

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

This course outline template acts as a guide for writing your course outline. As every course is different, please feel free to amend the template/ format to suit your requirements.

COURSE OUTLINE TEMPLATE			
Course Title	SEMICONDUCTOR PHYSICS AND DEVICES		
Course Code	ECPC13	No. of Credits	3
Department	E.C.E	Faculty	R.K.KAVITHA
Pre-requisites Course Code	None		
Course Coordinator(s) (if, applicable)	R.K.Kavitha		
E-mail	rkkavitha@nitt.edu	Telephone No.	0431-2503322
Course Type	<input checked="" type="checkbox"/> Core course <input type="checkbox"/> Elective course		
COURSE OVERVIEW			
Majority of electronic circuits are today are designed as integrated circuits (ICs), in which the entire circuit is fabricated on a single piece of semiconductor material.the objective of this introductory course is to learn the fundamental aspects of semiconductor physics , basic electronic devices,circuit configurations and basic circuit properties.			
COURSE OBJECTIVES			
<ul style="list-style-type: none"> To make the students understand the fundamentals of electronic devices. To train them to apply these devices in mostly used and important applications. 			
COURSE OUTCOMES (CO)			
Course Outcomes	Aligned Programme Outcomes (PO)		
Students are able to CO1: apply the knowledge of basic semiconductor material physics and understand fabrication processes. CO2: analyze the characteristics of various electronic devices like diode, transistor etc., CO3: classify and analyze the various circuit configurations of Transistor and MOSFETs.	1,2,3,4		
CO4: illustrate the qualitative knowledge of Power electronic Devices. CO5: become Aware of the latest technological changes in Display Devices.	7,10,12		

COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	Day	Topic	Mode of Delivery
1.	1	Course Introduction	Lecture / Tutorial C & T / PPT or any suitable mode
2.	2	Semiconductor materials, basic crystal structure	
3.	3	Formation of energy bands in solids Concept of hole, Intrinsic and extrinsic semiconductors	
4.	4	Conductivity Of Semiconductor, Equilibrium Carrier concentration	
5.	5	Density of states and Fermi level, Carrier transport – Drift and Diffusion	
6.	6	Continuity Equation and Hall Effect	
7.	7	Basic Crystal Structure, Crystal growth techniques for Si and GaAs (Czocharalski Method)	
8.	8	Float Zone method, Bridgman Technique	
9.	9	Epitaxial Growth Technique	
10.	10	Lithography Etching Methods	
11.		UNIT II	
12.	11	PN Junction Diodes Introduction, Pn Junction as a rectifier	Lecture / Tutorial C & T / PPT or any suitable mode
13.	12	Energy Band Structure, Current Components	
14.	13	Volt –Ampere Characteristics	
15.	14	Diode Resistance, transition & diffusion Capacitance	
16.		Problem Solving Skill test	

17.	15	Different types of Diodes (Zener , Schottky, photo diode,etc)	
18.	16	Limiting and Clamping Circuits, Breakdown Mechanism in Diodes	
19.	Assessment –I Cycle Test 1		
20.	UNIT III		
21.	17	BJT Introduction, Modes of operation	Lecture / Tutorial C & T / PPT or any suitable mode
22.	18	BJT Current components	
23.	19	BJT models	
24.	20	BJT as a Switch, Breakdown mechanisms	
25.	21	Photo Devices Mini-Project	
26.	UNIT IV		
27.	22	MOSFET Operations, Structure, Types	Lecture / Tutorial C & T / PPT or any suitable mode
28.	23	V-I Characteristics	
29.	24	Second order effects, MOSFET as an amplifier and switch	
30.	25	Capacitance and equivalent model	
31.	26	CMOS structure , BiCMOS operations	
32.	27	Operation of CCDs	
33.	Assessment-II Cycle Test-II		
34.	UNIT V		
35.	28,29	Power Devices Introduction, Operation and characteristics of thyristor family: SCR ,TRIAC, DIAC	Lecture / Seminars PPT or any suitable mode
36.	30,31	Triggering power diodes, power transistors	

37.	32,33	IGBTs, GTOs Fabrication and VI characteristics	
38.	34,35	Display Devices : LCD , Plasma & LED Display Panels	
39.	End Semester		

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1.	Cycle Test – 1	3 rd week of August	1 hour	20
2.	Cycle Test – 2	Last week of September	1 hour	20
3.	Problem Solving Skill test	2 nd week of August and		10
	Mini Project	2 nd week of september		10
4.	End Semester Exam	4 th week October	3 hour	40

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

Text Books

1. S.M.Sze, 'Semiconductors Devices, Physics and Technology, (2/e)', Wiley, 2002.
2. A.S.Sedra&K.C.Smith, "Microelectronic Circuits (6/e)", Oxford, 2010.
3. L.Macdonald&A.C.Lowe, "Display Systems", Wiley, 2003

Reference Books

1. J.Millman and C.C.Halkias, "Electronic devices and Circuits", McGraw Hill, 1976.
2. A.Bar-Lev,"Semiconductors and Electronic Devices, (3/e)", Prentice Hall, 1993.
3. B.G.Streetman, "S.K.Banerjee: Solid state Electronic devices, (6/e)", PHI, 2010.

COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)

1. The students through class representative may give their feedback at any time which will be duly addressed.
2. Feedback from the students through MIS and class committee meetings.

COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)

CORRESPONDENCE

1. All the students are advised to come to the class regularly. All the correspondence (schedule of classes/ schedule of assignment/ course material/ any other information regarding this

course) will be intimated in the class only.

ATTENDANCE

1. Attendance will be taken by the faculty. 100 % is a mandatory. However, the relaxation upto 20% will be given for leave on medical, and other essential requirements followed in the institute. Every student should maintain minimum 80% physical attendance in these contact hours along with assessment criteria to attend the end semester examination.
2. Any student who fails to maintain 80% and misses any lab experiment needs to appear for the compensation classes with regular evaluation process. Students attendance is compulsory for Quiz and end semester.
3. Students not having 80% minimum attendance with compensation at the end of the semester will have to REDO the course.

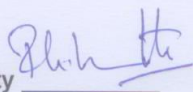
ASSESSMENT

1. Attending all the assessments are mandatory for every student.
2. Finally every student is expected to score minimum 1/3 rd of the top rank holder of the class (including all assessments) to pass the course. Otherwise student would be declared fail and 'F' grade will be awarded. Further he can take up only FORMATIVE ASSESSMENT.
3. Please refer to B.Tech., Regulations 2015 for the letter grades and corresponding grades.

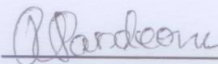
Plagiarism, academic honesty: The students are expected to follow institute rules.

FOR SENATE'S CONSIDERATION

Course Faculty



CC-Chairperson



HOD

