ISCI 104 – Making Science Connections Abroad: London and Paris

Fall 2012

Syllabus

Course description (brief)

This course presents students with an interdisciplinary view on the process of scientific progress with the help of a number of case studies. Each case study will trace a chain of scientific discoveries and technological breakthroughs spanning a diverse range of disciplines, including biology, physic, astronomy, chemistry, engineering, and computing. Students will examine how scientific method was used in the process of experimentation leading up to many of these discoveries. Each case study will also illustrate the impact of scientific innovation on our everyday lives and experiences. This course will culminate with a trip to London and Paris during the winter break of the 2012/13 academic year. Being two major capital cities, London and Paris offer main historical locations where the scientists whose work is discussed in the course had lived and worked, along with first-class museums exhibiting scientific and engineering artifacts discussed in this course.

Course description (full)

Not a single scientific discovery was made in isolation from the research work that was conducted previously. Everyone would agree that the invention of electric motor would have been impossible without previous studies in electricity and magnetism. However, there are many precursors, studies, and inventions leading up to the discovery of electricity and magnetism that reach far beyond physics. In fact, this discovery can be traced directly to one of the earliest areas of scientific inquiry – astronomy. The history of scientific progress has plenty of similar connections linking seemingly unrelated areas of science and technology together in a chain of discoveries leading to a single scientific breakthrough. For example, none of the modern advances in computing and information technology would have been possible without the invention of Jacquard loom, which revolutionized the textile industry at the beginning of the 19th century. The invention of the Jacquard loom itself would not have been possible without the invention of the camshaft by the ancient Greeks who used it in water-powered stamp mills.

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This course will culminate with a trip to London and Paris during the winter break of the 2012/13 academic year. These two cities are the centers of Enlightenment in the 18th century Europe, when the number of scientific discoveries and inventions blossomed as a result of promoting science and intellectual discourse, as opposed to superstition and intolerance. Scientists in both England and France made many very important discoveries laying the foundation for the Industrial Revolution of the 19th century. Although many historians agree that both countries had very similar if not equal conditions, it was England where the Industrial Revolution started and bloomed as a result of the invention of the steam engine. Both London and Paris have many museums where students will see many of the scientific and technological artifacts discussed in this course. Being two major capital cities, London and Paris offer many historical locations where the scientists whose work is discussed in the course had lived and worked. Students enrolled in this course will spend five full days in London, take a high-speed train running under the English Channel and arrive in Paris, where they will spend another five full days. In addition to visiting several science museums, students in this course will participate in many other activities without which such a trip would not be complete. In London, the program will include a visit to Westminster Abbey, The Tower of London, British Museum, British Library, Science Museum, Museum of Natural History, and Greenwich Observatory. Students may also choose to visit the London Eye and see a play in one of London’s theatres. Also, London is the place of one of the largest New Year’s Eve celebrations in the world – and that’s where the class will be on December 31, 2012. In Paris, students will visit Notre Dame Cathedral, The Louvre, Musée d’Orsay, Musée de l’Orangerie, Arc de Triomphe, Eiffel Tower, Cité des Sciences et de l’Industrie, and Musée des Arts et Métiers.

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**Textbook and other reference materials**
Learning outcomes
Upon a successful completion of this course, the students will:
- Acquire understanding of the scientific method;
- Be able to see the applications of science in every day life;
- Understand and be able to explain how scientists think, work, and evaluate the natural world;
- Know the difference between what science is and is not;
- Understand the connections between many disciplines of science and engineering in the historical context of scientific discovery.

Additionally, this course incorporates the following CIE learning outcomes:
- Students will be able to explain the complexity and interdependency of global events and issues by demonstrating:
  1. knowledge of world geography;
  2. knowledge of world history;
  3. an understanding of diversity of values, beliefs, ideas, and world views.
- Students will value and respect intercultural and global diversity by exhibiting:
  2.3 the ability to examine issues objectively and without prejudice;
  2.4 appreciation for multiple perspectives.
- Students will act as global citizens by:
  3.1 thinking critically and creatively and integrating knowledge of the world.

Sample course schedule
Pre-departure (Fall 2012 semester, 2nd term): 15 hours (10 class meetings)
1. Introduction, class orientation
2. Scientific method; what science is and is not
3. Chemistry: from coal tar to modern plastics
4. Computing: from weaving to iPhone
5. Physics: from maritime navigation to electric appliances
6. Engineering: from land surveying to 3D movies
7. Biology: topics TBD
8. Paris and the Age of Enlightenment
9. London and the Industrial Revolution
10. Discussion of academic itinerary in London and Paris

Travel abroad (Winter break 2012/13): 30 hours minimum

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<thead>
<tr>
<th>Date</th>
<th>Destination/Location</th>
<th>Location of Lodging</th>
<th>Excursions or Academic Sites to be Visited</th>
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</thead>
<tbody>
<tr>
<td>12/26/12</td>
<td>CCSU to JFK to LON</td>
<td>In flight</td>
<td></td>
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<tr>
<td>12/27</td>
<td>London</td>
<td>London</td>
<td>Orientation tour (2 hrs)</td>
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12/28 | London | London | British museum (2 hrs)  
|       |       |       | British Library (1 hr)  
12/29 | London | London | Museum of Natural History (2.5 hrs)  
|       |       |       | Science Museum (2.5 hrs)  
12/30 | London | London | Westminster Abbey (2 hrs)  
|       |       |       | The National Gallery (2 hrs)  
12/31 | London | London | National Maritime Museum and Royal Observatory, Greenwich (2 hrs)  
1/1/2013 | London | London | Victoria and Albert Museum (2 hrs)  
1/2 | London to Paris | Paris | Chunnel train from London to Paris  
|       |       |       | Orientation tour (2 hrs)  
1/3 | Paris | Paris | The Louvre (3 hrs)  
|       |       |       | Eiffel Tower (1 hr)  
1/4 | Paris | Paris | Notre Dame Cathedral (1 hr)  
|       |       |       | Cité des Sciences et de l'Industrie (2.5 hrs)  
1/5 | Paris | Paris | Musee d'Orsay (3 hrs)  
|       |       |       | Musee de l'Orangerie (1 hr)  
1/6 | Paris | Paris | Musée des Arts et Métiers (2.5 hrs)  
1/7 | Paris | Paris | Arc de Triomphe (1 hr)  
1/8 | CDG to JFK to CCSU  

Post-return: 3 hours (1 class meeting)  
1. Reflection; student reports

**Assessment**
Student performance will be assessed using several short quizzes, homework assignments, a final exam, and a post-trip in-class presentation. The final course grade will be determined as follows:

**On-campus before the trip**
Assignments 50%  
Participation 20%

**During the trip**
Participation 20%

**On-campus after the trip**
Reflection paper 20%

**Total** 100%