



SAINT LOUIS UNIVERSITY  
MADRID

**PHYS-1320-M36 PHYSICS I LABORATORY**  
Fall 2017

**Class Days and Time:** M, 4:00-6:20 p.m.  
**Classroom:** PAH-21  
**Prerequisite(s):** Co-requisite with PHYS-1310.  
**Credit(s):** 1  
**Instructor:** Francisco Prieto  
**Instructor's Email:** francisco.prieto@slu.edu  
**Instructor's Campus Phone:** 91 554 58 58, ext. 250  
**Office:** PAH-203  
**Office Hours:** M, 3:00-4:00 p.m.

**Course Description:**

This course is an introduction to the basic principles of kinematics and dynamics through hands-on practices in the laboratory. Here you gain an intuitive knowledge about how the fundamental laws of physics work in real life. The lab complements and helps you to consolidate the knowledge acquired in the theoretical class.

You will learn to use laboratory equipment and a data acquisition system complemented with a set of sensors to measure several physical magnitudes (position, velocity, force, etc.). The laboratory acts as a link between the ideas developed in the theory and how you can see them manifested in reality.

**Course Goals and Student Learning Outcomes:**

**Physics Program Objectives**

- A. Students will understand the principles of physics and apply these principles to problems of fundamental and practical interest.
- B. Students will design and conduct experiments and analyze and interpret data.
- C. Students will collaborate effectively on teams.
- D. Students will communicate effectively and professionally in oral and written formats.
- E. Students know about contemporary issues in science and technology.
- F. Students will understand the numerical formulation of scientific problems and be able to solve such problems utilizing at least one programming language or environment.

**Student Learning Outcomes**

Program Objectives	Student Learning Outcomes	Assessment Method
A	A.1. Calculate the error associated to a measurement. A.2. Apply the technique of error propagation. A.3. Relate the physical motion of an object to its graphical representation. A.4. Relate the data measured in the experiments to the theoretical equations. A.5. Explain the relationship between position, velocity, and acceleration for rotating and non-rotating systems. A.6. Apply Newton's laws of motion to calculate theoretically the	Mid-term and Final Exam - Conceptual questions - Problems

	<p>acceleration of an object subjected to forces.</p> <p>A.7. Apply the principle of conservation of energy for rotating and non-rotating systems.</p> <p>A.8. Calculate the elastic potential energy associated to a spring.</p> <p>A.9. Apply the Principle of Linear/Angular Momentum and Linear/Angular Impulse.</p> <p>A.10. Apply Archimedes' Principle to measure the buoyant force acting on a submerged object and the density of a fluid.</p> <p>A.11. Calculate theoretically the period of oscillation in the Simple Harmonic Motion.</p> <p>A.12. Show strong mathematical skills.</p>	
<b>B</b>	<p>B.1. Use a variety of measuring devices: micrometer, caliper, motion and force sensors.</p> <p>B.2. Measure, determine, and graph the basic components of motion: position, velocity, and acceleration.</p> <p>B.3. Verify Newton's second law experimentally through observing, and measuring some common forces (gravity, friction, tension).</p> <p>B.4. Prove experimentally the Work-Energy Theorem.</p> <p>B.5. Prove experimentally the laws of conservation of energy for rotating and non-rotating systems.</p> <p>B.6. Prove experimentally the principle of conservation of linear momentum for elastic and inelastic collisions.</p> <p>B.7. Measure the moment of inertia of various rotating objects.</p> <p>B.8. Prove experimentally the principle of conservation of angular momentum.</p> <p>B.9. Measure the surface tension.</p> <p>B.10. Measure some features of oscillatory motion by studying the Simple Harmonic Motion.</p> <p>B.11. Verify the validity of the experimental results using data acquisition software, and graphing and data analysis software.</p>	<p>Lab Notebook</p> <p>Lab Report</p>
<b>C</b>	<p>C.1. Work effectively in a team environment when working in the lab.</p>	<p>Team-work rubric</p>
<b>D</b>	<p>D.1. Keep a well-organized and complete lab notebook.</p> <p>D.2. Communicate effectively in written reports.</p> <p>D.3. Write a well-structured and clear lab report using the standard scientific format</p>	<p>Lab Notebook</p> <p>Lab Report</p>

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, the Campus regularly assesses its teaching, services, and programs for evidence of student learning outcomes achievement. For this purpose anonymized representative examples of student work from all courses and programs is kept on file, such as assignments, papers, exams, portfolios, and results from student surveys, focus groups, and reflective exercises. *Thus, copies of student work for this course, including written assignments, in-class exercises, and exams may be kept on file for institutional research, assessment and accreditation purposes.* If students prefer that Saint Louis University - Madrid Campus does not keep their work on file, they need to communicate their decision in writing to the professor.

**Required Texts and Materials:**

Physics I Laboratory Sessions Handbook and Student Response Manual.

Other References:

Knight, Jones, Field, *CollegePhysics: a strategic approach*, 3<sup>rd</sup> Ed., Pearson, 2017

Serway, Faughn, *Physics*, 9<sup>th</sup> Ed., Thomson Brooks/Cole

H. Young, *College Physics*, 9<sup>th</sup> Ed., Pearson, 2012

**Attendance Policy:**

- **It is mandatory to complete all lab activities.** Any unexcused absence will result in a zero for the corresponding lab session.
- **Make up exams are not given.** Students who legitimately miss an exam, due to a doctor's visit or family emergency must provide written documentation of the circumstances. A letter from the university counselor is accepted. Exams that are missed illegitimately result in a score of F. Grades for these students will be based on the remaining exams. Missing more than one exam results in an F grade.
- Useful information of the course can be found in Blackboard: <https://myslu.slu.edu>

**Course Requirements and Grading Rationale/System:**

The work undertaken in the practical sessions is assessed by continuous assessment of the lab notebooks, the marks of all the lab reports, the marks of the pre-lab questions, and the marks of the exams.

**1. Attendance and participation**

You should sign-in at the beginning of each laboratory session and are required to stay either until the end of the lab session or until all measurements and analyses have been recorded in your laboratory notebook. You may sign out only after the approval of a lab demonstrator.

1<sup>st</sup> Mid-Term Grade – 10%  
Final Grade – 10 %

**2. Continuous assessment of lab notebook**

Lab notebooks will be checked at the end of each practical session. Only when the results are satisfactory will the students be allowed to proceed to the next experiment. The lab notebooks will be marked at the end of each semester.

1<sup>st</sup> Mid-Term Grade – 20%  
Final Grade – 15 %

**3 Assessment of experimental write-ups**

Reports of the experiments should be handed in before the start of the new lab session. If reports are handed in late, but within one week of the deadline, then 20% of the marks will be forfeit. Write-ups handed in more than one week after the deadline will be marked for the student's information but these marks will not count in the module assessment. Every effort will be made to return the marked write-up within a period of two weeks.

1<sup>st</sup> Mid-Term Grade – 35%  
Final Grade – 30 %

**4. Assessment of pre-lab questions**

At the beginning of the class the student must give to the instructor the answers to the questions that can be downloaded in the course Blackboard.

1<sup>st</sup> Mid-Term Grade – 5%  
Final Grade – 5 %

**5. Assessment by exams – 30% of the marks**

Two exams will be done: one halfway through the course (1<sup>st</sup> Mid-Term Exam) and another at the end (Final Exam) about materials related with the work done. Due exams are taken individually, not in groups. Exams will consist of a set of theoretical questions and an experimental exercise related to the sessions covered in class.

1<sup>st</sup> Mid-Term Grade – 30%  
Final Grade – 40 % (20% for the 1<sup>st</sup> Mid-Term and 20% for the Final)

	<b>1<sup>st</sup> Mid-Term Grade</b>	<b>Final Grade</b>
Attendance	10%	10%
Lab Notebook	20%	15%
Lab Report	35%	30%
Pre-lab questions	5%	5%
Exam	30%	40% (20% 1 <sup>st</sup> Mid-Term + 20% Final)
<b>TOTAL GRADE</b>	<b>100%</b>	<b>100%</b>

### **Grading Scales**

100 < A < 93%,  
93% < A- < 90%  
90% < B+ < 87%  
87% < B < 83%  
83% < B- < 80%  
80% < C+ < 77%  
77% < C < 73%  
73% < C- < 70%  
70% < D < 60%  
F < 60%

**E-mail:** Campus and course announcements will often be handled by e-mail. Students should check their “@slu.edu” e-mail regularly.

**University Statement on Academic Integrity:** Academic integrity is honest, truthful and responsible conduct in all academic endeavors. The mission of Saint Louis University is "the pursuit of truth for the greater glory of God and for the service of humanity." Accordingly, all acts of falsehood demean and compromise the corporate endeavors of teaching, research, health care and community service via which SLU embodies its mission. The University strives to prepare students for lives of personal and professional integrity, and therefore regards all breaches of academic integrity as matters of serious concern.

The governing University-level Academic Integrity Policy can be accessed on the Provost's Office [website](#). Additionally, SLU-Madrid has posted its academic integrity policy online: <http://www.slu.edu/madrid/academics>. As a member of the University community, you are expected to know and abide by these policies, which detail definitions of violations, processes for reporting violations, sanctions and appeals.

The professor will review these matters during the first weeks of the term. Please direct questions about any facet of academic integrity to your faculty, the chair of the department of your academic program or the Academic Dean of the Madrid Campus.

**University Title IX Statement:** Saint Louis University 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 Multiplettherapy Institute, the off-campus provider of counseling services for SLU-Madrid ([www.sinews.es](http://www.sinews.es); 917-00-1979). 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>.

**Students with Special Needs:** 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 disability), 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://www.slu.edu/madrid/learning-resources>.

Students with a documented disability who wish to request academic accommodations must contact Disability Services to discuss accommodation requests and eligibility requirements. Once successfully registered, the student also must notify the course instructor that they wish to access accommodations in the course. Please contact

Disability Services at [disabilityservices-madrid@slu.edu](mailto:disabilityservices-madrid@slu.edu) or +915 54 58 58, ext. 230 for an appointment. Confidentiality will be observed in all inquiries. Once approved, information about the student's eligibility for academic accommodations will be shared with course instructors via email from Disability Services. For more information about academic accommodations, see "Student Resources" on the SLU-Madrid webpage.

Note: Students who do not have a documented disability but who think they may have one are encouraged to contact Disability Services.

**Fall 2017 Course Schedule (tentative):**

Class date	Lab Session
Sept. 4	Presentation
Sept. 11	Lab 1 Measurement and uncertainty.
Sept. 17	<a href="#">Last Day to Drop a Class Without a Grade of W and /or Add a Class, choose Audit (AU) or Satisfactory/Unsatisfactory (S/U) Options</a>
Sept. 18	Lab 2 Motion in one dimension.
Sept. 25	Lab 3 Force and Newton's law.
Oct. 2	Lab 3 Force and Newton's law.
Oct. 9	Lab 4 Friction Force
Oct. 16	<b>First Mid Term Exam</b>
Oct. 23	Lab 5 Work and Energy
Oct. 30	Lab 5 Work and Energy
Oct. 30	<a href="#">Last Day to Drop a Class and Receive the Grade of W.</a>
Nov. 2	<a href="#">Spring Registration Opens!</a>
Nov. 6	Lab 6 Linear Impulse and Momentum.
Nov. 13	Lab 7 Rotational Motion.
Nov. 20	Lab 8 Fluids.
Nov. 27	Lab 9 Oscillatory motion.
Dec. 4	Review
Dec. 11	<b>Final Exam</b>

FALL 2017 FINAL EXAM SCHEDULE

	14 Dec (Th)	15 Dec (Fr)	18 Dec (Mn)	19 Dec (Tu)	20 Dec (Wd)
<b>08:30-11:30</b>	Mn classes that meet at 9:00 & 9:30	Mn classes that meet at 10:00	Mn classes that meet at 11:00 & 11:30	Tu classes that meet at 9:30 & 10:00	Tu classes that meet at 8:00
<b>12:00-15:00</b>	Tu classes that meet at 11:00	Mn classes that meet at 13:00	Tu classes that meet at 14:30	Mn classes that meet at 12:00	Tu classes that meet at 12:30
<b>15:30-18:30</b>	Mn classes that meet at 14:30	Tu classes that meet at 17:00 & 17:30	Mn classes that meet at 16:00	Tu classes that meet at 15:30 & 16:00	Mn classes that meet at 17:30
<b>19:00-22:00</b>	---	---	Mn classes that meet at 19:00	Tu classes that meet at 19:00	---