UNIVERSITY OF LEICESTER

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

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

F303 MPhys Physics
MPhys Physics with a Year Abroad*; MPhys Physics with a Year in Industry*
F3FM MPhys Physics with Astrophysics
MPhys Physics with Astrophysics with a Year Abroad*; MPhys Physics with Astrophysics with a Year in Industry*
F366 MPhys Physics with Space Science
MPhys Physics with Space Science with a Year Abroad *; MPhys Physics with Space Science with a Year in Industry*

*selected when on course
Students completing the Foundation Year of the BSc Physics with Foundation, and who meet the internal transfer requirements (see section 10), will be eligible to transfer to the relevant above-named MPhys programme as an integrated programme of study.

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 four years (five years for MPhys degrees with a year in industry/abroad, five years for MPhys degrees with foundation year, six years for MPhys degrees with foundation year and a year in industry/abroad).

The maximum period of registration is six years (seven years for MPhys degrees with a year in industry/abroad, seven years for MPhys degrees with foundation year, eight years for MPhys 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.

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.

7. Programme aims:

The programme aims to:

- provide students with a coherent working knowledge of general physics and specialised knowledge in some areas up to Masters-level (FHEQ level 7).
- provide exposure in some areas of physics to the frontiers of research
- generate interest in and understanding of the scope of physics {or astrophysics / space and planetary science}
- enable students to explore their interests in and aptitudes for a range of areas of physics
- provide the opportunity for students to achieve their full potential
- enable students to develop independent learning skills
- provide students with experience of working in a research environment
- introduce advanced data analysis and theoretical modelling techniques in areas of physical science up to Masters-level (FHEQ level 7).
- equip students with the knowledge and skills for original research, employment in R&D, education, science based industry and establishments, 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.

8. Reference points used to inform the programme specification:

- QAA Benchmarking Statement
- 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 techniques; discuss and describe a broad range of current research themes in physics; formulate evidence based scientific arguments; demonstrate specialist knowledge at Masters-level (FHEQ level 7) in some areas of physics.	Lectures; specified reading; problem classes; problem-based learning; group workshops; open ended group projects; laboratory practical classes; computer practical classes; research project work.	Written examinations; reports; oral presentations; assessed practical work; assessed computer exercises; assessed problems; group workshops; physics challenge problem sessions; student-led journal articles.

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
(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; describe and discuss the accumulation of scientific evidence; use computer programs to analyse data; apply conceptual knowledge in a research environment.	Lectures; specified reading; problem classes; problem-based learning; group workshops; open ended group projects; laboratory practical classes; computer practical classes; research project work.	Written examinations; reports; oral presentations; assessed practical work; assessed computer exercises; assessed problems; group workshops; assessed physics challenge sessions; student-led journal papers.
(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; problem-based learning; group projects; laboratory practical classes; computer practical classes; project work.	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 projects; laboratory practical classes; computer practical classes; project work.	Reports; oral presentations; assessed practical work; assessed computer exercises; physics challenge problem sessions; student-led journal papers.
(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 projects; laboratory practical classes; computer practical classes; research project work; student-led journal	Written examinations; reports; oral presentations; assessed practical work; assessed computer exercises; assessed problems; group workshops; physics challenge problem sessions; student-led journal.

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; group projects; project work; group workshops.	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; group projects; group workshops; physics challenge; projects.	Oral project presentations; physics challenge problem sessions.
(ii) Written communication		
Typical students should be able to write concise and clear scientific reports and papers, 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; student-led journal.	Written project and laboratory reports; formatively assessed CVs; written exams; student-led journal papers.
(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; workshops; projects; group projects; laboratory practical classes; computer practical classes.	Written examinations; reports; oral presentations; assessed practical work; assessed computer exercises; assessed problems; group workshops; physics challenge problem sessions; student-led journal papers.

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; problem based learning; open ended group projects; physics challenge; student-led journal.	Group assessment (outcomes and oral questioning); physics challenge sessions; assessed supervised team project meetings.
(vi) Problem solving		
Typical students should be able to: analyse problem; 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 and project supervision; open ended group projects; research projects; physics challenge; student-led journal.	Marked problems; written examinations; group work assessment; project assessment; physics challenge sessions; assessed practical work; assessed computer workshops; student-led journal.
(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.	Group presentations; poster presentations; oral presentations; viva examinations; reports; essays; physics challenge 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.	Resource based learning; project work; group projects; group industry projects; group education projects; study abroad experience; industrial experience; embedded employability programme.	Project reports; oral presentations; assessed practical classes; written examinations; student-led journal papers; 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.

In order to progress to the third year of the MPhys programme students must achieve a minimum year two mark of 55.00% (the recommended minimum year 2 mark for continuation on the MPhys programme is 60.00%).

PA3900 is a prerequisite module that must be passed with a mark of at least 40.00% for students to progress to year 4.

In order to progress to the final year of the MPhys programme students must achieve a minimum year three mark of 51.00% (the recommended minimum year 3 mark for continuation on the MPhys programmes is 55.00%).

In the event that a student does not attain the MPhys progression criteria, they will be transferred to the BSc programme.

During year 3 or 4, and before the meeting of the Board of Examiners, a student enrolled on the MPhys may, exceptionally, request to graduate with a BSc degree. In this case, and at the discretion of the Board of Examiners, a BSc may be awarded provided the intended learning outcomes for the BSc are met.

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 progress to year 4 of a Physics with Astrophysics degree students must, in year 3, attempt 30 credits of elective modules in an area of Astrophysics, and successfully pass (with a mark of at least 40.00%) an appropriately themed research project. To graduate with a Physics with Astrophysics degree students, in year 4, must take an appropriately themed advanced research project and select at least 15-credits of electives material with the appropriate specialism. In cases where a student fails to take the required speciality courses but successfully attains the MPhys progression criteria they will be transferred to the Physics MPhys.

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 progress to year 4 of the Physics with Space Science degree students must, in year 3, attempt 30 credits of elective modules in an area of Space Science, and successfully pass (with a mark of at least 40.00%) an appropriately themed research project. To graduate with a Physics with Space Science degree students, in year 4, must take an appropriately themed advanced research project and select at least 15-credits of electives material with the appropriate specialism. In cases where a student fails to take the required speciality courses but successfully attains the MPhys progression criteria they will be transferred to the Physics MPhys.

Progression from BSc programmes in Physics

Students on BSc programmes in Physics, who meet the minimum progression requirements and the pre-requisites of the equivalent MPhys programme, may transfer onto that programme.

11. Scheme of Assessment

The programme follows standard scheme of assessment of award and degree classification set out in **Senate Regulation 5**.

12. Special features:

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

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)

Appendix 2: Module specifications

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

Appendix 3: Skills matrix

ALL MPHYS PROGRAMMES

All MPhys 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

SEMESTER 1

Core modules		Credits
PA3210	QUANTUM MECHANICS	15
PA3250	MATHEMATICAL PHYSICS 3	15
Skills electives modules: one 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

YEAR LONG

Core modules		Credits
PA3010	PHYSICS SKILLS AND PROFESSIONAL DEVELOPMENT 3	0

YEAR 4

SEMESTER 1

Core modules		Credits
PA4980	PHYSICS SPECIAL TOPICS	15
PA4440	LITERATURE REVIEW PROJECT	15

YEAR LONG

Core modules		
PA4010	PHYSICS SKILLS AND PROFESSIONAL DEVELOPMENT 4	0

PA4970	ADVANCED RESEARCH PROJECT	30

Option modules: four from

PA4601	QUANTUM THEORY OF SOLIDS	15
PA4602	SCIENTIFIC INFERENCE	15
PA4603	SPACE PLASMAS	15
PA4604	RADIATION PROCESSES	15
PA4605	NANOTECHNOLOGY: TECHNIQUES AND DEVICES	15
PA4606	STATISTICAL MECHANICS	15
PA4607	ADVANCED SPACE SCIENCE	15
PA4608	BLACK HOLES AND ACCRETION ASTROPHYSICS	15
PA4609	GENERAL RELATIVITY AND QUANTUM FIELDS	15

MPHYS PROGRAMMES IN PHYSICS WITH A YEAR ABROAD

Students may elect to study a year abroad during their third year of study.

FIRST AND SECOND YEAR MODULES
As for the relevant named MPhys programme (see above).

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 AND FIFTH YEAR MODULES

As for the relevant third and fourth year modules from the named MPhys programme (see above).

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 an MPhys in the named area (see above) 'with a year abroad'.

MPHYS PROGRAMMES IN PHYSICS WITH INDUSTRY

Students may elect to undertake an industrial placement during their third year of study.

FIRST AND SECOND YEAR MODULES
As for the relevant named MPhys degree (see above).

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 AND FIFTH YEAR MODULES
As for the third and fourth year modules in the relevant named MPhys degree (see above).

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 an MPhys in the named area (see above) 'with a year in industry'.