Course Specification

Published Date:	24-Sep-2020
Produced By:	Oliver Jones
Status:	Validated

Core Information

Awarding Body / Institution:	University of Wolverhampton		
School / Institute:	Wolverhampton School of Sciences		
Course Code(s):	AP002H01UV AP002H31UV	Full-time Part-time	3 Years 6 Years
UCAS Code:	38R1		
Course Title:	BSc (Hons) Physics		
Hierarchy of Awards:	Bachelor of Science with Honours Physics Bachelor of Science Physics Diploma of Higher Education Physics Certificate of Higher Education Physics University Statement of Credit University Statement of Credit		
Language of Study:	English		
Date of DAG approval:	25/Sep/2017		
Last Review:	2016/7		
Course Specification valid from:	2016/7		
Course Specification valid to:	2022/3		

Academic Staff

Course Leader:	Dr Fabrice Laussy
Head of Department:	Georgina Manning

Course Information

Location of Delivery:	University of Wolverhampton
Category of Partnership:	Not delivered in partnership
Teaching Institution:	University of Wolverhampton
Open / Closed Course:	This course is open to all suitably qualified candidates.

Entry Requirements:

Entry requirements are subject to regular review. The entry requirements applicable to a particular academic year will be published on the University website (and externally as appropriate e.g. UCAS

- A minimum of 136 UCAS points from at least two A Levels or equivalent
- Post-16 qualifications should include study of Physics and Mathematics at A Level or equivalent, with pass grades being obtained in both of these subjects.
- Achieve the Access to HE Diploma gaining 60 credits in total with at least 45 credits achieved at level 3, of which 36 credits must be in science based units at level 3, including passes in Physics units: at least 27 of these 36 credits must be achieved at Merit or above and 9 credits with Pass or above.
- Applicants will normally be expected to hold GCSE English language and Mathematics at grade C or equivalent

Distinctive Features of the Course:

Physics is the most multifaceted discipline of Science. It involves exploring, experimenting and theorising, with all the scientific topics as its playground. A physicist is someone who wants to figure things out. To do so, he/she relies on a broad toolkit, from complex simulations run by computer codes to simple models based on a mathematical idea. Our course of Physics allows students to discover where lies their best potential.

If you like to think, guess, bet, tweak, explore, discover and want to contribute to tomorrow's new and emerging technologies, the Physics course is a good place to be.

Educational Aims of the Course:

The BSc (Hons) Physics course provides training in the core disciplines of Physics, bringing you to the edge of our contemporary understanding of the scientific disciplines that study the nature and properties of light and matter at low energies. An underpinning knowledge base will be developed in the structure and behavior of the objects and technologies that surround us on a daily basis. You will explore key topics including mechanics, optics, and electromagnetism—at both the classical and quantum level—and how these are articulated and combined together to give rise to the physics of the solid state and other condensed matter. An emphasis will be given to how this knowledge can be applied in a practical context through continuous and intensive laboratory-based explorations. The degree program will be supported by strong foundation teaching in study skills, with additional instruction in mathematics and computing provided throughout the course. All students will be given the opportunity to undertake their own research project in the final year of study, supervised by research-active University staff of international recognition. An appreciation of the application of physics will be developed through contributions by employers towards the delivery of the course. The University of Wolverhampton Enterprise and Employability Award is embedded into the course, with all first year students completing the Bronze Award and the Silver Award being completed during your second year of study. An optional sandwich placement is available for students who wish to gain valuable experience in industry and further enhance their employability, contributing towards the Gold Enterprise and Employability Award. All students will produce a Physics Skills e-portfolio over the duration of their studies which will act as a showcase of their skills for future employers.

Intakes:

September

Major Source of Funding:

Office for Students (OFS)

Tuition Fees:

Tuition fees are reviewed on an annual basis. The fees applicable to a particular academic year will be published on the University website.

Year	Status	Mode	Amount
2020/1	H	Full Time / Sandwich	£9250.00
2020/1	Overseas	Full Time / Sandwich	£12250.00
2020/1	H	Part Time	£3050.00
2020/1	Overseas	Part Time	£6125.00

PSRB:

None

Course Structure:

September (Full-time)

Part time students study alongside full time students. However, they do not study more than 80 credits in each academic calendar year.

Year 1

Full time and Sandwich Undergraduate Honours students normally study 120 credits per academic year; 60 credits semester 1 and 60 credits semester 2.

Module	Title	Credits	Period	Type
4AP001	Optics	20	SEM1	Core
4MM018	Core Techniques in Mathematics	20	SEM1	Core
4MM024	Mechanics	20	SEM1	Core
4AP003	Quantum Mechanics	20	SEM2	Core
4AP004	Electromagnetism I	20	SEM2	Core
4AP006	Scientific Computing	20	SEM2	Core

September (Full-time)

Part time students study alongside full time students. However, they do not study more than 80 credits in each academic calendar year.

Year 2

Full time and Sandwich Undergraduate Honours students normally study 120 credits per academic year; 60 credits semester 1 and 60 credits semester 2.

Module	Title	Credits	Period	Type
5AP001	Electromagnetism II	20	SEM1	Core
5AP002	Solid State Physics	20	SEM1	Core
5MM002	Mathematical Analysis	20	SEM1	Core
5AP004	Thermodynamics and Statistical Physics	20	SEM2	Core
5AP005	Quantum Physics	20	SEM2	Core
5AP006	Numerical Methods	20	SEM2	Core

September (Full-time)

Part time students study alongside full time students. However, they do not study more than 80 credits in each academic calendar year.

Year 3

Full time and Sandwich Undergraduate Honours students normally study 120 credits per academic year; 60 credits semester 1 and 60 credits semester 2.

Module	Title	Credits	Period	Type
6AP010	Modern Physics	20	SEM1	Core
6AP002	Computational Physics	20	SEM1	Core
6AP003	Research Project 1	20	SEM1	Core
6AP001	Condensed Matter Physics	20	SEM2	Core
6AP012	Electrodynamics	20	SEM2	Core
6AP009	Research 2	20	SEM2	Core

Please note: Optional modules might not run every year, the course team will decide on an annual basis which options will be running, based on student demand and academic factors, to create the best learning experience.

Learning, Teaching and Assessment

Academic Regulations Exemption:

None

Reference Points:

Quality Code - Part A: Setting and Maintaining Academic Standards. Including :

Qualifications Frameworks

Characteristics Statements

Credit Frameworks

Subject Benchmark Statements – QAA Subject Benchmark for Physics, astronomy and astrophysics(2008)

The Physics Degree (2014) Institute of Physics

Quality Code - Part B: Assuring and Enhancing Academic Quality

University Policies and Regulations

Equality Act (2010)

Learning Outcomes:

CertHE Course Learning Outcome 1 (CHECLO1)

Demonstrate knowledge of the underlying concepts and principles associated with your area(s) of study, and an ability to evaluate and interpret these within the context of that area of study

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CertHE Course Learning Outcome 2 (CHECLO2)

Demonstrate an ability to present, evaluate and interpret qualitative and quantitative data, in order to develop lines of argument and make sound judgements in accordance with basic theories and concepts of your subject(s) of study.

CertHE Course Learning Outcome 3 (CHECLO3)

Evaluate the appropriateness of different approaches to solving problems related to your area(s) of study and/or work

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CertHE Course Learning Outcome 4 (CHECLO4)

Communicate the results of your study/work accurately and reliably, and with structured and coherent arguments

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CertHE Course Learning Outcome 5 (CHECLO5)

Demonstrate the qualities and transferable skills necessary for employment requiring the exercise of some personal responsibility

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DipHE Course Learning Outcome 1 (DHECLO1)

Demonstrate knowledge and critical understanding of the well-established principles of your area(s) of study, and of the way in which those principles have developed with an understanding of the limits of your knowledge, and how this influences analyses and interpretations based on that knowledge.

DipHE Course Learning Outcome 2 (DHECLO2)

Demonstrate the ability to apply underlying concepts and principles outside the context in which they were first studied, including, where appropriate, the application of those principles in an employment context

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DipHE Course Learning Outcome 3 (DHECLO3)

Demonstrate knowledge of the main methods of enquiry in the subject(s) relevant to the named award, and ability to evaluate critically the appropriateness of different approaches to solving problems in the field of

study

DipHE Course Learning Outcome 4 (DHECLO4)

Use a range of established techniques to initiate and undertake critical analysis of information, and to propose solutions to problems arising from that analysis

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DipHE Course Learning Outcome 5 (DHECLO5)

Effectively communicate information, arguments and analysis in a variety of forms to specialist and non-specialist audiences, and deploy key techniques of the discipline effectively

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DipHE Course Learning Outcome 6 (DHECLO6)

Demonstrate the qualities and transferable skills necessary for employment, requiring the exercise of personal responsibility and decision-making and undertake further training, developing existing skills and acquire new competences that will enable them to assume significant responsibility within organisations.

Ordinary Degree Course Learning Outcome 1 (ORDCLO1)

demonstrate a knowledge and understanding of the fundamental laws of physics and their principles.

Ordinary Degree Course Learning Outcome 2 (ORDCLO2)

apply the principles of physics to solve problems using appropriate mathematical tools.

Ordinary Degree Course Learning Outcome 3 (ORDCLO3)

establish an ability to use mathematical techniques and appropriate ICT packages/systems and analysis to model physical behaviour

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Ordinary Degree Course Learning Outcome 4 (ORDCLO4)

demonstrate a familiarity with practical techniques associated with physics

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Ordinary Degree Course Learning Outcome 5 (ORDCLO5)

execute investigations in physics

Honours Degree Course Learning Outcome 1 (DEGCLO1)

demonstrate a sound knowledge and understanding of the fundamental laws of physics and their principles.

Honours Degree Course Learning Outcome 2 (DEGCLO2)

apply the principles of physics to solve problems using appropriate mathematical tools.

Honours Degree Course Learning Outcome 3 (DEGCLO3)

establish an ability to use mathematical techniques and appropriate ICT packages/systems and analysis to model physical behaviour

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Honours Degree Course Learning Outcome 4 (DEGCLO4)

show competence in practical techniques associated with physics

Honours Degree Course Learning Outcome 5 (DEGCLO5)

"execute investigations in physics and critically analyse experimental results, drawing valid conclusions from the findings."

Honours Degree Course Learning Outcome 6 (DEGCLO6)

"validate, manage and implement a research study in Physics, effectively disseminating the scientific findings which arise."

Overview of Assessment:

Module	Title	Course Learning Outcomes
4AP001	Optics	CHECLO1, CHECLO2, CHECLO3, CHECLO4, CHECLO5
4AP003	Quantum Mechanics	CHECLO1, CHECLO2, CHECLO3, CHECLO4
4AP004	Electromagnetism I	CHECLO1, CHECLO2, CHECLO3, CHECLO4, CHECLO5
4AP006	Scientific Computing	CHECLO1, CHECLO2, CHECLO3, CHECLO4
4MM018	Core Techniques in Mathematics	CHECLO1, CHECLO2, CHECLO3, CHECLO4
4MM024	Mechanics	CHECLO1, CHECLO2, CHECLO3, CHECLO4, CHECLO5
5AP001	Electromagnetism II	DHECLO1, DHECLO2, DHECLO3, DHECLO4, DHECLO5, DHECLO6
5AP002	Solid State Physics	DHECLO1, DHECLO2, DHECLO3, DHECLO4, DHECLO5, DHECLO6
5AP004	Thermodynamics and Statistical Physics	DHECLO1, DHECLO2, DHECLO3, DHECLO4, DHECLO5, DHECLO6
5AP005	Quantum Physics	DHECLO1, DHECLO2, DHECLO3, DHECLO4, DHECLO5
5AP006	Numerical Methods	DHECLO1, DHECLO2, DHECLO3, DHECLO4, DHECLO5
5AP008	Physics Sandwich Placement	DHECLO2, DHECLO5, DHECLO6
5MM002	Mathematical Analysis	DHECLO1, DHECLO2, DHECLO3, DHECLO4, DHECLO5
6AP001	Condensed Matter Physics	DEGCLO1, DEGCLO2, DEGCLO3, DEGCLO4
6AP002	Computational Physics	DEGCLO2, DEGCLO3, DEGCLO5
6AP003	Research Project 1	DEGCLO1, DEGCLO2, DEGCLO3, DEGCLO6
6AP009	Research 2	DEGCLO1, DEGCLO2, DEGCLO3, DEGCLO4, DEGCLO5, DEGCLO6
6AP010	Modern Physics	DEGCLO1, DEGCLO2, DEGCLO3
6AP012	Electrodynamics	DEGCLO1, DEGCLO2, DEGCLO3, DEGCLO4

Teaching, Learning and Assessment:

A structured acquisition of knowledge and understanding of physics will be developed through traditional lectures supported by problem-solving work in tutorial classes. The applications of physics will be enhanced by contributions from employers within the subject area. Students will be presented with theoretical information in lecture sessions and then will use workshops, directed self-study, group tutorials, seminars and a range of IT-based activities such as on-line computer packages and laboratory based sessions to develop these concepts. Most of these sessions will focus on problem-based learning where students are required to utilise their knowledge to solve problems in applied subjects. Training in using the scientific literature will be provided through directed reading, with access to the American and European Journals of Physics and supervised guidance to this material along with activities involving student’s presentations, reports and a

journal club. The learning activities shall be focused on moving from a more tutor-centred approach in the earlier parts of the course towards a student-centred learning approach in the latter stages. On the first year, extra tutorial time in class, free to attend, is scheduled (weekly in semester 1 and bi-weekly in semester 2) for the benefit of students with lower entry points to support them if needed. Formative assessments will be used to allow students to assess their own understanding and provide indications to staff on their attainment.

Skills development forms an important part of the programme of study with both generic skills and practical skills being embedded throughout. All students will be required to construct an electronic Physics Skills e-portfolio throughout their whole degree programme. Each subject based workshop and practical class will require students to complete a short skills assessment of what has been achieved in that class which will be uploaded to their e-portfolio. Additional material will be added as part of the final year research project and the sandwich placement, if applicable. Students will be required to share their e-portfolio to their personal tutor at the end of each semester in order to obtain formative feedback at a scheduled personal tutor meeting. During the final year of study the e-portfolio will be required to be formally submitted as part of 6AP003 Research 1 module.

Generic skills will be embedded throughout the whole programme of modules. First year, first Semester modules will teach students how to make use of learning resources, including appropriate texts, research articles and electronic resources and will guide them in the correct use of information sources as well as good academic practice including scientific writing, correct referencing and avoidance of plagiarism. Formative use of plagiarism software will be incorporated in order to foster this aim. A further introduction to study skills will be provided as part of the 4AP003 Quantum Mechanics module, where students will be intensively trained in the self-study of a material by direct supervision in-class. In subsequent modules, students will be given opportunities to effectively communicate scientific information through the production of clear and accurate scientific essays, practical reports and presentations. Computer skills will be developed throughout the course, starting with 4AP006 that provides the basics of programming and data manipulation through to 6AP002 that provides advanced computational methods. A high capability in mathematical skills is critical for the physicist, including ability in numerical manipulation, presenting and interpreting information graphically, developing an ability to use mathematical techniques and analysis to model physical behaviour, alongside dealing with more abstract concepts. A strong emphasis will be placed on mathematics throughout the course, through Physics-tailored modules starting with 4MM011 Mathematics for Physicists. Students will be trained to develop effective time management skills throughout the whole of their course, contributing towards the management of their own learning.

Intensive practical skills will be embedded within most modules to develop competency, alongside an appreciation of the link between theory and practice that characterises Physics. The opportunity to develop additional practical skills, such as engineering workshop skills, exists during University Career Development Week activities. These additional skills can be evidenced in the student's 'Physics Skills e-portfolio' and will contribute towards their future employability. All students in their final year of study will be required to complete a Physics Research Project. This provides the student with the opportunity to undertake their own research into a physics-based problem whilst developing an in depth understanding of research methodology and data analysis. Options for involving employers and other external actors will be sought to further strengthen employability as part of both modules of a Research character.

Assessment Methods:

At the University of Wolverhampton, a variety of modes of assessment will be used to support and test your learning and progress and to help you develop capabilities that are valued beyond your University studies and into your working life. Your course may include a variety of assessment activities:

Written examinations (including online examinations, open and closed book examinations and quizzes)
Coursework (for example, essays, reports, portfolios, project proposals and briefs, CVs, poster presentation)
Practical (for example, oral and video presentations, laboratory work, performances, practical skills assessment)

In the final year of your undergraduate degree, and at the end of your postgraduate degree, you are likely to be expected to write an extended piece of work or research, such as a dissertation or a practice-based piece of research.

Student Support:

Each student will be allocated a personal tutor who can provide general help, advice, guidance and, if required, direct them to services such as the Student Office, Counselling Services, Student Enabling Centre, Student's Union, Chaplaincy (all Faiths), Study Skills (Learning centre, see below). The personal tutor will also be responsible for advising on progress of the Physics Skills e-portfolio each semester. The Director of Studies of the course will also provide one hour every week in semester 1 and every other week in semester 2, of in-class tutorials to address all academic questions, cross-fields, that need further development, particularly generic mathematical support, which is typically the source of the greatest difficulties. The fact that this support will be given by someone external to the subject will allow to provide a different perspective to the material that causes difficulty.

Module-specific support is provided through the module team via face-to-face and electronic tutorials, scheduled drop-in sessions or SAMS (Student Appointment Management System) appointments. Feedback from formative and some summative assessments will support learning by assisting the student in identifying and improving areas of weakness, and further developing areas of strength.

The team of Teaching Associates in the Faculty of Science and Engineering provides drop-in sessions for general study skills advice. Students will be also supported with study skills and mentoring support by the team of Graduate Teaching Assistants and student Peer Support 'Study Buddies' in the faculty.

The Faculty of Science and Engineering also offers a Student Support Team (located in the Faculty Administration Office) and this is a key additional source of support, particularly for non-academic related matters. This tends to be a student's first port of call and the team can advise students and, if required direct them to further University services as mentioned above.

There are also a range of support facilities (relating to assessment tasks) that are available in the Learning Resource Centre for students to access including the Maths Support Centre.

Employability in the Curriculum:

The University Enterprise and Employability Award is embedded within the course and the tasks associated with the award will be completed and uploaded to the Physics Skills e-portfolio. The 4AP006 Scientific Computing module will introduce students to the employability skills that are needed within a Physics-orientated career and will introduce the range of careers suitable for a physics graduate, with particular emphasis on those requiring high level computer skills as provided by our Physics course. The 4MM012 Mechanics module will require students to develop proposals requesting additional time on our most elaborate setup (smart carts) enabling further and/or more elaborate experiments to be conducted. These proposals will allow students to compete in a way similar to a research grant application, calling for them to promote their previous work on this setup and of their proposal for its future use if successful. This bidding contest will train students in a form of professional competition that is increasingly becoming the norm in the higher-education workplace. Completion of workshop tasks within these modules will enable students to obtain the Bronze Employability and Enterprise award. Students will subsequently complete the Silver Award as part of the level 5 modules, which will provide ample opportunities for developing written applications and/or presentations in cooperation with local professional bodies. Students will be required to complete a skills analysis, a written application or CV highlighting their skills and carry out an evaluation of a possible career option within the physics subject area. All students will be required to produce a career-action plan and deliver a poster presentation in their final year discussing their skills and career aspirations as part of the 6AP003 "Research 1" module. Students who complete the Physics Sandwich Placement or those undertaking alternative relevant work experience will then qualify for the Gold Award.

A wide range of assessments are incorporated into the course in order to encourage regular work and facilitate student understanding, including:

Phase tests/end examinations (seen and unseen, MCQ's, extended question and essay-type exams)

Practical reports and/or portfolios of practical reports

Case studies and problem-solving exercises

Oral and Poster Presentations

Written assignments

Personal Development Portfolio in the form of the Physics Skills e-portfolio

Structured assessment of a research project (from planning through to thesis submission)

Each module has two assessments, of two different types (e.g., written and oral). The variety of examination allows the examiner a more accurate assessment of the student's understanding and maturity, that can be impaired by personal aversion to a given type of assessment (for instance a time-constrained MCQ). It also trains the students in developing skills in several areas that will be of value for their future career prospects.

The assessment will evolve from mainly in-class work in the beginning of the course to more student centred work at the end of the course. This will include a focus on results obtained in the laboratory but analysed and interpreted in the student's own time through unsupervised preparation and work. As a consequence, the time in class gets increasingly decorrelated with the weight of the assessment as time passes.