# Nottingham Trent University Course Specification

| | Basic Course Information | |
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| 1. | Awarding Institution: | Nottingham Trent University |
| 2. | School/Campus: | Science & Technology/Clifton Campus |
| 3. | Final Award, Course Title and Modes of Study: | BSc (Hons) Physics & Mathematics FT<br>BSc (Hons) Physics & Mathematics SW |
| 4. | Normal Duration: | Full Time 3 years, Sandwich 4 years |
| 5. | UCAS Code: | FG31/FG32 |

## 6. Overview and general educational aims of the course

The BSc (Hons) Physics & Mathematics degree is designed to equip you with a broad based knowledge of physics, mathematics, and their applications. The emphasis of the course is on the understanding and proper application of mathematical techniques and the fundamental laws and principles of physics. Your acquisition of this knowledge and understanding will be supported by the use of professional mathematical and computational software and physics laboratory equipment.

The knowledge and understanding you will gain of physics and mathematics and their applications will equip you for a career in a variety of sectors. In addition to developing a wide knowledge of physics and mathematics, the degree will develop your investigative, experimental and computational skills as well as provide you with many general transferable skills, which will make you suitable for general graduate employment in a changing job market.

An optional placement year, usually salaried, is an important feature of the course: it can give you a distinct advantage in the job market on graduating and may even lead to an offer of employment with your placement provider. We have an experienced Placements Office to provide support in finding a placement that is right for you.

In summary, the course aims to:

- Develop a broad based knowledge of physics and mathematics and the skills to apply this knowledge.
- Equip you with the knowledge and skills necessary for a wide range of careers in industry, commerce, teaching, and research.
- Provide you with sufficient specialised knowledge and skills to enable you to pursue further study and research.
- Equip you with analytic problem solving skills and other transferable skills to prepare you for more general graduate employment.
- Provide an enjoyable and worthwhile educational experience in the fields of physics and mathematics.
- Enable you to realise your full academic potential whatever your background prior to coming to university, and to enhance your employment and careers opportunities.

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| 7. | **Course outcomes**<br>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**<br>By the end of the course you should be able to: |
| | K1. Demonstrate knowledge and understanding of a broad range of mathematics (M).<br>K2. Demonstrate an understanding that mathematics is a developing subject with widespread applications.<br>K3. Use mathematical and computational techniques to construct and analyse mathematical models of real-world phenomena, and assess their utility (M, P).<br>K4. Demonstrate an understanding of the need for rigour within mathematics (M).<br>K5. Demonstrate knowledge of most of the fundamental laws and principles of physics, and exhibit competence in the application of these principles to diverse areas of the discipline (P).<br>K6. Execute an experiment or investigation, analyse the results, and draw valid conclusions (P).<br>K7. Evaluate, select, and implement appropriate mathematical tools and techniques to solve a range of problems in mathematics and physics. For Physics, you should be able to identify the relevant physical principles, translate problems into mathematical statements, and apply your knowledge to obtain order-of-magnitude or more precise solutions as appropriate (M, P).<br>K8. Communicate scientific information to a range of audiences. In particular, you should be able to produce clear and accurate scientific reports (P). |
| | **Skills, qualities and attributes**<br>By the end of the course you should be able to: |
| | S1. Select, adapt and apply appropriate mathematical techniques to problems, and critically evaluate and interpret the results (M).<br>S2. Construct mathematical arguments, identifying assumptions and conclusions (M).<br>S3. Demonstrate good written and oral communication skills, presenting arguments and conclusions accurately and clearly (M, P).<br>S4. Demonstrate a high level of IT competency and numeracy; for example, in the use of professional mathematical or simulation software, in the analysis of data, and in the retrieval of information (M, P).<br>S5. Plan work, work effectively as part of a team, and work and learn independently (M, P).<br>S6. Manage your own learning and make use of appropriate texts and other learning resources (M, P).<br>(M) indicates that the outcome has been mapped to the Mathematics, Statistics and Operational Research benchmark standards. (P) indicates that the outcome has been mapped to the Physics benchmark standards. These benchmark standards provide a national framework for describing the content and standards of a Bachelor's degree with honours in mathematics and physics based disciplines. |
| 8. | **Teaching and Learning Methods** |
| | The teaching and learning strategies for BSc (Hons) Physics & Mathematics have been developed to support your acquisition of knowledge, understanding, and skills in this specialised area, and have evolved over a number of years based on feedback, review |

and reflection. You will be expected to take progressively more responsibility for your own learning at each level. Autonomous learning is encouraged and motivated within the course by use of the following practices:

- Interaction with other students, including from other courses, through small group based work.
- Presentation of ideas and findings to fellow students and tutors. This helps you to organise your thoughts, and reflect on your understanding.
- Discussion of ideas with tutors. Self- and staff-directed investigation is important to the development of learning autonomy. This culminates in the final year Project where you will work on a topic chosen in consultation with your Project Supervisor, who will guide you in your work on the Project.
- The application of knowledge learned or taught within modules. The progression in the course from level to level ensures that earlier knowledge and skills are built on and developed.

The delivery of material is supported by strategies to encourage your consolidation and application of knowledge. To realise the course aims, the following practices will be adopted:

- Lectures introduce and develop concepts and explore the application of these concepts.
- Directed learning supplements the development of concepts.
- Computer workshops and laboratory sessions develop skills and underpin the lecture material with concrete learning experiences.
- Seminars support the lectures and the consolidation and application phase of your learning process.
- Supervised project work develops a deeper understanding of concepts and applications and promotes the development of personal skills.

The University runs an online resource to support teaching and learning, referred to as a Virtual Learning Environment and known as the NTU On-line Workspace (NOW). All modules are represented on NOW and use it to provide you with learning material and news associated with the module or the course. The nature of the course means that some of your learning can be directly computer-aided. To this end, NOW is a useful way of providing data-files, demonstrations, and macros/programs.

## 9. Assessment Methods

Modules are assessed either via coursework or exam, or a combination of both.

Coursework assessments can take many forms. You may be given a practical task or laboratory experiment to complete, which you then write up in a report. You may also have to demonstrate what you have done or give a presentation on what you have achieved. Some coursework assessments will involve working together in small groups. Coursework can also include the use of tests. Your final year Project will

involve giving a presentation and writing a dissertation to demonstrate what you have achieved.

The range of assessment methods aims to give you a variety of ways in which to demonstrate achievement as well as encouraging the development of time management and communication skills, as well as other skills valued by employers.

There are a number of pieces of work that are not formally assessed but which form a valuable part of your learning experience. For example, in many modules you will be issued with seminar problem sheets, and you will be expected to tackle these for yourself before the answers are provided, either in class or online. You are expected to fully engage with these activities, as they form an invaluable part of the process of developing you as an autonomous learner. You will also receive a lot of informal formative feedback on a one-to-one basis during laboratory sessions and after oral and poster presentations.

## 10. Course structure and curriculum

You will study a range of modules as indicated below.

**Year 1**

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| Mathematical Methods | 20cps |
| Introduction to Numerical Methods | 20cps |
| Vector Algebra & Calculus | 20cps |
| Laboratory Instrumentation & Physics Skills | 20cps |
| Ideas of Motion: Galileo to Einstein | 20cps |
| Matter: Evidence for Quantisation | 20cps |

**Year 2**

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| Differential Equations & Transform Methods | 20cps |
| Numerical Methods for Ordinary Differential Equations | 20cps |
| Advanced Calculus | 20cps |
| Thermal & Environmental Physics | 20cps |
| Fundamental Forces | 20 cps |
| The Quantum World | 20 cps |

**Year 3**

Industrial Placement year for Sandwich students

**Year 3/4**

Choose two of the following four modules:

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| Linear Systems | 20 cps |
| Differential and Integral Equations | 20 cps |
| Numerical Analysis & Dynamical Systems | 20 cps |
| Topics in Applied Mathematics | 20 cps |

Choose two of the following three modules:

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| Condensed Matter | 20 cps |
| Advanced Modern Physics | 20 cps |
| Advanced Experimental Techniques | 20 cps |

Choose either:

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| Project (Mathematics) | 20 cps |
| Professional Mathematics Skills | 20 cps |

Or:

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| BSc Project and Professional Skills (Physics) | 40 cps |

The course is studied either Full Time over 3 years or over 4 years for the Sandwich mode. On the Sandwich route you will undertake a placement working within a company for at least 36 weeks between your second year and your third year. Successful completion of the year of industrial experience is necessary for you to gain the Sandwich award. For this, you will write a report detailing and evaluating the work you undertook and your part in the overall company context. You will also receive a Diploma in Professional Practice, or an International Diploma in Professional Practice for an international placement. If you are successful in completing a placement of between 6 and 35 weeks' duration, then you will receive a Certificate of Professional Practice. Opportunities also exist to study abroad, ranging from summer schools to year-long exchange programmes. In Full Time mode, you will go directly into the third year after your second year.

You need to obtain 360 cps (credit points), 120 cps per year, to gain the honours qualification. Your final degree classification will be based on your year 2 mark (weighting 20%) and your final year mark (weighting 80%). Students who do not obtain enough credit points may be eligible for one of the following awards: Certificate of Higher Education (120 cps); Diploma of Higher Education (240 cps); or Ordinary degree (300 cps).

## 11. Admission to the course

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

There is an induction programme at the start of the first year. This gives an overview of the way the course runs and includes introductions to the IT and library resources, and the online course handbook that contains essential information about the course and the support we provide for your learning. You will also meet your Personal Tutor, Year Tutor, Course Manager, and Student Mentor (students in year 2 or 3 of tour course).

You are assigned a Personal Tutor at the start of the course and regular meetings will take place throughout each year. Module Leaders, Year Tutors and a Course Manager

oversee the smooth running of the course and they also serve as an additional source of support and advice for you.

Extensive online module information including learning materials is provided on the University Virtual Learning Environment, NOW. This also includes course information such as the course handbook and module specification documents. We have excellent computing facilities with some 24 hour availability for IT labs.

The school has a Student Information Desk for assessment hand-in and return, queries about fees, and other general queries.

If you decide to opt for the Sandwich award, the Mathematics Placements and Employability Tutor will work with you to develop your CV and will help you to target your applications so that you get a placement that is right for you. You will be assigned a visiting tutor who will visit you at the company.

In addition to the support above, the University Student Support Services can give you extensive support and advice on a range of issues, e.g. financial problems, dyslexia and disability, and personal problems.

## 13. Graduate destinations / employability

Graduate employability is fundamental to the strategic aims of Nottingham Trent University, as reflected by the fact that NTU is consistently placed close to the top of the league table of all UK Universities for graduate employment.

This course will equip you with the knowledge and transferable skills for employment in a broad range fields related to physics and mathematics. There are opportunities for graduates in physics and mathematicians throughout industry such as engineering, management, business, commerce, and the public sector, and also in the education sector in roles such as teaching.

Graduates who choose to venture into other sectors will be equally successful in gaining employment because of the many transferable skills developed on this course. Skills of numeracy, reasoning, presentation and report writing, together with the analytic approach to problem solving that you will acquire, are highly valued by employers.

As a graduate from this course, you will be equipped with the knowledge and skills needed to engage in further study, either whilst at your place of employment (for professional and personal development) or at university (for a higher degree).

In addition to the expertise available within the School, the University has a comprehensive careers service open to all students to assist in securing employment

(http://www.ntu.ac.uk/careers/).

14. **Course standards and quality**

All aspects of quality management within the School are in accordance with the University's Academic Standards and Quality Handbook. The Course Management Team, which includes the Course Manager and Module Leaders, oversees the operational arrangements for the Course. In addition, the Course Committee, central to which are the student representatives, meets regularly throughout the year to review, evaluate and develop the Course. Formal course monitoring takes place at the end of each module through the administration of questionnaires offering closed and open ended questions, which is in addition to informal feedback received from students throughout the year.

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. Feedback from the Course Committee and student evaluation at module and course level inform the Interim Course Report (ICR), which reviews and evaluates the student experience at course level. In turn the ICR informs the School Standards and Quality Report (SSQR), which is presented to the University as part of the institutions quality assurance and enhancement cycle. The ICR also informs a Periodic Course Review every three years to ensure that the course remains current and that standards have been maintained.

15. **Assessment regulations**

This course is subject to the University's Common Assessment Regulations (located in its Academic Standards and Quality Handbook). Any course specific assessment features are described below:

There are no course specific exceptions from the University regulations.

16. **Additional Information**

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| Collaborative partner(s): | N/A |
| Course referenced to national QAA Benchmark Statements: | Physics, and Mathematics, Statistics and Operational Research. |
| Course recognised by: | |
| Date this course specification approved: | 21st March 2018 |
| Any additional information: | |
| Course specification updated: | April 2018 |