

DEPARTMENT OF ECE
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the programme and specialization	B.Tech. ECE		
Course Title	ELECTRODYNAMICS AND ELECTROMAGNETIC WAVES		
Course Code	ECPC12	No. of Credits	4
Course Code of Pre-requisite subject(s)	None		
Session	July 2018	Section (if, applicable)	A and B
Name of Faculty	Dr.P.Muthu chidambaranathan	Department	ECE
Email	muthuc@nitt.edu	Telephone No.	0431-2503309
Name of Course Coordinator(s) (if, applicable)			
Course Type	<input checked="" type="checkbox"/> Core course <input type="checkbox"/> Elective course		

Syllabus (approved in BoS)

Course Content

Electrostatics. Coulomb's law. Gauss's law and applications. Electric potential. Poisson's and Laplace equations. Method of images. Multipole Expansion.

Electrostatic fields in matter. Dielectrics and electric polarization. Capacitors with dielectric substrates. Linear dielectrics. Force and energy in dielectric systems.

Magneto-statics. Magnetic fields of steady currents. Biot-Savart's and Ampere's laws. Magnetic vector potential. Magnetic properties of matter.

Electrodynamics. Flux rule for motional emf. Faraday's law. Self and mutual inductances. Maxwell's Equations. Electromagnetic Boundary conditions. Poynting theorem.

Electromagnetic wave propagation. Uniform plane waves. Wave polarization. Waves in matter. Reflection and transmission at boundaries. Propagation in an ionized medium.

Text Books

1. *D.J.Griffiths, "Introduction to Electrodynamics (3/e)", PHI, 2001*
2. *E.C. Jordan & G. Balmain, "Electromagnetic Waves and Radiating Systems", PHI, 1995.*

Reference Books

1. *W.H.Hayt, "Engineering Electromagnetics, (7/e)", McGraw Hill, 2006.*
2. *D.K.Cheng, "Field and Wave Electromagnetics, (2/e)", Addison Wesley, 1999.*
3. *M.N.O.Sadiku, "Principles of Electromagnetics, (4/e)", Oxford University Press, 2011.*

4. N.NarayanaRao, "Elements of Engineering Electromagnetics, (6/e)", Pearson, 2006.
5. R.E.Collin, "Foundations for Microwave Engineering (2/e)", McGraw-Hill, 2002.
6. R.E.Collin, "Antennas and Radiowave Propagation", McGraw-Hill, 1985.

COURSE OBJECTIVES

- To expose the students to the rudiments of Electromagnetic theory and wave propagation essential for subsequent courses on microwave engineering, antennas and wireless communication

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
CO1: recognize and classify the basic Electrostatic theorems and laws and to derive them.	
CO2: discuss the behavior of Electric fields in matter and Polarization concepts.	
CO3: classify the basic Magneto static theorems and laws and infer the magnetic properties of matter.	
CO4: summarize the concepts of electrodynamics & to derive and discuss the Maxwell's equations.	
CO5: students are expected to be familiar with Electromagnetic wave propagation and wave polarization.	

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week	Topic	Mode of Delivery
1	1 WEEK 9-13 July (4 Contact Hours)	Electrostatics. Coulomb's law. Gauss's law and applications	Lecture C&T/ PPT or any suitable mode
2	2 WEEK 16- 20 July (4 Contact Hours)	Electric potential. Poisson's and Laplace equations.	

3	3 WEEK 23-27 July (4 Contact Hours)	Method of images. Multipole Expansion.	
4	4 WEEK 30 st July to 3rd August (4 Contact Hours)	Electrostatic fields in matter.	
5	5 WEEK 6-10 August (4 Contact Hours)	Dielectrics and electric polarization. Capacitors with dielectric substrates.	
6	6 WEEK 13-17 August (4 Contact Hours)	Linear dielectrics. Force and energy in dielectric systems.	
		ASSESSMENT I – 20 MARKS	WRITTEN TEST
7	7 WEEK 27 th August to 31 Aug (4 Contact Hours)	Magneto-statics. Magnetic fields of steady currents.	
8	8 WEEK 3-8 September (4 Contact Hours)	Biot-Savart's and Ampere's laws.	Lecture C&T/ PPT or any suitable mode
9	9 WEEK 10 th to 14 th September (4 Contact Hours)	Magnetic vector potential. Magnetic properties of matter.	
		ASSESSMENT II – 10 MARKS	QUIZ/TEST
10	10 WEEK 17 th to 21st September (4 Contact Hours)	Electrodynamics. Flux rule for motional emf.	Lecture C&T/ PPT or any suitable mode

11	11 WEEK 24 th to 28 th September (4 Contact Hours)	Faraday's law. Self and mutual inductances.	WRITTEN TEST
12	12 WEEK 1-5 October (4 Contact Hours)	Maxwell's Equations. Electromagnetic Boundary conditions. Poynting theorem.	
	ASSESSMENT III – 20 MARKS		
13	13 WEEK 8-12 October (4 Contact Hours)	Electromagnetic wave propagation. Uniform plane waves.	
	14 WEEK 15-19 October (4 Contact Hours)	Wave polarization. Waves in matter.	
15	15 WEEK 22-26 October (4 Contact Hours)	Reflection and transmission at boundaries. Propagation in an ionized medium.	Lecture C&T/ PPT or any suitable mode
END SEMESTER – 50 MARKS			WRITTEN TEST

C & T : Chalk and Talk
PPT : Power Point

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Problem Solving Unit Test -1 (First 2 units)	3 rd Week of August	60 Minutes	20
2	Problem Solving Quiz (First 3 Units)	3 rd Week of September	60 Minutes	10
3	Problem Solving Unit Test -2 (Unit 3 & 4)	3 rd Week of October	60 Minutes	20

CPA	Compensation Assessment*	First week of November	60 Minutes	20/10
4	End Semester Examination (All 5 units - End Semester)	Middle of November	180 Minutes	50

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

Feedback from the students during class committee meetings
 Anonymous feedback through questionnaire

COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)

MODE OF CORRESPONDENCE (email/ phone etc)

Email or announcement in class

COMPENSATION ASSESSMENT POLICY

Only genuine cases of absence shall be considered. CPA will be conducted for 20/10 marks.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- **At least 75% attendance in each course is mandatory.**
- **A maximum of 10% shall be allowed under On Duty (OD) category.**
- **Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.**

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the

Academic office.

The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION

FOR APPROVAL

Course Faculty [Signature]

18.07.2018

CC-Chairperson [Signature]

[Signature]

HOD [Signature]

19/7/18

Guidelines:

- a) The number of assessments for a course shall range from 4 to 6.
- b) Every course shall have a final assessment on the entire syllabus with at least 30% weightage.
- c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered. Details of compensation assessment to be specified by faculty.
- d) The passing minimum shall be as per the regulations.
- e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.
- f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.
- g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.