Imperial College London

# Module Specification (Curriculum Review)

## Basic details

| | | | | |
|---|---|---|---|---|
| | | | Earliest cohort | Latest cohort |
| UID | | Cohorts covered | 2020-21 | |
| Long title | Suns, Stars and Planets | | | |
| New code | PHYS50006 | New short title | Suns, Stars & Planets | |
| Brief description of module *(approx. 600 chars.)* | By studying this module, students will become familiar with the structure and evolution of the Sun and other stars. Students will also learn about the key physical principles that determine the current state of the planets in our own Solar System, and that allow us to detect and begin to characterise planets in other star systems. | | | |
| | 333 characters | | | |
| Available as a standalone module/ short course? | N | | | |

## Statutory details

| | ECTS | CATS | Non-credit | | |
|---|---|---|---|---|---|
| Credit value | 5 | 10 | N | HECOS codes | |
| FHEQ level | 5 | | | | |

## Allocation of study hours

| | Hours | |
|---|---|---|
| Lectures | 22 | |
| Group teaching | 0 | *Incl. seminars, tutorials, problem classes.* |
| Lab/ practical | 0 | |
| Other scheduled | 11 | *Incl. project supervision, fieldwork, external visits.* |
| Independent study | 92 | *Incl. wider reading/ practice, follow-up work, completion of assessments, revisions.* |
| Placement | 0 | *Incl. work-based learning and study that occurs overseas.* |
| Total hours | 125 | |
| ECTS ratio | 25.00 | |

## Project/placement activity

| | |
|---|---|
| Is placement activity allowed? | No |

## Module delivery

| | | | |
|---|---|---|---|
| Delivery mode | Taught/ Campus | Other | |
| Delivery term | | Other | Term 3 |

## Ownership

| | |
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| Primary department | Physics |

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|---|---|
| Additional teaching departments | None |
| | |
| | |
| Delivery campus | South Kensington |

## Collaborative delivery

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|---|---|
| Collaborative delivery? | N |

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|---|---|
| External institution | N/A |
| External department | N/A |
| External campus | N/A |

## Associated staff

| Role | CID | Given name | Surname |
|---|---|---|---|
| Module Leader | | Yvonne | Unruh |
| Topic Leader | | Juliet | Pickering |
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# Learning and teaching

## Module description

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| Learning outcomes | On completion of this module you will be able to:<br>• Demonstrate familiarity with the stellar structure equations and explain the physical concepts underpinning them<br>• Derive scaling relations from the stellar structure equations<br>• Discuss how the derived scalings compare to observed relations for main-sequence stars<br>• Describe the characteristics of the internal structure as well as the outer layers of the Sun<br>• Describe the current state of planets and smaller bodies in our own Solar System, including internal structure, atmospheric structure and surface temperature.<br>• Demonstrate an appreciation of the wide range of physics and chemistry that determines the current state of planetary and small body surfaces.<br>• Describe the methods used to detect planets around other stars, including the limitations and selection effects inherent in these methods |
| Module content | • Stellar Structure: stellar structure equations, energy generation and transport; hydrostatic equilibrium; the Schwarzschild convective stability criterion.<br>• Scaling laws resulting from the stellar-structure equations as applied to main-sequence stars; comparisons to observed scaling relations; the role of mass in determining stellar characteristics<br>• Sun: Internal structure and outer layers (atmosphere); the Sun in context<br>• Stars: Life-cycle basics; the Hertzsprung-Russell diagram; Concepts of magnitude, parallax and proper motion in stellar astronomy<br>• Planets and smaller bodies in our own Solar System: internal structure, atmospheric structure and surface temperature; prediction of surface temperatures for objects without atmospheres; Kepler’s laws of planetary motion; Methods used to detect planets around other stars, including the limitations and selection effects inherent in these methods; Exoplanets; Current state of the search for life elsewhere in the universe |

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|---|---|
| Learning and Teaching Approach | Students will be taught using a combination of lectures, office hours, and directed exercises on theoretical work |
| Assessment Strategy | A written exam (2h) in term 3 covering all learning outcomes will comprise the summative assessment and will contribute 100% of the module mark. The exam will test competences in any of the listed learning outcomes. |
| Feedback | General feedback on written examinations for each module is provided in the form of written reports from the examiners for the students. |
| Reading list | Self-contained lecture notes are provided to the students, so there is no text book required for this module. For students wishing to explore the topic further, a range of (fully optional) textbooks are listed as suitable sources. These include<br>•Principles of Astrophysics, by Charles R. Keeton, Springer<br>•The Stars: their structure and evolution, by Roger J. Taylor, CUP, 2nd edition<br>•An Introduction to the Sun and Stars, Simon F. Green & Mark H. Jones (eds), CUP<br>•Planets & Planetary Systems, by Stephen Eales, Wiley-Blackwell<br>•Transiting Exoplanets, by Carole Haswell, CUP<br>•Exploring the Solar System, by Peter Bond, Wiley-Blackwell<br>•An Introduction to the Solar System, David A. Rothery, Neil McBride & Iain Gilmour (eds), CUP<br>•An Introduction to Astrobiology, David A. Rothery, Iain Gilmour & Mark Sephton (eds), CUP |

## Quality assurance

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|---|---|
| Date of first approval | |
| Date of last revision | |
| Date of this approval | |
| Module leader | Yvonne Unruh |

## Office use only

| | |
|---|---|
| QA Lead | |
| Department staff | |
| Date of collection | |
| Date exported | |
| Date imported | |

Notes/ comments

Template version 16/06/2017

## Assessment details

| | | Pass mark |
|---|---|---|
| Grading method | Numeric | 40% |

## Assessments

| Assessment type | Assessment description | Weighting | Pass mark | Must pass? |
|---|---|---|---|---|
| Examination | 2-hour exam | 100% | | N |

100%