FLORIDA SOUTHWESTERN STATE COLLEGE

**School of Pure and Applied Sciences**

**Astronomy**

## Instructor Information

**Instructor:** Dr. Marius Coman
**Office Location:** N 230 Collier campus
**Office Hours:**
Posted under announcements in canvas
**Phone Number:** (239) 732-3721
**Email:** Use Canvas' Email

## Course Information

**Course:** AST 2002C, ASTRONOMY (ASTRONOMY)
**Section Number:** 801
**Course Reference Number:** 23860
**Delivery Method:** FSW Online
**Campus:** FSW On-Line

**Credit Hours:** 3 Credits - 2 Lecture Hours - 2 Lab Hours

**Course Description:** This course provides a survey of astronomy as a quantitative observational science. It is designed to provide an introduction to the night sky, astronomical tools and methods, the historical development of our understanding of the universe, the solar system, stellar properties, the lives and deaths of stars, galaxies and cosmology.

## Course Location

This class is offered **online**, does not meet in person.

Materials, posted under modules will be accessed through canvas.

## Prerequisites/Co-requisites

**Course Prerequisites:** (Demonstration of readiness for college-level computation and communication ) and MAT 1033 or higher with a grade of "C" or better.

## Topic Outline

**Topic Outline:**

- An introduction to the night sky
- The geocentric and heliocentric models of our solar system
- Gravity
- Light and the electromagnetic spectrum
- Astronomical tools and methods
- Our solar system
- The Sun
- Stellar properties
- The interstellar medium and star formation
- The lives and deaths of stars
- The Milky Way and the diversity of galaxies
- Cosmology
- The search for extraterrestrial intelligence

## Student Learning Outcomes

All courses at Florida SouthWestern State College contribute to the General Education Program by meeting one or more of the following General Education Competencies:

**C**ommunicate clearly in a variety of modes and media.
**R**esearch and examine academic and non-academic information, resources, and evidence.
**E**valuate and utilize mathematical principles, technology, scientific and quantitative data.
**A**nalyze and create individual and collaborative works of art, literature, and performance.
**T**hink critically about questions to yield meaning and value.
**I**nvestigate and engage in the transdisciplinary applications of research, learning, and knowledge.
**V**isualize and engage the world from different historical, social, religious, and cultural approaches.
**E**ngage meanings of active citizenship in one's community, nation, and the world.

**A. General Education Competencies and Course Outcomes**

1. Listed here are the course outcomes/objectives assessed in this course which play an integral part in contributing to the student's general education along with the general education competency it supports.

General Education Competency: **Evaluate**

Course Outcomes or Objectives Supporting the General Education Competency Selected:

- Identify the major celestial phenomena associated with the Sun, Moon, planets, and stars and analyze their relationship to the celestial sphere.
- Use star charts to locate stars and constellations, and compare astronomical and astrological predictions; use sampling to approximate the number of stars seen by the naked eye in the night sky.
- Describe the ancient concepts of astronomy and show how they relate to modern day concepts.
- Identify and apply the relevant theories of gravitation and motion to predict and analyze planetary orbits; use observational data to draw conclusions about the

shapes of planetary orbits (such as Mercury's).

- Determine the mass of a celestial object (such as the Moon) by using Kepler's laws and observational data (such as a satellite's orbit around the Moon).
- Identify the various observational tools used in astronomy and categorize and differentiate the regions of the electromagnetic spectrum; identify gaseous elements by their spectral lines.
- Use the Doppler Effect to determine the rotational period of a celestial object (such as Mercury).
- Compare theories of formation of stars and their planetary systems.
- Compare and contrast the major physical characteristics of the Earth and Moon; integrate relevant theories related to the Moon's origin, its phases and its tidal effects on Earth.
- Compare and contrast the structure and physical characteristics of the terrestrial and Jovian planets.
- Compare and contrast the various objects comprising the solar system debris; use occultation data (such as from the Pluto-Charon system) to determine the diameter of each of the objects involved.
- Identify, describe, and compare the different layers in the Sun's interior and atmosphere; measure the Sun's diameter using pinhole projection.
- Compare the various methods of measuring distances and other stellar properties; measure the proper motion of Barnard's star and determine the star's overall motion in space.
- Interpret the H-R diagram and use it to describe stellar evolution.
- Describe the properties of the interstellar medium and theories of stellar formation.
- Trace and compare the life histories of stars of various masses; compare the properties of white dwarfs, neutron stars, and black holes.
- Describe the physical makeup, stellar populations, and evolution of our Galaxy; construct the shape and a scale drawing of our Galaxy by using appropriate observational data.
- Compare the different types of galaxies and theories of their origin, and describe the nature of active galactic nuclei.

- Differentiate among cosmological models and identify their limitations; deduce the size and age of the observable universe by using Hubble's law.
- Describe efforts to communicate with extraterrestrial intelligence, develop one such method, and identify the obstacles astronomers face in pursuing such searches.

**B. In accordance with Florida Statute 1007.25 concerning the state's general education core course requirements, this course meets the general education competencies for science.**

- Students will demonstrate the ability to critically examine and evaluate scientific observation, hypothesis, or model construction, and to use the scientific method to explain the natural world.
- Students will successfully recognize and comprehend fundamental concepts, principles and processes about the natural world

## Academic Integrity Policy

At FSW, we believe in the power of honesty and integrity as the pillars of academic excellence. As part of our college community, it's crucial that you understand the importance of these values in your academic journey. All work submitted by students for credit in this course is required to adhere to FSW's Academic Integrity Policy. This means cheating on coursework is unacceptable, will receive a "0" grade, and may be subject to disciplinary action. FSW faculty may use Turnitin, Packback, CheckGPT, or similar tools to evaluate coursework for plagiarism and/or artificial intelligence (AI) generated content.

Cheating or other academic misconduct can include, but is not limited to:

- Copying information from published or unpublished sources (online or in print) without citing those sources.
- Copying someone else's work or allowing someone else to copy yours.
- Submitting written work generated by AI as your own without direct authorization from your professor.
- Submitting work for credit that has already been submitted for credit in another class, even if you wrote it.

- Unethical distribution or use of exam content.

According to the Academic Policies and Procedures section of the College Catalog, “Those in charge of academic tasks have an obligation to make known the standards and expectations of acceptable academic conduct. Each student has an obligation to know and understand those standards and expectations.” As such, each student should review the policies and procedures outlined in the Academic Integrity Policy and expect that any violation of these policies will be subject to disciplinary action.

If you have any questions about these principles, reach out to your professor. They are here to help you succeed. Let's work together to maintain an honest, vibrant learning environment at FSW!

## Institution Policies

### Programs for Students with Disabilities

Florida SouthWestern State College, in accordance with the Americans with Disabilities Act and the College’s guiding principles, offers students with documented disabilities programs to equalize access to the educational process. Students needing to request an accommodation in this class due to a disability, or who suspect that their academic performance is affected by a disability should contact the Office of ADAptive Services at the nearest campus. The office locations and telephone numbers for each campus are located on the Office of ADAptive Services website.

### Reporting Title IX Violations

Florida SouthWestern State College, in accordance with Title IX and the Violence Against Women Act, has established a set of procedures for reporting and investigating Title IX violations including sexual misconduct. Students who need to report an incident or need to receive support regarding an incident should contact the Equity Officer at equity@fsw.edu. Incoming students are encouraged to participate in the Sexual Violence Prevention training offered online. Additional information and resources can be found on the College’s website.

### Financial Aid and Attendance Verification

Florida SouthWestern State College, in accordance with Federal Regulations, is responsible for verifying student attendance and engagement in classes before federal financial aid funds are distributed. In order to demonstrate both your attendance and engagement in this class, you will need to complete the attendance verification assignment within the first week of class. To complete the assignment, click on the “Attendance Verification” link on the Canvas course menu. Additional information and resources can be found on the College’s Financial Aid website.

## School Policies

Extra Credit: All extra credit opportunities offered in any School of Pure and Applied Science course must be offered equally to all students in the class, and cannot account for more than 5% of the overall course grade.

## Course Assessment

This course will be assessed by a combination of class participation, graded homework assignments, module/unit quizzes/exams, graded labs, and/or a comprehensive final exam.

## Requirements for Students

Students are expected to submit al labs/tasks/quizzes by the due date.

Familiarize yourself with the Academic Integrity & Misconduct principles.

Technology Requirements:

- laptop or desktop computer with an up-to-date OS;
- stable high speed internet;
- external webcam with microphone only for proctored exams.

## Attendance Policy

Submitting lab reports, tasks and quizzes by the due date is your responsibility.

## Grading Policy

Your final grade will depend on the total points earned; the weight for exams, labs reports and

Homework/assignments is specified in the following table:

| Item | Weight (in %) |
|---|---|
| 3 Examinations | 10 |
| 18 Lab reports & 18 Tasks | 80 |
| 10 Quizzes / Assignments | 10 |

Your final grade is calculated as a weighted average:

$$\text{Final Grade} = \overline{\text{Labs}} \cdot \frac{40}{100} + \overline{\text{Tasks}} \cdot 0.4 + \overline{\text{Exams}} \cdot 0.1 + \overline{\text{Quizzes}} \cdot 0.1$$

$$\overline{\text{Exams}} = \frac{\text{Exam}_1 + \text{Exam}_2 + \text{Exam}_3}{3}$$

$$\overline{\text{Labs}} = \frac{\sum_{i=1}^{18} \text{Lab}_i}{18}$$

$$\overline{\text{Tasks}} = \frac{\sum_{j=1}^{18} \text{Task}_j}{18}$$

The following range will be used to determine your final course grade:

| Grade Percent | Letter Grade |
|---|---|

| Grade Percent | Letter Grade |
|---|---|
| 90-100 | A |
| 80-89.9 | B |
| 70-79.9 | C |
| 60-69.9 | D |
| Below 60 | F |

*Withdrawals: It is the student's responsibility to withdraw officially from any class that they cease to attend. Failure to do so will result in the recording of an "F" grade.*

*(Note: The "incomplete" grade ["I"] should be given only when unusual circumstances warrant. An "incomplete" is not a substitute for a "D," "F," or "W." Refer to the policy on "incomplete grades.)*

**LATE WORK POLICY:**

Assignments/quizzes/lab reports are due on the due date.

If an assignment/quiz/lab report is submitted late, 2 points will be subtracted per day, for up to 5 days.

Exams

There will be three exams including the final, which is a cumulative exam. All needed formulas and constants will be allowed/provided.

There are no "Make-ups" for examinations. If you miss an exam due to a documented extenuating circumstance you must contact the professor as soon as possible; however, you will receive zero points for that exam unless you have a substantiated unforeseen occurrence or a written excuse from a physician, the Dean, or an academic advisor.

## Required Course Materials

**The Essential Cosmic Perspective**
**ISBN:** 9780134874364


**Authors:** Jeffrey Bennett, Megan Donahue, Nicholas Schneider, Mark Voit
**Publisher:** Pearson
**Edition:** 9

Visit the FSW Bookstore to find required course materials.

## Additional Required Materials for FSW Online Courses

FSW Online courses (including online, live online, blended online, and flex modalities) also require the following materials:

- **External webcam** and microphone (to take proctored tests and/or final exams.)
- Laptop or desktop computer with an up-to-date operating system (see Semester Start-Up Check-List for details).
- Stable high-speed internet

As scrap paper is not authorized during online exams, it is recommended that students consider the following if authorized for use:

- Small, lap-sized, dry-erase board
- Dry erase marker(s)

## Class Schedule

Week 1

Lab 0: Astronomical Observations, Observing the Sun and the Moon

Lab 1: Reasoning and Estimating I

Task 1: Sort the objects in order of increasing density

Week 2

Lab 2: The night sky, Familiarizing yourself with Stellarium

Task 2: Rank the objects in order of angular diameter

Lab 3: Denisty of astronomical objects

Task 3: Rank the activities in chronological order

Week 3

Exam 1

Lab 4: Stellarium Visible Constellations

Task 4: Celestial Coordinates

Week 4

Lab 5: Determining your latitude and longitude

Task 5: Sun's position in relationship with latitude

Task 6: Sun's altitude in relationship with Latitude

Week 5

Lab 6: Kepler's Laws

Task 7: Verifying Kepler's Laws

Task 8: Calculate Centrifugal Force exerted upon you in the heliocentric model

Week 6

Lab 7: Theory of gravity

Task 9: Supermoon

Lab 8: Percentage of Moon Illuminated by Sun

Lab 9: Heliocentric Model: scaled down model

Week 7

Exam 2

Lab 10: Doppler shift

Task 10: Nebular Theory: Angular momentum conservation

Week 8

Lab 11: Estimating Charon's diameter assuming we know Pluto's

Task 11: Moon's phases

Task 12: Moon's path along the sky from new Moon to new Moon

Week 9

Lab 12: Track the Sun’s motion using Stellarium

Lab 13: Sun's power output

Task 13: Star's Brightness Temperature relationship

Week 10

Lab 14: Analemma, Sun's path throughout the year

Task 14: Hubble's Law, inferring universe's age

Week 11

Lab 15: Star's spectral type, Hertzsprung Russel diagram

Task 15: Circumstellar Habitable zones

Lab 16: Luminosity versus temperature; graphing stars based on their T vs luminosity relationship

Task 16: Drake's equation

Week 12

Lab 17: Reflection and refraction

Task 17: Refractive lens

Week 13

Lab 18: Building a refracting telescope

Task 18: Hydrogen emission spectrum

Final Exam Wednesday, April 24th, 10 AM - 11:50 AM, 1 hour 50 minutes

## Tutoring and Support Services

**Academic Tutoring**

FSW provides professional in-person and online tutoring through its Tutoring Centers located inside the campus library. Tutoring Centers consist of Math Center, Writing

Center, and the Peer-Tutoring Center. In addition to on-campus tutoring services, the College provides all students 24/7 access to Tutor.com.

For additional help with this course, the student may:

1. Meet with the Professor during posted office hours.
2. Seek On-Campus Assistance: Each Campus, as well as the Hendry/Glades Center, has at least one place where students can go for assistance with academics. All are available to each student, regardless of the location or type (on-campus, online, etc.) of the class.
3. Request a tutor from the Florida SouthWestern State College Peer Tutoring Center.
4. Use the Online 24/7 Tutoring Services (tutor.com). Look for the link in your Canvas course navigation menu.
5. Use the **FSW Math Tutorials** link located in Canvas for additional math resources (videos, links to resources, etc.) by topic.

**BUCS Care Services**

Bucs Care Services is focused on educating and informing the community through caring, advocacy, and supportive endeavors. FSW cares about our student's holistic development and wellness. We believe that for all students to be successful, support must be given on an emotional, social, physical, and intellectual basis.

Care Services include:

- Wellness Hub (Mindfullness@FSW)
- Care Pantry
- Mental Health Services
- Public Health Resources
- Active Minds
- Homeless Student Resources

If you feel you are struggling and need to speak with someone concerning personal issues, please do not hesitate to contact the Care Services office via email

(bucscare@fsw.edu) or phone (239-489-9046) for community resources and group counseling.

**All of these services are available to the student at no additional cost.**

TECHNICAL DIFFICULTIES: Students who experience technical difficulties must contact the professor immediately and attach a screenshot of the issue. If technical problems continue with students' personal computers, it is their responsibility to contact technical support and/or use the computers available on Florida SouthWestern State College campuses to complete the assignments.

This Syllabus is subject to reasonable changes at the discretion of the professor. From time to time, this syllabus may need to be amended for pedagogical reasons, and the instructor will notify students via announcements or email of any changes, additions, and/or deletions to the syllabus.