

The frontiers of astronomy, 2019

Start date 13 December 2019**End date** 15 December 2019**Venue** Madingley Hall
Madingley
Cambridge**Tutor** Dr Robin Catchpole**Course code** 1920NRX021**Director of ISP and LL**

Sarah Ormrod

**For further information on this
course, please contact**Head of Academic Centre Administration, Zara Kuckelhaus
zara.kuckelhaus@ice.cam.ac.uk, 01223 746204**To book** See: www.ice.cam.ac.uk or telephone 01223 746262

Tutor biography

Robin Catchpole, retired as Senior Astronomer at the Royal Observatory Greenwich, currently works at the Institute of Astronomy in Cambridge. Born in 1943, he took a BSc at University College, London, before being posted to the Royal Observatory at the Cape of Good Hope. He received his doctorate from the University of Cape Town. In 1991 he returned to the Royal Greenwich Observatory, where he worked until it closed in 1998. He has authored and co-authored over 120 research papers and has used telescopes around the world including the Hubble Space Telescope. His research interests include the composition of stars, exploding stars, the structure of our Galaxy and galaxies with central black holes. He has given numerous popular lectures and radio and TV interviews. Originated the design of the 33 ton bronze truncated cone at the new Astronomy Centre in Greenwich, completed, and opened by the Queen, in 2007. Is currently part of the team intending to build the Solar Pyramid, which will be the largest sundial in the world.

Course programme

Friday

Please plan to arrive between 16:30 and 18:30. You can meet other course members in the bar which opens at 18:15. Tea and coffee making facilities are available in the study bedrooms.

19:00	Dinner
20:30	Session1: Contents and Scale of the Universe
22:00	Terrace bar open for informal discussion

Saturday

07:30	Breakfast
09:00	Session 2: Our Solar System
10:30	Coffee
11:00	Session 3: Asteroids and Impacts, Should we worry?
13:00	Lunch
14:00	Free
16:00	Tea
16:30	Session 4: The Evolution of the Sun and Stars and the Origin of the Elements
18:00	Free
18:30	Dinner
20:00	Session 5: Visit the Institute of Astronomy to use telescope; if cloudy: The Sun and Climate Change
21:30	Terrace bar open for informal discussion

Sunday

07:30	Breakfast
09:00	Session 6: Black Holes, Dark Matter and Vacuum Energy
10:30	Coffee
11:00	Session 7: Are We Alone, In a Universe perfectly suited to our existence?
12:45	Lunch

The course will disperse after lunch

Course syllabus

Aims:

- To give participants a deeper understanding of the universe of which they are part.
- To give participants an ability to evaluate and put in a broader context, media reports on astronomy.
- To increase participants' awareness of the world around them, including the origin of everything, and in particular to no longer see the night sky a painted dome but as a dynamic ever changing place, a 3 dimensional entity.

Content:

The nature of stars, galaxies, black holes, dark-matter, vacuum-energy and the role of gravity, the size of the universes, the evolution of stars and origins of elements created therein, the ultimate fate of our Sun and planets, the origin of our solar system and the variety of environments and landscapes within our solar system, the threats to life on Earth from cosmic impacts, evidence for past impacts and the probability of future impacts, the possibility of finding intelligent life elsewhere and why it seems to be silent out there, the structure of our Sun, its major cycles, the effects of magnetic fields on the solar atmosphere and how this effects our Earth, how the Earths climate has changed over the long and short timescales and what relevance the Sun might have to short term climate change on Earth.

Presentation of the course:

Teaching will be in the form of lectures followed by questions from students that will be discussed in class to further their subject understanding.

A general class discussion will address the question as to whether we are alone in the universe and I hope we can discuss this topic together.

I make no promise as it depends on the weather, but propose to make an evening visit to the Institute of Astronomy to use their 16 inch telescope to look at objects in the sky.

As a result of the course, within the constraints of the time available, students should be able to:

Have a deeper and better understanding of the night sky.

Have a deeper understanding of the origin of everything they see around them.

Have a broader perspective of ourselves, our civilisation and our Earth, within the context of our Universe.

Reading and resources list

Listed below are a number of texts that might be of interest for future reference, but do not need to be bought (or consulted) for the course.

Author	Title	Publisher and date
Rees, Martin.	Just Six Numbers	Phoenix, Orion Pub Group, 2004.
Rees, Martin.	Our Final Century?	William Heinemann Ltd 2003
Freedman, R A, and Kaufmann, W J..	Universe	Freeman, 2007, 8 th edition.

Note Students of the Institute of Continuing Education are entitled to 20% discount on books published by Cambridge University Press (CUP) which are purchased at the Press bookshop, 1 Trinity Street, Cambridge (Mon-Sat 9am – 5:30pm, Sun 11am – 5pm). A letter or email confirming acceptance on to a current Institute course should be taken as evidence of enrolment.

Information correct as of: 28 October 2019