

# Fullerton College

## ESC 116 LF Astronomy Laboratory

### Spring 2017

**CRN: 20801 Monday 1:00-5:00 PM Room 417**

**Instructor:** Liliana Barabas

**Phone:** (714) 992-7455      **Office:** 411-14      **Website:** <http://staffwww.fullcoll.edu/lbarabas>

**Email:** [lbarabas@fullcoll.edu](mailto:lbarabas@fullcoll.edu) Please mention the class meeting day (Monday 1 PM lab) in your email.

**Office hours:** Mon/Wed 10:30-11:00 AM, Tue/Thu 9-10 AM and 1:30-2 PM and Wed 12:30-2 PM.

**Advisory:** MATH 20 and ESC 116 Astronomy lecture. Note that the lab is not required for lecture and you will have separate grades for the two classes.

**Objective:** The objective of this laboratory is to illustrate how astronomers work, what types of data they measure and how this data is used to understand the universe. You will perform hands-on and computer based exercises on the following topics: starcharts, motion of the sky, celestial coordinates, telescopes, phases of the Moon, motion of planets, distance to a star cluster, expansion of the universe etc.

**Textbook:** Astronomy lab packet available in the bookstore. Additional handouts will be provided in class.

**Supplies:** Notebook, pen, pencil, ruler, eraser, two Scantron Forms No 882 E (100 questions in green) and scientific calculator (bring it to every class). Using your phone for calculations during lab is not encouraged.

**Attendance:** You are expected attend each one of the laboratories throughout the semester and be on time. If you arrive late, you may not be allowed to do the lab. If you have a strong reason for an absence, please discuss it with me and accommodations will be arranged if possible. If you have more than 2 unexcused absences you may be dropped, or, if the drop date has passed, you will receive an F grade. Note that it is your responsibility to officially drop the course if you want to withdraw.

*Deadline to add is February 12; deadline to withdraw with a W is Sunday, April 30, 2017.*

**This course includes a required field trip** to Griffith Observatory on Friday, March 10, 2017, 4 - 8 PM. Transportation may be available.

Grading	Weight	Grading scale
Lab reports	12 x 10 points each = 120 points	A = 180 points or more (90% or above)
Field trip	10 points	B = 160 – 179 points (80 – 89%)
Midterm	35 points	C = 140 – 159 points (70 – 79%)
Final exam	35 points	D = 120 – 139 points (60 – 69%)
<b>Total</b>	<b>200 points</b>	F = below 120 points (59 % or below)
Extra credit	20 points	

**Homework:** You are required to read the entire assigned exercise prior to coming to class. It will help your understanding of the material if you take notes while you read and during lab lectures.

**Laboratory Experiments:** In order to obtain credit for an exercise you have to be present in class or do a makeup - you cannot copy the results from a classmate for credit. As proof of attendance you need to obtain instructor's signature on the first page of your report the day you performed the experiment. You will work in groups of up to three, but each person must submit a separate, original lab report. Do not copy from your lab partners and do not allow your lab partners to copy from you. The lab report will consist of the lab report forms in the packet and charts or graphs where applicable. Put pages in order and use pencil for recording and plotting data. Neatness and spelling count. Lab reports are due at the beginning of the next scheduled lab period. There is a 10% penalty for lab reports turned in one week late. Tardier lab reports will not be accepted.

**Midterm and final:** are each a one hour exam and consist of multiple-choice and short answer or essay questions. You will need Scantron Form No. 882 E (100 question in green) and calculator. The exams are closed book, but you are allowed to bring a single, double sided 3x5 card. No make-ups are given except in cases of documented emergencies.

**Field trip to the Griffith Observatory: Friday, March 10, 2017, 4 - 8 PM.** Transportation may be available – see me to sign up for a ride in the school van. Turn in a typed, one page report, single spaced, size 12 and attach the ticket from the planetarium show as proof of attendance. Due date: April 24, 2017.

**Meeting time and place:**

- If you are driving there, we meet around 4 PM at the Observatory. Griffith Observatory is located at 2800 East Observatory Avenue, Los Angeles, CA 90027.
- School van passengers meet at 2:45 PM and depart at 3:00 PM in the Parking lot C East, located east of the Lemon St parking structure, next to the 700 Technology and Engineering building. You can leave your car on the first level of the parking structure if you have a campus parking permit.

**What to bring:** notebook, pen, student ID and money for the planetarium show (\$5 with student ID, \$7 otherwise), jacket or sweater – it gets cold in the evening, water, snacks.

The purposes of the field trip are: 1. to **visit the exhibits** in the Observatory, 2. **watch a planetarium show** and 3. **observe through the telescopes** (on the roof of the Observatory or on the front lawn if they are available and if the time permits). When you arrive at the Observatory purchase your ticket for the 4:15 or 5:15 PM show. The Friday show times are: 5:15 6:15, 7:45, 8:45 PM. Show tickets may be purchased only at the Observatory, only for that day's shows and are available at the main ticket counter inside or at automated ticket machines around the building. Tickets may be purchased with either cash or credit card. Tickets for each show are sold until 10 minutes before the listed start time of that show, unless tickets have been sold out prior to that time.

Once you purchased a show ticket, you can visit the observatory exhibits at your own pace. Take notes while visiting because you are expected to write a report in order to obtain credit for the field trip.

In order to see the planetarium show, you must be in line for your show at least 10 minutes before the show time printed on the ticket. There will be building announcements as a reminder, but you are ultimately responsible for being on time. There is no late admission to the theater.

After the show you can continue to visit the exhibits or view through the telescopes if they are available. School van passengers meet at 7:00 in front of the Observatory and we expect to be back on campus around 8 PM. Students who drove there don't need to check out with me at the end of the visit.

All students attending this event are expected to conduct themselves according to the Fullerton College Standards of Student Conduct and Discipline Policy. No alcoholic beverages.

**Extra credit:** You can earn a maximum of 20 extra credit points by completing some of the activities listed below. You will not receive credit for more than 20 extra credit points.

No	Title	Points	Due date
1	Star gazing field trip on a Saturday evening at Devil's Punchbowl in Pearblossom, CA, a two hour drive from Fullerton. Date TBA. Turn in a 1-2 page single spaced paper describing what you have learned.	15	Last day of class
2	Attend a Natural Science Division seminar (schedule to be announced in class and on MyGateway). Turn in a 1-2 page report.	5	Within two weeks of each seminar
3	Attend an Orange County Astronomers meeting, held every second Friday of the month, and turn in a 1-2 page summary, single spaced. Go to <a href="http://ocastronomers.org/">ocastronomers.org/</a> for more information.	10 each	Last day of class
4	Go to a different planetarium show than the one required for class and turn in a 1-2 page single spaced paper describing what you have learned and attach your planetarium show ticket as proof of participation. Nearby planetariums include Tessmann Planetarium at Santa Ana College and Mt. San Antonio College Planetarium.	10	Last day of class

## Schedule

Week	Date	Experiment	
1	Jan 30	Orientation	
2	Feb 6	1. Planisphere	
3	13	2. Celestial Coordinates	
4	20	<i>Presidents' Day Holiday</i>	
5	27	3. The motion and phases of the Moon	
6	Mar 6	4. Motion of the planets	
7	13	5. Kepler's laws	<i>Bring scientific calculator</i>
8	20	6. Spectroscopy	<i>Bring scientific calculator</i>
9	27	<b>Midterm</b> ( <i>bring Scantron Form 882E, calculator and 3x5 note card</i> )	<i>Bring Scantron Form 882E, calculator and 3x5 note card</i>
10	Apr 3	7. Telescope optics	<i>Bring scientific calculator</i>
11	10	<i>Spring break April 10-16, 2017</i>	
12	17	8. The revolution of the Moons of Jupiter	<i>Bring scientific calculator</i>
13	24	9. Flow of energy out of the Sun <i>Griffith Observatory field trip report is due</i>	<i>Bring scientific calculator</i>
14	May 1	10. Rotation of the Sun	<i>Bring scientific calculator</i>
15	8	11. Distance to Pleiades	<i>Bring scientific calculator</i>
16	15	12. Hubble's law	<i>Bring scientific calculator</i>
17	22	<b>Final exam</b>	<i>Bring Scantron Form 882E, calculator and 3x5 note card</i>

- The above is my tentative schedule as of the first day of class. I reserve the right to make changes that will be announced in class. Students are responsible for all material presented in class including announcements about changes in course procedures and schedule.
- Eating or drinking are NOT allowed in the classroom.
- Please turn off or silent your cell phone before you enter the classroom.
- Maintain a business-like attitude during the class in the lab, on the field and observation deck. Disruptive behavior will not be tolerated.
- Do not perform any unauthorized experiments. Inform the instructor immediately if any equipment is not functioning properly or in case of emergency or injury.
- Clean up your work area and return equipment to its original location before you leave the lab. Put away the keyboard and mouse in the cabinet.
- Cheating in any form will not be tolerated. If caught, you will receive a zero on that assignment. If you are uncertain of what constitutes academic dishonesty, refer to the Academic Policies section of your Fullerton College Catalog.

**Course objectives:** Upon successful completion of the course the student will be able to:

- Prepare graphs to depict data and calculated quantities.
- Locate an astronomical object on an Equatorial Star Chart, given the Right Ascension and Declination of the object.
- Read Construct, on an optical bench, a simple astronomical telescope using long-focal-length and short-focal-length convergent lenses.
- Calculate the magnification of a telescope for different eyepieces.
- Apply Kepler's 3<sup>rd</sup> law, modified by Newton, to find the mass of the Moon and Jupiter.
- Determine the recessional speed of a galaxy by applying the Doppler equation.
- Estimate the age of the Universe by the use of Hubble's law.
- Describe the function and the structure of refractor and reflector telescopes

**Student learning outcomes:** Upon successful completion of ESC 116L F, the student will be able to

- Apply scientific reasoning to future astronomical discoveries.
- Use the scientific method in collecting data, formulating and testing a hypothesis.
- Read, analyze and interpret data to draw valid scientific conclusions.

**Class conduct:** Students are expected to conduct themselves according to Fullerton College Standards of Student Conduct as specified in the college catalog and schedule.

- Please be considerate of your teacher and classmates by being on time to class, not leaving early and not disrupting class with conversation or noise.
- Please turn off or silent your phone while class is in session.

**Disability accommodations:** Fullerton College is committed to providing reasonable accommodations for students with disabilities upon request of the student and upon verification of disability. The Disability Support Services office is located in room 842 and can be reached at (714) 992-7099. If you have been certified as needing to take an exam at DSS, please contact me at the beginning of the semester and at least a week in advance of the exam date.

**Academic honesty:** Students are expected to abide by ethical standards in preparing and presenting material which demonstrates their level of knowledge and which is used to determine grades. Such standards are founded on basic concepts of integrity and honesty. These include, but are not limited to, the following areas:

1. Students shall not plagiarize, which is defined as
  - a. stealing or passing off as one's own the ideas or words of another, or
  - b. using a creative production without crediting the source.

The following cases constitute plagiarism:

- paraphrasing published material without acknowledging the source,
  - making significant use of an idea or a particular arrangement of ideas, e.g., outlines,
  - writing a paper after consultation with persons who provide suitable ideas and incorporating these ideas into the paper without acknowledgment, or
  - submitting under one's own name term papers or other reports which have been prepared by others.
2. Students shall not cheat, which is defined as
    - a. using notes, aids, or the help of other students on tests or exams in ways other than those expressly permitted by the instructor, or
    - b. misreporting or altering the data in laboratory or research projects involving the collection of data.
  3. Students shall not furnish materials or information in order to enable another student to plagiarize or cheat.

Instructors may deal with academic dishonesty in one or more of the following ways:

1. Assign an appropriate academic penalty such as an oral reprimand or point reduction.
2. Assign an "F" on all or part of a particular paper, project, or exam.
3. Report to the appropriate administrators, with notification of same to the student(s), for disciplinary action by the College. Such a report will be accompanied by supporting evidence and documentation.