



# CBL International Oxford Summer Institute at Oriel College



## Natural Science Programme Outline 2014 - Oxford

Oriel College (University of Oxford, UK) and CBL International (Centre for International Business and Commercial Law) are inviting groups from selected university faculties to participate in a 4-week session of *CBL International Oxford Summer Institute at Oriel College*.

### The session will be held in Oxford from 3 to 30 August 2014

This exclusive programme will give participants the opportunity to attend lectures focusing on mathematics, physics, and cosmology. They would interact with professors and faculty from the University of Oxford and the University of Cambridge and know the most recent research they're involved.

Visits to various institutions and labs in Oxford, Cambridge or London give delegates the opportunity to go to the "real world" and see how the theory they learn in class is applied in science and technology.

*CBL International Oxford Summer Institute at Oriel College* is a programme with a very interdisciplinary approach. Therefore students from the following departments and schools are invited to join:

- School/Department of Mathematics
- School/Department of Physics
- School/Department of Economics
- School/Department of Astrology
- School/Department of Statistics
- School/Department of Engineering

Each 4-week session of Oxford Summer Institute will be composed by four courses. Each week, one course will be taught. Combining lecture time, preparation, study time, and tests, each week is designed to be equivalent to 2 - 3 ECTS credits or 1 - 1.5 US credits, in total of 8 - 12 ECTS or 4 - 6 US credits. Each week delegates are invited to participate in one examination. All programmes offered by CBL International Education are run by OKC as EFL programmes and are accredited by the British Accreditation Council.





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The following courses will be offered during the programme:

## 1. **Cosmology and Large-Scale Structure**

The aim of this course is to present the most relevant theoretical and observational results on which modern cosmology is based. The course covers the basic mathematical framework of the standard cosmological model, its observational motivations and its most important shortcomings. At the end of the course the student should be able to understand the main open questions in cosmology, as well as the current and future observational and computational tools used to tackle them.

Faculty member(s) for this topic:

- **Dr David Alonso Monge**, Researcher, Department of Physics, University of Oxford (UK)

## 2. **Theoretical Physics: Symmetries and Field Theories**

This short course will focus on one of the primary guides to our understanding of modern day physics: symmetries. In particular: How symmetries can be used to construct gauge theories, the Higgs mechanism and gravity as a gauge theory. Topics would cover Symmetries and field theories, The Higgs mechanism and gravity as a gauge theory, Shift and Galilean symmetries in the early and late universe.

Faculty member(s) for this topic:

- **Dr Johannes Noller**, Researcher, Department of Physics, University of Oxford (UK)

## 3. **Mathematical Methods: Calculus**

Topics would be covered in the calculus course are:

- Limits, Closed and Compact Sets, Convex Sets
- Functions ; continuous, concave functions
- Maxima and Suprema
- Fixed points and existence of equilibrium
- Differentiation and Taylor Series
- Differential equations
- Integration
- Implicit Function theorem

Faculty member(s) for this topic:

- **Dr Charles Roddie**, University lecturer, Faculty of Economics, University of Cambridge (UK)



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## 4. Introduction to Logic

The course would cover the following topics: syntax and semantics of propositional logic; syntax and basic semantics of first-order logic; formalising mathematical arguments in logic. The main aim of the course is to introduce students to two formal languages and thereby enable them to formalise (i.e. translate into a logical language) mathematical arguments. Formalisation allows us to test whether mathematical arguments are valid or not (i.e. whether the conclusion logically follows from the premisses). A final (very introductory) lecture on Gödel’s Incompleteness Theorem could be included, as a sort of ‘glimpses beyond’ lecture. The title of the course could be ‘Logic’ or ‘Introduction to Logic’, as appropriate.

Faculty member(s) for this topic:

- **Dr Alexander Paseau**, Associate Professor of Philosophy, University of Oxford (UK)

## 5. Visits and workshops

Delegates will also have the chance to go to London or various institutions or labs in Oxford or Cambridge. As the classroom lectures are good venues for more theoretical content, the visits to various institutions and labs can be a good opportunity for students to know how science and technology is applied, and what the cutting edge technology is being developed to advance our frontiers in technology, energy and infrastructure.

Possible visits will be:

<b>Institution</b>	<b>Area of Interest</b>	<b>Location</b>
Sharp Laboratories of Europe	Optoelectronics/ IT / Health technology	Oxford
Poyry	Energy engineering and market	Oxford
Culham Centre for Fusion Energy	Nuclear energy/ physics/ engineering	Oxford
Cavendish Laboratory Museum	Physics	Cambridge
Thames Barrier	Engineering/ Infrastructure	London
Royal Observatory Museum	General Science/Astronomy	London
Science Museum London	General Science	London

## Certificate and academic transcript

A certificate and academic transcript co-signed by Oriel College and CBL International will be issued to the participants, containing topics covered during the programme. Oxford Summer Institute is a certificate programme that may be accountable for optional credits depending on the requirements of the home institution/school/university.



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## **Tuition Fee**

Tuition fee for Chinese students

RMB 17,000

## **Accommodation**

College accommodation, bed & breakfast (single room)

RMB 16,500

Extra charge for full board (lunch and dinner served daily)

RMB 7,000

## **Application**

Student groups can apply through a **university/school representative**. Qualified representatives will be **individual professors, programme directors, or the head of the international office**.

Regular applications due **4 April 2014**

For further information regarding *CBL International Oxford Summer Institute at Oriel College* and the application process, please contact:

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