Academic Course Description

SRM University
Faculty of Engineering and Technology
Department of Electronics and Communication Engineering

EC0322 Microwave and Optical Communication Lab

Sixth Semester, 2014-15 (Even Semester)

Course (catalog) description

To provide a depth knowledge about the Microwave and Optical components and in analyzing the microwave and Optical equipments. The laboratory exercises are designed to give students ability to design, build, and analyze the components. The first half of the course uses Microwave bench setup. The second half of the course uses Optical bench setup and softwares such as MATLAB and/or Pspice for simulation. Laboratory assignments progress from investigation of the properties of basic microwave and optical components.

Compulsory/Elective course: Compulsory for ECE students

Credit hours: 2 credits

Laboratory

Microwave communication Lab (Room No. TP11L3, 11th floor, Tech Park)

Optical communication Lab (Room No. TP11L2, 11th floor, Tech Park)

Course coordinator(s)

Mrs. J. Manjula, Assistant Professor (S.G), Department of ECE

Instructor(s)

Name of the instructor	Class handling	Office location	Email (domain: @ktr.srmuniv.ac.in)	Schedule
Mrs. P. Malarvizhi (Batch-1)	Group 1	TP1203A	malarvizhi.p	Day 1-AN , Day 4-FN
Ms. S. Sudarvizhi (Batch-2)		TP1003A	sudarvizhi.s	Day 1-AN , Day 4-FN
Mrs. Diana Emarald Aasha (Batch -3)		TP903A	dianaemeraldaasha.s	Day 2-FN , Day 3-AN
Mrs. S. T. Aarthy (Batch-4)		TP10S8	aarthy.s	Day 2-FN , Day 3-AN
Mrs. R.Bhakkialakshmi (Batch -1)	Group 2	TP1006A	bhakkialakshmi.r	Day 1 -FN, Day 4 - AN

Mrs. J. Manjula (Batch -2)		TP12S3	manjula.j	Day 1 -FN, Day 4 - AN
Mr. B. Ananda Venkatesan (Batch -3)		TP10S4	anandavenkatesan.b	Day 2 -AN, Day 3 - FN
Mrs. G. Suganthi Brindha (Batch-4)		TP903A	sugnathibrindha.g	Day 2 -AN, Day 3 - FN

Relationship to other courses

Pre-requisites: Nil

Assumed knowledge:

Basics of Physics
Basics of Microwave circuits

Co-requisites:

EC0302 Microwave communication
EC0304 Optical communication and Networks

Text book(s) and/or required materials: Lab manual; additional materials posted on SRM web.

References :

1. Laboratory manual, ECE department, SRM University
2. Sisodia and Raghuvanshi – "Basic Microwave techniques and laboratory manual"

Computer usage

Orcad SPICE simulation may be used to analyze the frequency response of RF and IF amplifiers.

Hardware Laboratory Usage

Each laboratory station is equipped with a Microwave and optical bench setup unit containing a power supply, switches and indicators. Students work in groups of three, but maintain individual laboratory notebooks and submit individual reports.

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100%

Broad area: Communication | Signal Processing | Electronics | VLSI | Embedded

Course objectives

The objectives of this course is	Correlates to Program Objective
To have a detailed practical study on microwave equipments and microstrip components.	2, 3, 4
To study the optical devices and to use in appropriate application	2, 3, 4

Course Learning Outcome

This course provides the foundation education in Microwave and optical devices and makes them to analysis the operation of each device. Through lecture, laboratory, and out-of-class assignments, students are provided learning experiences that enable them to:	Correlates to program outcome		
	H	**M**	**L**
Study and analysis of microwave equipments and Optical devices.	c, f	d	
Become proficient with computer skills (eg., OrCAD Pspiceand MATLAB) for the analysis and design of amplifiers.	f		

H: high correlation, M: medium correlation, L: low correlation

Course Topics

No.	Lab Experiments	Sessions
1	Characteristics of reflex Klystron	1
2	Wavelength and frequency measurement	2
3	Study of power distribution in Directional coupler	3
4	Study of power distribution in E ,H plane & Magic Tee	4
5	Impedance measurement by slotted line method	5
6	Gain and radiation pattern of Horn antenna	6
7	Characteristics of Microstrip antenna	7
8	DC characteristics of LED and PIN photo-diode	8
9	DC characteristics of LASER diode	9
10	Measurement of Numerical Aperture, propagation and bending losses	10
11	Analysis of Analog optical link	11
12	Analysis of Digital optical link	12
13	Simulation of AM, RF and IF amplifier using software	13

Evaluation methods

Attendance - 5%
Pre-lab questions - 10%
In-lab experiment - 15%
Post-lab questions - 10%

Report	-	15%
Model exam	-	20%
End Semester Exam	-	25%

Laboratory Policies and Record Format

Records are due at the beginning of the lab period. The records are intended to be a complete documentation of the work done in preparation for and during the lab. The record should be complete so that someone else familiar with Electronic design could use it to verify your work. The pre-lab and post-lab record format is as follows:

1. Each student should bring a hardcopy of lab manual (which will be forwarded by the corresponding staff in-charge) for the scheduled lab experiment, with pre-lab questions filled and relevant tabular columns drawn. The observations entered in this printout have to be attested and marks should be awarded during that lab period itself.
2. Lab record for current session has to be submitted during the next session itself. Faculty should award the marks for record and has to sign the coversheet as well as index page during that session itself. **Lab records should be submitted on the record sheets provided from the university.** Your record is a professional presentation of your work in the lab. Neatness, organization, and completeness will be rewarded. Points will be deducted for any part that is not clear.
3. In this laboratory students will work in teams of three. However, the lab records will be written individually. Please use the following format for your lab records.
    a. **Cover Page:** Include your name, Subject Code, Section No., Experiment No. and Date.
    b. **Objectives:** Enumerate 3 or 4 of the topics that you think the lab will teach you. There should be one or two sentences per objective. Remember, you should write about what you will learn, not what you will do.
    c. **Design:** This part contains all the steps required to arrive at your final circuit. This should include diagrams, tables, equations, K-maps, explanations, etc. Be sure to reproduce any tables you completed for the lab. This section should also include a clear written description of your design process. Simply including a circuit schematic is not sufficient.
    d. **Questions:** Pre-lab questions should be answered in the print-out of lab manual itself. Post-lab questions should be answered in Lab record sheets**.** Answers should be written formally.
3. Your work must be original and prepared independently. However, if you need any guidance or have any questions or problems, please do not hesitate to approach your staff in-charge during office hours. The students should follow the dress code in the Lab session.
4. Each laboratory exercise (circuit) must be completed and demonstrated to your Staff In-charge in order to receive working circuit credit. This is the procedure to follow:
    a. Circuit works: If the circuit works during the lab period (3 hours), call your staff in-charge, and he/she will sign and date it.. This is the end of this lab, and you will get a complete grade for this portion of the lab.
    b. Circuit does not work: If the circuit does not work, you must make use of the open times for the lab room to complete your circuit. When your circuit is ready, contact your staff in-charge to set up a time when the two of you can meet to check your circuit.
5. Attendance at your regularly scheduled lab period is required. An unexpected absence will result in loss of credit for your lab. If for valid reason a student misses a lab, or makes a reasonable request in advance of the class meeting, it is permissible for the student to do the lab in a different section

later in the week if approved by the staff in-charge of both the sections. Habitually late students (i.e., students late more than 15 minutes more than once) will receive 10 point reductions in their grades for each occurrence following the first.

7. **Records Due Dates**: Records are due one week after completion of the corresponding lab.
8. **Systems of Tests:** Regular laboratory class work over the full semester will carry a weightage of 75%. The remaining 25% weightage will be given by conducting an end semester practical examination for every individual student.

9. General Procedure

a. Follow precautions of reflex klystron power supply.

b. Set the voltage levels of beam and repeller supply voltage to safe mode of reflex klystron.

c. Setup the microwave bench as per the given block diagram and study the characteristics of the microwave components.

d. Set the optical circuits as per the given circuit diagram and study the performance parameters of fiber optics.

e. After the completion of the experiments switch off the power supply and return the components.

.....

Prepared by: Mrs. J. Manjula , Assistant Professor (S.G), Department of ECE

Dated: 5th Jan 2015 **Revision No.:** 00 **Date of revision:** NA

.....

Course Co-ordinator	**Academic Co-ordinator**	**Professor In-charge**	**HOD/ECE**
(J.Manjula)	(Mr.B.Viswanathan)	(Dr.R.Kumar)	(Dr.S.Malarvizhi)

Addendum

ABET Outcomes expected of graduates of B.Tech / ECE / program by the time that they graduate:

a. Graduates will demonstrate knowledge of mathematics, science and engineering.

b. Graduates will demonstrate the ability to identify, formulate and solve engineering problems.

c. Graduate will demonstrate the ability to design and conduct experiments, analyze and interpret data.

d. Graduates will demonstrate the ability to design a system, component or process as per needs and specifications.

e. Graduates will demonstrate the ability to visualize and work on laboratory and multi-disciplinary tasks.

f. Graduate will demonstrate the skills to use modern engineering tools, software's and equipment to analyze problems.

g. Graduates will demonstrate the knowledge of professional and ethical responsibilities.

h. Graduate will be able to communicate effectively in both verbal and written form.

i. Graduate will show the understanding of impact of engineering solutions on the society and also will be aware of contemporary issues.

j. Graduate will develop confidence for self education and ability for life-long learning.

k. Graduate will show the ability to participate and try to succeed in competitive examinations.

Program Educational Objectives

1. To prepare students to compete for a successful career in Electronics and Communication Engineering profession through global education standards.
2. To enable the students to aptly apply their acquired knowledge in basic sciences and mathematics in solving Electronics and Communication Engineering problems.
3. To produce skillful graduates to analyze, design and develop a system/component/ process for the required needs under the realistic constraints.
4. To train the students to approach ethically any multidisciplinary engineering challenges with economic, environmental and social contexts
5. To create an awareness among the students about the need for life long learning to succeed in their professional career as Electronics and Communication Engineers.