The Hong Kong University of Science and Technology

UG Course Syllabus

Engineering Optics

ELEC 4610

Credits: 4

ELEC 2400

Name: Jianan Qu

Email: eequ@ust.hk

Course Description

An introductory course in optics covering fundamentals of geometrical and physical optics. Topics include: review of geometrical optics, first order optical system and analysis, aberrations, designs of optical component and system; Basic wave theory, diffraction, interference, polarization, dispersion; fundamentals of optical instrumentation. Exclusion: PHYS3038 Prerequisite: ELEC 2400

Intended Learning Outcomes (ILOs)

By the end of this course, students should be able to:

1. Explain key theoretical concepts relating to optics and applications of optical technology, including the nature and propagation of light, and optical instrumentation.
2. Observe key optical phenomena experimentally and build a variety of optical instruments.
3. Analyze simple optical systems consisting of lenses, stops, reflectors and prisms, determine and use principal points and focal points, and calculate and describe optical aberrations.
4. Analyze and design systems for measurement of polarization, precision measurement based on interference, optical thin film, interferometer, etc.
5. Analyze Fraunhofer diffraction patterns, determine the spatial resolution of an imaging system, design optical gratings and build an optical spectrometer.

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments:

[List specific assessed tasks, exams, quizzes, their weightage, and due dates; perhaps, add a summary table as below, to precede the details for each assessment.]

Assessment Task	Contribution to Overall Course grade (%)	Due date
Mid-Term	20%	dd/mm/yyyy *
Homework	15%	dd/mm/yyyy *

Laboratory	15%	dd/mm/yyyy *
Final examination	50%	dd/mm/yyyy

* Assessment marks for individual assessed tasks will be released within two weeks of the due date.

Mapping of Course ILOs to Assessment Tasks

[add to/delete table as appropriate]

Assessed Task	**Mapped ILOs**	**Explanation**
Homework	ILO1, ILO2, ILO3, ILO4, ILO5	This task assesses students' ability to explain and apply concepts (ILO 1), evaluate their analysis and instrumentation capabilities (ILO 2,4), and develop the understanding on more advanced concepts and technology (ILO 3,5).
Laboratory	ILO2, ILO3, ILO4, ILO5	The laboratory practices assess the students' understanding on the basic optical components and imaging system (ILO2,4), skills to instrument sophisticated optical instruments (ILO3,5), and the capabilities to work collaboratively to advanced problems (IOL4,5).

Final Grade Descriptors:

Grades	**Short Description**	**Elaboration on subject grading description**
A	Excellent Performance	Demonstrates a comprehensive grasp of subject matter, expertise in problem-solving, and significant creativity in thinking. Exhibits a high capacity for scholarship and collaboration, going beyond core requirements to achieve learning goals.
B	Good Performance	Shows good knowledge and understanding of the main subject matter, competence in problem-solving, and the ability to analyze and evaluate issues. Displays high motivation to learn and the ability to work effectively with others.
C	Satisfactory Performance	Possesses adequate knowledge of core subject matter, competence in dealing with familiar problems, and some capacity for analysis and critical thinking. Shows persistence and effort to achieve broadly defined learning goals.
D	Marginal Pass	Has threshold knowledge of core subject matter, potential to achieve key professional skills, and the ability to make basic judgments. Benefits from the course and has the potential to develop in the discipline.

F	Fail	Demonstrates insufficient understanding of the subject matter and lacks the necessary problem-solving skills. Shows limited ability to think critically or analytically and exhibits minimal effort towards achieving learning goals. Does not meet the threshold requirements for professional practice or development in the discipline.

Course AI Policy

Using generative artificial intelligence tools to complete assessment tasks is NOT allowed.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Feedback on assignments will include [specific details, e.g., strengths, areas for improvement]. Students who have further questions about the feedback including marks should consult the instructor within five working days after the feedback is received.

Resubmission Policy

[If applicable, explain the policy for resubmitting work or reassessment opportunities, including conditions and deadlines.]

Required Texts and Materials

Textbook(s):

1. Lecture notes
2. Hecht, *Optics*, Addison-Wesley, 5th Edition

Reference Books/Materials:

1. F. & L. Pedrotti, *Introduction to Optics*, Prentice Hall
2. Smith and Thomson, *Optics*, Wiley
3. R.S. Longhurst, *Geometrical and Physical Optics*, Wiley

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST's Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to Academic Integrity | HKUST – Academic Registry for the University's definition of plagiarism and ways to avoid cheating and plagiarism.