

**City University of Hong Kong
Course Syllabus**

**offered by College/School/Department of Electrical Engineering
with effect from Summer 2020**

Part I Course Overview

Course Title: Light: from Double Rainbows to Optical Fibers

Course Code: GE1342

Course Duration: One Semester (13 weeks)

Credit Units: 3

Level: B1

Proposed Area: Arts and Humanities
(for GE courses only) Study of Societies, Social and Business Organisations
 Science and Technology

Medium of Instruction: English

Medium of Assessment: English

Prerequisites: Nil
(Course Code and Title)

Precursors: Nil
(Course Code and Title)

Equivalent Courses: Nil
(Course Code and Title)

Exclusive Courses: Nil
(Course Code and Title)

Part II Course Details

1. Abstract

(A 150-word description about the course)

This course aims to guide students through some everyday observations related to light and a number of optical applications. What is a double rainbow? What gives a peacock its fascinating color? Does optical fiber have anything to do with your smart phone? How do blue lasers help the CD industry to stay competitive? This GE course is about light. We survey the wonderful optical phenomena in nature, milestones in optical discoveries over the century, and optical inventions that drastically shaped the modern world. Students will acquire a qualitative appreciation of optics in everyday life through lectures and group presentations.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs [#]	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	A2	A3
1.	<u>Explain</u> and demonstrate optical phenomena in nature such as the rainbow and the blue sky from simple optical principles		√	√	
2.	<u>Describe</u> the inventions related to optics such as the optical fiber and lasers			√	√
3.	<u>Explain</u> how optical discoveries shaped the modern philosophy in science		√	√	
4.	<u>Describe</u> the impacts of optical inventions in technology, science, and social context			√	√
		100%			

* If weighting is assigned to CILOs, they should add up to 100%.

[#] Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

3. Teaching and Learning Activities (TLAs)

(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.						Hours/week (if applicable)
		1	2	3	4			
Lecture	Large group activity involving the entire class registered on the course where the content pertaining to the particular CILO(s) is presented by the course instructor. The presentation will highlight the main issues concerned with each CILO, as well as the key concepts from each CILO. These will be mixed with broadcasts of selected clips from the wealth of online resources.	√	√	√	√			3 hrs/wk
Lab Visits	Visits to the optoelectronic laboratories will be arranged. The guided tour to the high-tech clean room facilities for fabrication of optical devices will be conducted. Hands-on demonstration of representative optical experiments will be illustrated.	√	√					
Group Discussions	Students on the course are organized into groups. In response to the lecture material, each team will huddle for a time of brainstorming and work together on the group-based presentation topic provided by the course instructor. By holding these sessions as part of the curriculum time, guidance is afforded to students in their discussions by the instructor.							
Group Presentation	Each team presents their findings to the rest of the class. Presentation topics also include group findings of items researched on during a team huddle, some of which are used as formative assessments to provide regular feedback.	√	√	√	√			

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.						Weighting*	Remarks
	1	2	3	4				
Continuous Assessment: <u>60%</u>								
Tests (min.: 2)	√	√	√	√			35%	
#Assignments (min.: 3)	√	√	√	√			25%	
Examination: 40% (Duration: 2 hours)								
Examination	√	√	√	√			40%	
							100%	

* The weightings should add up to 100%.

Remark:

To pass the course, students are required to achieve at least 30% in continuous assessment and 30% in the examination.

#may include homework, tutorial exercise, project/min-project, presentation

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair/Adequate (C+, C, C-)	Marginal (D)	Failure (F)
Test	Achievement in CILOs	High	Significant	Moderate	Basic	Not even reaching marginal levels
Presentation and report	Achievement in CILOs	High	Significant	Moderate	Basic	Not even reaching marginal levels
Examination	Achievement in CILOs	High	Significant	Moderate	Basic	Not even reaching marginal levels

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

Optics in the sky

Rainbows, blue sky, dispersion, reflection and refraction, scattering, waves and interference, cameras and lenses, adaptive optics and astronomy.

Optical fibers

History of optical fibers, Prof. Charles Kuen Kao, submarine optical cables, fiber-to-the-home.

Lasers

Einstein and lasers, particle nature of light, blue laser materials, patent issues and lawsuits.

Solar power

Solar cells, photovoltaic materials, efficiency issues, photonic crystals, micro- and nano-structures, butterflies and peacock feathers.

Display technology

Liquid crystal display (LCD), light emitting diode (LED), economical impacts, environmental impacts.

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

1.	Nil
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2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	Grant R. Fowles, "Introduction to Modern Optics," Dover Books (1989)
2.	David R. Falk et al., "Seeing the Light: Optics in Nature, Photography, Color, Vision, and Holography," Wiley & Sons Inc. (1986)
3.	Robert D. Guenther, "Modern Optics", Wiley (1990) QC355.2 .G84 1990
4.	Eugene Hecht, " Optics ", Addison-Wesley (1998) QC355.2 .H42
Online Resources:	
1.	http://science.howstuffworks.com/optics-channel.htm

Annex (for GE courses only)
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- A. Please specify the Gateway Education Programme Intended Learning Outcomes (PILOs) that the course is aligned to and relate them to the CILOs stated in Part II, Section 2 of this form:

GE PILO	Please indicate which CILO(s) is/are related to this PILO, if any (can be more than one CILOs in each PILO)
PILO 1: Demonstrate the capacity for self-directed learning	CILO 1 ¹
PILO 2: Explain the basic methodologies and techniques of inquiry of the arts and humanities, social sciences, business, and science and technology	CILOs 1-2 ²
PILO 3: Demonstrate critical thinking skills	CILOs 1-4 ³
PILO 4: Interpret information and numerical data	CILOs 1-2 ⁴
PILO 5: Produce structured, well-organised and fluent text	
PILO 6: Demonstrate effective oral communication skills	CILOs 3-4 ⁶
PILO 7: Demonstrate an ability to work effectively in a team	
PILO 8: Recognise important characteristics of their own culture(s) and at least one other culture, and their impact on global issues	
PILO 9: Value ethical and socially responsible actions	
PILO 10: Demonstrate the attitude and/or ability to accomplish discovery and/or innovation	CILOs 1-4 ¹⁰

GE course leaders should cover the mandatory PILOs for the GE area (Area 1: Arts and Humanities; Area 2: Study of Societies, Social and Business Organisations; Area 3: Science and Technology) for which they have classified their course; for quality assurance purposes, they are advised to carefully consider if it is beneficial to claim any coverage of additional PILOs. General advice would be to restrict PILOs to only the essential ones. (Please refer to the curricular mapping of GE programme: http://www.cityu.edu.hk/edge/ge/faculty/curricular_mapping.htm.)

- B. Please select an assessment task for collecting evidence of student achievement for quality assurance purposes. Please retain at least one sample of student achievement across a period of three years.

Selected Assessment Task
Final examination