# IDS 2935 (Quest 2):

# The Universe and Humanity's Place

(Working Title: How does Humanity conceive of its place in the universe?)

## I. General Information

### **Class Meetings**

- Fall 2023
  - o In-Person
    - T | Periods 6-7 (12:50 PM 2:45 PM)
    - R | Period 6 (12:50 PM 1:40 PM)
  - Location: NPB 1002

#### Instructor

- Developmental team: Prof. Peter Hirschfeld (Physics), Prof. Fred Gregory (History), Prof. Neil Sullivan (Physics), Prof. Selman Hershfield (Physics)
- Fall 2023 Instructor: Prof. Kathryn L. McGill (Physics)
  - o Office: NPB 2112
  - Office Hours: Mondays Per. 3-4 (9:35 11:30 am)
  - o Email: Contact via Canvas mail
  - o Phone: (352) 846-2548

## **Course Description**

What is the universe and what is humanity's place in it? This is one of the fundamental questions that people have always asked, and we are still asking it. This course will explore humanity's view of terrestrial and celestial phenomena from ancient to modern times, and in parallel offer basic explanations for how science views these phenomena today. Topics include the solar system and how various civilizations and eras have conceived of its structure, light and relativity, and modern concepts of cosmology.

Through an interdisciplinary approach that includes physics, astronomy, history, and philosophy we will enable non-scientists to appreciate the modern scientific paradigm while learning how this paradigm was developed. Rather than present modern ideas about time, space and the solar system as facts to be memorized and regurgitated, the course will expose students to the convoluted path by which these ideas arose, including the many mistakes made by philosophers and scientists along the way. By the end, students will not only understand more

about how the universe works, but they will have acquired a framework to think about technological aspects of the world around them, as well as the internalized that science is an organic, evolving enterprise rather than a static set of "correct answers".

#### Disclaimer

This is the first time this course is being taught, and as such it is considered as under development. Some changes to the schedule, communicated with appropriate notice, are possible as we move through the course together. If you are aware of any sources (books, blogs, podcasts, videos, etc.) relevant to the content covered in this course, please do not hesitate to share them with me and the class.

#### **Quest and General Education Credit**

- Quest 2
- Physical Sciences

This course accomplishes the <u>Quest</u> and <u>General Education</u> objectives of the subject areas listed above. A minimum grade of C is required for Quest and General Education credit. Courses intended to satisfy Quest and General Education requirements cannot be taken S-U.

### **Required Readings and Works**

- Required text: A History of Science in Society: From Philosophy to Utility, 4<sup>th</sup> Ed. by Andrew Ede & Lesley B. Cormack, University of Toronto Press (2022).
- Additional readings available on Canvas and/or through Course Reserves are indicated in the weekly schedule below. Bibliographic information for these readings is listed here in chronological order according to the weekly schedule:
  - 1. Gower, Reid. "The Frontier is Everywhere." *The Sagan Series*. <a href="https://saganseries.com">https://saganseries.com</a>. Accessed 17 August 2023.
  - 2. Weinberg, Steven. *To Explain the World: The Discovery of Modern Science*. First edition. New York: Harper, 2015.
  - 3. Lucretius Carus, Titus. et al. *De Rerum Natura*. First published 1924; new version 1975, rev. 2nd ed. 1982, reprinted with revisions 1992. Cambridge, Mass: Harvard University Press, 1992.
  - 4. "Hipparchus." New Mexico Museum of Space History.

    <a href="https://www.nmspacemuseum.org/inductee/hipparchus/">https://www.nmspacemuseum.org/inductee/hipparchus/</a>. Accessed 17 August 2023.
  - 5. Adler, Mortimer Jerome et al. *Foundations of Science and Mathematics*. Chicago: Encyclopedia Britannica, 1960.
  - 6. Ptolemy, and G. J. Toomer. Ptolemy's Almagest. New York: Springer-Verlag, 1984.
  - 7. Copernicus, Nicolaus et al. *On the Revolutions of the Heavenly Spheres*. Newton Abbot [Eng: David & Charles], 1976.
  - 8. Galilei, Galileo, Henry Crew, and Alfonso de Salvio. *Dialogues Concerning Two New Sciences*. Norwich, N.Y: William Andrew Pub., 2001.

- 9. Strogatz, Steven. "From Fish to Infinity." *The New York Times*. <a href="https://archive.nytimes.com/opinionator.blogs.nytimes.com/2010/01/31/from-fish-to-infinity/">https://archive.nytimes.com/opinionator.blogs.nytimes.com/2010/01/31/from-fish-to-infinity/</a>. Accessed 17 August 2023.
- 10. Gregory, Frederick. *Natural Science in Western History*. Boston, Mass: Houghton Mifflin, 2008.
- 11. Einstein, Albert. "A Brief Outline of the Development of the Theory of Relativity." *Nature* **106**, 782–784 (1921). <a href="https://doi.org/10.1038/106782a0">https://doi.org/10.1038/106782a0</a>
- 12. *Behind the Curve,* directed by Daniel J. Clark, starring Mark Sargent and Patricia Steere. Delta-v Productions, 2018.
- 13. Barber, Bernard. "Resistance by Scientists to Scientific Discovery." *Science* **134**, 596–602 (1961). *JSTOR*, <a href="http://www.jstor.org/stable/1707961">http://www.jstor.org/stable/1707961</a>. Accessed 17 August 2023.
- Dick, Steven J. "Why We Explore." NASA.
   https://www.nasa.gov/exploration/whyweexplore/Why\_We\_13.html. Accessed 17 August 2023.
- 15. "Five Perspectives of the Universe and the Science that Shifted Them." Google Arts & Culture. <a href="https://artsandculture.google.com/story/1AWhPyygoxp9nw">https://artsandculture.google.com/story/1AWhPyygoxp9nw</a>. Accessed 17 August 2023.
- 16. "Pale Blue Dot." YouTube, uploaded by carlsagandotcom, 9 September 2015, <a href="https://www.youtube.com/watch?v=GO5FwsblpT8">https://www.youtube.com/watch?v=GO5FwsblpT8</a>.

Materials and Supplies Fees: n/a

## II. Graded Work

## **Description of Graded Work**

**Lecture Activities (5%):** In-class discussions and/or (non-lab) activities will be assigned throughout the course. All together, these activities will be worth 5% of your total grade. These activities are meant to encourage attendance and allow for brief reflection on the week's material. Make-ups will be granted for university-approved absences.

**Homework (20%):** There are twelve homework assignments consisting of physics problems at the level covered in class, science and reading content questions, and essay questions (100-200 words) relating to questions raised in the readings and classroom discussion about the nature of science and how it has influenced our view of our place in the universe. Homework will cover the previous week's readings and discussions and will be due at the start of class on Tuesdays. Your lowest 2 homework scores will be dropped from your grade.

Labs (25%): There are ten labs that are done in class with data being taken in class in small groups, but with each student responsible for completing their own lab report. Data will be collected in-class on Tuesdays, with the report itself due by start-of-class the following Thursday. The labs satisfy the experiential requirement for Quest 2 classes, giving students first-hand experience with how the modern scientific method works. Your lowest lab score will be dropped from your grade.

**Midterm Exams (15% each):** The exams consist of a mixture of physics problems, content from history, science, and philosophy, and analytical essays about the nature of science and our view of humanity's place in the universe.

**Final exam (20%):** The final exam consists of the same types of questions as in the midterms except that it is cumulative for the entire course.

### **Grading Scale**

For information on how UF assigns grade points, visit: <a href="https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/">https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/</a>

III.

А	90 – 100%	С	70 – 74%
A-	87 – 90%	C-	67 – 70%
B+	84 – 87%	D+	64 – 67%
В	80 – 84%	D	60 – 64%
B-	77 – 80%	D-	57 – 60%
C+	74 – 77%	E	<57

# **Annotated Weekly Schedule**

Week 0	Introduction to Course	
Wed. Aug. 23 (no class)	Semester Begins	
Thurs. Aug. 24 (Per. 6)	Introduction to Course	
	Viewing of <u>The Sagan Series</u> excerpt: "Chapter 1: The Frontier is Everywhere"	
Week 1	The Origins of Natural Philosophy	
Tues. Aug. 29 (Per. 6-7)	Discovering Science	
	Reading:	
	Weinberg, Preface (Course Reserves; pp. ix-xiv)	
	Ede & Cormack, Introduction (pp. xii-xv)	
	Ede & Cormack, Chapter 1, beginning until "Socrates, Plato, Aristotle, and the Epicureans:	
	The Ideal & The Real" (pp. 1-13)	
	<u>In-Class Lab</u> : None	
	Homework due by start of class: None	
Thurs. Aug. 31 (Per. 6)	Aristotelian Theories and Logic	
	Reading:	
	Ede & Cormack, Chapter 1, "Socrates, Plato Aristotle, and the Epicureans: The Ideal & The	
	Real" until "Euclid and the Alexandrians" (pp. 13-23)	
	<u>Lab due by start of class</u> : None	
Week 2	Greek, Roman, and Islamic Contributions to Natural Philosophy	
Tues. Sept. 5 (Per. 6-7)	The Alexandrians	
	Reading:	
	Ede & Cormack, Chapter 1, "Euclid and the Alexandrians" to chapter end (pp. 23-29)	
	New Mexico Museum of Space History, "Hipparchus" (linked above & in Canvas)	

	In-Class Lab: Lab 1	
	Homework due by start of class: HW1 (based on Week 1 material)	
Thurs. Sept. 7 (Per. 6)	Roman & Islamic Natural Philosophy	
	Reading:	
	Lucretius' De Rerum Natura, "Substance is Eternal" until "Confutation of Other Philosophers"	
	(Course Reserves)	
	Ede & Cormack, Chapter 2, beginning until "Ptolemy's Astronomy" (pp. 31-34)	
	Ede & Cormack, Chapter 2, "Science in the Byzantine Empire" until "The Islamic Renaissance" (pp. 46-50)	
	Lab due by start of class: Lab 1	
Week 3	Science in the Middle Ages	
Tues. Sept. 12 (Per. 6-7)	The Islamic Renaissance	
	Reading:	
	Ede & Cormack, Chapter 2, "The Islamic Renaissance" until "On the Heavens and Number Around the Globe" & "Conclusion: The End of the Islamic Renaissance" (pp. 50-61 & 70-72)	
	<u>In-Class Lab</u> : Lab 2	
	Homework due by start of class: HW2 (based on Week 2 material)	
Thurs. Sept. 14 (Per. 6)	Medieval Philosophy	
	Reading:	
	Ede & Cormack, Chapter 3, "Christian Theology vs. Aristotle's Natural Philosophy" until "The	
	Black Death and the End of the Middle Ages" (pp. 84-98)	
	Lab due by start of class: Lab 2	
Week 4	Questioning Humanity's Central Place in the Universe	
Tues. Sept. 19 (Per. 6-7)	Dtolomy and the Enjoyele Hypothesis	
Tues. Sept. 19 (Per. 6-7)	Ptolemy and the Epicycle Hypothesis	
Tues. Sept. 19 (Per. 6-7)	Reading:	
Tues. Sept. 19 (Per. 6-7)	Reading: Ede & Cormack, Chapter 2, "Ptolemy's Astronomy" until "Galen's Medicine" (pp. 34-40)	
Tues. Sept. 19 (Per. 6-7)	Reading: Ede & Cormack, Chapter 2, "Ptolemy's Astronomy" until "Galen's Medicine" (pp. 34-40) Adler & Wolff, "Guide to Sixth Reading" (Course Reserves; book pp. 77-89; digitized book pp.	
Tues. Sept. 19 (Per. 6-7)	Reading: Ede & Cormack, Chapter 2, "Ptolemy's Astronomy" until "Galen's Medicine" (pp. 34-40) Adler & Wolff, "Guide to Sixth Reading" (Course Reserves; book pp. 77-89; digitized book pp. 103-115)	
Tues. Sept. 19 (Per. 6-7)	Reading: Ede & Cormack, Chapter 2, "Ptolemy's Astronomy" until "Galen's Medicine" (pp. 34-40) Adler & Wolff, "Guide to Sixth Reading" (Course Reserves; book pp. 77-89; digitized book pp. 103-115) Ptolemy's Almagest, Sections 3-7 (Course Reserves)	
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	Reading: Ede & Cormack, Chapter 2, "Ptolemy's Astronomy" until "Galen's Medicine" (pp. 34-40) Adler & Wolff, "Guide to Sixth Reading" (Course Reserves; book pp. 77-89; digitized book pp. 103-115) Ptolemy's Almagest, Sections 3-7 (Course Reserves) In-Class Lab: Lab 3 Homework due by start of class: HW3 (based on Week 3 material)	
Tues. Sept. 19 (Per. 6-7)  Thurs. Sept. 21 (Per. 6)	Reading: Ede & Cormack, Chapter 2, "Ptolemy's Astronomy" until "Galen's Medicine" (pp. 34-40) Adler & Wolff, "Guide to Sixth Reading" (Course Reserves; book pp. 77-89; digitized book pp. 103-115) Ptolemy's Almagest, Sections 3-7 (Course Reserves) In-Class Lab: Lab 3 Homework due by start of class: HW3 (based on Week 3 material) The Copernican View	
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Thurs. Sept. 21 (Per. 6)	Reading: Ede & Cormack, Chapter 2, "Ptolemy's Astronomy" until "Galen's Medicine" (pp. 34-40) Adler & Wolff, "Guide to Sixth Reading" (Course Reserves; book pp. 77-89; digitized book pp. 103-115) Ptolemy's Almagest, Sections 3-7 (Course Reserves) In-Class Lab: Lab 3 Homework due by start of class: HW3 (based on Week 3 material) The Copernican View Reading: Ede & Cormack, Chapter 4, "Copernicus, Tycho Brahe, and the Planetary System" until "The Age of Exploration" (pp 109-114) Adler & Wolff, "Guide to the Seventh Reading" (Course Reserves; book pp.93-102; digitized book pp. 119-128) Copernicus' On the Revolutions of the Heavenly Spheres, Chapters 4-5 (Course Reserves) Lab due by start of class: Lab 3	
Thurs. Sept. 21 (Per. 6)  Week 5	Reading: Ede & Cormack, Chapter 2, "Ptolemy's Astronomy" until "Galen's Medicine" (pp. 34-40) Adler & Wolff, "Guide to Sixth Reading" (Course Reserves; book pp. 77-89; digitized book pp. 103-115) Ptolemy's Almagest, Sections 3-7 (Course Reserves) In-Class Lab: Lab 3 Homework due by start of class: HW3 (based on Week 3 material) The Copernican View Reading: Ede & Cormack, Chapter 4, "Copernicus, Tycho Brahe, and the Planetary System" until "The Age of Exploration" (pp 109-114) Adler & Wolff, "Guide to the Seventh Reading" (Course Reserves; book pp.93-102; digitized book pp. 119-128) Copernicus' On the Revolutions of the Heavenly Spheres, Chapters 4-5 (Course Reserves) Lab due by start of class: Lab 3 A Clash of Religion and Science	
Thurs. Sept. 21 (Per. 6)  Week 5	Reading: Ede & Cormack, Chapter 2, "Ptolemy's Astronomy" until "Galen's Medicine" (pp. 34-40) Adler & Wolff, "Guide to Sixth Reading" (Course Reserves; book pp. 77-89; digitized book pp. 103-115) Ptolemy's Almagest, Sections 3-7 (Course Reserves) In-Class Lab: Lab 3 Homework due by start of class: HW3 (based on Week 3 material) The Copernican View Reading: Ede & Cormack, Chapter 4, "Copernicus, Tycho Brahe, and the Planetary System" until "The Age of Exploration" (pp 109-114) Adler & Wolff, "Guide to the Seventh Reading" (Course Reserves; book pp. 93-102; digitized book pp. 119-128) Copernicus' On the Revolutions of the Heavenly Spheres, Chapters 4-5 (Course Reserves) Lab due by start of class: Lab 3 A Clash of Religion and Science Brahe's Data & Kepler's Analysis Reading: Ede & Cormack, Chapter 4, "Johannes Kepler and Tycho Brahe" until "The Protestant	
Thurs. Sept. 21 (Per. 6)  Week 5	Reading: Ede & Cormack, Chapter 2, "Ptolemy's Astronomy" until "Galen's Medicine" (pp. 34-40) Adler & Wolff, "Guide to Sixth Reading" (Course Reserves; book pp. 77-89; digitized book pp. 103-115) Ptolemy's Almagest, Sections 3-7 (Course Reserves) In-Class Lab: Lab 3 Homework due by start of class: HW3 (based on Week 3 material) The Copernican View Reading: Ede & Cormack, Chapter 4, "Copernicus, Tycho Brahe, and the Planetary System" until "The Age of Exploration" (pp 109-114) Adler & Wolff, "Guide to the Seventh Reading" (Course Reserves; book pp.93-102; digitized book pp. 119-128) Copernicus' On the Revolutions of the Heavenly Spheres, Chapters 4-5 (Course Reserves) Lab due by start of class: Lab 3 A Clash of Religion and Science Brahe's Data & Kepler's Analysis Reading:	

	In-Class Lab: Lab 4	
	Homework due by start of class: HW4 (based on Week 4 material)	
Thurs. Sept. 28 (Per. 6)	Galileo's Argument with the Church	
, , ,	Reading:	
	Ede & Cormack, Chapter 4, "Galileo" (pp. 126-129) and "The Protestant Reformation and the	
	Trial of Galileo" (pp. 133-138)	
	Galileo's The Dialogues, Preface & "Day 3" (Course Reserves)	
	Lab due by start of class: Lab 4	
Week 6	Midterm 1 & First Interlude	
Tues. Oct. 3 (Per. 6-7)	Midterm 1 (Weeks 1-5)	
	Reading:	
	Review: Midterm 1 covers assigned readings, in-class discussions, Labs 1-4, and HW1-4	
	In-Class Lab: None	
	Homework due by start of class: None	
Thurs. Oct. 5 (Per. 6)	Interlude: Number Systems	
	Reading:	
	Strogatz, "From Fish to Infinity" (linked above and in Canvas)	
	Ede & Cormack, Chapter 2, "On the Heavens and Number Around the Globe" (pp. 61-70)	
	Lab due by start of class: None	
Week 7	The Scientific Revolution	
Tues. Oct. 10 (Per. 6-7)	Developing the Framework for Practicing Science	
	Reading:	
	Ede & Cormack, Chapter 5, from beginning until "Isaac Newton: The Great Polymath" (pp.	
	143-149)	
	In-Class Lab: Lab 5	
	Homework due by start of class: HW5 (based on Week 5 material)	
Thurs. Oct. 12 (Per. 6)	Newton Enters the Scene	
	Reading:	
	Ede & Cormack, Chapter 5, "Isaac Newton: The Great Polymath" until "Mechanical	
	Philosophy" (pp. 149-156) and "Newton and the Experimental Method" (pp. 166-168)	
Wash 0	Lab due by start of class: Lab 5	
Week 8	Newton's Laws & Scientific Gatekeeping  Newton's Laws of Motion and Gravitation	
Tues. Oct. 17 (Per. 6-7)		
	Reading:	
	Adler & Wolff, "Guide to Twelfth Reading" (Course Reserves; digitized book pp. 189-202) Weinberg (Course Reserves; pp. 225-235)	
	In-Class Lab: Lab 6	
	Homework due by start of class: HW6 (based on Week 7 material)	
Thurs. Oct. 19 (Per. 6)	Scientific Gatekeeping	
Thurs. Oct. 19 (Per. 6)	Reading:	
	Ede & Cormack, Chapter 5, "The Place of Women in the Study of Science" to chapter end (pp.	
	173-178)	
	Ede & Cormack, Chapter 12, "Women in Science" (pp. 380-383)	
	Ede & Cormack, Chapter 13, Connection Box: "Indigenous Worldviews: Religion and Science"	
	(pp. 414-415)	

	Lab due by start of class: Lab 6	
Week 9	Exploring Electricity and Magnetism	
Tues. Oct. 24 (Per. 6-7)	Discovering Electricity	
, ,	Reading:	
	Gregory, Chapter 11, "Gathering Information: Early Eighteenth-Century Experiments"	
	through end (Course Reserves; pp 224-241)	
	In-Class Lab: Lab 7	
	Homework due by start of class: HW7 (based on Week 8 material)	
Thurs. Oct. 26 (Per. 6)	Bringing Magnetism into the Picture	
	Reading:	
	Gregory, Chapter 16, chapter start until "Light and Heat" (Course Reserves; pp. 326-337)	
	Lab due by start of class: Lab 7	
Week 10	Quantum Theory	
Tues. Oct. 31 (Per. 6-7)	Particles or Waves?	
	Reading:	
	Ede & Cormack, Chapter 8, "The Nature of Electricity and the Science of Thermodynamics"	
	until "The Atom Deciphered" (pp. 268-282)	
	Gregory, Chapter 25, "The Creation of Quantum Mechanics" (Course Reserves; pp. 534-539)	
	In-Class Lab: Lab 8	
	Homework due by start of class: HW8 (based on Week 9 material)	
Thurs. Nov. 2 (Per. 6)	Connecting the Dots	
	Reading:	
	Ede & Cormack, Chapter 8, "The Atom Deciphered" (pp. 282-288) and Chapter 10, "The New	
	Physics: Indeterminacy" (pp. 318-322)	
	Weinberg, Chapter 15 "Epilogue: The Grand Reduction" (Course Reserves; pp. 256-268)	
	Lab due by start of class: Lab 8	
Week 11	Nuclear Physics	
Tues. Nov. 7 (Per. 6-7)	The Development of Nuclear Physics	
	Reading:	
	Gregory, Chapter 25, "Toward a More Dangerous World" to chapter end (Course Reserves;	
	pp. 539-543) In-Class Lab: Lab 9	
Thurs New O (Der C)	Homework due by start of class: HW9 (based on Week 10 material)	
Thurs. Nov. 9 (Per. 6)	The Ethics of Nuclear Physics	
	Reading:	
	Gregory, Chapter 26 (Course Reserves), The Nature of Science Box: "Science and Morality" (p. 554) and "Nuclear Fears" (p. 557) and "The Peaceful Use of Nuclear Power" (pp. 564-567)	
	Lab due by start of class: Lab 9	
Week 12	Midterm 2 & Second Interlude	
Tues. Nov. 14 (Per. 6-7)	Midterm 2 (Weeks 7-11)	
	Reading: Review: Midterm 2 covers assigned readings, in-class discussions, Labs 5-9, and HW5-9	
	In-Class Lab: None	
	Homework due by start of class: None	
Thurs Nov 16 (Dor 6)		
Thurs. Nov. 16 (Per. 6)	Interlude: Relativity	

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	Reading: Einstein, "A Brief Outline of the Development of the Theory of Relativity" (Course Reserves)
	Lab due by start of class: None
Week 13	Practicing Science
Tues. Nov. 21 (Per. 6-7)	Documentary: Behind the Curve
1463.1101.21 (161.07)	Reading:
	Barber, "Resistance by Scientists to Scientific Discovery"
	In-Class Lab: None
	Homework due by start of class: HW10 (based on Week 11 material)
Thurs. Nov. 23	Thanksgiving Holiday (no class)
Week 14	Biological Considerations
Tues. Nov. 28 (Per. 6-7)	Embracing Evolution
	Reading: Ede & Cormack, Chapter 7, "The Question of the Origin of Species" until "The Professionalization of Science and Science Education" (pp. 229-239) Gregory, Chapter 19, "Implications for Social and Political Philosophy" through chapter end (Course Reserves; pp. 405-410) In-Class Lab: Lab 10
	Homework due by start of class: Homework 11 (based on Week 13 material)
Thurs. Nov. 30 (Per. 6)	Understanding our DNA
	Reading: Ede & Cormack, Chapter 10, "Discovering DNA" (pp. 341-346) Gregory, Chapter 23, "Deciphering DNA" (Course Reserves; pp. 497-499)  Lab due by start of class: Lab 10
Week 15	Humanity's Place in the Universe: Where Did We Come From & Where Are We Going?
Tues. Dec. 5 (Per. 6-7)	Carl Sagan's "Pale Blue Dot"
, ,	Reading: Steven J. Dick, "Why We Explore" (linked above and in Canvas) Google Arts & Culture, "5 Perspectives of the Universe and the Science that Shifted Them" (linked above and in Canvas) Ede & Cormack, Chapter 13, "What is Science in the Twenty-First Century?" until "The Materials Revolution" (pp. 413-420)
	<u>In-Class Lab</u> : None
	Homework due by start of class: HW12 (based on Week 14 material)
Wed. Dec. 6	Last Day of Classes
Thurs. Dec. 7	Reading Day
Fri. Dec. 8	Reading Day
Wed. Dec. 13 (8-10 pm)	Final Exam (NPB 1002)

# IV. Student Learning Outcomes (SLOs)

At the end of this course, students will be expected to have achieved the  $\underline{\text{Quest}}$  and  $\underline{\text{General Education}}$  learning outcomes as follows:

**Content**: Students demonstrate competence in the terminology, concepts, theories and methodologies used within the discipline(s).

- Identify, describe, and explain the physical laws of mechanics, electromagnetism, and thermodynamics covered in this course. (Quest, P). Assessments: In-class activities, homework problems, and exams.
- Identify, describe, and explain how scientific theories have developed and our view of the universe has changed over time. (Quest, P). Assessments: In-class activities, homework questions on the readings, exam essay questions.

**Critical Thinking**: Students carefully and logically analyze information from multiple perspectives and develop reasoned solutions to problems within the discipline(s).

- Critically analyze and evaluate quantitative data to draw conclusions and test hypotheses (Quest, P). Assessments: Lab report and problems in homework and exams featuring data.
- **Critically analyze and evaluate** scientific theories based on experimental evidence (Quest, P). **Assessments:** Homework problems, lab reports, and exam questions.

**Communication**: Students communicate knowledge, ideas and reasoning clearly and effectively in written and oral forms appropriate to the discipline(s).

 Develop and present in writing quantitative and qualitative arguments in support or in contradiction to scientific theories (Quest, P). Assessments: Homework problems, lab reports, exam questions.

**Connection**: Students connect course content with meaningful critical reflection on their intellectual, personal, and professional development at UF and beyond.

- Connect course themes of how scientific theories have evolved and are tested with how their ideas about science and technologies have changed (Quest). Assessments: In-class activities and self-reflection questions in the homework.
- Reflect on how their view of the universe has changed in their lifetime and in response to the
  historical and scientific content in this course (Quest). Assessments: In-class activities and selfreflection questions in the homework.

## V. Quest Learning Experiences

## 1. Details of Experiential Learning Component

The experiential learning component are the ten labs done in class. You will experience the excitement (and frustration!) of taking data yourself, e.g. how does one determine how far a planet is away from Earth or measure absolute zero in temperature? You will learn first-hand about errors in scientific measurements and what it means to test a theory or physical law. The written lab reports will contain both a presentation of the your results and discussion questions and conclusions, much as they would appear in a scientific paper.

## 2. Details of Self-Reflection Component

Self-reflection questions are embedded within the homework assignments and in-class activities. Specifically, there are questions about how the your view of scientific and technological progress has

evolved and how your view of humanity's place in the universe has changed based on the historical and scientific readings in the course.

## VI. Required Policies

### **Attendance Policy**

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:

https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

### **Students Requiring Accommodation**

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <a href="https://disability.ufl.edu/students/get-started/">https://disability.ufl.edu/students/get-started/</a>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

#### **UF Evaluations Process**

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <a href="https://gatorevals.aa.ufl.edu/students/">https://gatorevals.aa.ufl.edu/students/</a>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <a href="https://gatorevals.aa.ufl.edu/public-results/">https://gatorevals.aa.ufl.edu/public-results/</a>.

## **University Honesty Policy**

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code

(https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

## **Counseling and Wellness Center**

Contact information for the Counseling and Wellness Center: <a href="http://www.counseling.ufl.edu/">http://www.counseling.ufl.edu/</a>, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

### The Writing Studio

The writing studio is committed to helping University of Florida students meet their academic and professional goals by becoming better writers. Visit the writing studio online at <a href="http://writing.ufl.edu/writing-studio/">http://writing.ufl.edu/writing-studio/</a> or in 2215 Turlington Hall for one-on-one consultations and workshops.

### **In-Class Recordings**

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.