Course Information

Course Number:	ASTR 102
Course Title:	Observational Astronomy
Section:	507
Time:	Wednesday 7:30 - 10:30 P.M. (Beginning January 22)
Location:	OBSV 106
Credit Hours:	1

Instructor Details

Observatory Manager:	Don Carona
Office:	OBSV 204
Phone:	979-845-0536
E-Mail:	don@tamu.edu
Office Hours:	By Appointment

Instructor:	Raenessa Walker
Office:	MIST M317
E-Mail:	raenessa@tamu.edu
Office Hours:	Tuesdays 1:00 - 2:00 P.M.

Faculty supervisor:	Justin Spilker
Office:	MIST M324
E-mail:	jspilker@tamu.edu
Office hours:	N/A

Course Description

Welcome to Observational Astronomy! Learning the night sky is a fun and rewarding learning experience. During the semester, you'll learn the constellations, bright stars and how to setup and use a telescope to find objects in the night sky. Planets, star clusters and nebulae are some of the objects you'll be observing. You'll also be discussing astronomy topics in the classroom that every amateur astronomer should know. You do not need any prior experience using a telescope to be successful. We'll teach you everything you need to know to explore the night sky.

Course Prerequisites

None

Course Learning Outcomes

The Observational Astronomy course is designed to teach you the skills to become a successful amateur astronomer. The skills you derive from the course will allow you to enter into more advanced observing techniques if you choose to continue enhancing your skills after the course.

By the conclusion of this course, students should be able to:

- Explain the scientific process and how scientific theories are developed and tested.
- Identify the constellations, asterisms and bright stars above the horizon at night.
- Understand and apply the equatorial coordinate system for finding objects in the night sky.
- Use a star chart to locate astronomical objects above the horizon and determine the rise, transit and set times for any object in the sky.
- Know the parts of a telescope as well as the mathematical formulae to determine system parameters such as focal ratio, magnification and field-of-view.
- Setup and successfully align a telescope to a known star in the sky and use the telescope setting circles to find any object based on its equatorial coordinates.
- Explain concepts during one-on-one discussions with the instructor, specifically by showing where objects are in the night sky and how to locate them.
- Demonstrate understanding of the Earth-Moon relationship and phases of the Moon.
- Identify craters, mountains and valleys as well as other features on the lunar surface.
- Observe and categorize star clusters, nebulae and galaxies based on direct observations through the telescopes.
- Determine the rotation period of the Earth based on direct observations of star movement through the eyepiece of the telescope.
- Identify the Galilean Moons of Jupiter (if available for observations).
- Identify the bright moons of Saturn and the angle of the ring complex (if available for observations).

Textbook and/or Resource Materials (required)

- Laboratory Manual - Visit the Observational Course page for instructions on obtaining the weekly course materials. Download, print and bring the Week 2 materials with you to your first class.

- Peterson Field Guides, Stars and Planets 4th Edition, Jay M. Pasachoff
  (ISBN: 0395934311)

Print the manual single-sided only as you may need the back of the pages for additional work. The manual must be in a folder or notebook with your name clearly marked on the outer cover. You will be leaving the manual at the Observatory for the duration of the course unless otherwise instructed. Instructors grade the work in your lab manual. If you fail to bring a manual, you will not receive credit for any work completed. You will need the manual beginning the second class meeting (2nd week of classes).

Grading Policy

Grading will be on a 100-point scale, computed as follows:

Lab Work	50%
Quizzes	30%
Practical(s)	20%

Lab work: Aside from the observational work done at the telescope or with the unaided eye, you are expected to follow the directions of the instructors and the rules for the course. This includes taking care of the equipment. Failure to do so can result in demerits from your lab work grade.

Quizzes: There will be a maximum of five (5) quizzes given during the course. The dates for these quizzes may not be announced in advance. Quiz questions are generated from discussions in class, presentations and readings in the text. The lowest quiz grade will be dropped at the end of the semester.

Practical(s): Two lab practicals are planned during the course to test your knowledge of the night sky and your telescope pointing skills. Dates for lab practicals are dependent on the weather and progress of the individual class. Therefore, dates for lab practicals will be announced by the instructor at least one class night in advance of a practical.

If weather and/or time prevents a lab practical from being administered, your instructor may elect to use an alternative assignment in place of the grade for the missed practical. The assignment given may be a "take home" assignment, but must be one that can typically be completed within ~3 hours.

Grading scale

A	≥ 90
B	80 to 89.99
C	70 to 79.99
D	60 to 69.99
F	< 60

Late Work Policy

You must attend the section for which you are enrolled. You are expected to arrive on time. You will only receive half credit for arriving after a lab assignment has been given to the class. There are no make-ups for students who do not provide an official, written excuse as outlined in the student rules. For those with an excused absence, make-ups are given on an as-needed basis and coordinated with your instructor. Taking an exam for another class that occurs during your scheduled ASTR 102 class time does not constitute an excused absence.

Course Schedule

Reminder: ASTR 102 begins **the second week of classes**

Due to the nature of observational astronomy, the schedule is tentative and may be altered to accommodate weather conditions and/or transient astronomical events.

Week	Discussion	Indoor lab	Observing lab
2 (Jan 20)	• Course Introduction • Peterson Monthly Sky Map • Equatorial Coordinates	• Using the SFA Star Charts	• Finding Constellations • Using Charts and Sky Maps • Sketching the Positions of Constellations
3 (Jan 27)	• Types of Telescopes and Astronomical Cameras • Time (UTC) • Time (JD)	• Setting Up SAOImage DS9 On Your Computer • Finding Pluto in a CCD Image	• 8 inch Telescope Familiarization • Setting Circles and Pointing • Constellation Practice
4 (Feb 03)	• Telescope GoTo & Computer Control	• Celestron 6SE Operation Manual	• 6 inch Telescope Familiarization • Initialization & Alignment • Finding Objects Using the Hand Control
5 (Feb 10)	• Keeping an Observing Log • The Dreyer Description Code	• Creating a Dreyer Description Code	• Introduction to Messier Objects • Constellation Practice
6 (Feb 17)	• Earth, Moon & Sun - Phases of the Moon • Lunar and Solar Eclipses • Observing the Planets	• Lunar Maria • Diameter of Craters	• Observing Features Along the Lunar Terminator • Observing Jupiter • Positions of the Galilean Moons
7 (Feb 24)	• Nebula, Galaxies, Star Clusters	• Setting Up Stellarium On Your Computer • Using Stellarium to Find Information for Celestial Objects	• Observing Globular Clusters & Nebulae

Week	Discussion	Indoor lab	Observing lab
8 (Mar 03)	• Formation of the Moon	• Measuring the Height of Lunar Features	• Measuring the Angular Separation Between Stars
9 (Mar 10)	• Spring Break	• Spring Break	• Spring Break
10 (Mar 17)	• Variable Stars (Cepheids and RR Lyrae)	• Cepheid Variables and Extragalactic Distance	• Measuring the Brightness of a Star with the Unaided Eye
11 (Mar 24)	• Stars & Binary Systems • Hertzprung-Russell Diagram	• Spectroscopy of Vega and Beta Lyra with SAOImage DS9	• Messier Objects - Observing Binary Stars
12 (Mar 31)	• Unusual Stars & Quasars	• Flare Stars	• Messier Objects - Open Clusters
13 (Apr 07)	• The Asteroid Belt & Minor Bodies	• Kepler's Laws • Determining the Positions of the Planets	• Messier Objects - Instructor's Choice
14 (Apr 14)	• Practical Preparation		• Constellation Practical
15 (Apr 21)	• Practical Preparation		• Telescope Practical

Important additional information

Communications

Throughout the course, any additional information regarding the class will be sent via email to your TAMU email account. It is your responsibility to check your email before coming to class each class night. Typically, emails will not be sent after 5:00 PM. if possible. If you need assistance with your TAMU email, visit a Student Computing Center on campus.

Arriving at the Observatory

Students are responsible for their own transportation to and from the Observatory. While on the property, drive slowly and be cautious of wildlife as this is also a preservation area. The maximum speed limit is **15 mph** on the unpaved road leading to the Observatory. Speed is restricted to **10 mph** in the parking area. You can be removed from the course for not obeying the speed restrictions.

The main "white" gate noted on the map may be closed when you arrive for your first class at the Observatory. If so, wait patiently in your vehicle and your instructor will meet you at the gate and lead everyone to the Observatory. Please do not block the main gate. If the gate is open when you arrive, carefully follow the map and drive directly to the Observatory parking area. Parking at the Observatory does not require a permit.

After your first class night, the main gate will be opened no earlier than 30 minutes prior to the start of your class. You are to drive directly to the Observatory parking area after you pass the main gate.

Additional course needs

- You will need a red filtered flashlight for the course, to be discussed during the first class.
- Download, print and bring the Week 2 materials with you to your first class.

No food or drinks at the Observatory

Do not bring food or drinks to the Observatory! Eat dinner or a snack before coming to class. Water fountains are located inside the main building next to the restrooms and classroom. If you arrive with a drink, leave it in your vehicle.

No smoking/vaping at Observatory

There is no smoking/vaping anywhere on the property. Students violating this rule will be asked to leave immediately and will not receive credit for any lab work performed on that night.

Cold weather statement

During the cooler fall months through early spring, nighttime temperatures at the Observatory can be 5-10 degrees lower than on main campus. Pay attention to the temperature forecasts for

your class night and dress appropriately (long pants, coat, hat, gloves, etc.). If the skies are clear enough for observing, you will be outside.

Observatory safety rules

The following is a list of safety and related rules that must be followed by all who visit or attend classes at the Observatory. The rules are separated into three main categories: Fire and Emergency; Telescope Safety; and General Safety. A list of emergency telephone numbers can also be found below for reference.

Students are required to sign an Observatory Safety Rules Agreement online through Howdy prior to registering for a class at the Observatory. If it was not available through Howdy when you registered, please let your instructor know during your first class.

Emergency Telephone Numbers

Emergency Operator (All life-threatening Emergencies)	9-911
Area Maintenance V (Building Problems and Repair)	5-5542
24 hr Radio Room (Elevator & Pest problems, After-hours Maintenance)	5-4311
Environmental Health & Safety Dept. (Chemical spills/problems)	5-2132
After normal work hours call the Radio Room at	5-4311
Evacuation Coordinator	5-0536
University Police	5-2345
University Hospital	5-1511
College Station Fire Department (Non-Emergency)	764-3700
College Station Police Department (Non-Emergency)	764-3600
Bryan Police Department (Non-Emergency)	361-3680
Bryan Fire Department (Non-Emergency)	361-3888

Fire and Emergency Safety

The "grassy area" mentioned below refers to intersection of the parking area and eastern fence line. Your instructor will familiarize you with this area. It is important to be familiar with the location of this area as it is the meeting place for all persons during any emergency that requires you to exit the buildings. Do not drive away in your vehicle! Remain in the grassy area until you are dismissed by your instructor or emergency personnel.
There are two numbered buildings at the Observatory:

1. **Building #1238 (0.5 Meter Observatory): The small, double room observatory near the east fence line.**

2. **Building #1239 (Student Observatory / Classroom): The large building containing the classroom, restrooms and water fountains. The restrooms and water fountains are located in Rm 109.**

Three fire extinguishers are located inside the Observatory that are accessible to all persons:

1. **Inside the classroom against the west wall near the exit door.**

2. **Inside the main entrance door to the student observatory (big building), against the east wall.**

3. **Second floor of the student observatory between the elevator and stairwell exit.**

There are Fire Alarm Pull Stations located next to each exit door in both buildings and on the second floor inside the stairwell of the student observatory.

If you are in Building #1238 (0.5 Meter Observatory): All occupants are to proceed through the only marked exit door to the grassy area.

If you are in Building #1239 (Student Observatory / Classroom) First Floor: If in the classroom (Rm 106), exit through either of the marked exit doors and proceed to the grassy area. If in any area other than the classroom and if possible, proceed through the marked exit door in Rm 109. Proceed to the grassy area.

If you are in Building #1239 (Student Observatory / Classroom) Second Floor: All occupants are to proceed down the stairs and exit through the marked exit door in Rm 109 (first floor where the restrooms and water fountains are located). Proceed to the grassy area.

The Observatory is at the top of a hill near the Easterwood Airport and is exposed to all weather conditions. Severe weather can develop suddenly, especially during the summer months when prevailing winds are from the south. Straight Line Winds exceeding 80 mph have been recorded during summer thunderstorms and are dangerous conditions. As a result, your instructor may not allow you to leave until the threat has passed and even if class has officially ended! You are required to remain at the Observatory until you are dismissed by your instructor.

In the event of an emergency, follow the instructions given to you by your instructor. Above all, remain calm and quiet so that instructions can be heard by all. If you are asked to perform a duty by your instructor, follow their instructions.

Telescope Safety

When picking the telescope up from ground level, be certain to lift with your legs and not your back. Although the 8" telescopes weigh less than 30 pounds, serious back injury can occur from improper lifting.

Before moving the telescope to an object in the night sky, be certain that all persons are clear of the telescope to prevent getting hit.

Warning! Never look directly at the Sun with the naked eye or with a telescope. Permanent and irreversible eye damage may result. Never use a telescope to project an image of the Sun onto

any surface. Internal heat build-up can create a fire causing personal injury. Damage to the telescope and/or any accessories attached to it can also occur.

Never use an eyepiece solar filter or a Herschel wedge. Internal heat build-up inside the telescope can cause these devices to crack or break, allowing unfiltered sunlight to pass through to the eye.

Never leave the telescope unsupervised, either when children are present or with adults who may not be familiar with the correct operating procedures of the telescope.

Never point the telescope at the Sun unless you have the proper solar filter. When using the telescope with the correct solar filter, always cover the finder scope. Although small in aperture, finder scopes have enough light gathering power to cause permanent and irreversible eye damage. In addition, the image projected by the finder is hot enough to burn skin or clothing.

The 12' safety ladders in the domed observatories must be set so they cannot roll when a person is climbing. The first step of the ladder releases the wheels to prevent rolling. Hold the ladder up by the hand rails and press down on the first step with your foot and gently lower the ladder to the ground. Hold the hand rails at all times when climbing or standing on the ladders.

General Safety

All persons must wear shoes that completely cover the feet, such as tennis shoes or boots. Sandals or open toe shoes or open heel shoes are prohibited.

The student observing deck is where you will setup a telescope to complete your observational laboratory assignment. The deck is made of wood planks that can become detached and pose a tripping hazard. Likewise, notebooks and other necessary items can be laying on the deck while you are working and can pose a tripping hazard. You are required to have a red filtered flashlight at all times when outdoors at the Observatory. Red light allows you to maintain your night vision while working in the dark. Use your light when walking on the deck or between the deck and the classroom building to avoid tripping.

The maximum speed limit on the unpaved section of road leading to the Observatory is 25 mph. Speed is restricted to 10 mph in the parking area next to the Observatory. Be cautious of vehicles, tractors and utility vehicles that may be moving without headlights. Be cautious of pedestrian traffic, especially near the Observatory. Pedestrians can be very difficult to see since the road is narrow and there are trees and tall grass along the road's edge.

All persons should be aware that the property surrounding the Physics Teaching Observatory is open rangeland and prone to poachers (a person who hunts illegally), especially during the fall and winter months. If you witness any person(s) with a rifle or any firearm within the property, contact University Police immediately! If you are at the Observatory, let the instructor or person in charge know and they will be responsible for contacting law enforcement.

During the spring and summer months when mosquitoes are most active, all persons visiting or taking classes at the Observatory must wear insect repellent for protection against viruses that can be transmitted by mosquitoes and other biting insects. Spray repellents must be applied outside the fenced perimeter of the Observatory grounds to protect the sensitive optics in the telescopes.

Bats are indigenous flying mammals to our region. The bats living near the Observatory have been known to carry rabies. If you find a bat on the ground whether dead or alive, do not touch or come in contact with the animal in any way! Alert the instructor for your course or the person in charge. Environmental Health and Safety will be alerted and will be responsible for the proper handling of the animal. If a bat flies inside any building, leave the building; prop open an outside door; and stand clear of the door. Bats will typically fly out on their own within 10 or 15 minutes. If the bat cannot get out, contact University Pest Control to remove the animal. Do not attempt to catch or handle the bat! If you do come in contact with a bat, let your instructor know immediately so the animal can be quarantined if possible and tested properly. Wash the area of contact vigorously with soap and water and see your health professional as soon as possible for guidance.

University Policies

Attendance Policy

- The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.
- Please refer to Student Rule 7 in its entirety for information about excused absences, including definitions, and related documentation and timelines.

Makeup Work Policy

- Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor.
- Please refer to Student Rule 7 in its entirety for information about makeup work, including definitions, and related documentation and timelines.
- Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" (Student Rule 7, Section 7.4.1).
- "The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" (Student Rule 7, Section 7.4.2).
- Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See Student Rule 24.)

Academic Integrity Statement and Policy

"An Aggie does not lie, cheat or steal, or tolerate those who do."

"Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one's work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case" (Section 20.1.2.3, Student Rule 20).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at aggiehonor.tamu.edu.

Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit disability.tamu.edu. Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see University Rule 08.01.01.M1):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, you will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with Counseling and Psychological Services (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's Title IX webpage.

Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall wellbeing. Students are encouraged to engage in proper self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at suicidepreventionlifeline.org.