Saint Louis University – Madrid Campus
Division of Sciences and Engineering

Laboratory of Introduction to Astronomy (PHYS-1130-M36)
Fall 2016

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Credit Hours: 1
Meeting: PAH 25, 4:00-6:00 pm W
Prerequisites: MATH-1200 or higher.
Co-requisites: Enrolled in PHYS-1130-M01 (*Introduction to Astronomy)*

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.

Course description

This lab complements course PHYS-1130-M01, which is a **basic introduction to Astronomy**, appropriate for students who have taken no previous college science courses and who will likely not major in science. The lab provides a hands-on approach to the scientific methodology and to the concepts discussed in the classroom. It includes a field trip to Teide Observatory on Tenerife (Canary Islands, Spain), where we will carry out night observations with a 50cm optical telescope. We will also perform a remote radio observation from campus using a 34m radio antenna from NASA's Madrid Deep Space Communications Complex.

Course objectives

My main goals in this lab are to make you try real ways to do science, and to excite you to make discoveries of your own. More specifically, this course will

I. demonstrate some of the **basic concepts about Astronomy and Astrophysics** discussed in PHYS-1130-M01.
II. Let you practice the **scientific method**.
III. help you develop **critical thinking and reasoning** skills, make connections between concepts and be active in your learning.
IV. help you develop **effective communication** skills.
V. help you learn to **work effectively** alone and as part of a team.

To achieve the course goals listed above, a number of learning outcomes are expected from you, given below. These are the concepts and skills I expect you to acquire during the lab sessions, and that I will evaluate to give you a grade.

Student Learning Outcomes

After successful completion of this course, you will be able to:

1. localize objects in the sky.
2. use an optical telescope.
3. use astronomical software to prepare observations.
4. carry out simple astronomical observations.
5. use astronomical software to analyze astronomical data.
6. perform simple astronomical calculations.
7. extract information from an astronomical image.
8. produce and interpret a scientific plot or diagram.
9. relate concepts and fit facts into a bigger picture.
10. communicate your work and your results in an effective manner.
11. work effectively alone and as part of a team.

Material you need for this course:

The course will make extensive use of the learning platform (Blackboard Learn). All the relevant information about the course, including this syllabus, the assessment rubrics, pre-lab background reading and the lab manuals, will be posted there.

You will need a laptop for the field trip in order to work on the VO labs on the observatory (at least one every two people).You will need to install some free software tools for this lab work; instructions are given on Blackboard.

A pocket calculator may be useful for some of the local lab sessions.

Course Outline (tentative)

A tentative outline for the lab is given in Table 1, together with the related course parts from PHYS-1130-M01. Important dates are summarized in Table 2.

Table 1: Course outline (tentative)

Lab Session	Related PHYS-1130-M01 course parts*	Location	Date(s)
L1. The sky. Location of celestial objects.	Part I: Classical Astronomy	Madrid	September 7th
L2. Planetary motion	Part I: Classical Astronomy Part III: The Solar System	Madrid	September 21st
L3. Observing the Sun. Sunspots and rotation.	Part III: The Solar System	Madrid	October 5th
L4. Observation preparation. Software training.	Part I: Classical Astronomy Part II: The tools of Astronomy	Madrid	October 19th
L5-7. Night observations / VO labs	Part II: The tools of Astronomy Part III: The Solar System Part IV: Stars	Tenerife	October 21st-23rd
L8. Remote radio observations	Part II: The tools of Astronomy Part V: Galaxies and Cosmology	Madrid	November 2nd November 16th

L9. Cosmic distance ladder	Part IV: Stars Part V: Galaxies and Cosmology	Madrid	November 30th
L10. Searching for new worlds (optional)	Part IV: Stars Part VI: Astrobiology	Madrid	December 14th

* See PHYS-1130-M01 syllabus for details.

Table 2: Important dates

Drop without a "W"	Wednesday, September 14th
Midterm grade	Wednesday, October 19th
Field trip & night observations	Friday, October 21st to Sunday, October 23rd
Drop with a "W"	Friday, October 28th

Lab format: How the labs are going to work

The lab activities in this course are somewhat different from traditional labs in several ways: First, this course is mainly concerned with **practical aspects of observations in Astronomy**. Therefore, labs are a mix of working with real equipment, real astronomical data from different sources, and simulations. Second, the course includes a **mandatory field trip** to a professional astronomical observing facility.

Some lab sessions will be held at Teide Observatory on Tenerife (Canary Islands, Spain), where we will perform night observations with the 50cm MONS educational telescope. Other lab sessions will take place in daytime and in SLU-Madrid facilities. In one of these sessions, we will carry out remote radio observations using the PARTNeR 34m antenna from NASA's Madrid Deep Space Communication Complex in Robledo de Chavela, near Madrid. These observations will take place from campus in normal class hours, with support from an expert from the PARTNeR educational project (NASA/INTA). Details will be given in class in due time. Background information is posted on Blackboard.

The lab activities are intended to provide you with some perspective of how astronomers work, and to help you make the connections between the objectives, the methodology, and the analysis and interpretation of the experiments. The lab manuals are designed not to merely follow instructions but to encourage you to farther explore on your own. Although you will have to express some of your results mathematically, **the main focus lies on conceptually understanding the underlying science and the way astronomers get their results**.

How the field trip is going to be:

The field trip to Teide Observatory (OT) will take place during **one weekend, from Friday to Sunday**. We will be hosted at the Observatory premises near Teide National Park. A tentative schedule is given in Table 3.

During our stay at the OT, we will perform observations with the MONS 50cm educational telescope. Since it is unfeasible for all of us to work with the telescope at the same time, while one group is working at the dome, the rest will perform observations with the naked eye and will work on a Virtual Observatory (VO) computer lab. **All these lab sessions will take place during the night.**

Detailed information about the telescope and the labs is posted on Blackboard. Details on the trip (departure times, etc.) will be given in class in due time.

Table 3: Field trip schedule (tentative)

Dates	Activities
Friday, October 21st	• Flight to Tenerife • Visit to the observatory • Observational work / VO lab
Saturday, October 22nd	• Excursion to Teide National Park • Observational work / VO lab
Sunday, October 23rd	• Flight back to Madrid

Lab policies and class etiquette

As the instructor of this course, I will:

- **Attend all lab sessions**, unless some major reason prevents me from doing so. I will try to start and finish each class in due time, but please be patient if one day I need to take a few extra minutes to finish delivering some message.
- **Provide you with opportunities to put into practice the concepts and ideas** from the PHYS-1130-M01 course.
- **Help you develop new ways of thinking**, and provide you with opportunities to try them out.
- **Provide you with feedback** on your work to help you improve your learning.
- Be willing to **discuss with you all your questions and concerns** about the course. Unfortunately, since I am a limited amount of time on campus, interviews with me in times other than my scheduled office hours are only possible under previous appointment. However, I may be available a few minutes after class, and I check my SLU e-mail regularly.

As a student in this course, you are expected to:

- **Attend all lab sessions:**

  All lab sessions are mandatory except number 8 (Exoplanets). If you miss some lab session, youare expected to contact me as soon as possible to discuss a way to compensate for your absence. Absence on the field trip can only be accepted under extenuating circumstances.

  Absences must be justified in written form by a neutral third party. In particular, I warn you that any absence due to claimed illness will be considered unjustified unless a doctor's certification is provided. A trip that is not due to academic reasons is not a valid justification either.

- **Be punctual and respectful:**

  Private conversations should be deferred until the end of the lecture. Eating in class is forbidden by University regulations, and it is considered extremely rude, at least in Spain. Drinking water is allowed.

  Laptops must be closed if they are not required for the ongoing activity. A pocket calculator may be useful for some exercises. The use of other electronic devices is not permitted during the lab.

  Please note that **I expect you to remain focused on lab work until you have completed your tasks**. However, you will be allowed to leave when you are done with the work, even if the class time is not over. If you have to leave early for any other reason, please tell me before the class begins.

- **Come prepared:**

  In a lab, you are supposed to work using concepts that have been introduced beforehand. If you have not done your preparation work at home and have not paid attention in class, you will waste a lot of time trying to understand what you are supposed to do.

Note that **the participation grade includes punctuality, preparedness, personal effort, and timely submission of lab reports**. An evaluation rubric is posted on Blackboard; please have a look at it to see what I will assess.

- **Work in a team:**

  Teamwork is very important in science and in this course. You will be assigned a lab partner and will work with him/her through all the labs.

  Lab reports will get a group grade, and your ability to work as part of a team will be taken into account in your Participation grade as well. However, **do not mistake teamwork for letting your partner do most of the work and getting credit for it**. In exceptional circumstances I may give different grades to every group member, if it is evident that effort has been very unbalanced, or if conflicts arise among group members.

- **Do your homework:**

  You are responsible for turning in your lab reports or any other material requested by me in due time and form. **Lab reports will not be accepted after the scheduled due dates** unless exceptional circumstances apply.

- **Be honest with your work:**

  Cheating on tests and assignments is a serious offence. **Any student caught cheating in tests or assignments will receive an F for the course.** A student may also be suspended for one semester. For more information concerning academic dishonesty, refer to the Code of Student.

- **Communicate with me:**

  I encourage you to talk to me about any questions or concerns related with the course, as soon as possible and as often as you need it.

  In this course, **the university e-mail is a major means of communication**. You are responsible for checking their SLU e-mail account, and for reading and responding, if necessary, to all course-related messages.

Lab Assignments: What you will have to do at home

In addition to regular attendance to the course and the lab, you are expected to:

- **Prepare yourself** for each lab session by reading the corresponding background material and reviewing relevant concepts in advance.
- **Complete the lab reports** at home, if you could not complete them in class. A report must be turned in after each lab session except Session 3. Unless otherwise indicated, the reports must be turned in before the next lab session takes place.

Assessment and grading criteria:

What I will take into account to assess your learning

In the lab, assessment of your performance will be based on class observations and on your lab reports. I will follow very similar criteria to in PHYS-1130-M01, taking into account the following parameters:

- On the lab content and procedures:
  - Understanding of the **concepts and main ideas** involved in each lab session.
  - Understanding of the procedures for **collecting and processing the experimental data**, and for **calculating the parameters of interest** for a given problem.
- On the ability to make judgments and justify:
  - Ability to **argue and support one's own ideas**.
  - **Critical thinking**.
  - **Respect** to other's opinions.

- On the personal work:
  - **Originality** in the contributions.
  - **Rigor, clarity and integration**.
  - **Positive** learning attitude.
  - **Active** in learning.
  - Ability to **work alone and as part of a team**.
  - Compliance with **formal requirements** (attendance, deadlines…).

How I will grade you:

Your final grade will be computed based on the lab reports and your participation in the lab sessions, as summarized in Table 4. Letter grades will be given according to the scale presented in Table 5.

The midterm grade will be computed based on the work done up to the grade submission date. I also offer you the possibility to earn extra credit by doing the last lab session (Session L10, optional).

Table 4: General grading system

Assessment	Percentage	Remarks
Participation	**60%**	Includes: attendance, participation in lab, personal effort, preparedness, teamwork, outstanding contributions. An evaluation rubric is posted on Blackboard.
Lab reports	**40%**	A report must be turned in for each lab session except L4. There are eight lab reports in total (five held in Madrid and three in Tenerife). Each lab report is worth 5%. The grade will be the same for all group members. An evaluation rubric is posted on Blackboard.
Extra credit	**5%**	Grade corresponding to Lab Session L10 (optional). It will add to the final grade.

Table 5: General grading scale

Grade	Interval	
	Minimum	**Maximum**
A	93.0%	100.0%
A–	90.0%	92.9%
B+	87.0%	89.9%
B	83.0%	86.9%
B–	80.0%	82.9%
C+	77.0%	79.9%
C	73.0%	76.9%
C–	70.0%	72.9%
D	60.0%	69.9%
F	0.0%	59.9%

Policies

- **Class cancellations:**

In the event that a class is unexpectedly cancelled, a new appointment will be scheduled as soon as possible. Any assignments due planned for a cancelled class will be due at the next class unless other instructions are communicated.

- **Accommodations:**

In recognition that people learn in a variety of ways and that learning is influenced by multiple factors (e.g., prior experience, study skills, learning disabilities), resources to support student success are available on campus. Students who think they might benefit from these resources can find out more about:

- Course-level support (e.g., faculty member, departmental resources, etc.) by asking your course instructor.
- University-level support (e.g., tutoring/writing services, Disability Services) by visiting the Academic Dean's Office (San Ignacio Hall) or by going to: http://spain.slu.edu/academics/learning_resources.html.

Students who believe that, due to a disability, they could benefit from academic accommodations are encouraged to contact Disability Services at +34 915 54 58 58, ext. 204, or to visit the Counseling Office (San Ignacio Hall). Confidentiality will be observed in all inquiries. Course instructors support student accommodation requests when an approved letter from Disability Services has been received, and when students discuss these accommodations with the instructor after receipt of the approved letter.

If you anticipate issues related to the format or requirements of this course, please meet with me, and we will discuss ways to ensure your full participation.

- **Academic Honesty. Policy Statement on Academic Integrity**:

The following is a statement of minimum standards for student academic integrity at Saint Louis University.
The University is a community of learning, whose effectiveness requires an environment of mutual trust and integrity, such as would be expected at a Jesuit, Catholic institution. As members of this community, students, faculty, and staff members share the responsibility to maintain this environment. Academic dishonesty violates it. Although not all forms of academic dishonesty can be listed here, it can be said in general that soliciting, receiving, or providing any unauthorized assistance in the completion of any work submitted toward academic credit is dishonest. It not only violates the mutual trust necessary between faculty and students but also undermines the validity of the University's evaluation of students and takes unfair advantage of fellow students. Further, it is the responsibility of any student who observes such dishonest conduct to call it to the attention of a faculty member or administrator.
Examples of academic dishonesty would be copying from another student, copying from a book or class notes during a closed-book exam, submitting materials authored by or editorially revised by another person but presented as the student's own work, copying a passage or text directly from a published source without appropriately citing or recognizing that source, taking a test or doing an assignment or other academic work for another student, tampering with another student's work, securing or supplying in advance a copy of an examination without the knowledge or consent of the instructor, and colluding with another student or students to engage in an act of academic dishonesty.
Where there is clear indication of such dishonesty, a faculty member or administrator has the responsibility to apply appropriate sanctions. Investigations of violations will be conducted in accord with standards and procedures of the school or college through which the course or research is offered. Recommendations of sanctions to be imposed will be made to the dean of the school or college in which the student is enrolled. Possible sanctions for a violation of academic integrity include, but are not limited to, disciplinary probation, suspension, and dismissal from the University.
The complete SLU Academic Honesty Policy can be found at the following link: http://www.slu.edu/Documents/Madrid/academics/AcademicIntegrity.pdf

- **Collection of student work for assessment:**

Saint Louis University - Madrid Campus is committed to excellent and innovative educational practices. In order to maintain quality academic offerings and to conform to relevant accreditation requirements, we regularly assess our teaching, services, and programs for evidence of student learning outcomes achievement. For this purpose we keep on file "anonymized" representative examples of student work from all courses and programs such as: assignments, papers, exams, portfolios, and results from student surveys, focus groups, and reflective exercises. Thus, copies of your work for this course may be kept on file for institutional research, assessment and accreditation purposes. I may also keep samples of student work as examples for future students in this course. **If you prefer that Saint Louis University - Madrid Campus does not keep your work on file, you will need to communicate your decision in writing to me.**

- **Title IX statement:**

Saint Louis University - Madrid Campus and its faculty are committed to supporting our students and seeking an environment that is free of bias, discrimination, and harassment**. If you have encountered any form of sexual misconduct (e.g. sexual assault, sexual harassment, stalking, domestic or dating violence), we encourage you to report this to the University.** If you speak with a faculty member about an incident of misconduct, that faculty member must notify SLU's Title IX deputy coordinator, Marta Maruri, whose office is located on the ground floor of Padre Rubio Hall, Avenida del Valle, 28 (mmaruri@slu.edu; 915-54-5858 ext. 213) and share the basic fact of your experience with her. The Title IX deputy coordinator will then be available to assist you in understanding all of your options and in connecting you with all possible resources on and off campus.

If you wish to speak with a confidential source, you may contact the counselors at the SLU-Madrid's Counseling Services on the third floor of San Ignacio Hall (counselingcenter-madrid@slu.edu; 915-54-5858 ext. 230) or Sinews Multiple Therapy Institute, the off-campus provider of counseling services for SLU-Madrid (www.sinews.es; 91-700-1979). To view SLU-Madrid's sexual misconduct policy and for resources, please visit the following web address:

http://www.slu.edu/Documents/Madrid/campus-life/SLUMadridSexualMisconductPolicy.pdf