NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI
Department of Mathematics

COURSE OUTLINE			
Course Title	**Transforms and Partial Differential Equations**		
Course Code	MAIR32	No. of Credits	3
Department	Mathematics	Faculty	**Dr. P. Saikrishnan**
Pre-requisites Course Code	MAIR11 & MAIR21		
E-mail ID	psai@nitt.edu	Telephone No.	0431-2503687 & 9787877471
Course Type	General Institute requirements		

COURSE OVERVIEW

This course will introduce

- integral transforms (Laplace & Fourier Transforms) and its application to solve problems.
- Fourier series and its applications.
- theory of Partial differential equations.
- Mathematica model of some physical problem (one dimensional wave equation, steady state heat transfer equation)multiple integrals and its applications in engineering problems.

COURSE OBJECTIVES

The course objective is to

- understand the importance of transform techniques to solve engineering problems.
- apply Laplace and Fourier transform to solve the mathematical equations arising in engineering.
- understand Fourier series analysis and its use in solving boundary value problems.
- understand and solve the partial differential equations.
- construct mathematical model of some heat transfer problem and vibration of an elastic string

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
On completing this course students will be able to 1. Compute Laplace and inverse Laplace transform of functions. 2. Apply Laplace transform to solve ordinary differential equations. 3. Compute Fourier and inverse Fourier transform of functions. 4. Compute Fourier series of given function and interpret its coefficients.	

5. Able to form partial differential equation for given family of surfaces. 6. Compute solution of few types of linear and non-linear first order/second order PDEs. 7. Construct mathematical model of heat transfer problem and its solution by separation of variable method. 8. Construct mathematical model of vibration of elastic sting (one dimensional) and solution of it.	

MAIR32 - Transforms and Partial Differential Equations

Laplace Transform of Standard functions, derivatives and integrals – Inverse Laplace transform - Convolution theorem-Periodic functions – Application to ordinary differential equations and simultaneous equations with constant coefficients and integral equations.

Fourier series - Dirichlet's conditions - Half range Fourier cosine and sine series - Parseval's relation - Fourier series in complex form – Harmonic analysis.

Fourier transforms - Fourier cosine and sine transforms – inverse transforms - convolution theorem and Parseval's identity for Fourier transforms - Finite cosine and sine transforms.

Formation of partial differential equations eliminating arbitrary constants and functions - solution of first order equations - four standard types - Lagrange's equation - homogeneous and non-homogeneous type of second order linear differential equation with constant coefficients.

One-dimensional wave equation and one-dimensional heat flow equation - method of separation of variables - Fourier series solution.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week	Topic	Mode of Delivery
1.	1st 2nd & 3rd week	Laplace Transform of Standard functions, derivatives and integrals – Inverse Laplace transform -Convolution theorem-Periodic functions – Application to ordinary differential equations and simultaneous equations with constant coefficients and integral equations.	Chalk and talk.
2.	4th & 5th week	Fourier series - Dirichlet's conditions - Half range Fourier cosine and sine series - Parseval's relation - Fourier series in complex form – Harmonic analysis.	

3.	6th week	Assessment -1	
4.	6th & 7th week	Fourier transforms - Fourier cosine and sine transforms – inverse transforms - convolution theorem and Parseval's identity for Fourier transforms - Finite cosine and sine transforms.	
5.	8th - 10th week	Formation of partial differential equations eliminating arbitrary constants and functions - solution of first order equations - four standard types - Lagrange's equation - homogeneous and non-homogeneous type of second order linear differential equation with constant coefficients.	
6.	11th week	Assessment – 2	
7.	11th & 12th week	One-dimensional wave equation and one-dimensional heat flow equation - method of separation of variables - Fourier series solution	
8.	After 12th week	End Semester examination	

COURSE ASSESSMENT METHODS

S. No.	Mode of Assessment	Week/Date	Duration	% Weightage
1.	Asessment - 1	6th week	1 hour	20%
2.	Assessment - 2	11th week	1 hour	20%
3.	Asessment – 3 (Assignments)		Will be announced at the time of distribution of assignment sheets	10%
4.	Assessment -4 (End semester Exam)	13th or 14th week	3 hours	50%

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

1. Grewal.B.S., Higher Engineering Mathematics, 43rdEdition, Khanna Publisher, Delhi
2. Debnath L., and Dambaru Bhatta, Integral Transforms and Their Applications, 2nd Ed. (Special Indian Ed).Chapman & Hall/CRC, Indian Edtion, 2010

3. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2010.
4. Haberman R., Applied Partial Differential Equations: With Fourier Series and Boundary Value Problems. Pearson, 2013.
5. K.Sankara Rao, Introduction to Partial Differential Equations, 3rd Edn, PHI Learning Private Ltd. 2012.

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

1. Students can meet the faculty at any stage in the course duration in case he/she finds difficulty in understanding the concept.
2. Feedback form issued to students to express their comments about the course before cycle test 1 & after completing the syllabus. Students are requested to give genuine feedback about the course.
3. Student knowledge about the topic covered in this course will be judged through marks obtained in examination.

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

1. Examination:
   a) Students who have missed the first or second assessment or both can register the Re-Test examination which shall be conducted soon after the completion of the assessment - 2 and before assessment – 4(End semester examination).
   b) The Re-Test examination shall be conducted for 20 marks comprising the syllabus of both assessment -1 & assessment - 2.
   c) Students should submit assignments before last date of submission. In case students fails to submit their assignments within last date of submission, he/she will get zero mark for that particular assignment.

2. Attendance:
   a) The minimum attendance for appearing for the semester examination is 75%.
   b) Those students, whose attendance falls below 75% but above 50% in a subject, shall attend mandatory classes before the semester examinations to qualify to write semester exam.
   c) The students who are having attendance less than 50% /fail to attend mandatory classes have to redo the course in next semester.

3. The Institute follows relative grading with flexibility given to teachers to decide the mark ranges for grades. All assessment of a course will be done on the basis of marks.

4. The Performance Analysis Committee, which shall meet within seven days after the completion of all examinations, shall analyze the relative cumulative performance of students in all examinations (continuous and end-semester) of a course and finalize the letter grade ranges for the course.

5. The letter grades and the corresponding grade points are as follows:

Letter	S	A	B	C	D	E,R	F,I	V	FF	X
Grade(GP)	10	9	8	7	6	5	0	-	2	-

a) Students scoring less than the passing minimum marks in the assessments defined in the course plan shall be deemed to have not successfully completed the course and be given an 'F' grade.
b) Students awarded F grade may REDO the course or opt for formative assessment.
c) 'V' indicates lack of required attendance. Students awarded 'V' grade must compulsorily redo the course.
d) 'I' grade indicates incompletion of formative assessment.
e) A student who gets an 'I' grade must necessarily convert it to a 'R' grade by completing the formative assessment.
f) An 'FF' grade is awarded for not completing the formative assessment in the prescribed maximum period of study due to gross negligence. An 'FF' grade will have a grade point of 2 and it will remain on the grade card permanently. This will be used in the CGPA calculations.
g) A student who earns a minimum of 5 grade points (a 'E' grade or a 'R' grade) in a course is declared to have successfully completed the course.

h) If the students fails to appear semester examination due to genuine/medical reason, can register for special end semester examination after approval from course teacher & Head of department of Mathematics. The special end semester examination will be conducted within ten days from reopening of institute for next semester. Students should register their names with course teacher to appear for special end semester examination within three days from reopening of institute for next semester. Grade issued as per the guidelines followed for his/her batch students.

i) There will be one reassessment (for 90 marks) for the students who have secured "F" in this course and will be conducted within ten days from reopening of institute for next semester. Students should register their names with course teacher to appear for reassessment within three days from reopening of institute for next semester. If the students satisfy the criteria fixed by the faculty to promote E grade will be given E grade and others given 'F' grade.

ADDITIONAL COURSE INFORMATION

Students can reach course faculty by fixing appointment through E-mail (psai@nitt.edu) or phone (9787877471,during office hours (8.30am-5.15pm) intercom: 3687).

FOR SENATE'S CONSIDERATION

P. Saikrishnan 7/7/17

Dr. P. Saikrishnan
Associate Professor
(Course Faculty)

CC-Chairperson

7/7/2017

Dr. K. Murugesan,
Professor & Head
Dept of Mathematics