



Evolution and the fossil record

Start date 2 June 2017

End date 4 June 2017

Venue Madingley Hall
Madingley
Cambridge

Tutor Dr Peter Sheldon

Course code 1617NRX094

Director of Programmes Emma Jennings

For further information on this course, please contact Clare Kerr, Public Programmes Co-ordinator
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To book See: www.ice.cam.ac.uk or telephone 01223 746262

Tutor biography

Dr Peter Sheldon is an Honorary Associate in the School of Environment, Earth and Ecosystem Sciences at the Open University, where he was a Senior Lecturer in Earth Sciences until 2015. He has given over 75 residential courses in geology, palaeontology and evolution for the University of Cambridge Institute of Continuing Education since 1979. From 2008 to 2011 he was External Examiner for Scientific Studies at Oxford University's Department for Continuing Education, where he has given over 40 day-schools since 1993. His teaching style combines fieldwork, hands-on study of real specimens of rocks, minerals and fossils, and interactive lectures. He chaired the Open University course on *Geology* and has contributed to many other OU courses, including *Fossils and the History of Life*, *Evolution*, *Earth's Physical Resources*, *Discovering Science*, *The Geological History of the British Isles* and *Earth Science*.

Course Programme

Friday 2 June 2017

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.

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| 19.00 | Dinner |
| 20.30 – 22.00 | Introduction to evolution, fossils and the early history of life. |
| 22.00 | Terrace bar open for informal discussion |

Saturday 3 June 2017

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| 07.30 | Breakfast |
| 09.00 – c.09.40 | Short talk followed by field excursion to Needingworth gravel quarry. <i>Please bring stout footwear (essential; preferably walking boots, or wellington boots), waterproof clothing in case of bad weather, and, if you wish, a thermos flask which can be filled at breakfast.</i> <i>N.B. See also 'Equipment Required'.</i> A packed lunch will be provided. Return by 17.30 |
| 18.30 | Dinner |
| 20:00 – 21:30 | Natural selection, evolutionary processes and the origin of species. |
| 21:30 | Terrace bar open for informal discussion |

Sunday 4 June 2017

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| 07.30 | Breakfast |
| 09.00 – 10.30 | Practical session - yesterday's finds and other specimens. Evolution during the Palaeozoic Era. |
| 10.30 | Coffee |
| 11.00 – 12.30 | Other major events in the evolution of life, including mass extinctions. |
| 12.45 | Lunch |

The course will disperse after lunch

Course syllabus

Aims:

This course aims to:

1. Provide a wide-ranging introduction to evolution from a geological viewpoint, and give first-hand experience of collecting and identifying fossils in the field and teaching room.
2. Stimulate a continuing interest in evolution and palaeontology.
3. Give course members sufficient basic understanding and practical knowledge to enable them to begin to pursue an interest in evolution and palaeontology for themselves.

Content:

A major part of the course is an excursion to learn how to collect and identify fossils and sedimentary rocks in the field.

Topics to be covered during the sessions at Madingley Hall will be:

- the preservation of fossils
- introduction to natural selection and evolutionary processes
- the main fossil groups and how to identify them
- an overview of the history of life
- mass extinctions and evolutionary radiations

N.B. Level of fitness required Participants will at times need to be able to walk continuously for about 15-20 minutes within the quarry and over very rough and quite steep ground for short distances.

No previous background in evolution, palaeontology or geology is needed for the course, and no reading is required in advance.

Programme Please note that the field trip on Saturday may be subject to modification, depending on weather, state of the quarry and so on.

Presentation of the course:

The course will employ a wide variety of teaching and learning methods, including a field excursion, lectures with slides, and the opportunity to pick up and personally examine a large number of fossils put out on tables in the teaching room. On Sunday morning, participants are invited to put out their own specimens found on the excursion, so that everyone can examine, identify and learn from each other's finds.

Outcomes:

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

1. Identify some of the most common fossil groups, and comment briefly on their mode of life, preservation and geological age.
2. Briefly explain a few important evolutionary concepts, such as natural selection, speciation and extinction.
3. Outline a few major events in the history of life.
4. Know a little about basic palaeontological fieldwork, including some routine safety procedures.

Equipment Required:

Warm and waterproof clothing — **ESSENTIAL**. Please note that quarries stipulate that, for safety reasons, shorts or skirts should not be worn.

Walking boots (preferably) or wellington boots — **ESSENTIAL. N.B.** Ordinary walking shoes or trainers are *not* acceptable. Quarries are nearly always wet and muddy in places, and adequate foot protection is required within working areas, near machinery, etc. Bear in mind that wellington boots can be rather hot to wear in summer (compared with walking boots).

Thermos flask — you might find this to be a good idea.

Notebook, pen, pencil, rubber.

Hand-lens (optional) — you'll find your enjoyment and understanding of fossils and rocks increases if you have a hand-lens. Some hand-lenses should be available for purchase from Peter Sheldon for only £2 during the course. Hand-lenses can be also bought from stamp shops (philatelists) and some hobby shops. Magnification x 10 is recommended.

Plastic bags (a few strong, medium-sized shopping bags); paper — to wrap specimens.

A geological hammer (optional) — if you have one, it could be useful; otherwise we will lend out a few to share for the trip. Much study can be done without one and there is **NO** need to obtain a geological hammer for the course. (Note that an ordinary hammer should *not* be used to break open rocks; the metal is too brittle and metal chips may fly off.)

N.B. In addition to suitable footwear (see above), visitors to quarries have to wear standard safety helmets and high-visibility waistcoats. We will supply these items on loan.

Reading:

No reading is required in advance and no books need to be bought (or consulted) for the course. Many useful books on evolution, geology and palaeontology will be available for people to look at during the weekend, and a detailed and extensive booklist will be provided.

Currently, there is arguably no ideal book on evolution and the fossil record for the beginner. The following book is a wide-ranging, well-illustrated and authoritative introduction to evolution, but does not cover much about the fossil record and the history of life. *99% Ape – How Evolution Adds Up*. Jonathon Silvertown et al. (2008). Natural History Museum. Full colour. 224 pp. Paperback. ISBN 978-0565 092313. £14.99.

Fossils - the Key to the Past. Richard Fortey. (2015) is an excellent, well-illustrated general introduction to fossils. Natural History Museum, London. Full colour. 256 pp. Paperback. ISBN 978-0565093754. £15.00.

Website Addresses:

Among the many excellent websites you may wish to explore if you have access to the Internet are the following, which have links to a vast number of other relevant sites:

<http://www.nhm.ac.uk> - The Natural History Museum, London.

<http://www.ucmp.berkeley.edu> - Many exhibits and palaeontology/evolution links.

<http://www.si.edu> - The Smithsonian Institution.

<http://www.amnh.org> - The American Museum of Natural History.

<http://www.geolsoc.org.uk> - The Geological Society of London.

<http://www.bgs.ac.uk> - British Geological Survey.

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 October 2016