



Lahore University of Management Sciences

PHY 400/PHY 600 – Laser Laboratory

Summer 2021-22

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Course URL (if any)	https://physlab.org/

Course Basics				
Credit Hours	2			
Lab (per week)	Nbr of sessions Per week	4	Duration	6 hours
Recitation (per week)	Nbr of Rec (s) Per Week	N/A	Duration	N/A
Tutorial (per week)	Nbr of Tut(s) Per Week	N/A	Duration	N/A

Course Distribution	
Core	None
Elective	Yes
Open for Student Category	SSE BS SSE MS and PhD
Closed for Student Category	N/A

COURSE DESCRIPTION
<p>This laboratory course introduces the students' laser experiments, in which they cover a variety of hands-on laser experiments. This laboratory course explores laser optics, basic principles of laser operation, construction, and technology will be discussed so that the student can suggest and implement new ideas and understand old ones concerning laser design, development, and characterization. Students are required to carry out the experiments and record their observations independently.</p> <p>Topics include laser polarization, laser collimation, laser development, and diagnostics</p>

Teaching Methodology
<p>The course is scheduled to be in person/on-campus as it involves hands laboratory experiments. The students are required to record and analyze results, and present their findings in form of technical reports.</p>



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COURSE PREREQUISITE(S)	
•	None

COURSE OBJECTIVES	
•	• Theory and practice of laser optics and laser experimentation
•	• Understanding of laser systems and laser diagnostics
•	• Building new laser systems

Course Learning Outcomes	
	After successful completion of this course, students should be able to:
CLO1:	1. Understand laser optics experimentation
CLO2:	2. Design and build laser hardware
CLO3:	3. Understand ultrafast laser optics, and their diagnostics

Grading Breakup and Policy	
Technical Report	25
Presentation	25
Experiments (4 weeks of experimental work)	50
Total Marks	100

Examination Detail	
Midterm Exam	None
Final Exam	None



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Week #	Topics	Related CLOs
1	<ul style="list-style-type: none">• Introduction to the laser systems<ul style="list-style-type: none">- Argon ion laser- Characterization- Laser polarization, and collimation	CLO1
2	<ul style="list-style-type: none">• Designing of the laser diode module<ul style="list-style-type: none">- Laser diode modulation- Beam characterization	CLO2
3	<ul style="list-style-type: none">• Ultrafast laser optics<ul style="list-style-type: none">- Generation- Diagnostics systems [autocorrelation]	CLO3
4	<ul style="list-style-type: none">• Designing and constructing prototype laser systems<ul style="list-style-type: none">- Optimization- Characterization	CLO2

Textbook(s)/Supplementary Readings

1. Keln J. Kuhn, "Laser Engineering", Prentice Hall, (1997).
2. C. Nityanad, "Laser Systems and Applications", Prentice Hall India, (2011).
3. Richard N. Zare, "Laser Experiments for Beginners", University Science Books, (1995).
4. Claude Rulliere, "Femtosecond Laser Pulses: Principles and Experiments", Springer 2nd edition (1998)

Academic Honesty

The principles of truth and honesty are recognized as fundamental to a community of teachers and students. This means that all academic work will be done by the student to whom it is assigned without unauthorized aid of any kind. Plagiarism, cheating and other forms of academic dishonesty are prohibited. Any instances of academic dishonesty in this course (intentional or unintentional) will be dealt with swiftly and severely. Potential penalties include receiving a failing grade on the assignment in question or in the course overall. For further information, students should make themselves familiar with the relevant section of the LUMS student handbook.

Harassment Policy



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SSE, LUMS and particularly this class, is a harassment free zone. There is absolutely zero tolerance for any behaviour that is intended, or has the expected result of making anyone uncomfortable and negatively impacts the class environment, or any individual's ability to work to the best of their potential.

In case a differently-abled student requires accommodations for fully participating in the course, students are advised to contact the instructor so that they can be facilitated accordingly.

If you think that you may be a victim of harassment, or if you have observed any harassment occurring in the purview of this class, please reach out and speak to me. If you are a victim, I strongly encourage you to reach out to the Office of Accessibility and Inclusion at oai@lums.edu.pk or the sexual harassment inquiry committee at harassment@lums.edu.pk for any queries, clarifications, or advice. You may choose to file an informal or a formal complaint to put an end to offending behavior. You can find more details regarding the LUMS sexual harassment policy [here](#).

To file a complaint, please write to harassment@lums.edu.pk.

SSE Council on Equity and Belonging

In addition to LUMS resources, SSE's **Council on Belonging and Equity** is committed to devising ways to provide a safe, inclusive and respectful learning environment for students, faculty and staff. To seek counsel related to any issues, please feel free to approach either a member of the council or email at cbe.sse@lums.edu.pk

Rights and Code of Conduct for Online Teaching

A misuse of online modes of communication is unacceptable. TAs and Faculty will seek consent before the recording of live online lectures or tutorials. Please ensure if you do not wish to be recorded during a session to inform the faculty member. Please also ensure that you prioritize formal means of communication (email, lms) over informal means to communicate with course staff.