

## Stars: Building blocks of the Universe

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**Start date** 16 Nov 2019                      **End date** 17 Nov 2019

**Venue**                      Madingley Hall  
                                    Madingley  
                                    Cambridge

**Tutor**                      Dr Sonali Shukla                      **Course code** 1920NRX017

**Director of Academic Centres**                      Sarah Ormrod

**For further information on this course, please contact**                      Head of Academic Centre Administration, Zara Kuckelhaus  
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**To book**                      See: [www.ice.cam.ac.uk](http://www.ice.cam.ac.uk) or telephone 01223 746262

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### Tutor biography

Dr. Shukla holds a PhD in astrophysics from Vanderbilt University, USA. Her research areas include understanding the formation of young low-mass stars and disks around young stars and brown dwarfs. She spent a year as a pre-doctoral fellow at the Spitzer Science Center, Caltech, and continued her research as a postdoctoral researcher at Penn State University. She has served in education and public outreach, both as the Astronomy Outreach Assistant at the Institute of Astronomy and Public Engagement Coordinator at the University of Cambridge. Previously, she served as Assistant Director for the physics department at the University of Maryland, where she developed novel outreach and educational programmes, particularly to increase inclusion and diversity of students in the physical sciences. Dr. Shukla has developed inquiry-based practical exercises that incorporate real astronomical data whenever possible. When she is not lecturing astronomy, she works for the University of Cambridge's Careers Service advising students and postdoctoral researchers in the sciences.

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## Course programme

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### Saturday

Please plan to arrive between 13:00 and 15:00. Please note you can check in to your room from 14:00. You can meet other course members in the bar. Tea and coffee making facilities are available in the study bedrooms.

15:00	<b>Observing the stars: how do we know what we know?</b>
16:15	Tea
16:45	<b>The life cycles of stars</b>
18:00	Free
18:30	Dinner
20:00	<b>Introduction to the night sky (outdoors weather-permitting)</b>
21:15	Terrace bar open for informal discussion

### Sunday

07:30	Breakfast
09:30	<b>Classifying stars</b>
10:45	Coffee
11:15	<b>Extreme phenomena: supernovas and black holes</b>
13:00	Lunch
14:00	<b>Stellar systems: planets in our solar system and beyond</b>
15:15	Course ends

## **Course syllabus**

### **Aims:**

This course aims to:

- 1) Provide the historical context for understanding observational astronomy.
- 2) Give a comprehensive overview of how stars are born, develop and die, including understanding extreme phenomena such as novae and supernovae.
- 3) Outline stellar classification and how stars are related to stellar-like objects and how their classification affects the ability to host planetary systems.
- 4) Provide the framework for observing the night sky with the naked eye from the UK.

### **Content:**

Stars have been observed by humans since the dawn of time, but how did we learn the physics behind these pinpoints of light in the sky? We will examine the ingenuity of observational astronomy, further probe the life cycles of stars with the latest research, explore stellar classification and evolution, as well as take a look at some extreme phenomena such as stellar mass black holes. The course will also include a session on observing the night sky, which will be held outdoors weather permitting.

### **Presentation of the course:**

This course will consist of a combination of Tutor-led lectures and group discussion. Weather-permitting, there will be short Tutor-led group observing session.

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

- 1) understand the basic physical concepts behind observational astronomy
- 2) gain a broad perspective of stellar evolution and how scientific understanding of this process has also evolved
- 3) understand the differences of what can be observed with the naked eye, small back garden telescopes and large research telescope facilities
- 4) be able to understand popular space news items and differentiate what makes an astronomy story newsworthy

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## Reading and resources list

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Listed below are texts that might be of interest should you wish to supplement your learning on the course. Any essential reading is marked with an asterisk \*

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Author	Title	Publisher and date
Ridpath I., and Tirion W.	Stars and Planets	Princeton University Press 2017
Cox, John	Cambridge Pocket Star Atlas	Cambridge University Press 1996

## Website addresses

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## Additional information

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### Venue

Details of how to find Madingley Hall can be found on our website:  
<http://www.ice.cam.ac.uk/who-we-are/how-to-find-the-institute>

### Refreshments

Tea and coffee and lunch will be provided. If you have any specific dietary requirements or allergies and have not already advised us, please inform our Admissions Team on [ice.admissions@ice.cam.ac.uk](mailto:ice.admissions@ice.cam.ac.uk) or +44 (0)1223 746262.

**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:* 09 October 2019