Nottingham Trent University Course Specification

	Basic Course Information	
1.	Awarding Institution:	Nottingham Trent University
2.	School/Campus:	School of Science and Technology
3.	Final Award, Course Title and Modes of Study:	MEng (Hons) Mechanical Engineering
4.	Normal Duration:	4 Years FT, 5Years SW
5.	UCAS Code:	H302/303

6. Overview and general educational aims of the course

MEng (Hons) Mechanical Engineering is designed to provide you with a multidisciplinary approach to Mechanical Engineering built upon a strong foundation in aspects of mathematics, engineering science, mechanics and dynamics. You will study mechanical engineering in practical, theoretical and industrial contexts and will utilise these when considering engineering solutions for a range of practical problems. 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.

The MEng course is ideal for students who wish to pursue a career as a professional engineer and are aiming for Chartered Engineer status. The extra year of study at an advanced level gives you the opportunity to undertake a significant piece of individual work and to broaden your knowledge and skills in current engineering developments.

Mechanical engineers use their understanding of engineering principles, physics and material properties to design, develop, operate and maintain any systems that have moving parts. They may work in a broad range of sectors, for example:

- transport – aerospace, automotive, rail
- construction
- energy
- manufacturing
- medicine
- biomedical devices
- sport

As an Mechanical engineer, you would:

- assess new developments or innovations to see if they are workable
- prepare technical plans using computer-aided engineering and design software
- estimate manufacturing and labour costs, and project timescales
- coordinate the work of technicians and craftspeople
- test prototypes and analyse data
- make sure that projects meet safety regulations
- plan and oversee inspection and maintenance schedules.

Mechanical engineering is a very diverse field which is also rapidly developing. It is important that your course is both current and relevant to your future career. Your course will work closely with industrial partners and use industry-led projects to ensure that at the end of your studies you are as well prepared as possible for a career in this exciting and rewarding field. You should be prepared for module content which must be flexible to keep up with the rapid technological developments in the field. Such flexibility is paramount in ensuring you are entering the workplace with industry-relevant and industry-acquired skills.

This course will teach you the skills required to operate as an effective Mechanical Engineer and solve problems using 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 (4 years) and sandwich mode (5 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 Mechanical 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. Contextualise, apply and integrate knowledge of scientific and mathematical principles to resolve complex engineering problems, with consideration for limitations, risks, and new and existing technologies.
2. Critically evaluate scientific and mathematical literature to formulate engineering solutions to unfamiliar problems.
3. Contextualise, apply and integrate theory and knowledge of design processes and methodologies in the context of unfamiliar situations to problem solve and understand complex engineering solutions.
4. Demonstrate understanding of advanced engineering principles and techniques and their application to a wide range of problems in Mechanical Engineering.
5. Critically evaluate business, customer and user needs to establish solutions that are fit for purpose.
6. Integrate the commercial, legal, economic and social context into the engineering process.
7. Apply ethical considerations throughout the engineering process.

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 Institution of Mechanical Engineers for Chartered Engineer registration.

Skills, qualities and attributes

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

8. Demonstrate competence in scientific methods of enquiry to solve unfamiliar engineering problems using appropriate methods for measurement, analysis and evaluation of data, and including the application of mathematical, statistical and computational methods.
9. Evaluate data using quantitative and computational methods in order to analyse engineering processes and problems.
10. Plan and manage the design process by defining problems, identifying industry relevant constraints and communicating ideas effectively in order to generate innovative designs.

11. Apply practical and laboratory skills using appropriate equipment, processes, materials and components.
12. Work effectively as part of a team, exercising initiative and personal responsibility.
13. Demonstrate the ability to evaluate risk throughout the engineering process from product design through to commercialisation.

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 Institution of Mechanical Engineers for Chartered Engineer registration.

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-led projects. 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 laboratory and practical sessions and small group seminars. Course material is supported through e-resources. The University Virtual Learning Environment (NOW) is widely used to share laboratory data, present supplementary resources such as summary slides of lectures and links to online videos, resources such as articles and recent research papers and information about the organisation 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, teaching through misconceptions and problem-based methods and reviewing, discussing and considering aspects of taught material associated with case studies, lectures, workshops or laboratory classes.

A strong foundation in materials, workshop and design skills are required to understand how a product should be made to ensure it meets the needs of the end-user or desired task, is appropriate for ongoing maintenance, and how its full life cycle is considered, such as suitable materials and methods for disposal.

Laboratory classes develop hands-on practical skills in the application of key principles, concepts and methods of Mechanical and General Engineering. These will involve you examining, developing and troubleshooting current mechanical engineering products. 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 MEng (Hons) Mechanical Engineering degree is a 4-year full time or 5 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 five modules which are a mix of engineering and mechanical engineering modules. In the second year (level 5) you study six modules. In your third year (level 6) you will work on a group project. In addition you will study one engineering module, one mechanical engineering module and two optional specialised modules relevant to mechanical engineering. In your final year you will undertake a major individual project, the Design to Market module and then choose two from the four optional modules. The optional modules at level 7 are based on our world-class research and will give you the opportunity to work at the cutting edge of mechanical 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.

The MEng (Hons) Mechanical Engineering degree is modular and addresses key aspects of mechanical engineering with particular relevance to the mechanical engineering industry. The modules selected on the degree are designed to meet the course learning outcomes.

The course structure is shown below:
Modules are 20 credit points unless otherwise stated.

Level 4.
Engineering Science Fundamentals
Engineering Mathematics and Technical Computing
Innovation and Engineering Solutions (40 credit points)
Solid Mechanics and Dynamics
Thermofluids

Level 5.
Digital Systems and Computer Engineering
Engineering Modelling and Simulation Techniques
Industrial Design and Product Case Studies
Integrated Group Design Projects
Control Systems and Engineering
Materials and Manufacturing

Level 6
Performance Engineering
Group Engineering Design and Optimisation Project (40 credit points)
Robotics

Level 6 options – choose 2 from:
Human Factors Engineering
Sustainable Design and Product Death
Sensors and Embedded Electronics
Mechanical Engineering in Sport

Level 7
Individual Industrial/Research Engineering Project (60 credit points)
Design to Market

Level 7 options – choose 2 from:
Robotics, Cybernetics and Biomechatronics
Fluid Dynamics in Physiology and Medical Devices
Prosthetics and Rehabilitation Robotics
Optimising Sport Equipment
Medical Applications of Smart Materials

A MEng Honours degree will be awarded to students who successfully complete 480 credit points of study, 120 credit points each year.

11. Admission to the course

Entry requirements.

For current information regarding all entry requirements for this course, please see the 'Applying' tab on the NTU 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, 6 and 7. 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, 5 and 6, 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 levels 6 and 7 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 Mechanical Engineers. As an MEng (Hons) graduate, typical roles would be: Mechanical Engineer; Design Engineer; Safety and Risk Manager; R&D Engineer; Project Manager; Operations Manager; Human Factors Engineer; Development and Test Engineer; Manufacturing Engineer; Control and Instrumentation Engineer, and Quality Control Engineer.

Mechanical Engineers work in a wide range of industry sectors such as: automotive; rail; aerospace; defence; construction; medical instrumentation; manufacturing and energy.

Your course will also prepare you well for postgraduate study or research.

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

There are well-established systems for managing the quality of the curriculum within the School. The course is subject to, and fully complies with, the University's requirements in respect of course standards and quality; this involves:

1. The appointment of external examiners to the course. External examiners are appointed to each course and report annually on the appropriateness of the curriculum, the quality of student work, and the assessment process.
2. Monitoring of the course and the production of an annual Interim Course Report. At the end of each year the Course Manager writes an evaluative report, informed by staff and student feedback. This is then discussed by the Course Committee and the School Academic Standards and Quality Committee, and actions are identified.
3. Periodic review of the course. Periodic Course Review is the mechanism by which course teams reflect on the validity, currency, and the academic quality of the provision once every three years. This is a face-to-face discussion with external stakeholders and students, centering on key data sets provided in advance of the meeting to enable appropriate consideration of the current and future quality and standards of the course. The outcome of the review is a three-year Course Development Plan.
4. A Course Committee covering all undergraduate courses within the department of Engineering is held three times a year. Student representatives, elected by their peer group, attend and contribute to discussion.
5. Formal module evaluation is gathered by anonymous questionnaire at the culmination of each module.

6. An annual Engineering Advisory Board 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 50% of your Level 6 average and 50% of your Level 7 average.

16. Additional Information

Collaborative partner(s):

Course referenced to Quality Assurance Agency for Higher Education (QAA) Benchmark Statements: Engineering, 2015

Course recognised by:

Date this course specification approved: February 2020

Any additional information: