ASTRONOMY 14
COURSE SYLLABUS
(Read Carefully)

Course Description: Astrophotography and Imaging (1 unit)
This course will satisfy the Sierra College lab science requirement.

Pre or co-requisites: Astronomy 2, 5, 10 or the equivalent.

Instructor: David Dunn

Office: Office S-201 in Sewell Hall, next to the Planetarium.

Office Hours: To be announced on first day of class

Email: ddunn@sierracollege.edu

Campus Extensions: Dunn (ex. 7912; 916-660-7912)

Laboratory Codes, Times, and Instructors

40315	Tues, Thurs	12:30-1:50 PM	Dunn

Meeting Place: Always meet in Room ST-2 at **12:30 P.M**. **SHARP** on class days for lab activities. It is important to show up on time to receive handouts and hear important announcements.

Photo/imaging Sessions: Only students in Astronomy 14 may attend the sessions. Always dress warmly for outdoor activities and if possible bring a red flashlight. Check with your instructor for the status of scheduled sessions. *We will meet on selected THURSDAY nights.*

Break Period: There is no formal break period during class. When taking a break from class activities, students are expected to use common sense on when to take a break and to inform their team members when doing so.

Textbook and Materials:

Text: *Astrophotography (Legault)* and A-14 *Lab package* (In Bookstore/Handouts in class)
Maps: Star/Constellation Maps SC-001 and SC-002 (Buy now at Campus Store)
Green Book packet: material used in the in our log book (aka Green Book, available at Campus store)
A camera (digital SLR) if you have one – though we'll be using the Nikon D3100.
We'll supply 3 red flashlights per group.
Notebook and pencils
Warm clothes for observing sessions
Other materials made available in class during the semester

VERY IMPORTANT

If you decide to drop the class, please drop before the deadlines. Instructors may drop a student for excessive absences and, then again, they might not.

CHECK YOUR SCHEDULE OF CLASSES FOR THE DEADLINE DROP DATE ....

…. Hopefully, you WON'T drop the class ...

Grading and Attendance

1. The final grade in this class is based on total "assigned" points (roughly 320 points):
   A = 90% or more of total points assigned
   B = 80% or more, but less than 90%, of total points assigned
   C = 70% or more, but less than 80%, of total points assigned
   D = 60% or more, but less than 70%, of total points assigned

2. At least one 20-point quiz and a 25-point Midterm Exam will be given; your instructor will announce the times. A 50-point portfolio of photos and images obtained during the sessions is due on the day of the Final Exam. A 50-point Final Exam will be given on the last day of class. Any exceptions to the exam schedules will be noted in class. All exams are partially solo and partially open book and open notes. Any quizzes are individual, not team efforts.

3. The *Astrophotography Log* (the Green Book) is to be maintained throughout the session. The log will be checked (for organization and content) during the Midterm Exam and again during the Final Exam. A properly maintained log is worth 20 points accumulated over the semester.

4. On campus Laboratory Exercises are worth 10-15 points each (about eight 2-part or 3-part labs). These 10 points are determined from two activities:

   1) Completing the exercise and the corresponding exercise sheet.

   2) Completing questions and putting them on an "Observer's Summary of Activity" sheet in the *Astrophotography Log*.

5. Photo Session Field Trips are worth 20 points each (about five sessions are expected).

6. Laboratory Exercises and exams cannot be made up. If a problem exists, notify the instructor before the exercise/exam date. One daytime lab class may be missed without penalty. If a Photo Session Field Trip is missed, a score of 10/20 will recorded for the first absence and 0/20 for all future absences.

7. Exercise and Exam scores are periodically posted in the ST-2 room. Please check the results for accuracy. Once you begin taking the Final Exam, previous scores can no longer be contested.

General Instructor Expectations of Students: We expect each student to give his or her best effort in participating in class activities and accomplishing assigned tasks. We expect students to adhere to their behavior responsibilities as detailed in the *Sierra College Student Handbook*. Cheating, plagiarism, or any other forms of dishonesty are considered grounds for an immediate course grade of F and possible dismissal from Sierra College.

Student Expectations of Instructor: You can expect our best effort in teaching the principles of Astronomy. We hope to impart in our students a sense of excitement in observing and studying nature's show in the cosmos. We are very open to suggestions for topics that students wish to discuss or improvements in the course content and/or presentation.

Student Safety: All students should be aware of the proper procedures under emergency conditions in the classroom or building. This awareness includes how and where to meet during an evacuation, and location and use of the building first aid kit, fire extinguishers, and phones.

COMPLETE THE GREY INFORMATION CARD

Give this card to the instructor before leaving class on the first day. The small square in the upper right hand corner of the card is used for your group/telescope letter. Your instructor will assign this letter to you.

Thank you for electing to take Astronomy 14. I hope you will learn much and enjoy the subject as much as I do. David Dunn

Potential **Photo/Imaging Sessions**

Our class will be observing on 5 of these dates. These dates are dependent on weather/sky conditions! Confirmation of going will be in class or on the Astronomy 14 Canvas Website.

Week #2 (February 7)
Week #3 (February 14)
Week #4 (February 21)
Week #5 (February 28)
Week #6 (March 7)
Week #7 (March 14)
Week #8 (March 21)
Week #9 (March 28)
Week #10 (April 4)
Week #11 (April 11)
(Spring Break)
Week #12 (April 25)

Be in front of ST-2 at 7:00 PM SHARP!! Departure is at 7:10 PM.

Note: These times are for ALL Thursday night sessions!

Course Content Outline:

- Measuring Devices, Significant Figures, Error, and Scientific Notation
- Small Telescopes and Binoculars
- Optical Bench and Optical Parameters
- Photography and Star Trails
- Computers, Star Maps, and Data Collection
- 35mm Cameras and Photographic Film Processing
- CCD Cameras
- Image Processing Software
- Piggyback and Prime Focus Astrophotography
- CCD Imaging
- Photometers and Light Curves
- Spectrometers and Stellar Chemistry
- Computer Links with Remotely Operated Telescopes
- Telescopes and Digital Coordinate Systems
- Planning an Imaging Session
- Observatory Methods and Practices

Student Performance Outcomes:

Through assigned tasks, peer-lead hands-on activities, computer simulated exercises, classroom discussions, and quizzes/exams, students will:

- Perform computations making proper use of significant figures, scientific notation, calculators, and digital computers;
- Maintain a log of all laboratory and field activities;
- Understand the celestial and horizon coordinate systems;
- Understand celestial motions and they effect the choices of astronomical photography;
- Know several stars and constellations and general sky orientation;
- Describe the general optical construction of reflector and refractor telescopes along with their inherent advantages and disadvantages;
- Compute the following optical characteristics of a telescope: magnification power (M), practical magnification (PM), light gathering power (LGP), resolving power (RP), field-of-view (FOV), and f-ratio (FR);
- Compare and contrast the computed optical characteristics M, LGP, FOV, and FR of a simple telescope with those measured in the lab through the use of an optical bench;
- Determine the optimal telescope to use for a given observational arrangement based on purpose, cost, and portability;
- Describe the observational techniques of astrometry, photometry, and spectroscopy;
  State the functions and processes of an astronomical observatory;
- Explain how to use a computer to link to remote telescopes to collect astronomical data;
- Use image processing software;
- Use rulers, protractors, reticule magnifiers, and similar devices to measure features on astronomical photographs;
- *Create a digital image using a CCD camera;*
- Create a light-curve using a CCD camera and variable light source in the lab;
- Use a spectrometer to measure and interpret emission lines from fluorescing gas tubes;
- Plan an observing session through the use of constellation charts, celestial almanacs, and astronomical computer software;
- Properly set up a small computerized telescope to visually observe a celestial object during day or evening hours;
- Properly set up a small computerized telescope for the purpose of observing a celestial object with either a camera (film or CCD) or spectrometer;
- Describe, locate, and image the Moon (or Sun), a planet, a multiple star system, a star cluster, a nebula, and a galaxy;
- Complete a semester project in astrometry, photometry, or spectroscopy which includes a series of images generated using either a 35 mm or a CCD digital camera and corresponding image and data analysis.

Course Student Learning Outcomes

1. Students will explain their knowledge and skill in Celestial Navigation, evaluating the significance of important astronomical phenomena.
2. Students will operate a variety of Optical Systems, demonstrating proficiency in their use.
3. Students will use various Imaging Systems to produce high quality image data products, demonstrating overall mastery of image reduction skills.