MODULE DESCRIPTOR

MODULE TITLE	**Introduction to Cosmology**						
MODULE CODE	AA1053 (L4)	**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**	**None**	**Excluded Combinations**	**None**

MODULE AIMS

This module aims to

- Provide an introduction to cosmology, suitable for people with little prior knowledge of the subject and with a limited background in physics and maths.
- To provide an understanding of the physical laws as applied to the Universe.
- To provide an introduction to basic concepts in Cosmology.
- To develop elementary problem solving skills.
- To provide the opportunity to develop skills and techniques used in astronomy, which have wider applications (these include problem solving and preparation of scientific essays).
- To enhance the student's key skills (communication, numerical skills, IT, time-management).

MODULE CONTENT

THE BIG BANG - THE SECOND ERA

- the hot big bang model - the "standard model"
- expansion --> cooling
- hot particles and radiation
- what happened to antimatter
- protons and neutrons form
- atomic nuclei form
- atoms form - recombination
- decoupling - cosmic background radiation

BEFORE THE BIG BANG - THE FIRST ERA

* inflation
  * theory + speculation
  * why the big bang was hot
  * why the universe expands
  * total energy = zero ?
  * solving the horizon and flatness problems
* cosmology <--> particle physics

AFTER THE BIG BANG - THE THIRD ERA

* steady expansion, astrophysics
* the meaning of expansion and accelerated expansion
* distance becomes harder to define
* Einstein's equations
* redshift
* horizons
* the Cosmic Background Radiation (CBR)
* observational evidence for expansion
  * Hubble
  * Tolman test (1991)
  * CBR hotter in the past
  * absorption lines
* Hubble's constant
* galaxy formation
  * epoch of formation
  * dark matter
  * Hubble Space Telescope images, Keck results.
* open or closed
* exciting research topics

INTENDED LEARNING OUTCOMES

On successful completion of this module a student will be able to:

1.	describe or define concepts and cosmological terms from the syllabus
2.	solve elementary problems in basic cosmology
3.	summarise scientific information and concepts and draw conclusions.
4.	use library or on-line resources to research a scientific topic
5.	collate material from a variety of sources and write a coherent essay in this subject area

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** *(indicative only – see Workload Table for guidance)*	**Category of assessment**	**Learning Outcomes being assessed**
2	Question Sheets Mixed problems and questions	2 x 33.33%	6-7 questions/problems	Coursework	1,2,3
1	Scientific Essay	33.33%	800-1000 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: AA1053 (L4) **MODULE TITLE:** Introduction to Cosmology

LOCATION OF STUDY: *UCLAN CAMPUS*

MODULE TUTOR(S)	*Roger Clowes*

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

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, guidance on researching and writing a scientific essay and assessed coursework. The *Course Notes,* closely linked to a course textbook, 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. Some of the activities contain questions to encourage students to solve conceptual and numerical problems and to build their confidence prior to attempting the assessed question sheets. The assessed question sheets are designed to enable students to demonstrate their understanding and ability to solve problems and explain the concepts involved.

The essay titles are chosen to be topical, reflecting recent cosmological research. The essay is designed to enable students to develop their research skills and ability to summarise results, draw conclusions and write them up in a formal essay.

SCHEDULED LEARNING AND TEACHING ACTIVITY	*No. of hours*
Tutorial	
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=aa1053*