Knowledge and the Universe

A Quest 2 Syllabus

Primary General Education Designation: Physical Sciences

Secondary General Education Designation: International

I. Course Information

Quest 2 IDS2935
Fall 2024
Meeting Day/Time: M/W/F 10:40 a.m. – 11:30 a.m.
Location: LAR 0310 (in-person)
General Education Designation: Physical Sciences, International
A minimum grade of C is required for general education credit

Instructor

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Course Description

How can different people view the same evidence yet form or retain different conclusions? This course introduces students to the concept of inference: the process by which we convert information presented to us into new conclusions or new knowledge. This course asks students to apply inference not just in a scientific context but also to pressing societal issues.

The units of this course are structured with a repeating cycle of science, history, analysis, and application. Each unit focuses first on a seminal debate or mystery regarding fundamental questions in the history of astronomy. Is the Earth flat? Does the Earth orbit the Sun? Is the Universe expanding or static? This is then followed by asking questions that encourage examination of current, pressing societal issues. Are vaccines harmful? Is the climate changing and are humans responsible? Are AI chatbots a valid source of information? These seemingly disparate topics will be linked by addressing how we, as scientists and members of society, process information in order to draw conclusions. How do we know what we know?

While it may seem absurd now, there was a time when much of society believed the Sun orbited the Earth. For the historical astronomy examples explored in the course, we will discuss the experiments and data that were available, the ambient culture that influenced decision making, and other relevant factors that would have been considered by the scientists in their conclusion drawing process. Similarly, for the current societal issues, we will introduce relevant evidence and scientific principles to understand each issue. In both cases, our primary focus will be on understanding how different people can view the same evidence yet form or retain different conclusions.

This course explores the advancement of knowledge broadly in terms of Bayesian analysis. In this framework, observations from real world experiments (i.e., imperfect experiments with error bars and noise) are balanced with prior assumptions or knowledge (e.g., I think this data is better fit with a line than a parabola, I don't trust this instrument's measurements, I don't trust this person's opinion/ memory, etc.). Each historical unit is coupled to extensive discussions of examples in which this kind of thinking applies in the actual day-to-day lives of the students. This course will encourage students to explicitly examine how the combination of observed facts and their own 'prior knowledge' can lead rational people to draw different conclusions from the same set of observations. We will use classroom discussions among the whole class and breakout groups on a weekly basis to explore these ideas. This course will solidify these concepts for students to the point where they will automatically think about priors and likelihoods when determining how they come to accept facts as truth.

By using an inference- or Bayesian-based approach to view the development of knowledge, we obtain a unique window into understanding how people from other countries, cultures, religions, or upbringings may develop different beliefs or knowledge despite living in an increasingly connected world. Throughout the semester, we will continuously look at examples of pressing societal issues (climate change, anti-vaccination, and large language model artificial intelligence in particular), the specific 'priors' that surround decision making and knowledge development for these topics, and isolate how priors can vary between or within different societies or sub-groups within a society. Students will be asked to not only continuously confront their own priors, but also to attempt to understand the origin of priors that conflict with their own. We will use examples of pressing societal issues to promote students understanding the origin of varied beliefs or knowledge in order to provide them with the tools needed to effectively engage with politically, culturally, or socioeconomically diverse groups.

Required Course Materials (to purchase/rent; UFALLACCESS recommended)

- *The Essential Cosmic Perspective 9E,* Bennett, Donahue, Schneider & Voit (ISBN:978-0134446431)

Other Assigned Reading (Links provided through Canvas):

- Original Ptolemy Almagest excerpt:
  - https://bertie.ccsu.edu/naturesci/cosmology/ptolemy.html
- 'Introduction to Inference'
  - Course notes, provided by the Instructor via Canvas.
- Lord Kelvin on the sun:
  - http://www-history.mcs.st-andrews.ac.uk/Extras/Kelvin_sun_1.html
- The age of the earth (Excerpt from Comte de Buffon)

- The age of the Earth in the twelfth Century: a problem (mostly) solved
- How to think like an Epidemiologist
    - https://www.nytimes.com/2020/08/04/science/coronavirus-bayes-statistics-math.html
- The Anti-vaccination Movement: A Regression in Modern Medicine
    - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6122668/pdf/cureus-0010-00000002919.pdf
- Excerpts from the "The Great Debate":
    - https://apod.nasa.gov/diamond_jubilee/1920/cs_nrc.html

Supplemental Reading (Not Required):

- The Sun in the Church: Cathedrals as Solar Observatories (Heilbron)

Statement on Experiential Learning and Learning Labs

As a Quest-2 class, a key element is the application of experiential learning. You will visit the Campus Teaching Observatory (CTO) to complete two astronomical learning labs, where you will look through telescopes at objects in the sky, record your observations, and submit a report on what conclusions those observations let you draw. Dates and times will be specified in the Canvas course and/or lecture. ***Astronomical observations are subject to availability of clear observing conditions!*** Thus, while we can try to plan out our experiential learning lab schedule, our actual ability to observe on a given night will not be known until the day of the planned event, and sometimes only within an hour or two of the start time.

Statement on Materials and Supplies Fees

N/A

II. Coursework & Schedule

1. List of Graded Work

Work	Description	Word Count	Points
Homework Problem Sets	Problem sets (see weekly schedule for details) including simple physical calculations, brief reading analysis, and discussion preparation will be assigned throughout the semester. Problem sets will assess student comprehension of the physical concepts covered in the course. Problem sets will be graded for accuracy.	N/A	30
Class Prep Quizzes	Comprehension Quizzes will be assigned to ensure students have completed the assigned reading and/or lecture ***prior to coming to class***. This is essential to facilitating classroom discussion. Quizzes will be available via Canvas and have a strictly enforced deadline prior to the class/week when the material is to be discussed. Quizzes will be graded for accuracy.	N/A	15
Experiential Learning Observing Labs	Observing lab assignments to be carried out requiring students to make measurements toward questioning or confirming the underpinnings of astronomical knowledge. Lab reports will be graded for accuracy and clarity.	N/A	10
Societal Parallel Writing Assignments	Identification of societal parallels, along with an essay explaining how it relates to the subject of the unit. Essays will be graded based on (i) completion, (ii) accurate application of course material to the writing subject, (iii) logical consistency of any arguments presented, and (iv) grammatical and spelling accuracy.	500	20
Final Presentations	Group presentations addressing historical examples where humans acted irrationally based on either misinformation, limited scientific knowledge, dogmatism, or similar.	N/A	15
Attendance	Class attendance will be taken at the discretion of the instructor including by checking presence via participation of in class-based Surveys. Attendance points will be awarded to students present in class. Scores will be recorded in Canvas.	N/A	10

As a general matter:

- Most assignments are already available with due dates on Canvas so that students can plan accordingly for their semester. Due dates may be postponed owing to the class delays (e.g., because of unanticipated class cancellations), but will not be advanced.
- Students must submit completed assignments via Canvas in the format specified in the assignment. Except for the Class Prep Quizzes that are not accepted late, assignments will generally be penalized 20%/day. Exceptions must be consistent with UF's excused absences policy.
- Students must ensure that any submitted assignments are legible (i.e., can be easily read and graded), contain the correct information (i.e., that you don't submit last week's HW assignment for this week), and that the submitted files are not corrupted (i.e., that the file can be opened by the grader). ***Failure to submit the correct document in a readable form will be treated as equivalent to not submitting the document.***

2. Weekly Course Schedule

Week #	Topic	Physical Sciences + Q2 Method/Concept/Practice at Work	Assigned Work For After Class
1-2	Why do planets appear to 'wander' relative to the 'fixed' stars?	**Ptolemy, Copernicus, Kepler, Galileo, & Occam's razor: modelling the solar system.** Students will learn the mechanics of planetary orbits. We will discuss the methods and data that ancient astronomers used to identify the motion of planets. We will discuss relevant societal factors (e.g. religious/dogmatic influence) that contributed to solar system model formation.	First Problem Set
3-4	How do scientists decide what to believe?	**Introduction to inference.** We will introduce the concept of inference and explore examples where students intuitively accept or reject testimony/evidence (e.g. when judging the validity of an alleged UFO photo). We will use these examples to build a simple and intuitive framework for Bayesian analysis and to introduce the critical Bayesian concept of a 'prior'. Class discussions will be used to discuss further examples of priors in daily life, highlighting all the other names we might refer to them as (expectations, intuition, common knowledge, etc.). We will discuss the historical example of the relationship between the religious/dogmatic beliefs and Astronomy to reflect on the ways in which cultural beliefs influence the development of an individual's priors.	First Writing Assignment
4-5	Public Knowledge about Public Health	**The Anti-vaccination Movement.** We will discuss the origins, some initial studies, and retracted conclusions which have formed the basis of the modern anti-vaccination movement. We will specifically re-address "how do scientists decide what to believe" and generalize this to "how do humans decide what to believe". We encounter here an example where two different people in modern society can apparently live in the same area, read the same news, see the same evidence, and yet come to different conclusions. We will discuss how this can happen specifically using a Bayesian framework coupled to highly variable priors held by each individual. Course meeting discussions will focus on the distinction (or lack thereof) between how scientists and members of society draw conclusions when faced with evidence that contradicts their expectations. We will discuss how the anti-vaccination movement has manifested in different countries and different cultures. Regardless of our ability to understand and accept varied priors, we will use an inference-based framework as a way to understand how different individuals can arrive at different conclusions with the same evidence.	Second Writing Assignment
5	Night Lab Lectures	**What is light and how do telescopes work?** We first will discuss the nature of light and what we can learn from it. Students will learn about two primary types of spectra, how we understand them, and how astronomers use them. Then students will learn about the benefits of using telescopes ahead of looking through the telescopes themselves.	Night Lab Writing Assignment

Week #	Topic	Physical Sciences + Q2 Method/Concept/Practice at Work	Assigned Work For After Class
6	What is the source of the Sun's energy?	**Energy in physics.** Students will learn the concepts of energy and power in the context of our Sun. We will discuss modern and ancient methods to measure the Sun's power output, but highlight the difficulty in observing where this power comes from. We will discuss different options for powering the sun including chemical burning, gravitational contraction, and nuclear fusion. We will examine the historical evolution in our understanding of the Sun's power, and its coevolution with the available body of physical knowledge. Class discussions will prepare students for their experiential learning experiment, and discuss difficulties *inferring knowledge* about something we cannot directly see or touch.	Second Problem Set Solar (Day) Lab Writing Assignment
7-8	Artificial Intelligence and Knowledge	Artificial intelligence tools, specifically chat bots, have recently become household names. How does the existence of AI chatbots relate to human knowledge? How is it different from previous knowledge access tools like search engines? What are its strengths, and what are its limits? These AI tools are knowledge engines built on the same conceptual machinery as the scientific method, and in this module, we will use them as examples of how inference works and where it can go wrong.	Third Writing Assignment
8-9	Earth's Origins	At the turn of the 20th century, determining the age of the Earth was a hot scientific topic. There were many methods proposed to measure the age of the Earth. In this module, we'll cover the physical ideas that were presented to measure the age of the Earth, discuss the role that Lord Kelvin played in this debate, and finally present the currently accepted model for the Earth's origin.	Third Problem Set
9-10	Climate Change	**The History of, Evidence for, and Debate about Climate Change.** We will define climate change and discuss the evidence and experiments that have been used to establish its existence. We will contrast the near uniform consensus in the scientific community with the ongoing debate in the public domain. We will explore real data to identify ways one can influence conclusions by applying very specific assumptions (e.g. smoothing the data over very specific timescales, placing emphasis on – or specifically neglecting -- individual datapoints). Breakout sections will discuss how the perceived validity of very specific assumptions can vary based on an individual's priors. We will look at polling data from different countries to identify the popularity of action on climate change, and review articles and arguments that have been presented from both sides. We will discuss instances of 'selective neglect' of evidence, and how such actions can be understood with priors.	Fourth Writing Assignment

Week #	Topic	Physical Sciences + Q2 Method/Concept/Practice at Work	Assigned Work For After Class
10-11	Galaxies	This module will focus on the revelation that the Universe is much larger than our own Milky Way. We will look at what earlier generations of astronomers saw in the night sky, and why they were confused about sizes. We'll establish the basic rungs of the 'distance ladder' that are used to establish distances to far-off objects that allow us to grasp the size and scale of our Universe.	Fourth Problem Set
11-12	Cosmology: The Birth, Size, and Expansion of the Universe	**An Expanding Universe**? Students will learn about the current favored model for the Universe. Students will see Edwin Hubble's original dataset that he used to propose an expanding Universe. We will debate how confident Hubble should have been in his conclusion of an Expanding Universe. We will explore the implications of an expanding Universe (specifically, the Big Bang, size, and fate).	Prepare for final project
12	Dark Matter, Dark Energy, & the Fate of the Universe	**Our Cosmic Pie of Ignorance.** We now have abundant evidence to conclude that the dominant composition of the Universe is Dark Matter and Dark Energy. These are 'substances' that (to this point) we cannot touch or directly probe. Instead, despite making up 95% of our Universe's composition, we only know of their existence through inference. We will discuss the transformative study that revealed the existence of dark energy. We will scrutinize the data and examine how scientists were able to draw this bold conclusion. Class discussions will focus on the essential role that detailed statistical analysis played in allowing scientists to be certain in this conclusion and relate this back to the main theme of the class.	Fifth Problem Set Prepare for final project
13	Are we alone in the Universe?	**Exoplanets and Aliens.** Recent history remembers a time when it was not known if planets existed around other stars. The past two decades have seen an explosion in our knowledge about the existence, statistics, and characteristics of exoplanets. Students will learn the physics behind exoplanet detection and characterization. We will explore the data that led to early exoplanet discoveries, confront uncertainties/noise in the data, and evaluate the certainty in these detections. Breakout sessions will explore the uncertainty of early exoplanet discoveries, the process of acceptance of these discoveries, and how this changed scientific priors on the question "do exoplanets exist?".	Fifth Writing Assignment Prepare for final project
14-15	Final Project	These weeks are reserved for student-led final presentations.	Final Reports

- **Generally every week before class, students are required to complete pre-recorded lectures, readings, and pre-class quizzes.**

III. Grading

3. Statement on Attendance and Participation

Attendance and Participation:

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/UGRD/academic-regulations/attendance-policies/

- Attendance will be regularly taken by the instructor. Any absences that do not meet University criteria for 'excused' will result in a student not receiving credit for that day. Any student who attends class but does not participate in a graded attendance event (e.g., a Canvas survey does not work for them for technical reasons) must present themselves to the instructor *immediately* following lecture to receive attendance credit. However, some leniency is automatically built in: *up to a few absences will not be penalized and do not require justification.*

4. Grading Scale

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

A	90 – 100%		C	70 – 73%
A-	87 – 89%		C-	67 – 69%
B+	84 – 86%		D+	64 – 66%
B	80 – 83%		D	60 – 63%
B-	77 – 79%		D-	57 – 59%
C+	74 – 76%		E	<56%

A minimum grade of **C** is required for a general education credit.

IV. Quest Learning Experiences

5. Course Delivery and Engagement

Number of Seats Anticipated: 76 students

Delivery Method: In person, Synchronous

This course will be an in-person class with a heavy emphasis on interactive discussion.

In this course, we will explore what role prior knowledge and experience plays in determining what a person chooses to believe. For example, we will explore why students may likely believe me when I assert that "I rode my bike to work today" but will likely not believe me when I assert "I rode my dragon to work today." (The answer is they have 'strong priors' that dragons don't exist.) We will use this basic concept to discuss examples through history where strong priors influenced or impacted the advancement of astronomy (e.g., why did it take so long for civilization to accept that the Sun – and not the Earth – was the center of the solar system? Because they had strong priors – partially grounded in

religion or dogma – that Earth must be at the center.) We will then apply these same concepts to current events and societal issues (e.g., How can groups of voters fixate on the same problem [e.g., a faltering economy] but have vehement disagreements about the solutions? How can groups of voters see the same data [e.g., rising ocean temperature measurements] but disagree about the implications?). The goal of this class is not to determine right-from-wrong, nor fact-from-fiction, but rather to shed light on the process through which humans assemble knowledge as modeled within a Bayesian framework.

To promote class-meeting discussion and interaction, reading assignments and lecture material will be assigned via Canvas in advance. Students will be required to complete these assignments in advance of class, which will allow us to focus our class meeting times on answering questions, doing practice problems, and engaging in debate.

6. Details of Experiential Learning Component

This course focuses around having students question the origins of knowledge. As such, the course includes two experiential learning labs where students carry out experiments that simultaneously demonstrate the underpinnings of astronomical knowledge while allowing students to assess the level of the certainty that should be associated with the conclusions from those experiments.

The experiential learning components include:

1) Solar System Observing: Students will observe objects in the solar system.
2) Solar Observing: Students will observe the Sun.

These are some of the experiments that led Galileo to conclude that the cosmos are not “perfect” and scientists to understand our place in the solar system. Each of these labs will require students to carry out an experiment and provide a written summary of conclusions. In particular, students will be asked analyze the certainty of the conclusions of these experiments and how any conclusions might be influenced by assumptions made during the experiment.

7. Details of the Self-Reflection Component

Students will carry out self-reflection through their written assignments which will require they consider how course concepts apply to the modern world and their everyday lives. Within our society, groups of people can hear the same testimony, face the same set of observations, or experience the same situation, yet come away with inconsistent opinions. We will discuss how humans come to conclusions – broadly defined – through a combination of observations/information convolved with their prior knowledge or assumptions. We will ask students to reflect on how this fact-vetting framework applies to their everyday life.

8. What is the essential/pressing question your course explores?

How do we know what we know? How do you determine to believe (or not) what a person tells you? How can a group of people hear the same testimony, face the same set of observations, or experience the same situation, yet come away with inconsistent opinions or conclusions?

Scientists draw conclusions by carrying out experiments that shed light on unknowns. Astronomers in particular advance knowledge using observations of distant objects to infer physical knowledge. Yet, there are a number of examples in history where the scientific community was slow to develop consensus. We will use a series of historical examples to explore how scientists confront observations with priors in order to develop conclusions.

While our course will focus on the advancement of knowledge in Astronomy. We will continuously focus on how the scientific knowledge building process applies to students in their everyday life. Humans develop opinions and vet facts based on a number of factors (e.g. reliability of source, existence of conflicting opinions, prior subject knowledge). This course will ask students to explore how they process knowledge, a concept that applies to students' everyday life. We will ask students to confront how they draw conclusions and determine fact. We will focus less on determining what the 'right' conclusion is, but instead emphasize and make explicit the process that leads humans to draw conclusions.

III. General Education and Quest Objectives & SLOs

9. This Course's Objectives—Gen Ed Primary Area and Quest

Physical Sciences Objectives ➔	**Quest 2 Objectives ➔**	**This Course's Objectives ➔** (This course will….)	**Objectives will be Accomplished By:** (This course will accomplish the objective in the box at left by…)
Physical science courses provide instruction in the basic concepts, theories and terms of the scientific method in the context of the physical sciences.	Address the history, key themes, principles, terminologies, theories, or methodologies of the various social or biophysical science disciplines that enable us to address pressing questions and challenges about human society and/or the state of our planet.	… expose students to the basic principles of astronomy fact-gathering and research. Astronomy is unique in that the object studied can be seen only at a distance, and often with limited direct observability. The limited availability of observational information impacts the conclusion drawing process (inference).	… examining through 7 distinct Units historical examples within Astronomy where great advancements where made. We will discuss what observations were made and how they led scientists to draw the conclusions that they did.
Courses focus on major scientific developments and their impacts on society, science and the environment, and the relevant processes that govern physical systems.	Present different social and/or biophysical science methods and theories and consider how their biases and influences shape pressing questions about the human condition and/or the state of our planet.	… deeply and continuously immerse students in the practice and discipline of probabilistic inference and Bayesian analysis: the subtle but critical underpinnings of the conclusion drawing process at the core of the Scientific Method.	… examining through 7 distinct Units which explore historical examples within Astronomy where great advancements were made. In each case, advancement required not only evidence, but also confronting established (incorrect) common knowledge.

Physical Sciences Objectives ➔	Quest 2 Objectives ➔	This Course's Objectives ➔ (This course will….)	Objectives will be Accomplished By: (This course will accomplish the objective in the box at left by…)
Students will formulate empirically-testable hypotheses derived from the study of physical processes, apply logical reasoning skills through scientific criticism and argument, and apply techniques of discovery and critical thinking to evaluate outcomes of experiments.	Enable students to analyze and evaluate (in writing and other forms of communication appropriate to the social and/or biophysical sciences) qualitative or quantitative data relevant to pressing questions concerning human society and/or the state of our planet.	… use astronomy as a means for studying how observations can lead to new knowledge.	… using two lab modules where students will gather or use data (e.g., on the Sun's temperature or the expansion of the Universe). Students will critically analyze the experiment design, data, and conclusions.
	Analyze critically the role social and/or the biophysical sciences play in the lives of individuals and societies and the role they might play in students' undergraduate degree programs.	… examine how the *exact same* critical thinking and conclusion drawing process used in the Scientific Method can apply to the actual day-to-day lives of the students.	… examine historical examples where groups of highly educated scientists with expert knowledge examined the same evidence and drew varied conclusions. We will examine why that happened, and how that applies to students' everyday lives.
	Explore or directly reference social and/or biophysical science resources outside the classroom and explain how engagement with those resources complements classroom work.	… have students gather real astronomy data to confirm/explore/validate/ understand the origins of observational facts asserted in lecture.	… have students construct their own experiments and/or data processing to gather insight on the underpinnings of modern astronomy knowledge.

10. This Course's Student Learning Outcomes (SLOs)—Gen Ed Primary Area and Quest

	Physical Sciences SLOs ➔ Students will be able to…	Quest 2 SLOs ➔ Students will be able to…	This Course's SLOs ➔ Students will be able to…	Assessment Student competencies will be assessed through…
Content	**Identify, describe, and explain** the basic concepts, theories and terminology of natural science and the scientific method; the major scientific discoveries and the impacts on society and the environment; and the relevant processes that govern biological and physical systems.	**Identify, describe, and explain** the cross-disciplinary dimensions of a pressing societal issue or challenge as represented by the social sciences and/ or biophysical sciences incorporated into the course.	**Identify, describe, and explain** the physical principles that underly our current model for the cosmos as well as how scientists process evidence to come to conclusions and link this to how individuals and groups of people come to make decisions and form opinions while taking into account the influence of the priors that those individuals and groups possess.	Bi-weekly writing assignments, problem sets, and experiential learning labs.
Critical Thinking	**Formulate empirically-testable hypotheses** derived from the study of physical processes or living things; apply logical reasoning skills effectively through scientific criticism and argument; and apply techniques of discovery and critical thinking effectively to solve scientific problems and to evaluate outcomes.	**Critically analyze** quantitative or qualitative data appropriate for informing an approach, policy, or praxis that addresses some dimension of an important societal issue or challenge.	**Analyze** and **evaluate** the role that priors play in setting opinions and beliefs so that students can critically analyze and more deeply understand what drives knowledge and opinion formation.	Bi-weekly writing assignments, problem sets, and experiential learning labs.

	Physical Sciences SLOs ➔ Students will be able to…	Quest 2 SLOs ➔ Students will be able to…	This Course's SLOs ➔ Students will be able to…	Assessment Student competencies will be assessed through…
Communication	Communicate scientific knowledge, thoughts, and reasoning clearly and effectively.	**Develop and present**, in terms accessible to an educated public, clear and effective responses to proposed approaches, policies, or practices that address important societal issues or challenges.	… write, present, and debate the basics of a quantitative formulation of the scientific method known as probabilistic inference.	… biweekly written assignments requiring clear communication and thoughtful reasoning as well as final presentations.
Connection	N/A	**Connect course content** with critical reflection on their intellectual, personal, and professional development at UF and beyond.	… apply the same thought patterns that govern in the scientific process to societal contexts in situations as wide-ranging as medical diagnoses, social media discourse, journalism, politics, and religion.	… biweekly written assignments that require drawing parallels from the scientific process discussed in class to the real world.

10a. This Course's Objectives and Student Learning Outcomes (SLOs)—Gen Ed Secondary Area

International Objectives (for N co-designation)

International Objectives →	**This Course's Objectives→** **(This course will….)**	**Objectives will be Accomplished By:** **(This course will accomplish the objective in the box at left by…)**
International courses promote the development of students' global and intercultural awareness.	… use the advancement of science (astronomy) to probe the underpinnings of how humans vet knowledge which naturally includes intercultural awareness.	… use a Bayesian framework to probe how and why a person's upbringing and background can impact their views-on and perception-of the word.
Students examine the cultural, economic, geographic, historical, political, and/or social experiences and processes that characterize the contemporary world, and thereby comprehend the trends, challenges, and opportunities that affect communities around the world.	… discuss how past experiences, education, and biases shape the 'priors' that any and all people bring to decision making processes. Emphasis will be placed on how variations in international or cultural norms impact individual prior development, and therefore knowledge development.	… discuss specific examples of when astronomy was misled by 'common knowledge' or dogmatic ideas, and how/why this happened (e.g., the slow advancement of the Copernican model, the poor estimations of the Age of the Earth).
Students analyze and reflect on the ways in which cultural, economic, political, and/or social systems and beliefs mediate their own and other people's understanding of an increasingly connected world.	… explore the role that priors (i.e. the past experiences, education, and biases) play in determining how a person makes decisions and reaches conclusions. Emphasis will be placed on understanding how an internationally connected community with access to the same information can remain in tension when drawing conclusions about important societal issues (vaccine safety, climate change, and disinformation campaigns will be used as specific examples).	… exploring how scientists/ astronomers draw varied conclusions based on the same data owing to their varied strongly held beliefs, past research history, and/or preferences (e.g., Einstein's unfounded insertion of a cosmological constant). A mirrored process will be used to explore the role of priors when examining climate change data, interpreting vaccine safety studies, or vetting social media information sources.

International Student Learning Outcomes (for N co-designation)

	International SLOs ➔ **Students will be able to…**	**Course SLOs ➔** **Students will be able to…**	**Assessment** **Student competencies will be assessed through…**
Content	Identify, describe, and explain the historical, cultural, economic, political, and/or social experiences and processes that characterize the contemporary world.	… understand how groups of people can come to varied conclusions even when faced with the same evidence or testimony.	… societal parallel writing assignments where students will discuss how both scientists and all humans draw conclusions drawn through a combination of accepted evidence and priors, which can vary dramatically based on background, upbringing, and subject education.
Critical Thinking	Analyze and reflect on the ways in which cultural, economic, political, and/or social systems and beliefs mediate understandings of an increasingly connected contemporary world.	… navigate the data-flooded world of the internet and social media using the same tools of inference to employ critical thinking in everyday life.	… societal parallel writing assignments where students link the 'knowledge building' process we discuss in astronomy to the 'fact vetting' process that all humans carry out continuously.

IV. Required Policies

11. Students Requiring Accommodation

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, https://disability.ufl.edu/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

12. 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 https://gatorevals.aa.ufl.edu/students/. 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 https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

13. 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. This includes the use of AI: ***except where explicitly instructed in the AI module, no student is allowed to use any AI tools (e.g., including Grammarly) to assist with any assignments in this course. Doing so will be considered a violation of the student honor code.*** 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.

14. Counseling and Wellness Center

Contact information for the Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc/Default.aspx, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

15. 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 http://writing.ufl.edu/writing-studio/ or in 2215 Turlington Hall for one-on-one consultations and workshops.

16. In Class Recording

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.

17. Known Class Cancellations

We will follow the University’s academic calendar, and do not currently anticipate any class cancellations.