



SUFFOLK UNIVERSITY

MADRID CAMPUS

SCI L112 M1 – STRUCTURE OF THE UNIVERSE LABORATORY

Instructor Information:

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Course Information:

Meetings: Teide Observatory, Tenerife, Canary Islands, Spain.

Catalog Description: The laboratory provides a hands-on approach to learning scientific methodology and critical thinking in the context of astronomy and physics. The lab activities are somewhat different from traditional labs in several ways: (a) Labs sessions held at Mons Observatory on Tenerife (Canary Islands). (b) This course is mainly concerned with practical aspects of the telescopic observations in Astronomy. (c) Labs are a mix of working with real equipment and simulations (virtual experiments). (d) The lab activities are arranged in a way that encourages students to make the connection between the objective, the methodology, and the analysis and interpretation of the experiment. (e) Several leading questions are mingled with the lab instructions to insure that students do not merely follow instructions but understand them. (f) Although students have to express their results mathematically, the main focus lies in conceptually understanding the underlying science and discovering fundamental laws. The overall aim is to provide students with some tools of how to do science, and excite them in making discoveries of their own.

Prerequisites: Be enrolled in SCI 112.

Credit Hours: 1

This course follows the US Federal Government's Credit Hour definition: "An amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutional established equivalence that reasonably approximates no less than:

- (1) One hour of classroom or direct faculty instruction and a minimum of two hours of out of class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or ten to twelve weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or
- (2) At least an equivalent amount of work as required in paragraph (1) of this definition for other academic activities as established by the institution including laboratory work, internships, practice, studio work, and other academic work leading to the award of credit hours."

For full up-to-date statement:

https://cihe.neasc.org/sites/cihe.neasc.org/files/downloads/POLICIES/Pp111_Policy_On_Credits-And-Degrees.pdf

To complete this course, students will need to dedicate, at a minimum, the following amount of time to the listed activities:

Assignments/Activities	Engagement Estimate	Engagement Hours
Course Readings	~100 pages x 8 minutes	13
Homework	5 hours	5
Research Project	2 hours preparation	2
Poster preparation	2 hours preparation	2
Final Exam Preparation	2 hours preparation	2
Class Attendance	6 hours x 4 nights	24
TOTAL		50 HOURS

Textbook/Course Materials:

E. Chaisson & S. McMillan, Astronomy, a beginner's guide to the Universe, 8th ed., Pearson, 2016.

Software Stellarium. Virtual Observatory practices

(www.as.oats.inaf.it/aidawp5/eng_download.html?fsiz=medium)

Course Goals & Learning Objectives:

GOALS	OBJECTIVES	ASSESSMENTS
Upon successful completion of this course, students will know/understand:	Upon successful completion of this course, students will be able to:	How the student will be assessed on these learning outcomes
<ul style="list-style-type: none"> Understand the process of science 	<ul style="list-style-type: none"> Observe natural phenomena Interpret observations Draw conclusions observations. 	<ul style="list-style-type: none"> Working as a team of 3-4 participants, the student will setup and run different real and virtual observations, under the instructor's supervision, evaluation, and help.
<ul style="list-style-type: none"> Get hands-on experience in using equipment in the field of astronomy studied in the class, and in using computer software for prepare the observations. 	<ul style="list-style-type: none"> Setup the equipment for making various observations and collecting data in the field of astronomy. 	<ul style="list-style-type: none"> Working as a team of 3-4 participants, the student will setup and run different real and virtual observations, under the instructor's supervision, evaluation, and help.
<ul style="list-style-type: none"> Learn the procedures of collecting and processing the experimental data, and calculating the parameters of interest from the data. 	<ul style="list-style-type: none"> Collect and process the experimental data using the laptop, and determine the parameters of interest in each particular experiment, together with the error analysis of the results. Use astronomical software and online astronomical databases. 	<ul style="list-style-type: none"> The students will submit the exercises sheets containing the collected and processed data.
<ul style="list-style-type: none"> Know how to present the results of their observations in a form of a poster which contains the images taken during the lab sessions. 	<ul style="list-style-type: none"> Present scientific results as formal poster using the Microsoft Power Point. 	<ul style="list-style-type: none"> Each team of students will write and submit a poster dedicated to a particular type of astronomical object.
<ul style="list-style-type: none"> Get familiar with the sky and the motion of the celestial objects in the sky. 	<ul style="list-style-type: none"> Identify constellations and celestial objects in the night sky. Operate a reflector telescope and a DSLR camera. 	<ul style="list-style-type: none"> The last night of observations students will take a practical exam about the operation of the telescope.

Assignments/Exams/Papers/Projects:

A practical exam will be taken during the last night at the Observatory. During the trip to the Teide Observatory, each observing team will collect digital images. This material will be used to prepare a poster paper for public display with the observational material collected. This will focus on a particular kind of object.

Grading/Evaluation:

- a. 60% of the lab grade is based on attendance, the interest shown on the practices, the work done during the observations, and the data collection and processing.
- b. 20% of the lab grade is based on the practical exam.
- c. 20% of the lab grade is based on poster paper. The grade for the poster submitted late is decreased by 10% for each day.
- d. The laboratory grade will affect the course grade and will count towards 10% of the grade in the lecture part course.
- e. The lab Manuals are shown in the Course Content section on BlackBoard. The use of Stellarium in the student laptop is required. **It is the student responsibility to install JAVA and Stellarium in his/her laptop before the first lab session.**
- f. There are no make-up labs.

There will be curve, and grades will be assigned as follows:

- 100% > A > 93%.
- 93% > A- > 89%.
- 89% > B+ > 86%.
- 86% > B > 82%.
- 82% > B- > 79%.
- 79% > C+ > 76%.
- 76% > C > 72%.
- 72% > C- > 69%.
- 69% > D+ > 65%.
- 65% > D > 60% .
- 60% > F > 0% .

Course and Classroom Policies:

This lab has place at the Teide Observatory. Lab sessions take place during the night. The Teide Observatory is a professional working place. Student must have the maximum respect to the rest of workers, scientific equipment, and any facility of the observatory.

Each student need to use his/her laptops during the lab sessions.

In this course, the university e-mail is a mayor way of communication. Student is responsible for reading it. Assignments will be accepted by e-mail.

Participation/Attendance Policy:

The SUMC Student Handbook states the following:

Once a student is registered for a course, attendance at every meeting of every class is expected, including those held in the first week of the semester. A maximum of two unjustified absences is permitted. Each additional absence will cause the final course grade to be lowered by one-third of a letter grade, i.e., from A to A-; A- to B+; B+ to B, etc.

Excessive absences in a course will have a negative effect on the final grade. When a student is absent, the quality of his or her work in a course will deteriorate since material missed in class sessions can rarely be made up satisfactorily, even though the student remains responsible for that work.

Please note that even when a student has a justified reason for missing class, such as illness, the negative academic impact on learning will be the same as if the absence were for spurious reasons.

In this course, any absence due to illness should be justified by a note from the student's physician or other health professional confirming the day(s) on which the student was unable to attend class. A written excuse from a student's host parent or residence supervisor is also acceptable.

Attendance to all lab sessions is mandatory. 20% of the final grade will be lost every time the student fails to attend an observation, except for illness.

The student is expected to fully engage in the lab work. Full engagement requires:

- Active participation in the **team's work** on the experiment setup and the data collection, in order to get hands-on experience;
- Active participation in the team's work on the preliminary data processing and analysis during the lab session;
- **Individual work** out of the lab on the final data analysis, to ensure that any mistakes made in the preliminary data analysis are determined and fixed. In such a case, the corrected exercise sheet should be emailed to the instructor (any questions or requests for help are very welcome);
- **Individual work** on virtual experiments;
- Active participation in the **Team's work** on writing and submitting a poster.

Disability Statement:

If you anticipate issues related to the format or requirements of this course, please meet with me. I would like us to discuss ways to ensure your full participation in my classroom.

If formal, disability-related accommodations are necessary, it is very important that you be registered with the Office of Disability Services (ODS) at the main Campus in Boston so that I am notified of your eligibility for reasonable accommodations. We can then plan how best to coordinate your accommodations. Check the ODS web site at www.suffolk.edu/disability for information on accommodations.

Student Resources:

SUMC provides a range of student services, both academic and personal. To learn more about course-related tutorials and academic workshops, refer to the SUMC Student Handbook, Section 2 "Academic Policies and Services". Section 5, "Living in Madrid", contains information on the medical and mental health resources, including an English-speaking therapist, available to you.

Midterm Review:

Due to the specific format of the Lab course, there will be no midterm exam for this course. If I observe any poor time-management or study skills, lack of effort, difficulty with the course material or with writing or language skills, etc., the Academic Standing Committee or I may contact you to suggest strategies for addressing these difficulties. I strongly encourage you to visit me and to talk to me at any time during the Lab course so we may discuss how you can be successful in this class.

Academic Misconduct:

www.suffolk.edu/about/mission-history/policies-procedures/academic-misconduct-policy

Suffolk University expects all students to be responsible individuals with high standards of conduct. Students are expected to practice ethical behavior in all learning environments and scenarios, including classrooms and laboratories, internships and practice, and study groups and academic teams. Cheating, plagiarism, unauthorized collaboration, use of unauthorized electronic devices, self-plagiarism, fabrication or falsification of data, and other types of academic misconduct are treated as serious offenses that initiate a formal process of inquiry, one that may lead to disciplinary sanctions.

Student work will be thoroughly examined for academic integrity and may be scanned using plagiarism detection software. A faculty member suspecting academic misconduct will contact the student using the Suffolk email address to schedule a meeting and will make all effort to do so within five business days of detecting the incident. During the meeting, the faculty member will present the documentation that led to suspected academic misconduct. Resolution of the incident will be according to the procedures outlined in the SUMC Student Handbook.

Academic Grievances Policy:

www.suffolk.edu/student-life/student-services/student-handbook/university-policies-for-student-cas-sbs/grievances-academics

Course Schedule:

The schedule, policies, procedures, and assignments in this course are subject to change in the event of extenuating circumstances, by mutual agreement, and/or to ensure better student learning.

Dates	General topic of lesson	Readings or other assignments due
Day 1	Fly to Tenerife Introduction to the sky and to the astronomical equipment	Mons Telescope manual
Day 2	Observational work in small groups	Stellarium on student laptop
Day 3	Observational work in small groups	Stellarium on student laptop
Day 4	Observational work in small groups	Practical exam
Day 5	Fly back to Madrid	