

APPROVED**PHYS6051: Astronomy & Instrumentation****Module Details**

Module Code:	PHYS6051
Title:	Astronomy & Instrumentation APPROVED
Long Title:	Astronomy & Instrumentation
NFQ Level:	Fundamental
Valid From:	Semester 1 - 2019/20 (September 2019)
Duration:	1 Semester
Credits:	5
Field of Study:	4411 - Physics
Module Delivered in:	3 programme(s)
Module Description:	This module gives the student an introduction to the science, optics, instrumentation and data analysis associated with Astronomy.

Learning Outcomes	
<i>On successful completion of this module the learner will be able to:</i>	
#	Learning Outcome Description
LO1	Describe and explain optical systems used in astronomy
LO2	Describe and explain methods and instrumentation used for photon detection in astronomy
LO3	Describe the evolution and structure of the Universe
LO4	Explain the Solar System in terms of its origins and structure
LO5	Use instrumentation and software for image acquisition and data analysis
Dependencies	
Module Recommendations	
Incompatible Modules	
No incompatible modules listed	
Co-requisite Modules	
No Co-requisite modules listed	
Requirements	
No requirements listed	

Indicative Content
Methods and instrumentation used for photon detection in astronomy Observations windows for astronomy, Photometry methods. CCD, CMOS imagers. Photomultiplier tubes. Instrumentation for detection at different wavelengths.
Describe and explain optical systems used in astronomy Types of telescope. Performance metrics. Practical limitations to performance due to the atmosphere - optical aberrations etc. Celestial coordinates. Recording images using CCDs.
Explain the Solar System in terms of its origins and structure The Sun, Earth and Moon, inner planets, outer planets. Exploration and search for life in the solar system. Space travel within the solar system. Satellites & Space junk.
Describe the evolution and structure of the Universe The Big Bang and expansion of the Universe. Stars and Galaxies. Origin of the elements. Supernovae and Black Holes.
Laboratory experiments in astronomy Analysis of sun spot data from the SIDC, working with bias/dark/flat frames produced by a CCD camera, astronomical image processing and the impact of the atmosphere on image acquisition, using planetarium software to understand coordinate systems and telescope fields of view.

Module Content & Assessment

Assessment Breakdown	%
Coursework	100.00%

Assessments

Coursework			
Assessment Type	Short Answer Questions	% of Total Mark	35
Timing	Week 7	Learning Outcomes	1,2
Assessment Description This assessment tests the knowledge and understanding of optical and data acquisition systems used in Astronomy			
Assessment Type	Short Answer Questions	% of Total Mark	35
Timing	Week 12	Learning Outcomes	3,4
Assessment Description This assessment deals with the science associated with the foundation and evolution of the Solar System and Universe			
Assessment Type	Practical/Skills Evaluation	% of Total Mark	30
Timing	Every Second Week	Learning Outcomes	5
Assessment Description Laboratory reports and skills test examinations on practical aspects of the module.			
No End of Module Formal Examination			
Reassessment Requirement			
Coursework Only <i>This module is reassessed solely on the basis of re-submitted coursework. There is no repeat written examination.</i>			

Module Workload

Workload: Full Time					
Workload Type	Contact Type	Workload Description	Frequency	Average Weekly Learner Workload	Hours
Lecture	Contact	Delivery of module content.	Every Week	3.00	3
Lab	Contact	Laboratory experiments in astronomy.	Every Week	1.00	1
Independent Learning	Non Contact	Study of module material.	Every Week	3.00	3
Total Hours					7.00
Total Weekly Learner Workload					7.00
Total Weekly Contact Hours					4.00

Workload: Part Time					
Workload Type	Contact Type	Workload Description	Frequency	Average Weekly Learner Workload	Hours
Lecture	Contact	Delivery of module content.	Every Week	3.00	3
Lab	Contact	Laboratory experiments in astronomy.	Every Week	1.00	1
Independent Learning	Non Contact	Study of module material.	Every Week	3.00	3
Total Hours					7.00
Total Weekly Learner Workload					7.00
Total Weekly Contact Hours					4.00

Module Resources

Recommended Book Resources

Roger A. Freedman, Robert M. Geller, William J.. (2019), Universe, 11th. 27, WH Freeman, p.896, [ISBN: 1319248640].
Eric Chaisson, Steve McMillan. (2014), Astronomy Today, 8th. 28, Pearson, p.828, [ISBN: 9781292057736].
Steve B Howell. (2006), Handbook of CCD Astronomy, 2nd. 7, Cambridge University Press, p.224, [ISBN: 0521617626].

This module does not have any article/paper resources

Other Resources

Website, Blackrock Castle Observatory,
<https://www.bco.ie>
Website, European Southern Observatory,
<https://www.eso.org/public/ireland/>
Website, European Space Agency,
<https://www.esa.int/ESA>
Website, NASA,
<https://www.nasa.gov/>
Website, Astronomy Picture of the Day,
<https://apod.nasa.gov/apod/astropix.html>
Website, Space Weather,
<http://www.spaceweather.com/>
Planetarium Application, Stellarium,
<http://stellarium.org/>
Interactive Online Sky Atlas, Centre de Données Astronomiques de Strasbourg. Aladin Sky Atlas,
<https://aladin.u-strasbg.fr/>

Module Delivered in

Programme Code	Programme	Semester	Delivery
CR_SCHEM_7	Bachelor of Science in Analytical and Pharmaceutical Chemistry	-1	Mandatory
CR_SPHYS_7	Bachelor of Science in Applied Physics and Instrumentation	-1	Elective
CR_SPHYS_6	Higher Certificate in Science in Applied Physics and Instrumentation	-1	Elective