Programme Specification (Undergraduate)
2020 - 2021
Date amended: February 2020

1. **Programme title(s) and UCAS code(s):**

F300 BSc Physics
BSc Physics with a Year Abroad*; BSc Physics with a Year in Industry*
F3F5 BSc Physics with Astrophysics
BSc Physics with Astrophysics with a Year Abroad*; BSc Physics with Astrophysics with a Year in Industry*
F365 BSc Physics with Space Science
BSc Physics with Space Science with a Year Abroad *; BSc Physics with Space Science with a Year in Industry*
F399 BSc Physics with Foundation Year†;
† satisfactory completion of the Foundation Year allows progression to any of the above-named programmes as an integrated programme of study
* Selected when on course

2. **Awarding body or institution:**

University of Leicester

3. **a) Mode of study:**

Full time

b) Type of study:

Campus-based

4. **Registration periods:**

The normal period of registration is three years (four years for BSc degrees with a year in industry/abroad, four years for BSc degrees with foundation year, five years for BSc degrees with foundation year and a year in industry/abroad)

The maximum period of registration is five years (six years for BSc degrees with a year in industry/abroad, six years for BSc degrees with foundation year, seven years for BSc degrees with foundation year and a year in industry/abroad)

5. **Typical entry requirements:**

Three A-levels including Physics and Mathematics, typical offer ABB to include Physics and Mathematics. International Baccalaureate 30 points to include Physics and Mathematics, at least one at Higher Level.

For BSc Physics with Foundation Year
A level: BCC or points equivalent from best three A levels. Typically in subjects outside of the 'usual' A levels expected by the department. BTEC Diploma: DDM in appropriate subject area. Access to HE courses in Science and Engineering: 45 L3 credits, including 30 at Distinction and remaining L3 credits at least at Merit.

6. **Accreditation of Prior Learning:**

APL will not be accepted for exemptions from individual modules, however may be considered for direct entry to year 2, on a case by case and subject to the general provisions of the University APL policy.

For Foundation Year Variant:
n/a

7. **Programme aims:**

The programme aims to:

- provide students with a coherent working knowledge of general physics
- provide exposure in some areas of physics to the frontiers of research
- generate interest in and understanding of the scope of physics {astrophysics / Space Science}
- enable students to explore their interests in and aptitudes for a range of areas of physics and technology
- provide the opportunity for students to achieve their full potential
- enable students to develop independent learning skills
- equip students with the knowledge and skills for employment in research and development, education, government, and science based industry, and for training at management levels in other professions

In addition, for the 'with Industry' variants

- To provide experience of applications of professional and discipline-specific skills in Industry and to reinforce knowledge through its use in different environments.

In addition, for the 'Year Abroad' variants

- To provide experience of study of physics, physics research, or related academic content at an appropriate level in a University in a different country, and to reinforce knowledge through its use in different environments.

For the Foundation Year variants, see Foundation Year Programme Specification

8. Reference points used to inform the programme specification:

- IoP accreditation [http://policy.iop.org/IOP/accreditation.html]
- QAA Benchmarking Statement for Physics, astronomy and astrophysics (2008) and departmental statement [http://www.le.ac.uk/physics/teach/docs/qaabenchmarks.pdf]
- University of Leicester Learning and Teaching Strategy 2011-2016
- University of Leicester Periodic Developmental Review Report
- External Examiners' reports (annual)
- University employability strategy
- Destinations of Leavers from Higher Education (DLHE) survey

9. **Programme Outcomes**

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
(a) Discipline specific knowledge and competencies		
(i) Mastery of an appropriate body of knowledge		
Typical students should be able to: recall and apply the basic concepts and laws of physics and related mathematics as specified in the Institute of Physics 'Core of physics'; solve model problems; conduct experiments and apply common experimental, computing, and programming techniques; discuss and describe some current research themes in physics; formulate evidence based scientific arguments.	Lectures; specified reading; problem classes; problem-based learning; group workshops; open ended group project work; laboratory practical classes; computer practical classes; research projects.	Written examinations; reports; oral presentations; assessed practical work; assessed computer exercises; assessed problems; group workshops; physics challenge problem sessions.
(ii) Understanding and application of key concepts and techniques		
Typical students should be able to: solve familiar and unfamiliar physics related problems; demonstrate novel application of basic knowledge; design, construct and conduct physics experiments; use computer programs to analyse data; describe and discuss the accumulation of scientific evidence.	Lectures; specified reading; problem classes; problem-based learning; group workshops; open ended group project work; laboratory practical classes; computer practical classes; research projects.	Written examinations; reports; oral presentations; assessed practical work; assessed computer exercises; assessed problems; group workshops; physics challenge problem sessions.
(iii) Critical analysis of key issues		
Typical students should be able to: critically appraise data and discuss its limitations; draw quantitative conclusions from sample data; critically assess and compare scientific theories in some areas.	Lectures; tutorials; problem-based learning; group workshops; open ended group project work; laboratory practical classes; computer practical classes; research projects.	Reports; oral presentations; assessed practical work; assessed computer exercises.
(iv) Clear and concise presentation of material		
Typical students should be able to: present scientific ideas, data and results in a variety of forms (e.g. reports, seminars, posters, papers etc); participate in scientific discussion and debate.	Tutorials; problem-based learning; group workshops; open ended group project work; laboratory practical classes; computer practical classes; research projects.	Reports; oral presentations; assessed practical work; assessed computer exercises; physics challenge problem sessions.
(v) Critical appraisal of evidence with appropriate insight		
Typical students should be able to discuss and implement experimental methodology; collect and critically analyse data; draw valid inferences from data in a variety of settings; discuss and criticize scientific literature.	Problem-based learning; lectures; open ended group project work; laboratory practical classes; computer practical classes; research projects.	Written examinations; reports; oral presentations; assessed practical work; assessed computer exercises; assessed problems; group workshops; physics challenge problem sessions.

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
(vi) Other discipline specific competencies		
Typical students should be able to: discuss, design and implement scientific experiments; competently use a range of standard laboratory equipment; describe and adhere to laboratory safety procedures; describe and discuss novel applications of physics; describe and discuss some areas of current research in physics; design, write and implement computer code to solve physics-based problems.	Tutorials; problem-based learning; open ended group projects; group workshops; research projects.	Written reports; oral presentations; assessed practical work; assessed computer exercises; written examinations.
(b) Transferable skills		
(i) Oral communication		
Typical students should be able to: organise, manage and present project work; collect and critically analyse data; solve unfamiliar numerical problems; design, write and implement computer programs; describe and discuss scientific concepts to a variety of audiences; apply scientific methods to novel situations.	Tutorials; problem-based learning; open ended group projects; group workshops; physics challenge sessions; research projects.	Oral project presentations and questioning; physics challenge problem sessions.
(ii) Written communication		
Typical students should be able to write concise and clear scientific reports, laboratory reports and project summaries; write CVs; clearly discuss some areas of current research in physics in written form.	Tutorials; problem-based learning; open ended group project work; laboratory practical classes; CV writing workshop; research projects.	Written project and laboratory reports; formatively assessed CVs; written exams.
(iii) Information technology		
Typical students should be able to: write software to solve numerical problems and analyse data; use mathematical packages for data analysis; use spreadsheets/word processing facilities.	Lectures; workshops; research projects; open ended group projects; laboratory practical classes; computer practical classes.	Assessed IT tasks; laboratory/project assessment; reports; assessed problems.
(iv) Numeracy		
Typical students should be able to: use analytical and graphical methods; analyse data; solve numerical problems involving e.g. calculus, linear algebra, vector and Fourier methods; apply and assess methods of numerical approximation.	Lectures; group problem solving workshops; problem-based learning; open ended group projects; research project; computer practical classes; laboratory practical classes; physics challenge sessions.	Written examinations; reports; oral presentations; assessed practical work; assessed computer exercises; assessed problems; group workshops; physics challenge problem sessions.

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
(v) Team working		
Typical students should be able to: discuss concepts and formulate plans working with peers; organise time and tasks coherently between group members; produce joint reports/presentations.	Group problem solving workshops; problem-based learning; open ended group projects; research projects.	Group assessment (outcomes and oral questioning); physics challenge sessions; assessed supervised team project meetings.
(vi) Problem solving		
Typical students should be able to: analyse problems; plan and implement projects; apply physics knowledge and problem solving ability to novel applications; write software to solve numerical problems solve unfamiliar numerical problems.	Tutorials; lectures; problem-based learning; laboratory classes; computer classes; open ended group projects; research projects.	Assessed problems; group work assessment; project reports; physics challenge assessed computer classes.
(vii) Information handling		
Typical students should be able to: describe and discuss the scientific method; collect and analyse data; present data in various forms (e.g. tabular and graphical); access, search and appraise articles in scientific journals/literature.	Tutorials; lectures; problem-based learning; laboratory and project supervision; group projects.	Project and laboratory reports; oral presentations; viva examinations; reports; physics challenge problem sessions.
(viii) Skills for lifelong learning		
Typical students should be able to: plan and undertake projects involving elements of independent research; access, search and appraise scholarly articles; collect and analyse data; search for and pursue employment and/or further study opportunities; work effectively in teams; work to deadlines.	Group workshops; research projects; open ended group projects; study abroad experience; experience with industry.	Project reports; oral presentations; assessed practical classes; written examinations; formatively assessed CVs; Leicester Award.

10. Progression points:

Laboratory and project based modules are not available for reassessment except at the discretion of the Board of Examiners who may ask students to resubmit one or more assessed coursework elements where it is possible for students to achieve a pass mark for the module by improving their mark in individual coursework elements. This will typically be in cases of mitigating circumstances.

PA1900 is a prerequisite module that must be passed with a mark of at least 40.00% for students to progress to year 2.

PA2900 is a prerequisite module that must be passed with a mark of at least 40.00% for students to progress to year 3.

Progression on a specialist Physics with Astrophysics or Space Science course

To progress to year 2 of the Physics with Astrophysics degree students must attempt one of PA1601, PA1602 or PA1603. To progress to year 3 of the Physics with Astrophysics degree students must attempt one of PA2601, PA2602, PA2603 in year 2. To graduate with a Physics with Astrophysics degree students must attempt 30 credits of elective modules in an area of Astrophysics and attempt an appropriately themed research project in year 3. In cases where a student fails to take the required speciality courses but otherwise passes the year successfully they will be transferred to the Physics BSc.

To progress to year 2 of the Physics with Space Science degree students must attempt one of PA1601, PA1602 or PA1604. To progress to year 3 of the Physics with Space Science degree students must attempt one of PA2603, PA2604, PA2605 in year 2. To graduate with a Physics with Space Science degree students must attempt 30 credits of elective modules in an area of Space Science and attempt an appropriately themed research project in year 3. In cases where a student fails to take the required speciality courses but otherwise passes the year successfully they will be transferred to the Physics BSc.

11. Scheme of Assessment

The programme follows the standard scheme of award and classification set out in the Senate Regulations 5.

12. Special features:

Group problem solving; student-centred learning; research projects; problem-based learning; opportunity of industry; business or education-led group research projects.

13. Indications of programme quality

Institute of Physics accreditation
QAA Subject Review
Academic Review
External examiners reports
Destinations of Leavers from Higher Education (DLHE) survey

14. External Examiner(s) reports

The details of the External Examiner(s) for this programme and the most recent External Examiners' reports can be found here.

Appendix 1: Programme structure (programme regulations)

<u>All BSc PHYSICS PROGRAMMES</u>
All BSc programmes in Physics share the same core module structure.

YEAR 1

SEMESTER 1

Core modules		Credits
PA1110	MECHANICS	15
PA1130	ELECTRICITY AND MAGNETISM	15
PA1710	MATHEMATICAL PHYSICS 1.1	15

SEMESTER 2

Core modules		Credits
PA1110	LIGHT AND MATTER	15
PA1140	WAVES AND QUANTA	15
PA1720	MATHEMATICAL PHYSICS 1.2	15

YEAR LONG

Core modules		Credits
PA1010	PHYSICS SKILLS AND PROFESSIONAL DEVELOPMENT 1	0
PA1900	EXPERIMENTAL PHYSICS 1	15
Option modules: one from		
PA1601	INTRODUCTION TO ASTROPHYSICS, MODERN PHYSICS AND SPACE SCIENCE	15
PA1602	INTRODUCTION TO APPLIED PHYSICS, ASTROPHYSICS AND SPACE SCIENCE	15
PA1603	INTRODUCTION TO APPLIED PHYSICS, ASTROPHYSICS AND MODERN PHYSICS	15
PA1604	INTRODUCTION TO APPLIED PHYSICS, MODERN PHYSICS AND SPACE SCIENCE	15

YEAR 2

SEMESTER 1

Core modules		Credits
PA2710	MATHEMATICAL PHYSICS 2	15
PA2260	RELATIVITY, QUANTUM PHYSICS AND PARTICLES	15
PA2240	ELECTROMAGNETIC FIELDS	15

SEMESTER 2

Core modules		Credits
PA2720	THERMAL AND STATISTICAL PHYSICS	15
PA2230	CONDENSED MATTER PHYSICS	15
Option modules: one from		
PA2601	INTERMEDIATE ASTROPHYSICS AND MODERN PHYSICS	15
PA2602	INTERMEDIATE ASTROPHYSICS AND APPLIED PHYSICS	15
PA2603	INTERMEDIATE ASTROPHYSICS AND SPACE SCIENCE	15
PA2604	INTERMEDIATE MODERN PHYSICS AND SPACE SCIENCE	15
PA2605	INTERMEDIATE APPLIED PHYSICS AND SPACE SCIENCE	15
PA2606	INTERMEDIATE APPLIED PHYSICS AND MODERN PHYSICS	15

YEAR LONG

Core modules		Credits
PA2010	PHYSICS SKILLS AND PROFESSIONAL DEVELOPMENT 2	0
PA2900	EXPERIMENTAL PHYSICS 2	30

YEAR 3

YEAR LONG

Core modules		Credits
PA3010	PHYSICS SKILLS AND PROFESSIONAL DEVELOPMENT 3	0

SEMESTER 1

Core modules		Credits
PA3210	QUANTUM MECHANICS	15

Skills electives modules: two from		
PA3241	INDUSTRY PROJECT	15
PA3242	ASTRODYNAMICS	15
PA3243	ELECTRONICS	15
PA3244	LEAN LAUNCHPAD: EVIDENCE BASED ENTREPRENEURSHIP	15
PA3245	PHYSICS IN EDUCATION	15
PA3246	PYTHON	15
PA3247	NUMERICAL PROGRAMMING IN C	15
Option modules: one from		
PA3601	APPLIED AND MEDICAL PHYSICS	15
PA3605	QUASARS AND COSMOLOGY	15
PA3603	THE SPACE ENVIRONMENT	15

SEMESTER 2

Core modules		Credits
PA3230	RADIATION AND MATTER	15
PA3280	PHYSICS CHALLENGE	15
PA3900	RESEARCH PROJECT	15
Option modules: one from		
PA3604	ELEMENTARY PARTICLES, THE STANDARD MODEL AND BEYOND	15
PA3602	STELLAR ASTROPHYSICS	15
PA3606	PLANETARY PHYSICS	15

BSc PROGRAMMES WITH A YEAR ABROAD

Students in the following degrees may elect to study a year abroad during their third year of study.

BSc PHYSICS
BSc PHYSICS WITH ASTROPHYSICS
BSc PHYSICS WITH SPACE SCIENCE

BSc Physics with Foundation Year students may also be eligible, subject to funding and other individual considerations.

FIRST AND SECOND YEAR MODULES
As for the relevant named BSc programme.

THIRD YEAR MODULES
The third year of the course will be spent abroad taking approved courses, or an equivalent research placement, in one of the institutions associated with the Department of Physics and Astronomy in an approved exchange programme. Students may be required to spend part of the preceding summer vacation undertaking language preparation if appropriate. Students will be required to pass the year either by achieving an average module mark at the pass level in modules taken or, in the case of a research placement or other equivalent unassessed courses, submitting a satisfactory project report and record of achievement which will be assessed on a pass/fail basis. Students may also be asked to pass a viva examination. The marks will not be included in the degree assessment.

FOURTH YEAR MODULES
As for the relevant named BSc programme.

Following successful completion of the year abroad, and satisfactory completion of the programme requirements (as defined by the University Scheme of Assessment) students shall be eligible to be considered for the award of a BSc in the relevant named area 'with a year abroad'.

BSc PROGRAMMES WITH INDUSTRY

Students in the following degrees may elect to undertake an industrial placement during their third year of study.

BSc PHYSICS
BSc PHYSICS WITH ASTROPHYSICS
BSc PHYSICS WITH SPACE SCIENCE

BSc Physics with Foundation Year students may also be eligible, subject to funding and other individual considerations.

FIRST AND SECOND YEAR MODULES
As for the relevant named BSc degree.

THIRD YEAR MODULES
The third year of the course will be spent on an industrial placement. The work will be assessed on a pass/fail basis on the basis of a project report and a record of achievement. The marks from this year will not be included in the final degree assessment.

FOURTH YEAR MODULES
As for the relevant named BSc degree.

Following successful completion of the year in industry, and satisfactory completion of the programme requirements (as defined by the University Scheme of Assessment) students shall be eligible to be considered for the award of a BSc in the relevant named area 'with a year in industry'.

Appendix 2: Module specifications

See module specification database http://www.le.ac.uk/sas/courses/documentation

Appendix 3: Skills matrix

Appendix 4: Foundation Year Programme Specification