letter, or in person.

As a new student you will experience a minimum of a 3 day induction period at the commencement of your first academic year. Induction will inform you about:

- Student Support Services at University, School and Course level;
- University policies and procedures on academic systems;
- Personal development planning;
- Timetable issues, room allocations and location;
- University, School and Course Handbooks;
- Enrolment procedures;
- Computing, IT and Library services;
- Careers advice and the Employability Team;
- Health and Safety procedures.

During your induction you will be assigned a Course Tutor and informed about the best way to get in touch with your Course Leader and Module tutors. There will be a minimum of twelve course tutorial meetings at level 4 and a minimum of five at levels 5 and 6. Course tutorials help you to reflect on your approach to study and make connections between modules, integrating material from across the curriculum and encouraging you to achieve your potential. You also have an opportunity to discuss and deal with any personal or course-related issues that may be affecting your studies and get advice on the support the university can offer. Course tutorials, particularly at levels 4 and 5, are used to manage the projects you are working on, and to support you in developing your Professional Portfolio. Specific advice and guidance on option choices is given at level 6 to assist you in choosing options that best fit your interests, skills and aspirations.

Student Mentors are also available to provide you with learning support. Student Mentors are typically students at Level 5 and above of their course, who provide some form of mathematics, academic writing or module-specific support. Such support is usually available on a 'help desk' basis.

The University provides a wide range of student services, where you can get support and advice on issues such as finance, dyslexia and disability, and personal problems.

http://www.ntu.ac.uk/student_services/index.html

For accommodation matters, University Accommodation Officers will provide you with information, guidance and continuing support, for example hall of residence, private rented accommodation, and the Landlord Approval Scheme. The Accommodation Services can be accessed through www.ntu.ac.uk.

13. Graduate destinations / employability

There is a wide range of career opportunities for Biomedical Engineers. As a BEng (Hons) graduate typical roles would be: Biomedical Engineer; Junior Biomedical Engineer; R&D Clinical Engineer; Regulatory Compliance Engineer; Production Technologist; Production Development Engineer; Scale Up Engineer; Medical Devices Engineer; Field Service Engineer; Manufacturing Process Engineer; Additive Manufacturing Engineer; Biosensor and Bioinstrumentation Engineer. Your course will also prepare you well for postgraduate study.

Biomedical engineers who specialise in biomaterials develop materials that can be safely implanted in the body. Engineers who work in biomechanics apply principles from physics to biological systems. They develop artificial organs, such as the artificial heart. Engineers who focus on bioinstrumentation use computers or other electronic devices to diagnose or treat disease. A rehabilitation engineer helps improve the quality of life for people with disabilities. Tissue and cellular engineers grow cells outside of the body to be implanted in the body and serve some function. Genetic engineering is a related discipline in which an organism's DNA is altered so that different proteins will be produced. Genetic engineering has many applications in drug production.

This course design, its learning outcomes, themes and content have been developed based on industry guidelines, through discussions with sector employers. Biomedical engineering employers and stakeholders identified a number of important considerations for the training of highly qualified and industry relevant Biomedical engineering graduates:

- Consideration should be given to the provision of accreditation and relevance of placements and assessment against vocational standards or qualifications.
- Formal accreditation and industry relevant vocational qualifications and experiences should be incorporated.
- Project and placement opportunities should prepare students for time and business constraints and ensure the student is able to develop a product suitable for market from conception to manufacture.
- Students should have an appreciation of and be comfortable in using different and appropriate working and communication styles relevant to Biomedical Engineering companies, and be able to interact effectively both independently and in a team to maximise the value of their input to employers.
- Industry relies heavily on research, and academic knowledge should be developed to support this. A strong understanding of a wide range of engineering principles is considered critical, including mathematics for engineering and statistical analysis.

The course structure includes modules and opportunities in its design to encompass all of these stakeholder requirements.

14. Course standards and quality

The Course Committee, with staff and industry and student representatives, operates

to discuss matters arising on the course, review module feedback and consider the Course Standards and Quality report and external examiners' comments. Overarching responsibility for quality control lies with the School Academic Standards and Quality Committee whose remit is to provide guidance and support to academic courses. External Examiners offer further quality control through monitoring academic standards, moderation of assessment tasks and processes. An annual Engineering Employers Forum ensures that our provision is relevant to industry requirements.

15. Assessment regulations

This course is subject to the University's Common Assessment Regulations (located in Section 16 of the Quality Handbook). Any course specific assessment features are described below:

Your final degree classification is based on 20% of your Level 5 average and 80% of your Level 6 average.

16. Additional Information

Collaborative partner(s):

Course referenced to national QAA Benchmark Statements: Engineering 2015

Course recognised by:

Date implemented: July 2016

Any additional information: