



UNIVERSITY OF NORTHERN COLORADO

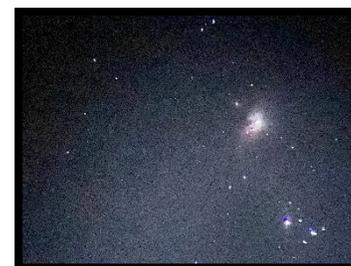
## Extended Campus

College of Natural & Health Science  
Department of Physics & Astronomy

UNC Dual Enrollment with Bennett High School

AST 100-675 The Sky and Planets (4 Credit Hours)  
Spring 2021

**Instructor:** LM Mangham  
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**Office:** A-103 North Building  
**Office Hours:** Monday/Wednesday: 9AM – 10AM  
 Tuesday/Thursday: 10:30AM - 11:30 AM  
**Classroom:** North Bldg A-103  
**Meeting times:** Monday, Wednesday, Thursday 12:00-1:00PM



*\*Note to Student: Other times are available by appointment; students are always welcome to email me and set up zoom appointment to help out with any questions.*

**Required Textbook:**

*The Cosmic Perspective 8<sup>th</sup> Ed. The Solar System (2016) Bennett/Donahue/Schneider/Voit (ISBN-13: 978-0-13-407381-1)*

**Course Web Page:** All course material will be posted on Canvas.

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**Instructional Method**

This course will utilize the following instructional methods:

**Traditional instruction**-Students will attend lectures/labs in person at the specified location(s). Students are expected to attend at the scheduled time and location for the course. Students are expected to complete 1-3 hours of homework/studying for each hour of lecture. Homework may also utilize traditional and/or online learning methods.

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**Pedagogy Philosophy**-*To provide a high level of excitement, energy, and enthusiasm in effort to generate student curiosity, engagement and ownership of the material presented. The subject matter presented will be in an all-inclusive classroom environment in which students are active participants.*

## **UNC Catalog Description**

The Universe and our place in it. Appropriate for non-science majors.

## **Course Description**

AST 100 General Astronomy covers:

- Motions and general nature of all objects found in the sky (Sun, Moon, planets, stars, etc.)
- The nature of the fundamental forces that affect astronomical objects
- Tools of the astronomer
- Contents of the solar system (planets, moons, asteroids, comets...)

**This course includes laboratory experience. This course falls under Area 6 of UNC's Liberal Arts Core.**

The lecture content of this course helps students to

- Develop foundational knowledge in physics
- Recognize that science involves the interplay of observation, experimentation, and theory
- Develop quantitative approaches to study natural phenomena
- Distinguish among scientific, nonscientific, and pseudoscientific presentations, arguments, and conclusions

## **The laboratory contents**

- Develops concepts of accuracy, precision, and the role of repeatability in the acquisition of scientific data
- Is predominately hands-on and inquiry-based with demonstration components playing a secondary role
- Emphasizes a student's formulation and testing of hypotheses with scientific rigor
- Stresses student generation and analysis of actual data, the use of abstract reasoning to interpret these data, and communication of the results of experimentation
- Develops modern laboratory skills

**(Satisfies 4 credits of LAC Area 6)**

## **Intended Outcomes:**

### **1. The student will**

- Identify the nature and the elements of the solar system
- Give causes for eclipses, seasons, and other astronomical events
- Use multiple systems of measurement of distances and angles
- Understand Kepler's and Newton's Laws
- Understand the tools of the astronomer

## **LAC6 Student Learning Outcomes:**

1. Explain the fundamental concepts within the scientific field of study at the introductory level.
2. Explain relevance of the science content to real world topics affecting humanity.
3. Evaluate the quality of evidence in a scientific argument
4. Select or Develop a Design Process. a. Select or develop elements of the methodology or theoretical framework to solve problems in a given discipline.
5. Analyze and Interpret Evidence. a. Examine evidence to identify patterns, differences, similarities, limitations, and/or implications related to the focus.
6. Analyze and Interpret Evidence. b. Utilize multiple representations to interpret the data.
7. Draw Conclusions. a. State a conclusion based on findings.

8. Interpret Information. a. Explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words).
9. Represent Information. a. Convert information into and between various mathematical forms (e.g., equations, graphs, diagrams, tables, words).

**GT Pathways Content Criteria:**

1. Develop foundational knowledge in specific field(s) of science.
2. Develop an understanding of the nature and process of science.
3. Demonstrate the ability to use scientific methodologies.
4. Examine quantitative approaches to study natural phenomena.
5. Perform hands-on activities with demonstration and simulation components playing a secondary role.
6. Engage in inquiry-based activities.
7. Demonstrate the ability to use the scientific method.
8. Obtain and interpret data and communicate the results of inquiry.
9. Demonstrate proper technique and safe practices.

**The Colorado Commission on Higher Education** has approved AST 100 for inclusion in the Guaranteed Transfer (GT) Pathways program in the GT-SC1 category. For transferring students, successful completion with a minimum C– grade guarantees transfer and application of credit in this GT Pathways category. For more information on the GT Pathways program, go to <http://highered.colorado.gov/academics/transfers/gtpathways/curriculum.html>.

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**Course Expectations**

Your attendance to the class is very important and you need to make a determined effort to be in attendance. You are allowed 3 unexcused absences, after which your grade will be begin to suffer. Tardiness will be noted and recorded. Due to the Zoom limitations I will allow you a 5-minute reprieve past the start. So please, try to be on time. This course primarily meets on Monday and Wednesday from 12:00 to 1:00 PM. And your lab assignments will be posted on Canvas every Tuesday.

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**Course Grading Policy**

Grading Category	Grading Percentage/Points
<b>Lecture 65%</b>	
<b>Homework</b>	20%
<b>Online Attendance</b>	5%
<b>Exams (2 exams)</b>	30%
<b>Ancient Astro Project – Final Proj.</b>	10%
<b>Lab Assignment (star Mapping)</b>	20%
<b>Summary Articles (journals)</b>	15%
<b>Total</b>	100%

(A “W” will only be given if the student withdraws from the class before the UNC withdrawal deadline. This must be done through Registration/Records.)

**Homework (20%):** There are homework assignments given during the semester. There will be one homework assignment per chapter consisting of roughly 5-10 questions. **ALL HOMEWORK WILL BE TURNED IN ON CANVAS!**

**Attendance (5%):** Online Attendance is important and will be worth 10% of your grade.

**Tests (30%):** There will be 2 exams during the semester worth a total of 30% of your grade. The first exam will cover the scientific method, classical and Renaissance Astronomy. The second test will cover Planetary astronomy.

**Labs (20%):** Due to Covid-19 and current Tri-County Threat Level we will, postpone outdoor labs for now, and, and focus on star coordinate system as it pertains to the celestial sphere and localized alt-azimuth techniques. Additionally, we will make use of the Starry Night Sky Software package.

**Reading Summary Articles (15%):** Students will be responsible for a one-page report over some astronomy article that is of interest. The student is to identify the article as a journal, magazine, internet-based article, etc. Just one page is asked for and is due every Thursday of each week.

**Ancient Astro Final Project (10%):** You will be assigned a project having to do with the history and techniques familiar with: the ancient Greeks, Egyptians, Mayans, and Celts, Polynesians, etc.

This project will be due by the end of the semester and will serve as your finals project.

## Topical Outline

- I. Astronomy and the nature of science
  - a. Scientific method
  - b. Science vs pseudoscience
  - c. History of astronomy as an example of science
- II. Observing the sky
  - a. Seasons
  - b. Lunar phases/eclipses
  - c. Celestial sphere
  - d. Navigation and timekeeping
- III. Our place in the universe
  - a. Scale of space and time
  - b. Earth's motion
- IV. Physics of astronomy
  - a. Kepler's laws
  - b. Newton's laws
  - c. Conservation laws
  - d. Energy
  - e. Nature of light and matter
- V. Tools of the astronomer
  - a. Telescopes and instruments
  - b. Space exploration
- VI. Contents of the solar system
  - a. Solar system formation
  - b. Planetary geology, atmospheres and moons
  - c. Small bodies
- VII. Life in the universe
  - a. Exoplanets
  - b. Astrobiology

***This course will utilize the following instructional methods.***

### **Traditional Instruction**

Students will attend lectures/labs in person (or online) at a specified location(s). Students are expected to attend at the scheduled time and location for the laboratory portion of the course. Homework may also utilize traditional and/or online learning methods.

### **Teaching Philosophy**

My approach to teaching science is to use hands on activities. The only way students are really going to learn is to experience science for themselves. Science is all around us and the students need to realize and understand this. They need to be engaged and interested in what they are learning. The best way to accomplish this is to facilitate the process, and to get them to ask questions and not be afraid to think outside the box by trying new things, and expressing new ideas based on what they know.

### ***Classroom Etiquette/Behavioral Expectations***

There is to be none of the following: No food and No drink (just water), No cell phones or use of headphones. You are to be respectful and courteous in class to your fellow classmates and instructor.

### ***Academic Integrity Policy***

You will be assigned a major term paper/Research Project for the course. You are to produce a bibliographic reference at the end of your paper/project and include in-text citations reflecting your sources. Plagiarism will not be tolerated and will result in a zero for the assignment. A student strongly thought to have plagiarized their research paper will be reported and will result for a zero for the assignment. If you are observed cheating on an exam you may be dismissed from the course.

### ***Electronics Policy***

Electronic devices such as: cell phones, Ipads, and headphones are to be put away in your backpack and shut off.

### ***Students with Disabilities***

Any student requesting disability accommodation for this class must inform the instructor giving appropriate notice. Students are encouraged to contact the Bennett High School counseling office to certify documentation of disability and to ensure appropriate accommodations are implemented in a timely manner.

## **Detailed Schedule**

### ***Week One***

Preparation: Lecture 1: A modern view of the universe  
Assignment: Earth Coordinates

### ***Week Two***

Preparation: Lecture 2: Patterns in the sky  
Assignment: The Celestial Sphere

### ***Week Three***

Preparation: Lecture 3: Ancient and Classical Astronomy Lecture Part 1  
Assignment: How the Ancients used astronomy

***Week Four***

Preparation: Lecture 4: Ancient and Classical Astronomy Lecture Part 2

Assignment: Ancient Astronomy Technology

***Week Five***

Preparation: Lecture 5: Renaissance Astronomy Part 1

Assignment: Renaissance short paper and PowerPoint presentation

***Week Six***

Preparation: Lecture 6: Renaissance Astronomy Part 2

Assignment: Renaissance Presentation continued

***Week Seven***

Preparation: Lecture 7: Gravity

Assignment: Gravity and Motion – The Physics of Gravity

***Week Eight***

Preparation: Lecture 8: The Solar System Part 1

Assignment: Overview of the Solar System 1

***Week Nine***

Preparation: Lecture 9: The Solar System Part 2

Assignment: Overview of the Solar System 2

***Week Ten***

Preparation: Lecture: 10 Our Planetary System Part 1

Assignment: The terrestrial Planets

***Week Eleven***

Preparation: Lecture: 11 Our Planetary System Part 2

Assignment: The Jovian Planets

***Week Twelve***

Preparation: Lecture: 12 Earth and Other Terrestrial Planets

Assignment: The Earth

***Week Thirteen***

Preparation: Lecture: 13 The Moon

Assignment: The Origin of the Moon

***Week Fourteen***

Preparation: Lecture: 14 The Moons of the Solar System

Assignment: The Jovian Moon System

***Week Fifteen***

Preparation: Lecture: 15 Final Exam Review and Questions

Assignment: Term Paper deadline

**UNC'S Policies:**

UNC's policies and recommendations for academic misconduct will be followed. For additional information, please see the Student Code of Conduct.

**Honor Code:**

All members of the University of Northern Colorado community are entrusted with the responsibility to uphold and promote five fundamental values: Honesty, Trust, Respect, Fairness, and Responsibility. These core elements foster an atmosphere, inside and outside of the classroom, which serves as a foundation and guides the UNC community's academic, professional, and personal growth. Endorsement of these core elements by students, faculty, staff, administration, and trustees strengthens the integrity and value of our academic climate.

**Dropping or Withdrawing from a UNC Dual Credit Course:**

Note: Drop and withdrawal dates for the courses at your school can be found on your [dual enrollment page for your high school](#).

Please use the [Dual Enrollment Drop & Withdrawal Form](#).

- You can drop your course up until the designated Drop Deadline. The course will be removed from your transcript and you will receive a full tuition refund.
- After the Drop Deadline and up until the Withdrawal Deadline you can withdraw from your course. The course will remain on your transcript with a grade of "W" (this does not impact your GPA), and there is no tuition refund.
- After the withdrawal deadline you are unable to be removed from the course. The course will remain on your transcript with the grade that you have earned, and there is no tuition refund.
- If you stop attending the course but fail to officially withdraw from the course(s), you will be responsible for full tuition and fees and the course grade will remain on your transcript.