كلية الهندســـة بشبرا
FACULTY OF ENGINEERING- SHOUBRA

Optical Communications
ECE423/ELE424/CCE507/ELE480

Chapter (0)
Course Outline

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Chapter Contents

0.1 Course Description

Optical Communications : ECE423/ELE424/CCE507/ELE480

Course goals:

Overview of optical fiber communications, Optical transmitter components- LEDs and lasers – Optical drivers and modulators - Photodetectors and their performance and characteristics, noise in photodetection, common types of photodetectors - Optical fiber modes, single and multi-mode fibers, single and multi-core fibers, attenuation and dispersion in Optical fibers.

0.2 Course Objectives

Upon a successful completion of this course, the student will be able to:

- Understand and define the fundamentals parameters of optoelectronic devices.
- Explain operational principles and construction of lasers.
- Model, analyze, design and build photonic devices, optical transmitter, receiver and amplifiers.
- Understand the basic optoelectronics including electromagnetism, light propagation in media, light amplification and detection, lasers, modulators, and detectors.
- Describe definitions, fundamentals and parameters of photo electronic devices.
- Be familiar with recent trends in optoelectronics such as fiber optics , solar cells, VLC, LIFI

0.3 Course Administration

- Instructors: **Assoc. Prof. Dr. Moataz Elsherbini**

  e mail: motaz.ali@feng.bu.edu.eg

  Office Hours: Tuesday 12-2

  Office: The Main Building Room

  TAs: Eng, Basma Ashraf
- URL: Faculty
- Text:
- **J. Wilson and J.Haukes, "Opto Electronics – An Introduction",**
- **Handbook of Optoelectronics Concepts, Devices, and Techniques (Volume One), 2nd edition , 2018.**

Notes: Lecture slides and Assignments are on the web.

0.4 Course Outline

Week	Items/Topics
1	**Chapter 0 Course Description and Outline** 0.1 Course Description 0.2 Course Objectives 0.3 Course Administration 0.4 Course Outline 0.5 Grade Distribution **Chapter 1 Optoelectronics in your neighborhood** 1.0 Preface 1.1 "λ" range (in nm) of light 1.2 How many kinds of displays are found in the market? 1.3 Components of opto-electronics 1.4 Integrated optical circuit (IOC) 1.5 Optoelectric integrated circuit (OEIC)
2	**Chapter 2 Cathode Ray Tube (CRT)** Electron trip inside CRT (Motion of Charge in "E" Field)

0.4 Course Outline

Week	Items/Topics
3	**Chapter 3 Light Emitting Diodes** 3.1 Parts of LED 3.2 operation of LED 3.3 Light emission 3.4 Light Biasing 3.5 Light Applications 3.6 Light Efficiency
4-5	**Chapter 4 Laser** 4.1 What is Laser 4.2 Basic concepts for a laser 4.3 Laser Characteristics (Properties) 4.4 Laser Radiation Properties 4.5 How does a laser work? 4.6 Laser Hazards 4.7 optical resonators 4.8 External Modulators
6	**Chapter 5 : Photo detectors , Solar cells and LCD** 5.1 Photodiode 5.2 Varactor diodes 5.3 Schottky Barrier diode (SBD) 5.4 PIN diodes 5.5 Tunnel diodes 5.6 Photovoltaic cells

0.4 Course Outline (Continued)

9	**Chapter 7 : Fiber Optics** 7.1 Optical fiber carrier 7.2 fiber material 7.3 fiber parameters 7.4 Propagation constant
10	7.5 Dispersion and Attenuation 7.6 Repeater spacing 7.7 Repeater spacing design 7.8 Power and efficiency 7.9 Photo detection 7.10 Receiver and optical cables 7.11 Free space optics 7.12 More optical devices
11	**Optical Communication System Based on VLC**
12-13	Presentations on VLC and Li-fi

0.5 Possible Researches

(reports)

Presentations on VLC and Li-fi

(Practical)

Design a mini project using suitable optical electronic components with aid of suitable CAD tool and Hardware Implementation, testing and results, preparing a report

0.6 Grade Distribution (for Cridet H system)

Assessment Tools	Weight
First Midterm Examination	30
Final Examination	40
Second Midterm Examination + Classwork	30
Quizzes (2 times)	10
Mini project, H/W S/W	10
Presentations	10
Total	100 %

0.6 Grade Distribution (for Mainstream system)

Assessment Tools	Weight
First Midterm Examination	25
Quiz	
Second Midterm Examination + Classwork	25
Quizzes (2 times) / proj	
Final	75
Total	125

About the Class

- Classroom Protocols:
  - Always be **on time**
  - **No side conversation**
  - **No cellphones ringing**

- You're welcome to ask **questions**
- You can interrupt me at any time
- Our responsibility is to facilitate your learning. You have to make the effort
- If you have a question on the lecture material, then
  - Look up a book.
  - Ask me during my office hours, or email me at anytime

Thank you for your attention