MODULE DESCRIPTOR

MODULE TITLE	**Ultraviolet, Optical and Infrared Astronomy (UVOIR)**					
MODULE CODE	AA2053 (L5)	**JACS CODE**	**F500**	**CREDIT VALUE**	*20 credits*	
DATE OF APPROVAL	April 2017				**VERSION NUMBER**	1
SCHOOL	**Physical Sciences and Computing**		**PARTNER INSTITUTION**		**N/A**	

RELATIONSHIP WITH OTHER MODULES

Co-requisites	**NONE**	**Pre-requisites**	**AA1051**	**Excluded Combinations**	**None**

MODULE AIMS

This module aims to:

- Provide students with a detailed understanding of astronomical detectors and technologies for the ultraviolet, optical and infrared wavelengths.
- Provide an understanding of physical laws and concepts as applied to Astronomy.
- Provide an understanding of the techniques and the opportunity to develop their skills in quantitative observational astronomy.
- Provide the opportunity to develop techniques used in astronomy which have wider applications
- Enhance the student's key skills in data analysis, astronomical techniques and application of related physical concepts.

MODULE CONTENT

Atmospheric Effects
The effects of the atmosphere on observations - extinction, air mass, refraction, dispersion, seeing. Sky background radiation.

Telescopes
Limits to resolution. Limiting magnitude. Characteristics of good observing sites. Telescope mountings and focuses. Optical aberrations. Planning an observing programme.

Photometry
Photometric techniques. Magnitudes and photometric systems, astronomical applications.

Detectors
Single-pixel and multi-pixel detectors. Photoemissive process. Photoconductive process. Semiconductors. Imaging, Micro-channel plates. Junction diodes. p-i-n diodes. CCDs, CMOS, Infrared arrays. Bolometers. Signal-to-noise ratio.

Experimental and observational work
Planning and carrying out observations/data analysis/experiments using detectors. Acquire astronomical images (using their own equipment and/or data provided by the University). Data reduction and analysis using software from specified open access sources.

INTENDED LEARNING OUTCOMES

On successful completion of this module a student will be able to:	
1.	Explain the principles of observational techniques and astronomical detectors including the physics of their operation for ultraviolet, optical and infrared wavelengths.
2.	Solve problems involving topics found in the syllabus.
3.	Extract and summarise relevant information from a given text or case study.
4.	Carry out a variety of quantitative observing and/or data reduction techniques at optical wavelengths.
5.	Record, analyse, present and report astronomical data with the aid of suitable software and IT packages.

ASSESSMENT METHODS

The method of assessment for this module has been designed to test all the learning outcomes. Students must demonstrate successful achievement of these learning outcomes to pass the module.

Number of Assessments	Form of Assessment	% weighting	Size of Assessment/Duration/ Wordcount	Category of assessment	Learning Outcomes being assessed
1	Question Sheet (including problems conceptual question).	40%	Approx. 4 problems	Coursework	1,2,3
1	Case study report (instrumentation)	30%	1200 words	Coursework	1,3
1	Data Analysis report based on imaging observations and their reduction.	30%	1600 words	Coursework	3,4,5

MODULE PASS REQUIREMENTS

To pass this module you must achieve a mark of 40% or above, aggregated across all the assessments.

APPENDIX

MODULE CODE: AA2053 (L5) **MODULE TITLE:** Ultraviolet, Optical and Infrared Astronomy

LOCATION OF STUDY: *UCLAN CAMPUS*

MODULE TUTOR(S)	Anne Sansom

MODULE DELIVERY	Semester Long	Semester 1		Semester 2		Semester 3		
	Year long	Semester 1 & 2	✓	Semester 2 & 3				
	Other (please indicate pattern of delivery)	DISTANCE LEARNING						

MODULE LEARNING PLAN

All modules should include details of the average learning time based upon 200 hours per 20 credits.

LEARNING, TEACHING AND ASSESSMENT STRATEGY

Distance learning students will learn via self-study, supported by detailed distance learning material supplied by the Course Team according to a Course Schedule. Tutorial support via online discussion forums, online classrooms email and telephone as required.

The learning materials include Course Notes with worked examples, self-test exercises, and assessed coursework. The *Course Notes,* are based around how we use observations coupled to basic physical principles to understand the phenomena of the Universe. Additional material and suggested further reading are available via Blackboard. Self-test exercises contain questions to encourage students to solve conceptual and numerical problems and to build their confidence prior to attempting the assessed question sheets.

This module consists of theoretical and practical material.

Theoretical material
Specific case studies enable students to see how the fundamental techniques apply both to observing with small telescopes and for professional use and will be used to illustrate current developments in satellite and ground-based telescopes and detectors. Tutorials based on the case studies will highlight the structure of scientific articles and emphasise the need for selectivity when reporting and summarising.

Practical material
Students will carry out observations and/or data analysis with guided support via e-Learn discussions and emails. This will also be supported by online simulated experiments. For this reason it is essential for distance learning students to be prepared to download and install appropriate data analysis software. Experiments, data logging and formal reports are designed to develop the students' experimental/observational and transferable skills.

Familiarisation exercises are designed to develop the student's practical skills before tackling the formally assessed work. The experimental work will be written up as a formal report including evidence of understanding of instrumentation.

Assessments consist of one question sheet based on the theoretical material, and two reports based on the practical material.

- The assessed question sheet is designed to enable students to demonstrate their understanding and ability to solve problems and explain the concepts involved.

- The case study requires the students to document the characteristics of a working telescope and instrument combination according to the brief, using information obtained from reference manuals on Observatory websites. This develops their ability to Extract and summarise relevant information.

- The report requires students to analyse electronic images obtained with a telescope and electronic area detector combination. Data processing techniques will be used to illustrate how astronomical images are processed. The data will be used in an astronomical application to estimate physical properties, including realistic error estimates. The analysis provides important practice in these important subject skills using astronomical IT packages and the production of the report further develops skills in scientific writing.

SCHEDULED LEARNING AND TEACHING ACTIVITY	No. of hours
Tutorial	8
TOTAL SCHEDULED LEARNING HOURS	8
GUIDED INDEPENDENT STUDY **First reading of posted materials (equiv. to lectures)** **Working through details** **Background reading** **Working on coursework assignments** **Reflection on feedback**	
TOTAL GUIDED INDEPENDENT STUDY HOURS	192
TOTAL STUDENT LEARNING HOURS ***(eg 200 hours per 20 credits)***	200

BIBLIOGRAPHY AND LEARNING SUPPORT MATERIAL

On-line Booklist: http://readinglists.central-lancashire.ac.uk/search.html?q=AA2053