



SAINT LOUIS UNIVERSITY  
MADRID

**PHYS 1640 M36: Engineering physics II lab**  
Fall 2017

**Class Days and Time:** M, 18:30-20:50

**Classroom:** PAH-21

**Prerequisite(s):** MATH-143, PHYS-161, PHYS-162. Must enroll also in PHYS-1630

**Credit(s):** 1

**Instructor:** Javier I. Romero Ardoy

**Instructor's Email:** javierignacio.romeroardoy@slu.edu

**Instructor's Campus Phone:** 91 554 58 58, ext. 000

**Office:** PAH Science office

**Office Hours:** MTWRF, 00:00-00:00

**Course Description:**

This course introduces students to the fundamentals of electromagnetism and optics through the detailed consideration of the basic laws governing them: electrostatics: electric field and capacitance; laboratory equipment (oscilloscope, voltage generator, digital multi-meter); currents, resistance and simple DC circuits; magnetism; elementary optics.

**Course Goals and Student Learning Outcomes:**

The laboratory constitutes a link between the ideas developed in the “theory” subject and reality. In this sense the student complements and consolidates the knowledge acquired in the theoretical class with the work developed in the laboratory.

The following learning outcomes have been defined for the Physics courses.

<b>Program Learning Outcomes (PLOs)</b>	
<b>A</b>	Students will possess a firm understanding of the principles of physics and the ability to apply these principles to problems of both fundamental and practical interest.
<b>B</b>	Students will possess an ability to design and conduct experiments, as well as to analyze and interpret data.
<b>C</b>	Students will possess the thinking skills and ability to identify, formulate, and solve technical problems.
<b>D</b>	Students will possess an ability to function on multidisciplinary teams.
<b>E</b>	Students will possess an understanding and respect for various cultures, and a sense of social responsibility.
<b>F</b>	Students will possess an understanding of professional and ethical responsibility.
<b>G</b>	Students will possess an ability to communicate effectively and professionally in oral and written formats

<b>H</b>	Students will possess the broad education necessary to understand the impact of science in a global, economic, environmental, and social context.
<b>I</b>	Students will possess a recognition of the need for, and an ability to engage in life-long learning.
<b>J</b>	Students will possess a knowledge of contemporary issues.
<b>K</b>	Students will possess an ability to use the computer in a scientific setting.

At the end of the course, students will (in the table below, the learning outcomes of this course are outlined, mapped to the Program Learning Outcomes in Physics):

<b>PLOs</b>	<b>Student Learning Outcomes</b>	<b>Assessment Method</b>
<b>A</b>	A.1. Students will possess an ability to apply appropriately the basic electromagnetism principles and equations (Coulomb's Law, Conservation of Charge, Ohm's Law, Kirchhoff's Laws, ...) into real problems in the lab.	<ul style="list-style-type: none"> <li>• Observation during lab sessions on how the students perform the lab experiment.</li> <li>• Midterm and Final exams, in the theory and practice parts.</li> </ul>
<b>B</b>	B.1. Students will possess an ability to replicate simple experiments related to electromagnetism B.2. Students will possess an ability to apply convenient ways of representing results as graphs, trend lines, tables, averages, etc. B.3. Students will possess the ability to analyze and interpret the results of an experiment by applying their knowledge of the applicable Physics principles. B.4. Students will possess a basic understanding of how to use several electrical tools and devices (multimeter, oscilloscope, transformer, electrophorus, function generator, voltage source, Van de Graaf generator, ...) in experiments. B.5. Students will possess an ability to measure different electromagnetism values as voltage, current, magnetic field, capacitance, electromotive force, electric force, frequency, etc. B.6. Students will possess a knowledge of the error calculation in an experiment. B.7. Students will possess an understanding of the way the different electromagnetism Laws and equations are verified experimentally.	<ul style="list-style-type: none"> <li>• Observation during lab sessions on how the students perform the lab experiment.</li> <li>• Post-lab questions for some lab sessions, lab reports for the remaining.</li> <li>• Midterm and Final exams, in the theory and practice parts.</li> </ul>
<b>C</b>	C.1. Students will possess an ability to build simple electrical circuits with resistors and capacitors.	<ul style="list-style-type: none"> <li>• Observation during lab sessions on how the students perform the lab experiment.</li> <li>• Midterm and Final exams, in the theory and practice parts.</li> </ul>
<b>D</b>	D.1. Students will possess an understanding of the planning and synchronization required when working in teams in the lab.	<ul style="list-style-type: none"> <li>• Observation during lab sessions on how the students perform the lab experiment.</li> </ul>

<b>G</b>	G.1. Students will possess an ability to write an experiment report in a scientific way.	<ul style="list-style-type: none"> <li>• Post-lab questions for some lab sessions, lab reports for the remaining.</li> </ul>
<b>K</b>	K.1. Students will possess an ability to connect different sensors to a computer to collect the required information directly on the computer. K.2. Students will possess an ability to use the computer to create graphs and trend lines from the results obtained for data analysis and representation.	<ul style="list-style-type: none"> <li>• Observation during lab sessions on how the students perform the lab experiment.</li> <li>• Post-lab questions for some lab sessions, lab reports for the remaining.</li> </ul>

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:**

**Lab manual:** PHYS-1640 Engineering Physics II Laboratory Sessions Handbook. Ed. Fall 2017

Guidelines:

- *Lab Report Guidelines.* Saint-Louis University document.
- *Lab Notebook Guidelines.* Saint-Louis University document.
- D. Halliday, R. Resnick, & K.S. Krane, *Physics. Vol. II. Extended Version*, 4th. Ed. John Wiley, Chichester, England, 1992.

#### **Attendance Policy:**

Students must 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 their laboratory notebook. They may sign out only after the approval of a lab demonstrator.

Students are expected to be in time. If late, they may not be allowed to join the lab session.

**It is mandatory to attend all lab sessions unless a reasonable excuse is given.** Any unexcused absence will lead to a grade of zero for the work related to that session (lab notebook, lab report or post-lab questions).

**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.

#### **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 the lab reports, the marks of the pre-lab and post-lab questions, and the marks of the exams. A description of how each of these marks is obtained is provided below.

Learning to write lab reports is basically a trial-and-error process. With this spirit in mind, students will follow a trial-and-error learning process throughout the course, and marks will be given accordingly. For some lab sessions students will be required to respond to post-lab questions intended to help them create the right mindset in order to write a good lab report, always following the lab report guidelines. Accordingly, for some other sessions, students will be required to write a complete lab report.

- **Assessment of pre-lab questions**

Before the beginning of the class the student must turn in the answers to the pre-lab questions that can be found on SLU Blackboard.

Midterm Grade – 10% of the marks

Final Grade – 5 % of the marks

- **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.

Midterm Grade – 20% of the marks

Final Grade – 10 % of the marks

- **Assessment of post-lab questions**

When required as published on SLU Blackboard, students will respond to some questions as homework after the lab session is finished. These post-lab questions are intended to help students reflect appropriately on how to create a good report for that lab session. Questions will be divided in sections, with each section corresponding to a section in the lab report (Introduction, Results & Discussion, Conclusions, ...). These post-lab questions will be typically due 4-5 days after the lab session; the due date will correspondingly be published on SLU Blackboard. As part of the trial-and-error learning process, a full mark will be given with the submission of the questions. Accordingly, a mark of zero will be earned when no submission is performed. The questions will be returned to the students with comments on what was answered correctly and what needed improvement.

Midterm Grade – 10% of the marks

Final Grade – 5 % of the marks

- **Assessment of experimental write-ups**

Reports of the experiments will be typically due before the start of the following lab session, but the due date will be published on SLU Blackboard when required. Not all lab sessions will require a lab report. As part of the trial-and-error learning process, the first lab reports are considered to make part of the learning phase reports and they will be optional and graded only for informative reasons, so the student may assess how far the lab report is from the objective. Regardless of this informative grade, a full mark will be given just with submission of the lab report for these learning phase reports; not submitting a report will imply a 'no grade' for that report. Students are highly encouraged to submit these optional learning phase reports in order to take the maximum advantage of the learning process. The reports that belong to this learning phase will be correctly identified as such on SLU Blackboard. There will typically be 3-4 lab reports making part of this first phase.

Learning phase reports:

Midterm Grade – 10% of the marks

Final Grade – 5 % of the marks

There will be a set of lab sessions, typically 2-3, that will require a mandatory lab report and that will be ordinarily graded. These lab sessions will be identified as such on SLU Blackboard with the corresponding due date for the lab report. These lab reports will be used to verify that the student is able to produce good quality lab reports as defined in the lab report guidelines.

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 not be accepted. Every effort will be made to return the marked write-up within a period of one week.

Ordinarily graded reports:

Midterm Grade – 0% of the marks (only learning phase reports before midterm)

Final Grade – 30 % of the marks

- **Assessment by exams**

Two exams will be done: one halfway through the course (Midterm 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 experimental exercises related to the sessions covered in class.

Midterm Grade – 50% of the marks

Final Grade – 45 % of the marks (15% for the Midterm and 30% for the Final)

- **Grading Scales**

90% ≤ A ≤ 100%,

87% ≤ A- < 90%

84% ≤ B+ < 87%

80% ≤ B < 84%

77% ≤ B- < 80%

74% ≤ C+ < 77%

70% ≤ C < 74%

66% ≤ C- < 69%

60% ≤ D < 66%

F < 60%

- (1) Students are encouraged to participate in class discussions and to ask questions.
- (2) Announcements may be made during the semester.
- (3) Useful information for the course may be found on SLU Blackboard.
- (4) Syllabus, reading and homework problems are subject to change.
- (5) Students are responsible for all lecture material, handouts and assigned reading.

**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; 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:

Monday, September 4	Introduction
Monday, September 11	Electric charge and Coulomb's law
Sunday, September 17	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
Monday, September 18	Digital multimeter
Monday, September 25	The oscilloscope
Monday, October 2	Equipotential lines
Monday, October 9	The parallel-plate capacitor
Thursday, October 12	Fall Break
Friday, October 13	
Saturday, October 14	
Sunday, October 15	
Monday, October 16	<b>Midterm exam - PAH-21</b>
Thursday, October 19	Midterm Grades Due.
Monday, October 23	Ohm's law
Monday, October 30	DC circuits Last Day to Drop a Class and Receive the Grade of W.
Wednesday, November 1	University Closed
Thursday, November 2	Spring Registration Opens!
Monday, November 6	Magnetic force
Thursday, November 9	University Closed
Monday, November 13	Optics presentation
Monday, November 20	Magnetic field
Monday, November 27	Magnetic induction
Monday, December 4	Review session
Wednesday, December 6	University Closed
Friday, December 8	University Closed
Saturday, December 9	

Sunday, December 10	
Monday, December 11	<b>Final exam Engineering physics II lab - PAH-21</b>
Tuesday, December 12	
Wednesday, December 13	
Thursday, December 14	Final Exam – Day 1
Friday, December 15	Final Exam – Day 2
Saturday, December 16	
Sunday, December 17	
Monday, December 18	Final Exam – Day 3 Midyear Commencement!
Tuesday, December 19	Final Exam – Day 4
Wednesday, December 20	Final Exam – Day 5
Saturday, December 23	Grades Due to Registrar

	<b>14 Dec (Th)</b>	<b>15 Dec (Fr)</b>	<b>18 Dec (Mn)</b>	<b>19 Dec (Tu)</b>	<b>20 Dec (Wd)</b>
<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	---