

**NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI**

<b>COURSE PLAN</b>			
<b>Course Title</b>	<b>ANALOG INTEGRATED CIRCUITS</b>		
<b>Course Code</b>	<b>ECPC23</b>	<b>No. of Credits</b>	<b>03</b>
<b>Department</b>	<b>Electronics and Communication Engineering</b>	<b>Faculty</b>	<b>Ms.M.Gayathri Devi</b>
<b>Pre-requisites Course Code</b>	<b>ECPC17</b>		
<b>Course Coordinator</b>	<b>-</b>		
<b>Other Course Teacher(s)/Tutor(s) E-mail</b>		<b>Telephone No.</b>	<a href="mailto:mgayathri@nitt.edu">mgayathri@nitt.edu</a> <b>8148421338</b>
<b>Course Type</b>	<b>Program Core</b>		
<b>COURSE OVERVIEW</b>			
<p>This course deals with the Operational amplifier, its DC and AC characteristics. Students will get exposure about the applications of operational amplifier and will gain knowledge about the design of Active filter, A/D, D/A Converter using Opamp. Students can learn about 555 Timer IC and its applications. They learn about the basics of PLL and its application. They will be acquainted with CMOS Differential amplifier.</p>			
<b>COURSE OBJECTIVES</b>			
To introduce the theoretical & circuit aspects of an Op-amp.			
<b>COURSE OUTCOMES (CO)</b>			
<p>Students are able to</p> <ul style="list-style-type: none"> <li>• CO1: Infer the DC and AC characteristics of operational amplifiers and its effect on output and their compensation techniques.</li> <li>• CO2: Elucidate and design the linear and non linear applications of an opamp and special application Ics.</li> <li>• CO3: Explain and compare the working of multi vibrators application IC 555 and general purpose opamp.</li> <li>• CO4: Classify and comprehend the working principle of data converters.</li> <li>• CO5: Illustrate the function of application specific ICs such as Voltage regulators, PLL and its application in communication.</li> </ul>			
<b>COURSE TEACHING AND LEARNING ACTIVITIES</b>			
<b>S.No.</b>	<b>Week</b>	<b>Topic</b>	<b>Mode of Delivery</b>
<b>1.</b>	Week 1 (3 Contact Hours)	Operational Amplifiers, DC and AC characteristics.	<b>Lecture C&amp;T/ PPT or any suitable mode</b>
<b>2.</b>	Week 2 (3 Contact Hours)	Typical op-amp parameters: Finite gain, finite bandwidth, Offset voltages and currents, Common-mode rejection ratio, Power supply rejection ratio, Slew rate.	

3.	Week 3 (3 Contact Hours)	Applications of Op-amp: Precision rectifiers. Summing amplifier, Integrators and differentiators.	<b>Lecture C&amp;T/ PPT or any suitable mode</b>
4.	Week 4 (3 Contact Hours)	Log and antilog amplifiers. Instrumentation amplifiers, voltage to current converters.	
<b>ASSESSMENT I - 20 Marks</b>			<b>Descriptive type (Written)</b>
5.	Week 5 (3 Contact Hours)	Active filters: Second order filter transfer function (low pass, high pass, band pass and band reject),	<b>Lecture C&amp;T/ PPT or any suitable mode</b>
6.	Week 6 (3 Contact Hours)	Butterworth, Chebyshev and Bessel filters. Switched capacitor filter.	
<b>ASSESSMENT II - 10 Mark</b>			<b>Assignment</b>
7.	Week 7 (3 Contact Hours)	Notch filter, All pass filters, self-tuned filters, Opamp as a comparator.	<b>Lecture C&amp;T/ PPT or any suitable mode</b>
8.	Week 8 (3 Contact Hours)	Schmitt trigger, Astable and monostable multivibrators, Triangular wave generator,	
9.	Week 9 (3 Contact Hours)	Multivibrators using 555 timer, Data converters: A/D and D/A converters	
<b>ASSESSMENT III - 20 Marks</b>			<b>Descriptive type (Written)</b>
10.	Week 10 (3 Contact Hours)	PLL- basic block diagram and operation, Four quadrant multipliers. Phase detector, VCO.	<b>Lecture C&amp;T/ PPT or any suitable mode</b>
11.	Week 11 (3 Contact Hours)	Applications of PLL: Frequency synthesizers, AM detection, FM detection and FSK demodulation.	
12.	Week 12 (3 Contact Hours)	CMOS differential amplifiers: DC analysis and small signal analysis of differential amplifier with Resistive load.	
13.	Week 13 (3 Contact Hours)	current mirror load and current source load, Input common-mode range and Common-mode feedback circuits.	
14.	Week 14 (3 Contact Hours)	OTAs vs Opamps. Slew rate, CMRR, PSRR. Two stage amplifiers, Compensation in amplifiers (Dominant pole compensation).	
15.	Week 15 (3 Contact Hours)	<b>CPA - 20 Marks</b>	<b>Descriptive type (Written)</b>
16.	Week 16 (3 Contact Hours)	<b>END ASSESSMENT – 50 Marks</b>	<b>Descriptive type (Written)</b>

**COURSE ASSESSMENT METHODS**

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1.	Assessment I	1st Week of August	60 Minutes	20
2.	Assessment II (Assignment)	3 <sup>rd</sup> Week of August	-	10
3.	Assessment III	2 <sup>nd</sup> Week of September	60 Minutes	20
4.	CPA	4 <sup>th</sup> Week of October	60 Minutes	20
5.	End Assessment	1 <sup>st</sup> Week of November	180 Minutes	50

**ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc****Text Books**

1. S.Franco, *Design with Operational Amplifiers and Analog Integrated Circuits (3/e)* TMH, 2003.
2. Sedra and Smith, *Microelectronics Circuits, Oxford Univ. Press, 2004*
3. Coughlin, Driscoll, *OP-AMPS and Linear Integrated Circuits, Prentice Hall, 2001.*

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

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

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

1. All the students are advised to check their NITT WEBMAIL/group mail/suggested by the course faculty, class representative regularly. All the correspondence (schedule of classes/ schedule of assessment/ course material/ any other information regarding this course) will be done through them only.
2. Queries (if required) to the course teacher shall only be emailed to the email id specified by the teacher.

ATTENDANCE

3. Attendance will be taken by the faculty in all the contact hours. Every student should maintain minimum of 75 % physical attendance in these contact hours along with assessment criteria to attend the end semester examination.
4. Any student, who fails to maintain 75% attendance need to appear for the compensation assessment (CPA). On successful completion of CPA Class along with assessment criteria will be eligible for attending the end semester examination.
5. Those students who have attendance lag and also missed any of the continuous assessments (CAs) with a valid reason can appear for CPA to get eligibility for writing the end semester examination as quoted in Pt. 2.
6. Students not having 75% minimum attendance at the end of the semester and also fail to attend CPA Classes have to take up REDO the course.

ASSESSMENT

7. Attending all the assessments are MANDATORY for every student.
8. If any student is not able to attend any of the continuous assessments due to genuine reason, student is permitted to attend the compensation assessment (CPA) with 20% weightage.
9. Finally, every student is expected to score min(ClassAverage/2,Maximun Mark/3) in the total assessment (1, 2, 3, 4 and 5) to pass the course. Otherwise the student would be declared fail and 'F' grade will be awarded. Further he can take up only FORMATIVE ASSESSMENT.

**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 study material 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 that assessment. Additionally, the names of those students so penalized will be reported to the class committee chairperson and HoD of the concerned department.
5. Students who honestly producing ORIGINAL and OUTSTANDING WORK will be REWARDED.

**ADDITIONAL COURSE INFORMATION**

eg.: The Course Coordinator is available for consultation at times that are displayed on the coordinator's office notice board. Queries may also be emailed to the Course Coordinator directly at -----

**FOR SENATE'S CONSIDERATION**

Course Faculty

  
[M. G. G. G. G. G.]

CC-Chairperson



HOD

