

Programme Specification: Undergraduate

For students starting in Academic Year 2022/2023

1. Course Summary

Name of programme & award title with UCAS code	Mathematical and Theoretical Physics [F340]
Awarding Institution	Aberystwyth University
Individual Accreditation(s)	Recognised by the Institute of Physics (IOP) for the purpose of eligibility for Associate Membership.
Final Award	Bachelor of Science
Date of Publication	September 2023
QAA Subject Benchmark	Information provided by Department of Physics Details of the QAA Benchmark statement for Mathematics, Statistics and Operational Research can be found here

How this information might change: Please read the important information at <https://www.aber.ac.uk/en/study-with-us/ug-studies/terms-conditions/>. This explains how and why we may need to make changes to the information provided in this document and to help you understand how we will communicate with you if this happens.

2: Duration

Programme	Years
Mathematical and Theoretical Physics [F340]	3

3: Educational aims of the programme

Information provided by Department of Physics

This programme is a 3-year honours degree scheme in which almost the entire content is in Mathematics and Physics.

The educational aims of the programme are:

- To provide students, through an Institute of Physics recognised programme, with knowledge and understanding in a range of topics in Mathematics, including topics in Physics.
- To develop skills in the application of such knowledge and understanding to the solutions of problems in Mathematics and theoretical Physics.
- To develop the ability to transfer subject-specific skills to a range of topics in Mathematics.
- To prepare students for careers in Mathematics and in allied professions.
- To develop analytical reasoning skills, team-working skills, information technology skills and other skills appropriate to a wide range of careers.

4: Intended learning outcomes

Information provided by Department of Physics

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills, qualities and other attributes in the following areas:

5: Knowledge and understanding

Information provided by Department of Physics

Knowledge and understanding

- A1. Of fundamental concepts and techniques of calculus, algebra, geometry, analysis, mathematical modelling and of a core of physics.
- A2. Of more advanced concepts in abstract algebra, real and complex analysis, numerical mathematics and fluid dynamics.
- A3. Of a selection of specialist topics in Mathematics and Physics.
- A4. Of software for the analysis of numerical data.
- A5. Of software for supporting presentations and producing reports.

Teaching, learning and assessment methods used to enable outcomes to be achieved and demonstrated:

Formal lectures (A1-A4), tutorials (A1-A3), examples classes (A1-A3), practical classes (A4, A5), help-desk encounters (A1), student-initiated informal meetings with lecturers (A1-A4), coursework (A1-A4). Project consultations (A1-A5) for students who have chosen the appropriate module.

Assessment – unseen written examinations (A1-A3), Presentations (A1-A5), coursework (A1-A4), project report (A1-A5), if appropriate.

6: Skills and other attributes

Information provided by Department of Physics

10.2.1. Intellectual skills

The ability to

- B1. Calculate and manipulate data obtained from, or related to, the bodies of knowledge studied.
- B2. Apply a range of concepts and principles in well-defined mathematical or theoretical physics contexts, showing judgement in the selection and application of tools and techniques.
- B3. Develop and evaluate logical arguments.

B4. Abstract the essential elements of problems, formulate them in a mathematical context and obtain solutions by appropriate methods.

Teaching, learning and assessment methods used to enable outcomes to be achieved and demonstrated

Formal lectures, tutorials, examples classes, practical classes, revision workshops, help-desk encounters, project consultations, student-initiated informal meetings with lecturers. Skills B1-B4 are developed in all these learning situations.

Assessment - unseen written examinations, coursework, presentations, project report. Skills B1-B4 are assessed by all these assessment methods.

10.2.2. Professional practical skills

The Ability to

- C1. Present arguments and conclusions effectively and accurately.
- C2. Use computer software to analyse and interpret the data.
- C3. Use computer software to support presentations and produce reports..

Teaching, learning and assessment methods used to enable outcomes to be achieved and demonstrated

Formal lectures, tutorials, examples classes, practical classes, revision workshops, help-desk encounters, student-initiated informal meetings with lecturers. Project consultations where appropriate. Skill C1 is developed in all these learning situations, and skill C2 in practical classes.

Assessment – unseen written examinations (C1), presentations (C1 -C3), coursework (C1 -C2), project report (C1 - C3), if appropriate.

7: Transferable/Key skills

Information provided by Department of Physics

The ability to

- D1. Apply general mathematical skills to the interpretation of numerical data.
- D2. Work as a member of a team.
- D3. Use information technology effectively to manage information.
- D4. Manage time and resources effectively.
- D5. Develop effective learning skills.
- D6. Be aware of the need to plan for employment and of need to develop various skills for such employment.
- D7. Work independently

Teaching, learning and assessment methods used to enable outcomes to be achieved and demonstrated

Skill D1 is developed in all learning environments in the Department of Mathematics and assessed by all assessment methods. Skill D2 is developed during practical classes. Skill D3 is developed primarily in practical classes and assessed by coursework. Skill D3 is also developed through the use of e-mail, which is a normal means of communication between staff and students. Skills D4 and D5 are developed in an induction course on study skills, in preparing set coursework and submitting it by given deadlines. Skills D4 and D5 are not explicitly assessed. Skill D6 is developed at meetings with Personal Tutors, by the Careers Development Programme and assessed by a *Curriculum Vitae* prepared by the student, at occasional recruitment meetings arranged for final-year student in the Department of Mathematics and in other interactions with the Careers Advisory Service. Skills D4, D5 and D7 are developed by independent study for an optional project.

8: Work-based learning (where appropriate)

9: What is the structure of the programme?

Year 1 Core modules

Core (30 Credits)

Name	Module Code	Credits	Semester
Classical Physics	PH11010	10	Semester 1
Modern Physics	PH14310	10	Semester 2
Classical Dynamics	PM14010	10	Semester 1

Core (80 Credits)

Name	Module Code	Credits	Semester
Coordinate and Vector Geometry	MA10110	10	Semester 1
Probability	MA10310	10	Semester 1
Algebra	MA10510	10	Semester 1
Mathematical Analysis	MA11110	10	Semester 2
Differential Equations	MA11210	10	Semester 2
Statistics	MA11310	10	Semester 2
Calculus	MP10610	10	Semester 1
Further Algebra and Calculus	MP11010	10	Semester 2

Year 1

Options Choose 10 credits

Name	Module Code	Credits	Semester
Technegau Labordy ar gyfer Ffiseg Arbrolfol (10 Credyd)	FG15510	10	Semester 2

Technegau Labordy ar gyfer Ffiseg Arbrofol (10 Credyd)	FG15510	10	Semester 2
Career Planning and Skills Development	MP12910	10	Semester 2
Cynllunio Gyrfa a Datblygu Sgiliau	MT12910	10	Semester 2
Laboratory Techniques for Experimental Physics (10 Credits)	PH15510	10	Semester 2
Laboratory Techniques for Experimental Physics (10 Credits)	PH15510	10	Semester 2
Energy and the Environment	PH19010	10	Semester 2

Year 2 Core modules

Core (50 Credits)

Name	Module Code	Credits	Semester
Real Analysis	MA20110	10	Semester 1
Introduction to Abstract Algebra	MA20310	10	Semester 1
Linear Algebra	MA21410	10	Semester 2
Complex Analysis	MA21510	10	Semester 2
Distributions and Estimation	MA26010	10	Semester 1

Core (50 Credits)

Name	Module Code	Credits	Semester
Thermodynamics	PH21510	10	Semester 1
Electricity and Magnetism	PH22510	10	Semester 2
Principles of Quantum Mechanics	PH23010	10	Semester 2

Mathematical Physics	PM26020	20	Semester 1
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Year 2

Options Choose 20 credits (level 2) from mathematics and/or physics which must include 10 credits from the list below, subject to pre-requisites.

Name	Module Code	Credits	Semester
Hydrodynamics 1	MA25610	10	Semester 2
Advanced Dynamics	MA25710	10	Semester 2
Hydrodynameg 1	MT25610	10	Semester 2

Final Year Core modules

Core (20 Credits)

Name	Module Code	Credits	Semester
Particles, Quanta and Fields	PH33000	0	Semester 1
Particles, Quanta and Fields	PH33020	20	Semester 2

Core (40 Credits)

Name	Module Code	Credits	Semester
Group Theory	MA30110	10	Semester 1
Norms and Differential Equations	MA30210	10	Semester 1
Partial Differential Equations	MA34110	10	Semester 1
Probability and Stochastic Processes	MA37410	10	Semester 2

Final Year

Electives Choose 60 credits (level 3) from mathematics and/or physics, subject to pre-requisites

10: University Regulations

Details of University Regulations can be found at <https://www.aber.ac.uk/en/academic-registry/handbook/regulations/>

11: Support for students and their learning

12: Entry Requirements

Information provided by Department of Physics

Details of Degree Course Requirements can be found by [clicking this link](#).

Applications submitted on the basis of other qualifications and applications from mature-age candidates will be considered on an individual basis. Such applications must have a sufficient background in Mathematics and Physics to be able to cope this scheme.

Details of entry requirements for the scheme can be found at <https://courses.aber.ac.uk/>

13: Methods for evaluating and improving the quality and standards of teaching and learning

14: Regulation of Assessment

Academic Regulations are published as Appendix 2 of the Academic Quality Handbook: <https://www.aber.ac.uk/en/aqro/handbook/app-2/>

15: External Examiners

External Examiners fulfill an essential part of the University's Quality Assurance. Annual reports by External Examiners are considered by Faculties and Academic Board at university level.

16: Indicators of quality and standards

Information provided by Department of Physics

The latest Periodic Review Panel approved the quality of education in Mathematics in the Institute of Mathematics and Physics, referring to strengths and high standards in

- the quality and appropriateness of programme design and curricula,
- the quality of teaching,
- the quality of academic support and the approachability of staff,
- the quality of student achievement,
- the quality of its examination processes and procedures.

The degree scheme in this programme was also approved by the Institute of Mathematics and its Applications in 2009/10.

The Department Quality Audit questionnaire serves as a checklist about the current requirements of the University's Academic Quality Handbook. The periodic Department Reviews provide an opportunity to evaluate the effectiveness of quality assurance processes and for the University to assure itself that management of quality and standards which are the responsibility of the University as a whole are being delivered successfully.