

Model No.12 Course Specifications : Optical Communications

Faculty of Engineering at Shoubra

University : Benha university

**Faculty** : Faculty of Engineering atShoubra

**Department** : Electrical Engineering Department

# 1- Course Data

Course Code : ECE 423

Course Title : Optical Communication

Study Year : Fourth Year

Specialization : Electronics and Communications Teaching Hours:

Lecture : 3

Tutorial : 2

Practical

# 2- Course Aim

For students undertaking this course, the aims are to:

2.1- Acquire the background needed for a clear understanding of the basics of Optical Communications.

2.2- Describe and assess the performance of the elements of an Optical Communication link.

2.3- Describe the physical limitations on the transmission speed and bandwidth availability of optical links.

2.4- Apply these concepts in the analysis and design of the power budget of a practical optical Fiber link.

# 3- Intended Learning Outcomes of Course (ILOS)

## a- Knowledge and Understanding

On completing this course, students will be able to:

- a-1- Demonstrate contemporary optical topics (a.14)
- a-2- illustrate usage of optical fibers (a.27)
- a-3- Describe optical communication systems (a.30)
- a-4- Mention methods of optical applications. (a.26)
- a-5- Define optical communication systems and links. (a.30)

## **b- Intellectual Skills**

At the end of this course, the students will be able to:

b-1 - Select appropriate solutions for optical generation and transmission problems based on analytical thinking. (b- 3)

b-2 - Think in a creative and innovative way in problem solving and design of optical communication systems. (b- 4)

b-3 - Solve optical communication problems, often on the basis of limited information. (b-8)

## c- Professional Skills

On completing this course, the students are expected to be able to:

c- 1 - Apply knowledge of mathematics, science, information technology, and engineering practice to solve optical communication problems. (c- 1)

- c- 2 Use computational facilities and techniques for optical design. (c- 5)
- c- 3 Use appropriate tools to measure optical communication system performance. (c- 19)

#### d- General Skills

- At the end of this course, the students will be able to:
- d-1 Refer to relevant literatures. (d-9)
- d-2 Develop skills related to creative and critical thinking as well as problem solving (d-12)

#### **4-** Course Contents

No.	Topics	No of hours
1	Semiconductor materials for optical communications	3
2	Radiative Recombination mechanisms in semiconductors	3
3	Radiative Recombination mechanisms in semiconductors	3
4	Spectrum of emitted radiation from LEDs and Laser Diodes	3
5	Midterm	3
6	ModulationChracteristics of Light Sources	3
7	ModulationChracteristics of Light Sources	3
9	Optical Detectors	3
10	Optical Communication Link Design	3
11	Power Budget Considerations	3

#### 5- Teaching and Learning Methods

- 5.1- Lectures
- 5.2- Class activity
- 5.3- Case study

#### 6- Teaching and Learning Methods of Disables

6.1- Not Applicable

#### 7- Student Assessment

#### a- Student Assessment Methods

1	Assignments to assess knowledge, practical and intellectual skills.
2	Quiz to assess knowledge and intellectual skills
3	Mid-term exam to assess knowledge and intellectual skills.
4	Oral Exam to assess knowledge skills, intellectual skills, Professional Skills and general skills
5	Final exam to assess knowledge, intellectual and practical skills

#### **b-** Assessment Schedule

No.	Assessment	Week
1	Assessments	3,9,11
2	Quizzes	4,7,10,12
3	Mid-term exam	8
4	Oral Exam	14

5 Final exam	15
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#### c- Weighting of Assessments

Assessment	Weight
Midterm Examination	20 %
Final Term Examination	60 %
Oral Examination	10 %
Practical Examination	0 %
Semester work	10 %
Other types of assessment	0 %
Total	100 %

#### 8- List of References

#### a- Books

1- "Fiber-Optic Communication Systems" Third Edition, GOVIND P. AGRAWAL, John Wiley & Sons, Inc., 2004

2- W. K. Pratt, "Laser Communication Systems", Wiley, New York , 1969

3- L. Kazovsky, S. Bendetto, and A. E.Willner, "Optical Fiber Communication Systems", Artec House, Norwood, MA, 1996

#### **b-** Recommended Books

1- G. Einarrson, "Principles of Lightwave Communication Systems", Wiley, New York. , 1996 2- N. Kashima, Passive Optical Components for Optical Fiber Transmission, Artec House, Norwood, MA , 1995

#### c- Periodical

1- IEEE Photon. Technol. Lett

2- J. Lightwave Technology

3- IEEE J. Quantum Electron.

4- IEEE J. Sel. Topics Quantum Electron.

#### Course coordinator

Assoc. Prof. Dr.M. Lotfy Rabeh

Head of department: Prof. Dr. Sayed abo-Elswood Ward



# Model No.11A Course Specifications : Optical Communication

Faculty of Engineering at Shoubra

**University** : Benha university

Faculty : Faculty of Engineering at Shoubra

**Department** : Electrical Engineering Department

# Matrix of Knowledge and Skills of the course

# Matrix of Knowledge and Skills of the course

No.	Topics	week	Basic Knowledge	Intellectual Skills	Professional Skills	General Skills
1	Semiconductor materials for optical communications	1	a1,a3	b2	c1	d1
2	Semiconductor materials for optical communications	2	a1,a3	b2	c1	d1
3	Radiative Recombination mechanisms in semiconductors	3	a1,a3	b2	c1	d1
4	Radiative Recombination mechanisms in semiconductors	4	a1,a3	b2	c1	d1
5	Spectrum of emitted radiation from LEDs	5	a2	b1, b2		
6	Spectrum of emitted radiation from Laser Diodes	6	a2	b1, b2		
7	Spectrum of emitted radiation from Laser Diodes	7	a2	b1, b2		
8	Mid-Term Exam	8				
9	Modulation Characteristics of Light Sources	9	a3,a5	b1, b2,b3	c1, c2,c3	d2
10	Optical Detectors	10	a3	b1, b2,b3	c1, c2,c3	d2
11	Basics of light propagation in Optical fibers	11	a2,a3	b1		d1
12	Basics of light propagation in Optical fibers	12	a2,a3	b1		d1
13	Optical Communication Link Design	13	a3,a4,a5	b1	c1, c2,c3	d2
14	Oral Exam	14				
15	Final exam	15				

Course coordinator:	Assoc. Prof. Dr.M. Lotfy Rabeh
Course instructor	Assoc. Prof. Dr.M. Lotty Raden
Head of department:	Prof. Dr. Saved Ward

# Matrix of course content and ILO's

 $\checkmark$ 

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 $\checkmark$ 

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√

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**d1** 

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**d**2

✓

✓

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Code: EC423 **Course Title:** Optical Communications Lecture: 3 **Tutorial**: 2 Practical: -Total:5 Program on which the course is given: B.Sc. Electrical Engineering (Communications) Major or minor element of program: Major **Electrical Engineering Department Department offering the program: Department offering the course: Electrical Engineering Department** Academic year / level: Fourth Year / Second Semester 2014-2015 **Date of specifications approval:** 20/6/2010 a2 a3 a4 a5 b1 **b**2 **b3 c1** c2 c3 **Course content** a1 Semiconductor materials for optical ✓ ✓ **√** √ communications - Radiative Recombination mechanisms in semiconductors Spectrum of emitted radiation from LEDs and ✓ ✓ ✓ Laser Diodes

ModulationChracteristics of Light Sources:

Basics of light propagation in Optical fibers

**Optical Communication Link Design** 

LEDs and Laser Diodes

**Optical Detectors** 

# Matrix of course aims and ILO's

Course Title: Optical Communic	ations	<b>Code</b> : EC423				
Lecture: 3 Tut	torial: 2	Practical: -				
Total:5						
Program on which the course is	given: B.Sc. Ele	ectrical Engineering (Commun	nications)			
Major or minor element of prog	gram: Major					
Department offering the progra	m: Electrica	Electrical Engineering Department				
Department offering the courses	: Electrica	ll Engineering Department				
Academic year / level:	Fourth Y	Year / Second Semester 2014-	-2015			
Date of specifications approval:	20/6/2010					

Course aims	a1	a2	a3	a4	a5	<b>b1</b>	b2	<b>b3</b>	c1	c2	c3	<b>d1</b>	<b>d</b> 2
Semiconductor materials for optical communications - Radiative Recombination mechanisms in semiconductors	~		>			~		>		~	~	~	>
Assimilate Spectrum of emitted radiation from LEDs and Laser Diodes- Optical Detectors and fibers.		~		~	~		~		<				
Describe the Design concepts of Optical Link and performance.			~		~	~	~		~			✓	

<b>Course coordinator:</b>	Assoc. Prof. Dr.M. Lotfy Rabeh
<b>Course instructor</b>	Assoc. Prof. Dr.M. Lotfy Rabeh
Head of department:	Prof. Dr. Sayed Abo-Elswood Ward