IL 177: A History of Telescopes– Seeing is Believing
MAY 2009

Meeting: Trexler 273
Instructor: Matthew C. Fleenor
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Time: See Outline
Office: Trexler 266D
Office Hours: TBA

Required Readings:
Reacting to the Past, Original Documents Packet, Aristotle, Galileo, Bellarmine

Suggested Readings:
A Very Short Introduction to the History of Astronomy (VISHA), Michael Hoskins
Galileo’s Daughter (GD), Dava Sobel
Cosmos (C), Carl Sagan
Papal Letters, Correspondence with Cardinal Bellarmine

Provided portions of the following:
The Structure of Scientific Revolutions, (SSR), Thomas Kuhn
A Brief History of Time (BHT), Stephen A. Hawking
Theoretical Concepts in Physics (TCP), Malcolm Longair

Purpose & Goals: Astronomy, Astrophysics, and Cosmology are fields that are often charged with feelings of awe, mystery, excitement, and astonishment. Our goal is to experience these fields through a better understanding of the astronomer’s basic tool, the telescope. Specific activities related to telescopes will include the following: hands-on observation, historical controversy, and personal interaction with observatory and related facilities. Our purpose is to gain a better understanding of how telescopes operate and what data they provide to astronomers. Within the astronomical context, we will also endeavor to place this scientific knowledge in the light of history and society.

Attendance: Due to the nature of the course and the May-term in general, you are only allowed one EXCUSED or UNEXCUSED absence for the duration of the course. This means that you must attend all overnight field trips, as missing would cause an absence of two days. Late arrivals greater than 15 minutes will constitute an official absence. Any deviations of the above attendance policy will result in an immediate drop from the course.

Blackboard (Bb): The course will utilize the Bb environment extensively. This includes reading materials, assignments, announcements and updates, and solutions. Please check the Bb daily before coming to class and/or lab.

Academic Integrity: The course will adhere strictly to the AI policy stated for the College. If you are in doubt about a particular policy, please ask me or consult the documentation on-line. Please refer to the “Integrity” page and links on Bb.

**Grading Rubric:**

Your grade is determined according to the following distribution.

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<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Historical Interaction</td>
<td>25%</td>
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<tr>
<td>Quizzes</td>
<td>15%</td>
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<tr>
<td>Lab</td>
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<tr>
<td>Homework</td>
<td>10%</td>
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<tr>
<td>Collaboration</td>
<td>10%</td>
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<tr>
<td>Final Exam</td>
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**Lab Component:**

There is an intensive laboratory for the course that includes making observations, taking data, and drawing conclusions supported by those data. Within the laboratory, we will explore both astronomical observation and the physical principles supporting astronomical measurements. A summary write-up for each investigation will include an abstract, data & calculations, and a summary.

**Historical Interaction (Reacting to the Past):**

We will gain some historical perspective through real-time interaction with your classmates regarding the trial of Galileo. Specifically, you will each have a particular role to play regarding the historical events surrounding Galileo’s astronomical discoveries, which supported the heliocentric cosmology of Copernicus. By actually carrying the weight of the debate and discussion, you will enter into a deeper understanding of the philosophical and historical context of scientific discovery.

**Collaborative Component:**

One of the stark distinctives of 21st century science is the degree of collaboration within the astronomical community. To gain some insight into this process, much time will be spent in group collaboration in/outside of class. Some of this will take place within the lab time, but you will also need to spend time communicating with others outside of scheduled class hours. This collaborative process will also take place with your Reacting groups.

**Quizzes and Exams:**

(Ashnost) Daily quizzes are completed both individually and in groups during class and graded with the intention to help keep you up-to-date with the reading material. Furthermore, these quizzes will also incorporate your previous intuitions about astronomy in hopes of better informing the validity of your reasoning. The final exam will cover the build-up of material through the historical presentations, quizzes, and laboratory investigation. This exam will take place in the last class period and contain questions of varying type: thought experiments, short
essay (explanation and opinionated), and graphical interpretation. Make-up exam or quizzes will follow strictly the attendance policy outlined above.

**Student Learning Outcomes:**

Students will–
1. explain the primary phenomena involved in making an astronomical observation and measurement.
2. outline the basic tenets of Aristotelian cosmology as it contrasts heliocentric models.
3. describe the basic interconnections between science and theology surrounding the trial of Galileo.
4. analyze the foundational bases for Galileo’s heresy and draw some conclusions for the boundaries of science and theology.
5. identify basic components of radio-wavelength astronomy and possible range of objects observable.
6. analyze advantages and disadvantages of varying non-optical wavelength ranges for observation.
7. calculate the basic physical properties of geo-satellite observatories.
8. discuss the role of dynamical movement within astronomical studies.