LNDN ASTR 2239
Introduction to Astronomy: British Contributions and Developments

CAPA LONDON PROGRAM

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 which led 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

You will develop critical thinking skills that will allow you to examine and make sense of celestial patterns. The course aims to help you see that science is fluid and it is governed by the scientific process of questioning and testing. You 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 you 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.

Developmental Outcomes

At the end of this course, you should demonstrate: responsibility & accountability, independence & interdependence, goal orientation, self-confidence, resilience, appreciation of differences. You will learn to communicate their ideas and research findings in both written and oral forms.

Methodology

You 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. You 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. You will actively explore the Global City you are currently living in. Furthermore, you will have the chance to collect useful information that will be an invaluable resource for the assignments in this course.

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

Course Prerequisites

There are no specific requirements or prerequisites for this course.

Statement of Technology

- What technology is required in the course (computer, operating system, software, webcams, internet connectivity, etc.)?
    - The use of the following applications or platforms may be required for this course: Canvas, Google Maps, Google Hangouts, Google Slides, Screencast-O-Matic, and Zoom is required in this course.
    - It is recommended for students to use a desktop or laptop computer less than six years old with at least 1GB of RAM, and to use the most recent version of Chrome or Firefox with JavaScript enabled. Internet connections should be at least 512kbps.
    - Email AcademicAffairs@capa.org regarding any concerns you have about your ability to secure reliable internet access or about any other academic technology needs.
- Whenever virtual class sessions occur, all participants are expected to activate their webcam and be sure that their face is fully visible in order to facilitate effective communication and encourage community. Any exemptions from this policy will be considered on a case by case basis. Students who wish to be considered for exemption from this policy must request this to their instructor in advance, stating their reason. Alternatively, if you prefer not to be viewable on video, you may contact

AcademicAffairs@capa.org to express your needs and CAPA Academic Affairs will work with the CAPA Center to discuss them.

- Any use of technology must be compliant with FERPA.

Required Readings/Materials

The textbook for this class, Astronomy from OpenStax, is available for free online, in web view and PDF format: www.openstax.org/details/astronomy
Print ISBN 1938168283, Digital ISBN 1947172247

You 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	
C+	77–79	Achievement that meets the course requirements in every respect.
C	73–76	
C-	70-72	Achievement that is worthy of credit even though it fails to meet fully
D+	67-69	

		the course requirements.
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	15%
Final Exam	25%
Overall grade	100%

Assessment Details

Weekly Quizzes: There will be one quiz per week. Quizzes will test 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 %: 15%; learning outcomes A-G.

Final Exam: The final exam will be at the end of the semester and will be cumulative. Grade %: 25%; 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: CAPA has a mandatory attendance policy. Attendance is taken at the beginning of every class. Unless otherwise expressed by your instructor, the first time a student has an unexcused absence for a class, their grade will not be impacted. The second time a student has an unexcused absence in that class, it will result in a 3 percent reduction of the final grade (for example: an A- [92] will become a B+ [89]). The student will be placed on academic probation at this time. Three unexcused absences per class will result in failure of the course. A pattern of three absences in more than one course will result in dismissal from the program.

Excused absences: Absences are only excused for medical reasons, for a family emergency, or for a religious holiday. To request an excused absence, you must contact excused.absence@capa.org ahead of time and provide evidence (e.g. a doctor's note) of the reason for your absence, otherwise the absence will not be excused. Even if the student knows the absence will not be excused, the student should still make contact to inform CAPA they will not be attending the online class.

In addition to contacting excused.absence@capa.org, it is the responsibility of the student to contact their instructor and make up any missed assignments.

Class participation: You are expected to participate actively and critically in online class discussions, and the participation portion of the class will be graded accordingly. You must read assignments BEFORE the class and sign in on time. Participation is a vital part of the grade: you are expected to participate orally in online forums and discussions in a critical and evaluative manner, to interact with the faculty and fellow students with respect and tolerance, and to actively engage in discussion. Derogatory or inflammatory comments about the cultures, perspectives, or attitudes of others in the class will not be tolerated.

Academic accommodations: Any student who feels they may need an accommodation based on the impact of a physical, psychological, medical, or learning disability should contact the instructor and/or the Director of Academic Affairs privately to discuss their specific needs. Students requesting accommodations must have their home institution's Disabilities Services or an appropriate licensed professional or healthcare provider submit official documentation directly to CAPA in a timely manner outlining their specific needs. If the documentation is submitted by a provider other than the home institution's Disabilities Services, it must be someone familiar with the history and functional limitations of the student's disability (not a relative or family member of the student). Any required accommodations will be approved by CAPA's Vice President for Academic Affairs, in consultation with relevant Academic Directors, before being relayed to faculty. Any student who requires an accommodation based on official documentation should also discuss their needs directly with their instructor.

Academic integrity: A high level of responsibility and academic honesty is expected. Because the value of an academic course depends upon the absolute integrity of the work done by the student, it is imperative that a student demonstrates a high standard of individual honor in their scholastic work and class behavior. Plagiarism, self-plagiarism, and cheating can result in dismissal from the program. Self-plagiarism—copying an assignment entirely or partially to submit to a different class in an attempt to receive credit twice for one piece of work—is unacceptable and considered cheating by duplication. You risk receiving a "0" for any assignments in which they have duplicated their own work. All substantial writing assignments will be run through the plagiarism checking software Turnitin when submitted via CANVAS. See CAPA's Academic Standards and Policies for more information and resources on plagiarism.

Sexual misconduct, required reporting, and Title IX: CAPA: The Global Education Network is committed to encouraging a safe and healthy environment at our CAPA centers. This commitment includes the understanding of, and applicable adherence to, the guidelines outlined in Title IX of the Education Amendments of 1972. Title IX necessitates that US universities provide equity in all educational programs and activities without sex discrimination.

CAPA understands the implications of Title IX compliance for our institutional partners and thus endeavors to support this compliance as a vital aspect of partnership. The safety and security of all students during a program is a matter of crucial importance to CAPA. To facilitate this, CAPA encourages students to openly disclose any and all information that is Title IX relevant so that CAPA staff can provide support and connect students with appropriate resources. Because students may not understand the implications of Title IX abroad, CAPA will work to advise students about the resources available through Title IX and explain the importance of compliance in Title IX reporting. CAPA will work to build student confidence in CAPA's status as a mandated reporter by outlining the advantage of disclosure for the student, reassuring them that any information disclosed will not be used in an inappropriate manner, and stressing that individuals will only be informed on a need-to-know basis.

Use of electronic equipment in class: All devices such as laptops, i-pods, i-pads, netbooks, notebooks and tablets, smartphones, cell phones, etc. are NOT allowed unless you have express permission from the faculty, or you have been instructed to do so. If you require an accommodation to use any type of electronic equipment, inform the Director of Academic Affairs at the beginning of Term

Use of electronic translators: In language courses students are NOT allowed to use electronic translators for writing texts in the target language: those submitting compositions and texts of whatever kind translated in such a fashion will receive a final F grade for the course.

Late submission: Late submission of papers, projects, journal entries, pieces of homework and portfolios is only permitted with prior approval. A request for an extension must be made to the relevant faculty member no later than two days prior to the due date. Late submission without prior approval will result in a 3 percent per day deduction of the final grade. In either case, work cannot be submitted after feedback has been provided to the rest of the class on the relevant assessment or one week after the due date whichever comes first, after which point a grade of "0" (F) will be given for the assessment.

Behavior during Examinations: During examinations, students must do their own work. Unless specifically instructed by the lecturer or instructor, talking during an exam is not permitted, and students may not access online resources of any kind, compare papers, copy from others, or collaborate in any way. Any failure to abide by examination rules will result in failure of the exam and may lead to failure of the course and disciplinary action.

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.

Student Privacy

Ensure student privacy is maintained. Always use the VPN when accessing systems containing FERPA data. Never reveal the identity of a student to any other student without a specific pedagogical rationale. In general, do not record meetings with students unless you have a specific pedagogical reason to do so. When you do want to record live meetings, use UMN Zoom only and configure it appropriately to adhere to FERPA requirements. Do not use any software that might record FERPA-relevant data, including student identities or e-mail addresses, that has not previously been UMN-approved.