Nottingham Trent University Course Specification

	Basic Course Information	
1.	Awarding Institution:	Nottingham Trent University
2.	School/Campus:	School of Science & Technology / Clifton Campus
3.	Final Award, Course Title and Modes of Study:	BSc (Honours) Physics with Nuclear Technology, FT & SW
4.	Normal Duration:	FT 3 years, SW 4 years
5.	UCAS Code:	F390

6. Overview and general educational aims of the course

Physics is concerned with the observation, understanding and prediction of natural phenomena and the behaviour of man-made systems. It is both a theoretical and practical discipline that continually evolves. Studying physics at university brings benefits that last a lifetime, and knowledge and skills that are valuable outside of physics.

This physics with nuclear technology course addresses the more general and fundamental topics of physics in the first year, and then provides a selection of more advanced topics in later years. You will develop investigative, experimental, mathematical, computational and other transferable skills. You will also gain a sound knowledge of some important topics in nuclear technology. It is a broad-based course that will help to make you numerate, articulate and eminently employable. The course may be studied full time over 3 years, or as a sandwich course by adding a placement year between Levels 2 & 3. Institute of Physics accreditation has been granted for the course in either mode.

The fundamental topics covered are classical and quantum mechanics, wave phenomena, electromagnetism, optics, thermodynamics and properties of matter. These areas are applied to such topics as condensed matter and imaging in later years. There is also a more specialist strand of Nuclear Technology that is developed throughout the course.

Opportunities exist to engage with a range of advanced concepts and applications, drawing upon the specialist expertise of the staff.

In summary, the course aims to:

- Provide you with an enjoyable and worthwhile educational experience in the fields of physics and nuclear technology.
- Enable you to graduate with theoretical knowledge and practical skills relevant to physics.
- Prepare you for a wide range of employment within the broad area of physics, as well as for postgraduate studies.
- Encourage and assist you to realise your full academic potential, whatever your academic background prior to coming to university, and to enhance your employment and career opportunities.
- Facilitate your personal development through the acquisition and use of a wide range of transferable skills.
- Generate an environment that is both caring and supportive in terms of both pastoral and academic aspects of university life.
- Allow you to benefit from a wide range of teaching methods and broaden your learning experience.

BSc(Hons) Physics with Nuclear Technology shares a common first year with BSc(Hons) Physics, MSci Physics, and BSc(Hons) Physics with Astrophysics: transfers between these four courses are therefore negotiable at the end of that year.

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. 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. (B)
2. Execute an experiment, computer simulation or investigation; critically analyse the results and draw valid conclusions. You should be able to evaluate the level of uncertainty in their results. (B)
3. Solve problems in physics using appropriate mathematical tools. You should be able to identify the relevant physical principles, translate problems into mathematical statements, and apply their knowledge to obtain order-of-magnitude or more precise solutions as appropriate. (B)
4. Use mathematical and computational techniques and analysis to model physical behaviour.
5. Communicate scientific information to a range of audiences. In particular, you should be able to produce clear and accurate scientific reports. (B)
6. Apply a working knowledge of a variety of experimental, mathematical and/or computational techniques applicable to research within physics. (B)
7. Demonstrate a sound familiarity with laboratory apparatus and techniques. (B)
8. Demonstrate knowledge of Health & Safety issues and regulations associated with nuclear technology. (B)
9. Demonstrate in-depth knowledge of topics of a technological nature.

(B) Indicates outcomes having specific reference to Quality Assurance Agency benchmark statements.

Skills, qualities and attributes

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

1. Use in a safe and competent manner laboratory equipment commonly employed in physics and its applications in nuclear technology, including radiation detection and measurement and non-destructive testing of materials.
2. Demonstrate good written and oral communication skills and present information in a clear and concise manner. (B)
3. Use appropriate IT packages/systems effectively for the analysis of data and the retrieval of information. (B)
4. Plan work and be able to work effectively as part of a team or independently. (B)
5. Apply problem solving skills to both problems with a well-defined solution and those that are open ended. (B)
6. Find, evaluate and manage information.
7. Manage your own learning and make use of appropriate texts and other learning resources. (B)
8. Explain what constitutes unethical scientific behaviour, and conduct your work, and especially your research activities, in an ethical manner.

8. Teaching and Learning Methods

The teaching and learning strategies for this course have been developed to support your acquisition of the knowledge, understanding and skills expected of a professional physicist, and have evolved over a number of years as a result of feedback, review and reflection. Autonomous learning is encouraged and motivated within the course through the following practices:

- Interaction with other students through work based in small groups.
- Presentation of concepts and findings to fellow students and tutors: this will help you to organise your thoughts and reflect on your understanding.
- Discussion of your ideas with tutors. Both self-directed and staff-directed investigation is important to the development of your learning autonomy. This culminates in the substantial final year project, where you will work on an advanced topic following an evolving plan negotiated with, and monitored by, your project supervisor.
- The application of the knowledge that you have gained within modules. The careful progression between the levels in the course ensures that you build upon and develop earlier knowledge and skills.

You will be expected to take progressively more responsibility for your own learning at each level.

Course delivery is supported by strategies to encourage you to consolidate and apply your knowledge. In order to realise the course aims, the following practices are adopted:

- Lectures are used to introduce and develop concepts and to explore their application. A subset of the core modules covers the fundamental physical laws to a greater depth at each level, and these laws are subsequently applied and reinforced in the other physics modules.
- Directed reading is used to supplement the concept development initiated through the lectures.
- Laboratory sessions are used to develop your practical skills and to underpin the lectures and directed reading.
- Seminars and examples classes are used to consolidate the application phase of your learning process: sometimes these will be integrated with the lectures.
- Mathematical skills are acquired within a dedicated first year module: you will subsequently learn how to apply them to gain a deeper understanding of the physics theories and applications covered in other modules.
- Supervised project work enables you to develop a deeper understanding of some of the concepts and applications, and helps to promote the development of your personal skills as a professional physicist.

All modules have a site on NOW, the Nottingham Trent University Online Workspace. NOW provides important information on each module, such as the syllabus, teaching schedule and assessment plan. Most module sites also store lecture notes and past examination papers, and provide links to other internet sites which are useful for that particular module. NOW also has a site that provides information at course level, such as notices and electronic versions of course handbooks, etc.

9. Assessment Methods

Broadly speaking, most modules are assessed by both examination and some form of coursework, although a small number of modules are assessed only by test/exam, whilst a larger number, including the project, are assessed entirely by coursework.

Physics is a discipline which is amenable to many types of assessment, and the philosophy of the teaching team is that the assessment strategies used within a particular module are chosen to be the most appropriate for that aspect of study. Often two or more different types of assessment are grouped together under a general heading, e.g. a "Portfolio" may include a range of tasks designed to demonstrate the acquisition of numerous skills.

Listed below are the main types of assessment that you will experience on the BSc Physics with Nuclear Technology course:

(a) Formal Laboratory Report
This assesses your ability to carry out a laboratory experiment and report on the findings in a scientific manner, discussing assumptions, error margins, conclusions, etc.

(b) Laboratory Notebook Entry
These encourage you to produce a contemporaneous record of laboratory activities, with suitable graphs, etc. A subset of the laboratory notebook entries will be expanded to form the formal laboratory reports.

(c) Formal Examination
These are used to assess your knowledge base and ability to integrate material under time constraints. Most are traditional closed book papers, but a small number may be revealed or open-book papers.

(d) Journal-Style Article
These test your ability to produce clear and accurate reports of investigations that you have carried out, in the style favoured by the major international physics journals.

(e) Oral Presentation
This assesses your oral communication skills and presentation skills using PowerPoint. Some of these are individual talks, whilst others are group presentations.

(f) Project
The project, carried out in the final year, tests your ability to design and implement an extended programme of work, and communicate the findings in a report written in an appropriate scientific manner.

(g) Literature Review
This forms part of the project and assesses your ability to find, evaluate and manage information.

(h) Poster
This also forms part of the project and tests your ability to condense your findings and present them in a visual format. You will also be expected to answer questions on the project based on the poster, as a means of assessing your oral communication skills.

(i) Problem Based Assignment
These assess your ability to apply mathematical and computational techniques to problems in physics.

(j) Class Tests
These are short tests, taken in the normal timetabled module slot. In some modules these are either open-book or partially revealed tests. Again they assess your knowledge base under timed conditions.

There are a number of pieces of work that are not formally assessed but which do 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

Each academic year you will study 120 credit points (cp) of modules:

Level 1
Ideas of Motion: From Galileo to Einstein (20cp)
Matter: Evidence for Quantisation (20cp)
Concepts of Astronomy & Cosmology (20cp)
Introduction to Laboratory Software (20cp)
Laboratory Instrumentation and Physics Skills (20cp)
Mathematical Techniques (20cp)

Level 2
Fundamental Forces (20cp)
Thermal & Environmental Physics (20cp)
Ionising Radiation & Non-Invasive Imaging (20cp)
Digital Techniques (20cp)
Nuclear Materials Science (20cp)
The Quantum World (20cp)

Optional sandwich placement year

Level 3
Project (40cp)
Condensed Matter (20cp)
Advanced Experimental Techniques (20cp)
Physics & Technology of Nuclear Reactors (20cp)
Laboratory Interfaces & Control (20cp)

In order to be awarded an honours degree, you must pass, or be compensated in, 360 credit points. Your final degree mark is made up from 25% of your second year mark and 75% of your third year mark. The degree classification awarded depends on your degree mark according to the following scheme:

70% and over	First class honours
60% - 69%	Upper second class honours
50% - 69%	Lower second class honours
40% - 49%	Third class honours

Students who pass Levels 1 & 2 plus a minimum of 60 credit points of level three modules are eligible for the award of an ordinary (unclassified) degree, provided that they have satisfied the learning outcomes of the course.

If you have passed modules worth 240 credit points, then you are eligible for the interim award of a Diploma in Higher Education. If you have passed modules worth 120 credit points, then you can be awarded an interim award of a Certificate of Higher Education. Please note that interim awards are only given to students on their exit from their course of study at NTU.

The course can be studied full time over 3 years or in sandwich mode over 4 years. On the sandwich route you will undertake a placement of 9 months or more with a company between your second year and your final year: this is usually salaried. You must successfully complete the period of industrial placement in order for you to be able to claim the sandwich award: in part this involves the writing of a report in which you detail and evaluate the work that you undertook and your part in the overall company context. You will also receive a Diploma in Professional Practice.

Due to the common first year curriculum of most of the physics degree courses, transfer to the second year of BSc Physics and BSc Physics with Astrophysics is possible upon successful completion of Level 1. Students with a suitable first year profile would also be considered for transfer to the second year of the MSci Physics course.

11. Admission to the course

The admissions policy for this course is administered in accordance with the University regulations, including a commitment to widening participation and equal opportunities.

For entry on to the BSc(Hons) Physics with Nuclear Technology course you would normally be over 18 years of age and possess one of the following:

- Five passes at GCSE grade C or above including passes in English and Mathematics and a minimum of 280 UCAS points at A2/AS level or equivalent (e.g. BTEC Nationals, International Baccalaureate). This will normally include at least a B and a C grade (in either order) in Physics and Mathematics at A2 level.
- Irish leaving certificate or Scottish National Higher qualifications in relevant subject areas at a suitable level.

Mature students with non-traditional qualifications with proven relevant experience and necessary motivation will be considered.

International qualifications are assessed for acceptability for entry based on the UCAS guide to international equivalences and on an appropriate English qualification.
Equivalent UK and International qualifications are acceptable. The equivalence of these qualifications to the standard entry requirements are usually established with reference to the published UCAS Tariff (e.g. Irish leaving certificate, Scottish National Higher and International Baccalaureate), the information published by UCAS ("International Qualifications Guide" and "UCAS Admissions Guide and Decisions Processing Manual"), and the recommendations of UK Naric. OCN and Access HE qualifications are acceptable if a sufficient number of level 3 units in Maths and Physics have been taken. Non-standard qualifications are referred to the admissions tutor for assessment.

If you wish to use Accreditation of Prior Experiential Learning (APEL) or Accreditation of Prior Certified Learning (APCL) for entry to this course, you will be assessed according to the standard procedures of the School of Science and Technology.

If you request APCL, you will be required to produce a transcript and details of the units/modules you have studied at your former institution to assist with the curriculum mapping process. This institution may be contacted before a final offer is made to confirm your suitability for the course of study.

If you wish to use APEL for entry to the start of the course, or exceptionally, for advanced entry, you will be required to provide a detailed curriculum vitae outlining relevant experience. You will be asked to complete an appropriate assignment to enable you to demonstrate your learning for which equivalence is being claimed.

If English is not your first language, you are expected to have a good command of spoken and written English. The minimum recommended requirement is the British Council IELTS grade 6.5 or CBTOEFL 213 or IBTOEFL 83. Equivalent experience may include the successful completion of a non-UK degree in the English language or a significant period of residence/work placement in an English-speaking country, for which evidence should be provided.

Advanced entry would normally be into Level 2 of the course, for which you would possess an appropriate Foundation Degree or HND in Physics or an equivalent subject. In order to ensure potential applicants from FdSc or HND routes have the suitable experiences to enable them to successfully progress on to MSci Physics, it is likely that the Admissions Tutor will request information about previous learning, for example transcripts and course content. Advanced entry into Level 3 would be considered in exceptional circumstances (e.g. successful completion of a Bachelor's degree and relevant certified/experiential learning).

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

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, and you will find that there are lots of people to support you at Nottingham Trent University.

You will have full access to Nottingham Trent University's 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, you will experience the full support of the Physics subject team. The Academic Team Leader for Physics and Mathematical Sciences, with support from the Courses Manager, Year Tutors, Module Leaders, and your Personal Tutor, takes overall responsibility for your support and guidance. Your Module Leaders will offer guidance and support to for each specific module that you take: indeed, the Physics subject team operates an open door policy and you are welcome to discuss academic problems linked to a specific module with the lecturer concerned.

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;
- Health and Safety procedures.

During your induction you will be assigned a Personal Tutor and informed about the best way to get in touch with your Course Leader and Module tutors. Every year, you will have regular time-tabled sessions with your Personal Tutor, in small groups. Your group tutorials will help you to reflect on your approaches to study and make connections between modules, integrating material from across the curriculum and encouraging you to achieve your maximum potential. You will also have an opportunity to discuss and deal with any personal or course-related issues which may be affecting your studies and get advice on what support the university can offer. Personal tutorials can also be used for personal development planning and skills development.

Student Mentors are also used to provide you with learning support. Student Mentors are typically students at Level 2 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 School operates a "one-stop-shop" administrative centre for assessment hand-in and return, queries about fees, and other general queries. The friendly staff in the centre are always available to help.

If you decide to follow the sandwich route, the School Placements 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 also be assigned a visiting academic tutor who will monitor your progress and visit you at the company.

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.

The University also has a Virtual Learning Environment called NOW (Nottingham Trent University Online Workspace). General information concerning the curriculum, module specifications, timetables, assessment schedules, etc. are available on the course sites, whereas module sites give syllabus details, assessment details, and, frequently, lecture material. This is an important educational aid whose use is steadily expanding.

The Clifton Library houses a vast number of physics textbooks, and has access to a reasonable number of relevant periodicals, many in electronic form. Library & Learning Resources (LLR) staff offer support for your learning needs. Both group and individual sessions are available to enable you to use the library resources to the full.

13. Graduate destinations / employability

Graduate employability is fundamental to the strategic aims of Nottingham Trent University, and this is reflected by our consistently high standings in the UK University league tables for graduate employment.

By the end of the course you will have developed a range of transferable skills, making you more attractive to potential employers.

Graduates in physics are needed in industry where their training in the methodology of physics equips them for positions in engineering, management and administration in a wide range of roles with a strong technological bias.

A proportion of graduates continue their studies at either masters or PhD level.

There is a shortage of qualified physics teachers in schools, which is not being met by the available graduates. NTU offers a PGCE in Physics Secondary Education, which you could embark upon following graduation from BSc Physics with Nuclear Technology, should you obtain a sufficiently high classification.

The University Careers Development Centre helps you find suitable employment. It offers sessions on such topics as interview technique and filling in application forms, and well as having psychometric tests available to see what type of careers suit your personality.

14. Course standards and quality

The course teaching team takes day-to-day responsibility for managing the Physics Cluster of courses. The design and delivery of the course are under the control of the Courses Committee. This committee has student representatives on it, who are elected by other students. The role of the student representatives is to gather feedback from fellow students, write a report, and present this at the Courses Committee. Student reps can also bring any concerns of students to the Courses Manager, enabling problems to be dealt with in a timely manner.

A team of External Examiners monitors the standards and quality of the course. Each External Examiner produces a detailed written annual report: these are considered by the Courses Committee, which uses the reports as one source of evidence when drawing up an action plan for the forthcoming year. Academic staff gather student feedback towards the end of each module, and this is reported on in the module leader's report, which also discusses all aspects of the delivery of the module for that academic year. The Courses Manager, on behalf and with the support of the Courses Committee, produces an annual Course Standards and Quality Report (CSQR), which is informed by numerous sources, including the External Examiners' reports, module leaders' reports, and contributions for each individual member of the Physics teaching team. The CSQR is considered at a meeting of the School of Science & Technology's Academic Standards & Quality Committee, where any issues arising are noted and the actions taken to alleviate them are reported back. In turn, the CSQR informs the annual School Standards and Quality Report (SSQR), which is scrutinised by senior University staff charged with overseeing the maintenance of the institution's high standards of educational provision.

The School operates a peer observation of teaching policy, whereby all lecturers are seen regularly in a teaching capacity by other lecturers within the teaching team. Suggestions for improvements are made, and other members of staff informed of good practices.

At the design stage of the course, the outcomes were aligned to those suggested within the benchmark statements of the Quality Assurance Agency for Higher Education. Statements from the Institute of Physics concerning key skills and knowledge for university level physicists were also given due consideration at this point.

The BSc(H) Physics with Nuclear Technology course is accredited by the Institute of Physics. To achieve this accreditation, the curriculum, the teaching staff, the facilities and the assessments have to achieve certain standards. Every four years the course is reaccredited to ensure that standards have been maintained.

15. **Assessment regulations**

The University's Common Assessment Regulations can be found in its Academic Standards and Quality Handbook). There are no course specific assessment features.

16. **Additional Information**

Collaborative partner(s):	None
Course referenced to national QAA Benchmark Statements:	The QAA descriptors for a qualification at BSc level in Physics & Astronomy have informed the design of this course.
Course recognised by:	Institute of Physics
Date implemented:	May 2012
Any additional information:	