Faculty of Engineering at Shoubra

Model No.12
Course Specifications : Microwave Electronics

University : Benha university

Faculty : Faculty of Engineering at Shoubra

Department : Electrical Engineering Department

1- Course Data

Course Code : ECE441 (كهت٤٤١) Course Title : Microwave Electronics Study Year : Fourth Year
Specialization :
Teaching Hours:
Lecture : 4 Tutorial : 2 Practical :

2- Course Aim

For students undertaking this course, the aims are to:

2.1- Build the student background and basic knowledge in how to generate and amplify microwaves
2.2- Provide knowledge and understanding of microwave tubes and semiconductor devices
2.3- Provide knowledge and understanding of microwave active components, phase shifters, mixers and detectors

3- Intended Learning Outcomes of Course (ILOS)

a- Knowledge and Understanding

On completing this course, students will be able to:

a1- Describe principles of design including microwave tubes and semiconductor devices, process related to microwave.(a5)
a2- List microwave applications.(a24)

b- Intellectual Skills

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

b1-Assess and evaluate the characteristics and performance of microwave tubes and semiconductor devices, systems and processes.(b6)
b2-Investigate the failure of microwave tubes and semiconductor devices, systems, and processes(b7)

c- Professional Skills

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

c1-Apply knowledge of microwave tubes, phase shifters, information technology, design and engineering practice to solve engineering problems. (c1)
c2- Prepare and present technical reports about microwave tubes and semiconductor devices .(c12)

d- General Skills

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

d- 1) Work in stressful environment and within constraints.(d2) .

4- Course Contents

No.	Topics	hours
1	Two cavity Klystron	4
2	Reflex Klystron	4
3	Travelling wave amplifier	4
4	Magnetron	8
5	Negative resistance devices (tunnel diode)	8
6	Gunn diodes and avalanche diode	4
7	Parametric amplifiers	4
8	Microwave oscillators	4
9	Microwave mixers	8
10	Phase shifting circuits	4

5- Teaching and Learning Methods

5.1- Power-point lectures/ White board
5.2- Class discussion
5.3- Tutorial problems

6- Teaching and Learning Methods of Disables

6.1- Nothing

7- Student Assessment

a- Student Assessment Methods

1	Assignments to assess knowledge and intellectual skills.
2	Quizes to assess knowledge and intellectual skills
3	Mid-term exam to assess assess knowledge and intellectual skills
4	technical report writing to assess knowledge, intellectual, professional and general skills
5	Final exam to assess knowledge and intellectual skills.

b- Assessment Schedule

No.	Assessment	Week
1	Assignments	2,5,6,7,9,11,12,13
2	Quizes	4, 10
3	Mid-term exam	8
4	technical report writing	3
5	Final exam	15

c- Weighting of Assessments

Assessment	Weight
Mid_Term Examination	23 %
Final_Term Examination	67 %
Oral Examination	0 %
Practical Examination	0 %
Semester work	10 %
Other types of assessment	0 %
Total	100 %

8- List of References

a- Course Notes

1- Course notes (Notes taken by students inside classroom)

b- Books

1- Liao , S.Y. Microwave Devices and circuits , Prentice Hall , 1996.

c- Recommended Books

1- Collin , R.E.,Foundations for microwave engineering ,McgrawHill , 2000.

- Course Coordinator : Dr. Abdallah Hammad Zaki

- Head of Department : Prof. Dr. Sayed Abo-Elsood Ward

Faculty of Engineering at Shoubra

Model No.11A
Course Specifications : Microwave Electronics

University : Benha university

Faculty : Faculty of Engineering at Shoubra

Department : Electrical Engineering Department

Matrix of Knowledge and Skills of the course

No.	Topics	week	Basic Knowledge	Intellectual Skills	Professional Skills	General Skills
1	Two cavity Klystron	1	a1,a2	b1	c1	
2	Reflex Klystron	2	a1,a2	b1	c1	
3	Travelling wave amplifier	3	a1,a2	b1	c1, c2	
4	Magnetron	4	a1,a2	b1	c1	
5	Magnetron	5	a1,a2	b1	c1	
6	Negative resistance devices (tunnel diode)	6	a1,a2	b1	c1	
7	Negative resistance devices (tunnel diode)	7	a1,a2	b1	c1, c2	
8	Midterm exam	8	a1,a2	b1		d1
9	Gunn diodes and avalanche diode	9	a1,a2	b1	c1	
10	Parametric amplifiers	10	a1,a2	b1, b2	c1	
11	Microwave mixers	11	a1,a2	b1, b2	c1	
12	Microwave mixers	12	a1,a2	b1, b2	c1, c2	
13	Phase shifting circuits	13	a1,a2	b1	c1	
14	advanced microwave circuits design	14	a1,a2	b1, b2	c1	
15	Final Exam	15	a1,a2	b1, b2		d1

- Course Coordinator : Dr. Abdallah Hammad Zaki

- Head of Department : Prof. Dr. Sayed Abo-Elsood Ward

Matrix of course content and ILO's

Course Title: Microwave Electronics **Code**: ECE441
Lecture: 4 **Tutorial**: 2 **Practical**: - **Total:**6
Program on which the course is given: B.Sc. Electrical Engineering (Communications)
Major or minor element of program: Major
Department offering the program: Electrical Engineering Department
Department offering the course: Electrical Engineering Department
Academic year / level: **Fourth** Year / **First** Semester
Date of specifications approval: 20/6/2010

Course content	**a1**	**a2**	**b1**	**b2**	**c1**	**c2**	**d1**
Two cavity Klystron	✓	✓	✓		✓		
Reflex Klystron	✓	✓	✓		✓		
Travelling wave amplifier	✓	✓	✓		✓	✓	✓
Magnetron	✓	✓	✓		✓	✓	
Negative resistance devices (tunnel diode)	✓	✓	✓		✓	✓	✓
Gunn diodes and avalanche diode	✓	✓	✓		✓		
Parametric amplifiers	✓	✓	✓	✓	✓	✓	
Microwave mixers	✓	✓	✓	✓	✓		✓
Phase shifting circuits	✓	✓	✓		✓		
advanced microwave circuits design	✓	✓	✓	✓	✓	✓	

Matrix of course aims and ILO's

Course Title: Microwave Electronics **Code**: ECE441
Lecture: 4 **Tutorial**: 2 **Practical**: - **Total:**6
Program on which the course is given: B.Sc. Electrical Engineering (Communications)
Major or minor element of program: Major
Department offering the program: Electrical Engineering Department
Department offering the course: Electrical Engineering Department
Academic year / level: **Fourth** Year / **First** Semester
Date of specifications approval: 20/6/2010

Course aim	a1	a2	b1	b2	c1	c2	d1
Build the student background and basic knowledge in how to generate and amplify microwaves	✓		✓		✓		
Provide knowledge and understanding of microwave tubes and semiconductor devices	✓	✓	✓	✓	✓		
Provide knowledge and understanding of microwave active components, phase shifters, mixers and detectors	✓	✓	✓	✓	✓	✓	

Course coordinator: Ass. Prof. Abdallah Hammad
Course instructor Ass. Prof. Abdallah Hammad
Head of department: Prof. Dr.Sayed Ward