

**Department of Electronics and Communication Engineering**

**NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI**

<b>COURSE OUTLINE TEMPLATE</b>			
<b>Course Title</b>	<b>ELECTRODYNAMICS AND ELECTROMAGNETIC WAVES</b>		
<b>Course Code</b>	<b>ECPC12</b>	<b>No. of Credits</b>	<b>04</b>
<b>Department</b>	<b>ECE</b>	<b>Faculty</b>	<b>R.MEENAKSHI</b>
<b>Pre-requisites Course Code</b>	<b>ECMI12</b>		
<b>Course Coordinator(s) (if, applicable)</b>	<b>Dr.MUTHU CHIDAMBARA NATHAN</b>		
<b>Other Course Teacher(s)/Tutor(s) E-mail</b>	<b>TEMPORARY FACULTY</b>	<b>E-mail/Telephone No.</b>	<a href="mailto:meenar@nitt.edu">meenar@nitt.edu</a> <b>0431-253334</b>
<b>Course Type</b>	<input checked="" type="checkbox"/> <b>Core course</b> <input type="checkbox"/> <b>Elective course</b>		
<b>COURSE OVERVIEW</b>			
<ul style="list-style-type: none"> <li>To expose the students to the rudiments of electromagnetic theory and wave propagation essential for subsequent courses on Microwave Engineering, Antennas and Wave Propagation and Wireless Communication.</li> </ul>			
<b>COURSE OUTCOME (CO)</b>			
<b>Course Outcomes</b>			
<p>At the end of the course students will be able to</p> <p>CO1: Recognize and classify the basic Electrostatics theorems, laws and derive them.</p> <p>CO2: Discuss the behavior of Electric fields in matter and polarization concepts.</p> <p>CO3: Classify the basic magneto static theorems, laws and infer the magnetic properties of matter.</p> <p>CO4: Summarize the concept of Electrodynamics &amp; to derive and discuss the Maxwell's Equations.</p> <p>CO5: Students are expected to be familiar with Electromagnetic wave propagation and wave propagation.</p>			

**COURSE TEACHING AND LEARNING ACTIVITIES**

<b>S.No.</b>	<b>Week</b>	<b>Topic</b>	<b>Mode of Delivery</b>
1.	1 <sup>st</sup> Week 10 <sup>th</sup> to 14 <sup>th</sup> July <b>(4 Contact Hours)</b>	<ul style="list-style-type: none"> <li>• Electrostatics.</li> <li>• Coulomb's Law.</li> <li>• Gauss's Law &amp; applications.</li> </ul>	Lecture C&T/ PPT or any suitable mode
2.	2 <sup>nd</sup> Week 17 <sup>th</sup> to 21 <sup>st</sup> July <b>(4 Contact Hours)</b>	<ul style="list-style-type: none"> <li>• Electric potential</li> <li>• Poissons and Laplace Equation</li> </ul>	
3.	3 <sup>rd</sup> Week 24 <sup>th</sup> to 28 <sup>th</sup> July <b>(4 Contact Hours)</b>	<ul style="list-style-type: none"> <li>• Method of images.</li> <li>• Multi pole Expansion.</li> </ul>	
4.	4 <sup>th</sup> Week 31 <sup>st</sup> July to 4 <sup>th</sup> August <b>(4 Contact Hours)</b>	<ul style="list-style-type: none"> <li>• Electrostatic Fields in matter.</li> </ul>	Lecture C&T/ PPT or any suitable mode
5.	5 <sup>th</sup> Week 7 <sup>th</sup> to 11 <sup>th</sup> August <b>(4 Contact Hours)</b>	<ul style="list-style-type: none"> <li>• Dielectrics and Electric Polarization.</li> <li>• Capacitors with Dielectric substrates.</li> </ul>	
		<b>ASSESSMENT I -5 MARKS</b>	<b>ASSIGNMENT</b>
6.	6 <sup>th</sup> Week 16 <sup>th</sup> to 25 <sup>th</sup> August <b>(4 Contact Hours)</b>	<ul style="list-style-type: none"> <li>• Linear Dielectrics.</li> <li>• Force and energy in Dielectric Systems.</li> </ul>	<b>WRITTEN TEST (DESCRIPTIVE)</b>
		<b>ASSESSMENTS II -20 MARKS</b>	
7.	7 <sup>th</sup> Week 28 <sup>th</sup> to 1 <sup>st</sup> August	<ul style="list-style-type: none"> <li>• Magneto- Statics.</li> </ul>	Lecture C&T/ PPT or any suitable

	(4Contact Hours)	<ul style="list-style-type: none"> <li>Magnetic Field of steady currents.</li> </ul>	mode
8.	8 <sup>th</sup> Week 4 <sup>th</sup> to 8 <sup>th</sup> September (4Contact Hours)	<ul style="list-style-type: none"> <li>Biot-Savart's and Ampere's Laws.</li> </ul>	
9.	9 <sup>th</sup> Week 4 <sup>th</sup> to 8 <sup>th</sup> September (4Contact Hours)	<ul style="list-style-type: none"> <li>Magnetic vector potential.</li> <li>Magnetic properties of matter.</li> </ul>	
		<b>ASSESSMENT III -5 MARKS</b>	<b>ASSIGNMENT</b>
10.	10 <sup>th</sup> Week 11 <sup>th</sup> to 15 <sup>th</sup> September (4Contact Hours)	<ul style="list-style-type: none"> <li>Electrodynamics.</li> <li>Flux rule for motional emf.</li> </ul>	Lecture C&T/ PPT or any suitable mode
11.	11 <sup>th</sup> Week 18 <sup>th</sup> to 28 <sup>th</sup> September (4Contact Hours)	<ul style="list-style-type: none"> <li>Faraday's Law.</li> <li>Self and mutual inductances.</li> </ul>	
12.	12 <sup>th</sup> Week 2 <sup>nd</sup> to 6 <sup>th</sup> October (4Contact Hours)	<ul style="list-style-type: none"> <li>Maxwell's Equations.</li> <li>Electromagnetic Boundary Conditions.</li> <li>Poynting theorem.</li> </ul>	
		<b>ASSESSMENT IV -20 MARKS</b>	<b>WRITTEN TEST (DESCRIPTIVE)</b>
13.	13 <sup>th</sup> Week 26 <sup>th</sup> October to 3 <sup>rd</sup> November (4Contact Hours)	<ul style="list-style-type: none"> <li>Electrodynamics wave propagation.</li> <li>Uniform plane waves.</li> </ul>	Lecture C&T/ PPT or any suitable mode
14.	14 <sup>th</sup> Week 9 <sup>th</sup> to 13 <sup>th</sup> October (4Contact Hours)	<ul style="list-style-type: none"> <li>Wave polarization.</li> <li>Waves in matter.</li> </ul>	
15.	15 <sup>th</sup> Week 16 <sup>th</sup> to 26 <sup>th</sup> October (4Contact Hours)	<ul style="list-style-type: none"> <li>Reflection and transmission at boundaries.</li> <li>Propagation in an ionized medium.</li> </ul>	

		COMPENSATION ASSESSMENT	WRITTEN EXAM	
END SEMESTER-50 MARKS			WRITTEN TEST (DESCRIPTIVE)	
COURSE ASSESSMENT METHODS				
S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1.	ASSESSMENT-I ( Assignments )	Offline (not in contact hours)	60 minutes	5
2.	ASSIGNMENT-II Descriptive type Examinations (First 2units)	3 <sup>rd</sup> wek of August	60 minutes	20
3.	Descriptive type Examinations (unit3 &4)	3 <sup>rd</sup> Week of October	60 minutes	20
4.	ASSESSMENT-III (Assignments )	Offline (not in contact hours)	-	5
5.	Compensation Assessment(CPA)	Last Week of October	60 minutes	Please refer Course policy for more details
6.	Final Assessment (Descriptive type of exam )	Middle of November	180 minutes	50
<b>ESSENTIAL READINGS :</b>				
<b>Text Books:</b>				
<ol style="list-style-type: none"> <li>1. D.J.Griffiths, “Introduction to Electrodynamics (3/e)”, PHI, 2001</li> <li>2. E.C. Jordan &amp; G. Balmain, “Electromagnetic Waves and Radiating Systems”, PHI, 1995.</li> </ol>				

**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 EXIT SURVEY**

1. Feedback from the students during class committee meeting.
2. Queries through questionnaire.

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

All the correspondence including Schedule of class, assessment, course material and any other information will be done in class/ over phone/ in faculty room/ through their webmail.

**ATTENDANCE:**

1. Attendance will be taken by the faculty in all the contact hours. Every student should maintain minimum 75% physical attendance in these contact hours along with assessment criteria to attend the end semester examination.
2. Any student, who fails to maintain 75% attendance need to appear for the compensation assessment (CPA) .student who scores more than 60% marks in CPA along with assessment criteria will be eligible for attending the end semester examination.
3. Those students who have attendance lag and also missed any of the continuous assessments (CAs) can appear for CPA to get eligibility for writing the end semester examination as quoted in Point2.Their scores in the CPA will NOT be taken into account for computing marks for CA.
4. Students not having 75% minimum attendance at the end semester and also fail in CPA (scores less than 60%) will have to RE Do the Course.

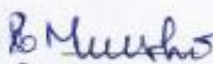
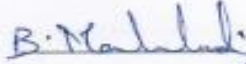

### **ACADEMIC HONESTY & PLAGIARISM:**

1. All the students are expected to be genuine during the course work. Taking of information by means of copying simulations, assignments, looking or attempting to look at another student's paper or bringing and using in any form for copying during any assessments is considered dishonest.
2. Tendering of information such as giving one's program, simulation work, assignments to another student to use or copy is also considered dishonest.
3. Preventing or hampering other students from pursuing their academic activities is also considered as academic dishonesty.
4. Any evidence of such academic dishonesty will result in the loss of marks on the assessment. Additionally, the names of those students so penalized will be reported to the class committee chairperson and H.O.D of the concerned department.
5. Students who honestly producing ORIGINAL and OUTSTANDING WORK will be REWARDED.

### **ADDITIONAL COURSE INFORMATION**

The Faculty is available for consultation at times as per the intimation given by the faculty.

### **FOR SENATE'S CONSIDERATION**

Course Faculty  CC-Chairperson  HOD   
[R. MEENAKSHI] [B. MALARKODI] (G. Lakshminarasayana)