UNIVERSITY OF CAMBRIDGE

Institute of Continuing Education

Undergraduate Certificate in Astronomy

2016-2017

Course code: 1617CCR104

COURSE SPECIFICATION

University of Cambridge Institute of Continuing Education, Madingley Hall, Cambridge, CB23 8AQ
Tel 01223 746222 www.ice.cam.ac.uk

Welcome to the **Undergraduate Certificate in Astronomy,** a University of Cambridge award offered by the Institute of Continuing Education (ICE). The Certificate is taught and awarded at FHEQ level 4 (i.e. first-year undergraduate level) and attracts 60 credits. The award is completed in one academic year. For further information about academic credit please see our website: http://www.ice.cam.ac.uk/studying-with-us/information-for-students/qualifications-that-we-offer.

The course offers three termly units and a syllabus and reading and resource list for each of these units are included in this course specification.

The Undergraduate Certificate in Astronomy will introduce students to the study of astronomy. You will learn about stars and galaxies and the scale, structure and formation of the Universe, as well as observation techniques and space explorations. The course will also examine recent developments and research. The course aims to:

- describe the key constituents of the observed Universe;
- explain the current theories about the nature, inter-relation, origin and evolution of these constituents;
- provide an understanding of the physical concepts underlying these theories;
- explain how these theories are underpinned by observation and measurement.

Teaching staff

Course Director

Dr Judith Croston. Judith is an ICE Teaching Officer and Academic Director for Physical Sciences, and also holds a part-time position as Principal Research Fellow at the University of Southampton. She obtained her MSci in Physics with Astrophysics from the University of Bristol, followed by her PhD in the area of extragalactic astrophysics from Bristol in 2004. She has previously worked as a postdoctoral researcher in the Service d'Astrophysique, Commission d'Energie Atomique, Saclay, as an Associate Lecturer with the Open University, and as a Research Fellow at the University of Hertfordshire. She currently leads several international research projects investigating jets from supermassive black holes using ground and space-based astronomical observatories, and is involved in planning for next-generation instruments and observatories.

Tutors:
Dr Simon Hodgkin was born in Newcastle and spent his early years just outside Dundee, home of the Mills Observatory, a source of great inspiration. After schooling in London, then Bristol, he obtained a degree in Physics with Astrophysics from Leeds University in 1989. His PhD was completed in 1995 with the X-ray astronomy group at Leicester University, working on ROSAT observations of late-type stars. After a postdoc position at Leicester, searching for and characterizing very low mass stars and brown dwarfs, Simon moved to the Institute of Astronomy (Cambridge) in 1999 to work with the Cambridge Astronomical Survey Unit, specializing in the processing and analysis of wide-field survey data from large-format CCD and infrared cameras. More recently, he has become especially interested in time-resolved astronomy, including searches for young eclipsing binary and transiting planetary systems, and studies of the transient Universe with the Gaia satellite.

Dr Hardip Sanghera obtained his PhD from Jodrell Bank, where he studied a class of radio loud active galaxies called Compact Steep Spectrum Radio Sources, where the radio jet is moving through the ISM, and yet may evolve into the typical larger classical radio source. Their study required high/ultra-high resolution observations using radio telescopes arrays e.g. VLA, MERLIN and VLBI, with follow-up observations using ground based optical telescopes, and the space based Hubble Telescope. Following his doctorate, he spent a number of years working at the Joint Institute for VLBI in Europe, in the Netherlands, before moving back to Cambridge, where he currently supporting the ESA space-based Planck observatory, which is mapping the CMB.

After attending school in Philadelphia and London, **Dr Neil Trentham** did his undergraduate degree studying natural sciences specialising in physics at the University of Cambridge. He then

did a PhD in astronomy at the University of Hawaii, graduating in 1997. Since then, he has worked at the University of Cambridge as a researcher in extragalactic astronomy and cosmology. He has studied a wide range of objects from Gamma Ray Bursts to low mass galaxies and dark matter. More recently he has become interested in astrobiology and the search for extraterrestrial life.

Dr Clare Worley is currently a Research Associate at the Institute of Astronomy at the University of Cambridge. She is working in particular on the Gaia-ESO Survey, a ground based optical survey that has been designed to complement the cutting edge Gaia Mission, with the combined goals of producing a 3D chemico-dynamic chart of the Milky Way. Previously Clare has worked as a Post-doctoral Fellow at the Observatoire de la Cote d'Azur, Nice, on the automated analysis of large scale datasets. She completed her PhD in Astronomy at the University of Canterbury, Christchurch, New Zealand, where she had also completed her Bachelor of Science with 1st Class Honours. During her career as an astronomer, Clare has been actively involved in both student and public education programmes.

Administrative staff

Academic Programme Manager: Linda Fisher, Institute of Continuing Education, University of Cambridge, Madingley Hall, Madingley, Cambridge, CB23 8AQ, 01223 746218, linda.fisher@ice.cam.ac.uk

Programme Administrator: Liz Deacon, Institute of Continuing Education, University of Cambridge, Madingley Hall, Madingley, Cambridge, CB23 8AQ, 01223 746227, liz.deacon@ice.cam.ac.uk

Venue

Madingley Hall is an historic Tudor mansion on the outskirts of Cambridge with one of the finest gardens in the region and will be the venue for your classes unless otherwise specified.

The Hall is situated in the village of Madingley, three miles west of Cambridge with easy access from the M11 and the A14. Full directions are given on our website at www.ice.cam.ac.uk/directions.

Workshops are held at Madingley Hall, which has a variety of teaching rooms ranging from the newly refurbished Courtyard Suite to rooms in the historic Hall. Workshops may be scheduled in different teaching rooms each term.

Additional venues

The Institute of Astronomy (IoA) is part of the Faculty of Physics and Chemistry within the School of the Physical Sciences of The University of Cambridge. The Institute of Astronomy main entrance is situated on Madingley Rise which joins Madingley Road opposite J. J. Thompson Avenue.

Parking
The map below indicates the IoA's car parks, with the main visitor car park the one just off Madingley Road. This includes a disabled parking space.

For more information about travelling to the IoA and parking please see links to the following webpages:

www.ast.cam.ac.uk/contact/directions
www.ast.cam.ac.uk/contact/map

Contact details of ICE

Institute of Continuing Education
University of Cambridge
Madingley Hall
Madingley
Cambridge
CB23 8AQ
T: 01223 746222
www.ice.cam.ac.uk
ug-awards@ice.cam.ac.uk

Please also refer to the 'information for students' section on ICE's website http://www.ice.cam.ac.uk/studying-with-us/information-for-students and the 2016/17 Student Handbook for award-bearing courses for further information and guidance relating to all aspects of the course including study skills, assignments, assessment and moderation. The Course Information and Help and Guidance section of the ICE VLE will also contain valuable information specific to your course.

Information correct as at 25/04/2016

Syllabus for first unit
Michaelmas term 2016

Stars and the cosmic cycle

Start date	3 October 2016	**End date**	12 December 2016
Day	Monday	**Time**	7.15pm-9.15pm
Venue 1	Madingley Hall, Madingley, Cambridge, CB23 8AQ		
Venue 2	Institute of Astronomy, Madingley Road, Cambridge CB3 0HA		
Tutors	Dr Clare Worley and Dr Sonali Shukla	**No of meetings/classes**	11 evening classes, one Saturday practical session (no half term break) + one optional Saturday maths revision class

Aims
To highlight the key physical foundations upon which the field of stellar evolution is based:

- To describe the Sun, its origin, inner workings, nature, observation, evolution and fate;
- To explain the current ideas about the nature, origin, evolution and fate of single stars;
- To describe the interstellar medium;
- To explore the consequences of binary star evolution and differences from the single star model;
- To present the physical concepts underlying these theories;
- To explain how these theories are underpinned by observation and measurement;
- To develop presentation skills to improve scientific communication.

Content
We will begin by discussing some major landmarks in the long history of astronomy, from measurements by the ancient Greeks to the latest discoveries of cutting-edge telescopes. From week two, we investigate how stars, including the Sun, are formed and evolve. We will explore in detail how stars are born, how they stay alive and how they eventually die. A star's birth mass is incredibly important, and we will unravel how this affects the stars and governs their path through life. We will continue to explore the stars when they are dead; they all form exotic objects such as white dwarfs, neutron stars or black holes. In the later sessions we will look at how stars in close proximity behave and evolve. It turns out that stars like to live in pairs, so the usually individual evolution of the stars becomes linked to that of their companion.

We will also find out how the observation and measurement of stars leads to knowledge of their properties like luminosity and distance, and how observations of star clusters are invaluable in this work. Concentrating on optical observations, we will investigate the basics of positional astronomy and telescope optics.

Presentation of the unit
The unit consists of 11 weekly Monday evening presentations from 7.15pm until 9.15pm in which the emphasis will be on interactive discussion. A significant proportion of material will be introduced through still and video images. There will also be one longer Saturday practical and problem-solving session, and an optional Saturday maths revision workshop.

Provisional weekly lecture list

All sessions take place at Madingley Hall unless otherwise stated

CW = Clare Worley SS = Sonali Shukla JC = Judith Croston

Session	Date	Content
Lecture 1	03/10/2016	The Tale of Astronomy: from the Greeks to Gaia (CW)
Lecture 2	10/10/2016	Nursery: key definitions, the interstellar medium and stellar birth (CW)
Lecture 3	17/10/2016	Staying Alive: nuclear processes (CW)
Optional Saturday Workshop Madingley Hall	23/10/2016 2.00pm – 5.00pm	Maths skills workshop – scientific notation, units, rearranging equations, making & interpreting graphs (JC)
Lecture 4	24/10/2016	To the Main Sequence ... and Beyond! (CW)
Lecture 5 ***Institute of Astronomy***	31/10/2016	Observing Stars: what's really out there? (CW)
Lecture 6	07/11/2016	When the Dust Settles: the remnants of stars (CW)
Saturday practical Madingley Hall	12/11/2016 (10.00am – 4.00pm)	Practical activities: working with astronomical data and data analysis (SS)
Lecture 7	14/11/2016	Victory of Gravity: the death of stars (CW)
Lecture 8	21/11/2016	Our Life Support Machine: the Sun (CW)
Lecture 9	28/11/2016	It Takes Two: binary stars (CW)
Lecture 10	05/12/2016	Student poster conference and oral presentations (CW)
Lecture 11	12/12/2016	Round-up of the course (CW)

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

- recall the key physical foundations upon which the field of stellar evolution is based;
- explain the current theories about the nature, interrelation, origin and evolution of the Sun, stars and interstellar medium;
- discuss the consequences of binary star evolution and differences from the single star model;
- present the physical concepts underlying these theories;
- explain how these theories are underpinned by observation and measurement;
- present their researched topic effectively to their peers.

Student assignments

Students will be expected to:

- read supporting material taken from Green and Jones (see booklist), other textbooks or from the Internet; participate in class discussions and activities; make effort to complete the home tasks; participate in discussion forums on the VLE; undertake practical work and problem-solving exercises.

- complete and submit for assessment a written report (**1,700-2,300 words**) describing the results of practical work.

- complete and submit for assessment one scientific concept poster written in language appropriate for a general public audience. The poster will be presented to the group in the session in week 10. This assignment must be on a different topic to the one covered in the written report from the practical session. Students may choose the topic of their poster from the tutor-approved list provided in week 4. The poster assignment is deemed to be **equivalent to 500 words** although the actual word count may be less than this where the subject matter is better covered by diagrams and images. The poster submission must be accompanied by a text elaboration **(an additional 800-1,200 words).**

The word limits apply for each assignment separately, giving a total of **3,000-4,000 words** (or equivalent) overall for the unit. **Each assignment is equally weighted 50/50.** These written reports must demonstrate that students are able to fulfil the term's learning outcomes.

All choices of assessment topics must be discussed and agreed with the tutor in advance.

All students are expected to upload their assignments into the VLE.

Closing date for the submission of assignments: **Monday 9 January 2016 by 12:00 (noon) UTC/GMT***
*Co-ordinated Universal Time / Greenwich Mean Time

Reading and resource list

Core text

Simon Green and Mark Jones	An Introduction to the Sun and Stars	Cambridge University Press 2004	ISBN 0-521-54622-2

The following are general astronomy textbooks that include much of the material of this course:

Roger A Freedman, Robert M Geller and William J Kaufmann	Universe	W H Freeman	ISBN 978-1464124921 10th edition (paperback)
Michael Zeilik	Astronomy: the Evolving Universe	Cambridge University Press 2002	ISBN 978-0521-800907 9th edition
Iain Nicolson	Unfolding Our Universe	Cambridge University Press 2000	ISBN 978-521-592703

The following are for background reading:

Patrick Moore	Atlas of the Universe	George Philip Ltd 2007	ISBN 978-0540091188 revised edition
Carolyn Collins Petersen and John C Brandt	Visions of the Cosmos	Cambridge University Press 2003	ISBN 978-0521818988
Monthly Magazine	Astronomy Now	Pole Star Publications UK	Available on subscription or from newsagents
Monthly Magazine	The Sky at Night	BBC	Available on subscription or from newsagents

Syllabus for second unit
Lent term 2017

Galaxies and quasars

Start date	9 January 2017	**End date**	20 March 2017
Day	Monday	**Time**	7.15 – 9.15pm
Venue	Madingley Hall, Madingley, Cambridge CB23 8AQ		
Tutors	Dr Hardip Sanghera and Dr Sonali Shukla	**No of meetings / classes**	10 evening classes and 2 Saturday practical sessions (with a half term break)

Aims

- To describe our own galaxy, the Milky Way, and its similarities to and differences from other galaxies in the Universe.
- To explain methods of observation and measurement of galaxy properties for nearby galaxies and distant galaxies.
- To describe the current theories about the nature, origin and evolution of normal galaxies and active galaxies and their connection with the evolution of the Universe.
- To provide an understanding of the role of gravity and other physical concepts underlying these theories.

Content

In this unit we will look at the larger scale structure of the Universe, in the form of galaxies. We investigate the position of the Milky Way in the Universe. Is it unique? How was it formed? We discover the relationship between galaxies and the evolution of the Universe as a whole.

We will discuss both observational and theoretical aspects of galaxy formation and evolution. When investigating the observations of galaxy formation we will consider the benefits of imaging of galaxies in more than one waveband. The concepts of dark matter and dark energy will be introduced and we will create a picture of the Universe in which we understand the connections between dark matter and energy, our own galaxy, black holes and active galaxies. The unit will rely on images from the world's largest telescopes and describe cutting-edge theory derived from these observations.

Presentation of the unit

The unit consists of 10 weekly Monday evening presentations from 7.15pm until 9.15pm in which the emphasis will be on interactive discussion. A significant proportion of material will be introduced through still and video images. There will also be two longer Saturday practical and problem-solving sessions.

Provisional lecture list

All sessions take place at Madingley Hall unless otherwise stated

HS = Hardip Sanghera SS = Sonali Shukla

Session	Date	Content
Lecture 1	9/01/2017	Overview of course content; mathematical & physical principles used during the course. (HS)

Lecture 2	16/01/2017	Disc, halo & bulge; stars, gas, dust, measuring the size and scale of the galaxy. (HS)
Lecture 3	23/01/2017	HII & CO observations; spiral structure; rotation curves and the mass of the galaxy. (HS)
Lecture 4	30/02/2017	Stellar populations, velocity and metallicity. (HS)
Saturday practical session Madingley Hall	04/02/2017 (10.00am – 4.00pm)	Practical activities: galaxy observations (SS/HS)
Lecture 5	06/02/2017	Introduction to other types of galaxies; classification scheme, similarities, differences. Galaxy evolution: spirals to ellipticals; interaction and mergers. (HS)
Half-term break	*13/02/2017*	*No class*
Lecture 6	20/02/2017	The active galaxy phenomenon; types of active galaxy. (HS)
Lecture 7	27/02/2017	The central engine of active galaxies and the unified model for active galactic nuclei (AGN). Black holes: evidence, triggering of AGN phenomena, role in galaxy evolution via feedback. (HS)
Saturday practical session Madingley Hall	04/03/2017 (10.00am – 4.00pm)	Practical activities: galaxy observations 2 (SS/HS)
Lecture 8	06/03/2017	Large scale structure; clusters and superclusters; surveys. (HS)
Lecture 9	13/03/2017	Dark Matter: evidence for and current detection experiments. (HS)
Lecture 10	20/03/2017	Summary of the course content, poster presentations and discussion. (HS)

Outcomes

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

- Describe our own galaxy, the constituents and structure of the Milky Way and compare and contrast it with other external galaxies;
- Explain how astronomers obtain measurements and images of both nearby and distant galaxies and explain how these results connect with current theories of galaxy formation;
- Provide an explanation of the role of gravity and other physical concepts in the formation and evolution of galaxies.

Student assignments

Students will be expected to:

- undertake reading at home (An Introduction to Galaxies and Cosmology by Jones and Lambourne (eds)) between weekly meetings; participate in class discussions; undertake practical work and problem-solving exercises;

- complete and submit for assessment a written scientific report **(1700 - 2300 words in length**) describing the results of practical work.

- complete and submit for assessment purposes one piece of written work, in the form of a scientific conference poster written in language appropriate for a general public audience. The

poster will be presented in the class session in Week 10. The poster assignment is deemed to be **equivalent to 500 words** but the actual word count may be less than this where the subject matter is better covered by diagrams and images. The poster submission must be accompanied by a text elaboration (**an additional 800-1200 words**).

The word limits apply for each assignment separately, giving a total **of 3000-4000 words** (or equivalent) overall. **Each assignment is equally weighted 50/50.** These written reports must demonstrate that students are able to fulfil the term's learning outcomes.

All choices of assessment topics must be discussed and agreed with the tutor in advance.

All students are expected to upload their assignments into the VLE.

Closing date for the submission of assignments**: Monday 10 April 2017 by 12:00 (noon) BST* (11:00 UTC)**

*British Summer Time

Reading and resource list

Core text:

Mark Jones and Robert Lambourne	An Introduction to Galaxies and Cosmology	Cambridge University Press 2004	ISBN 978-0521 546232 pb

The books below are of relevance to Unit 2:

Bradley W. Caroll & Dale A.Ostlie	An Introduction to Modern Astrophysics	Addison Wesley	ISBN: 978-0321210302
Roger A. Freedman Robert M Geller and William J Kaufmann	Universe	W H Freeman	ISBN 978-1464124921 10th edition (paperback) (highly recommended)
Bernard Schutz	Gravity from the Ground Up	Cambridge University Press 2003	ISBN 978-0521455065
Stephen W. Hawking	Universe in a Nutshell	Bantam (hardback) 2001	ISBN 0593048156
Rough Guides (John Scalzi)	Rough Guide to the Universe	Rough Guides (paperback) 2003	ISBN 978-1858289397
Begelman M & Rees M	Gravity's Fatal Attraction	Scientific American Library (paperback) 1998	ISBN 978-0716760290

Syllabus for third unit
Easter term 2017

Planets and planetary systems

Start date	10 April 2017	**End date**	3 July 2017
Day	Monday	**Time**	7.15pm-9.15pm
Venue	Madingley Hall, Madingley, Cambridge, CB23 8AQ		
Tutors	Dr Simon Hodgkin, Dr Neil Trentham and Dr Sonali Shukla	**No of meetings/classes**	10 evening classes plus 2 Saturday practical sessions (no classes on bank holidays)

Aims

- To describe the planets, the other bodies of the Solar System and the known extrasolar planetary systems;
- To explain the current theories about the nature, origin and evolution of the planets and planetary systems;
- To provide an understanding of some of the physical concepts underlying these theories;
- To explain how these theories are underpinned by observation and measurement.

Content

Starting with a description of the planets and other Solar System bodies we will then consider theories about the nature, origin and evolution of planets. This will lead on to one of the most fundamental of questions: are we alone? More than 2000 planets have now been discovered, and recent studies suggest that stars are orbited by a planet as a general rule, rather than as an exception. This is a rapidly changing field: how long will it be before Earth-like planets are found?

The observation and measurement of the properties of planets and satellites is a theme of this unit and we will concentrate on observations by space exploration. Space probes and ground-based telescopes have provided us with a wealth of superb planetary images, so we will make good use of still and video images to illustrate the course.

Presentation of the unit

The unit consists of 10 weekly Monday evening presentations from 7.15pm until 9.15pm in which the emphasis will be on interactive discussion. A significant proportion of material will be introduced through still and video images. We also make significant use of graphical figures with both linear and logarithmic axes for inter-comparisons between data, and between data and theory. There will be two longer Saturday practical and problem-solving sessions.

Provisional weekly lecture list

All sessions take place at Madingley Hall unless otherwise stated

SH = Simon Hodgkin NT = Neil Trentham SS = Sonali Shukla

Session	Date	Content
Lecture 1	10/04/2017	Physics in the Solar System and exoplanetary systems: Observations and theory. (SH/NT)
Bank holiday	*17/04/2017*	*No class*
Lecture 2	24/04/2017	The Inner and Outer Solar System (SH/NT)
Bank holiday	*01/05/2017*	*No class*
Lecture 3	08/05/2017	The Outer Solar System (cont.) (SH/NT)
Lecture 4	15/05/2017	Forming stars and planets (SH/NT)
Saturday practical Madingley Hall	20/05/2017 (10.00am – 4.00pm)	Solar system puzzles and paradoxes, discovery of extra-solar planets using different methods (SS)
Lecture 5	22/05/2017	Forming stars and planets (cont.) (SH/NT)
Bank holiday	*29/05/2017*	*No class*
Lecture 6	05/06/2017	Detecting Exoplanets (SH/NT)
Lecture 7	12/06/2017	Detecting and Characterising Exoplanets (SH/NT)
Saturday practical Madingley Hall	17/06/2017 (10.00am – 2.00pm)	Practical exercises in solar system and planetary astronomy (SS)
Lecture 8	19/06/2017	The diversity of planetary systems (SH/NT)
Lecture 9	26/06/2017	Exoplanet atmospheres (SH/NT)
Lecture 10	03/07/2017	Habitability (SH/NT)

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

- describe the key constituents of the Solar System and of extrasolar planetary systems;
- explain the current theories about the nature, interrelation, origin and evolution of the planets and planetary systems;
- demonstrate an understanding of the physical concepts underlying these theories;
- explain how these theories are underpinned by observation and measurement.

Student assignments

Students will be expected to:

- undertake reading at home between weekly meetings; complete occasional non-assessed assignments at home; and participate in class discussions.
- undertake practical work and problem-solving exercises.
- complete and submit two assignments, **each comprising 1,500 – 2,000 words**, based on the two practical/problem-solving sessions. These written reports must demonstrate that students are able to fulfil the term's learning outcomes.

The word limits apply for each assignment separately, giving **a total of 3000-4000** words (or equivalent) overall. **Each assignment is equally weighted 50/50.**

All choices of assessment topics must be discussed and agreed with the tutor in advance.

All students are expected to upload their assignments into the VLE.

Closing date for the submission of assignments*:* **Monday 24 July 2017 by 12:00 (noon) BST* (11:00 UTC)**

*British Summer Time

Reading and resource list

Recommended reading:

Carole Haswell	Transiting Exoplanets	Cambridge University Press 2010	ISBN 978-0521 139380
David A Rothery, Neil McBride and Iain Gilmour (eds)	An Introduction to the Solar System	Cambridge University Press, second edition (12 May 2011)	ISBN9781107600928

More detailed texts:

Michael Perryman	The Exoplanet Handbook	Cambridge University Press, 2011	ISBN 978-0521 765596
Sara Seager (Editor)	Exoplanets	University of Arizona Press, 2011	ISBN 978-0816 529452
J Kelly Beatty, C Collins Petersen and Andrew Chaikin	The New Solar system	Cambridge University Press, 1999	ISBN 978-0 521 645874, 4th edition pb
Roger A Freedman, Robert M Geller and William J Kaufmann	Universe: the Solar System	W H Freeman 2010	ISBN 978-1429240161 4th edition pb

TIMETABLE

Michaelmas 2016	
Stars and the cosmic cycle	
Lecture 1	03/10/2016
Lecture 2	10/10/2016
Optional Saturday workshop (2pm – 5pm)	15/10/2016 (Madingley Hall)
Lecture 3	17/10/2016
Lecture 4	24/10/2016
Lecture 5	31/10/2016 (Institute of Astronomy)
Lecture 6	07/11/2016
Lecture 7	14/11/2016
Saturday practical session (10am – 4pm)	19/11/2016 (Madingley Hall)
Lecture 8	21/11/2016
Lecture 9	28/11/2016
Lecture 10	05/12/2016
Lecture 11	12/12/2016
Lent 2017	
Galaxies and quasars	
Lecture 1	09/01/2017
Lecture 2	16/01/2017
Lecture 3	23/01/2017
Lecture 4	30/01/2017
Saturday practical session (10am – 4pm)	04/02/2017 (Madingley Hall)
Lecture 5	06/02/2017
Half-term (no class)	*13/02/2017*
Lecture 6	20/02/2017
Lecture 7	27/02/2017
Saturday practical session (10am – 4pm)	04/03/2017 (Madingley Hall)
Lecture 8	06/03/2017
Lecture 9	12/03/2017
Lecture 10	20/03/2017
Easter 2017	
Planets and Planetary Systems	
Lecture 1	10/04/2017
Bank Holiday (no class)	*17/04/2017*
Lecture 2	24/04/2017
Bank Holiday (no class)	*01/05/2017*
Lecture 3	08/05/2017
Lecture 4	15/05/2017
Saturday practical session (10am – 4pm)	20/05/2017 (Madingley Hall)
Lecture 5	22/05/2017
Bank holiday (no class)	*29/05/2017*
Lecture 6	05/06/2017
Lecture 7	12/06/2017
Saturday practical (10am – 2pm)	17/06/2017 (Madingley Hall)
Lecture 8	19/06/2017
Lecture 9	26/06/2017
Lecture 10	03/07/2017

Assignment submission dates are normally 3 weeks after final teaching session of term.

Whilst every effort is made to avoid changes to this programme, published details may be altered without notice at any time. The Institute reserves the right to withdraw or amend any part of this programme without prior notice.

University of Cambridge Institute of Continuing Education, Madingley Hall, Cambridge, CB23 8AQ
Tel 01223 746222 www.ice.cam.ac.uk