LEARNING ABROAD CENTER
UNIVERSITY OF MINNESOTA

In partnership with

CAPA
THE GLOBAL EDUCATION NETWORK

Introduction to Astronomy: British Contributions & Developments

COURSE DETAILS

Course Designator and Number: LNDN 3258
Number of Credits: 3
Language of Instruction: English
Contact Hours: 45
Instructor: Katrina Brown

COURSE DESCRIPTION

This course will explore human knowledge of the solar system and of the night sky, as well as the growth of astronomy as a science. The development of astronomy in England has been influenced by many factors and represents a rich microcosm of the evolution of astronomy in the western world. British contributions to astronomy will be used to exemplify the progress and achievements of this field of science.

Throughout history astronomy has been intertwined with both time-keeping and navigation, and we will explore these connections in and around London. The passage of time is manifested through the motions of the sun which we will investigate when we visit sundials throughout London. More elaborate structures, like Stonehenge (which we will discuss and visit), can be used to mark the passage of time on greater scales. The importance of astronomy to time-keeping also made it invaluable to navigation. When we visit the National Maritime Museum, we will examine and discuss the instruments in their Astronomical and Navigational Collection to elucidate the link between astronomy and navigation. This link between the two areas meant that the interests of astronomers intersected with the interests of the government, leading to the development of the Royal Observatory at Greenwich, which we will also visit and explore. Lastly, when we visit Westminster Abbey, we will see that the importance of the work of astronomers was so valued that the scientists themselves were esteemed.

Course Objectives

Students will develop critical thinking skills that will allow them to examine and make sense of celestial patterns. The course aims to help students see that science is fluid and governed by the scientific process of questioning and testing. Students will additionally learn to appreciate the close connections to astronomy and navigation and astronomy and time-keeping, and to see why these connections led to governmental interest in astronomy and how this affected British astronomers.

Learning Outcomes

By the end of the course, students will:

a. Understand current scientific explanations for the motions of celestial bodies in the solar system.
b. Understand the apparent motions of the stars and changes in the nighttime and daytime skies.
c. Be able to describe the different types of celestial bodies in the solar system and understand their variances.
d. Value the historical and scientific connections between astronomy and navigation and between astronomy and time-keeping.
e. Obtain an appreciation for the development of the field of astronomy.
f. Recognize and understand Britain's achievements in the field of astronomy, including the discovery of planets, the development of telescopes and clocks, contributions to optics, and the study of the electromagnetic spectrum.
g. Be familiar with British astronomers (such as Newton, Flamsteed, Halley, etc.) and understand their contributions to science.

Methodology

This course will meet twice per week. Students will learn the relevant background astronomy in the classroom and then visit sites in and around London, at which we will see and discuss applications, examples, and/or continuations of the classroom material. Students should also anticipate guest lecturers.

Field Component(s): CAPA provides the unique opportunity to learn about the city through direct, guided experience. Participation in the field activity(s) for this course is required. Students will actively explore the Global City they are currently living in. Furthermore, they will have the chance to collect useful information that will be an invaluable resource for the assignments in this course.

Students are strongly encouraged to participate in co-curricular program activities.

Course Prerequisites

There are no specific requirements or prerequisites for this course.

Required Readings/Materials

- The textbook for this class, Astronomy from OpenStax, is available for free online, in web view and PDF format:
    - openstax.org/details/astronomy
      Print ISBN 1938168283, Digital ISBN 1947172247.
- Students will also be expected to acquire and read Longitude: The True Story of a Lone Genius Who Solved the Greatest Scientific Problem of His Time, (1995), by Dava Sobel.

Grading

Grading Rubric

Letter grade	Score or percentage	Description
A	93–100	Achievement that is outstanding relative to the level necessary to meet course requirements.
A-	90–92	Achievement that is significantly above the level necessary to meet course requirements.
B+	87–89	
B	83–86	
B-	80–82	Achievement that meets the course requirements in every respect.
C+	77–79	
C	73–76	
C-	70-72	Achievement that is worthy of credit even though it fails to meet fully the course requirements.
D+	67-69	
D	60-66	
F	0-59	Represents failure (or no credit) and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an I.

Summary of How Grades Are Weighted

Assignments	**Percentage of grade**
Weekly quizzes	30%
Assignments	30%
Participation	10%
Final exam	30%
Overall grade	100%

Assessment Details

Weekly quizzes: There will be one quiz per week. Quizzes will tests students' understanding of the science of astronomy.

Grade %: 30%; learning outcomes A-C, F-G

Assignments: Assignments include in-class activities, worksheets, projects, and homework. Submitted materials will be graded on reasoning, correctness, and completion.

Grade %: 30%; learning outcomes A-C, F-G

Participation: Students will be expected to participate actively in class through their written and verbal contributions.

Grade %: 10%; learning outcomes A-G.

Final exam: The final exam will be a cumulative test at the end of the semester.

Grade %: 30%; learning outcomes A-C, F-G

COURSE CONTENT

Unit 1

- **Topics:** Astronomical distances, a tour of the Universe, heliocentric model of the solar system, scaled solar system walk, the Herschels and Uranus, Adams and Neptune, Pluto's status
- **Readings:** Astronomy Chpt 1.4-1.7, 12.4
- **Site-Exploration:** Park

Unit 2

- **Topics:** The tilt of the Earth, solstices, equinoxes, seasons, the moon and its phases, eclipses
- **Readings:** Astronomy Chpt 4.1, 4.2, 4.5, 4.7

Unit 3

- **Topics:** Celestial objects in our solar system, naked-eye astronomy, Stonehenge, calendars
- **Readings:** Astronomy Chpt 7.1, 13.1, 14.1, 4.4

Unit 4

- **Topics:** Sundials and local noon
- **Site-Exploration:** London sundials
- **Readings:** Astronomy Chpt 4.3, selected readings from the British Sundial Society

Unit 5

- **Topics:** Aristotle and Ptolemy and the geocentric model of the solar system, constellations, the Zodiac and Ophiuchus, Part 1 of astronomy and navigation
- **Readings:** Astronomy Chpt 2.1, 2.3

Unit 6

- **Topics:** Part 2 of astronomy and navigation (astrolabes, quadrants, sextants, etc.), longitude and latitude, timekeeping and astronomy (astronomical clocks, armillary spheres, etc)
- **Site-Exploration:** National Maritime Museum
- **Readings:** Selected readings on astrolabes from The Smithsonian

Unit 7

- **Topics:** Longitude and latitude, telescopes
- **Readings:** Longitude: The True Story of a Lone Genius Who Solved the Greatest Scientific Problem of His Time (Dava Sobel)

Unit 8

- **Topics:** The heliocentric model of the solar system, the work of Sir Isaac Newton
- **Site-Exploration:** The Monument, Westminster Abbey
- **Readings:** Astronomy Chpt 2.4, Chpt 3.1, 3.3, 3.4

Unit 9

- **Topics:** Part 1 early British astronomers and their accomplishments (including Caroline Herschel, Mary Somerville, Annie Maunder, Flamsteed, Airy, Wilkins, Halley, Herschel, etc.)
- **Site-Exploration:** The Monument

Unit 10

- **Topics:** Part 2 early British astronomers and their achievements, the Astronomers Royal, the Royal Observatory at Greenwich
- **Site-Exploration:** The Royal Observatory

Unit 11

- **Topics:** The EM spectrum, line spectra, British contributions to spectroscopy (including Melvill, Wollaston, Lockyer, Newton, and Maxwell), radio telescopes, External speaker on Jocelyn Bell and pulsars
- **Readings:** Astronomy Chpt 5.1-5.5, 6.4

Unit 12

- **Topic:** External speaker on Stephen Hawking and black holes
- **Final exam**

POLICIES

Attendance Policy

Students are expected to be on time and attend all classes while abroad. Many instructors assess both attendance and participation when assigning a final course grade. Attendance alone does not guarantee a positive participation grade; the student should be prepared for class and engage in class discussion. See the on-site syllabus for specific class requirements.

University of Minnesota Policies & Procedures

Academic integrity is essential to a positive teaching and learning environment. All students enrolled in University courses are expected to complete coursework responsibilities with fairness and honesty. Failure to do so by seeking unfair advantage over others or misrepresenting someone else's work as your own can result in disciplinary action. The University Student Conduct Code defines scholastic dishonesty as follows:

Scholastic Dishonesty

Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis.

Within this course, a student responsible for scholastic dishonesty can be assigned a penalty up to and including an "F" or "N" for the course. If you have any questions regarding the expectations for a specific assignment or exam, ask.

Student Conduct

The University of Minnesota has specific policies concerning student conduct. This information can be found on the Learning Abroad Center website.