



DEPARTMENT OF PHYSICS

COURSE PLAN – PART I			
Name of the programme and specialization	II Semester – M.Tech. NDT, II M.Sc (Physics) & Ph.D Course work		
Course Title	Computational Techniques		
Course Code	PH674	No. of Credits	3
Course Code of Pre-requisite subject(s)	NIL		
Session	January. 2019	Section (if, applicable)	NIL
Name of Faculty	Dr. S.Krishnaraj	Department	Physics
Official Email	krishs@nitt.edu	Telephone No.	NIL
Name of Course Coordinator(s) (if, applicable)	Dr. B. Kathikeyan		
Official E-mail	Telephone No.	Telephone No.	0431-250-3616
Course Type (please tick appropriately)	<input type="checkbox"/> Core course	<input type="checkbox"/> Elective course	

Syllabus (approved in BoS)

Unit I - C programming

C Programming basics - arithmetic operators– library functions – data input and output – relational operators – control statements – looping arrays functions – simple programs – user defined functions – pointers – passing pointers to functions – structures.

Unit II - Introduction to MATLAB

MATLAB environment – working with data sets – data input/output – logical variables and operators – array and X-Y Plotting – simple graphics – data types matrix, string, cell and structure – file input and output – Matlab files – simple programs.

Unit III - Applications of MATLAB

Matrices and array operation – elemental matrix functions – file functions – application of matlab– solving linear algebraic equations – curve fitting – interpolation – numerical integration –basic 2D Plots – overlay plots – specialized 2D plots – 3D plots – view

Unit IV - Introduction to LABVIEW

Introduction to LABVIEW tools palette, controls & functions palette, data types, conversion – front panel, block diagram construction, parallel data flow, create



indicators/controls/constants math operations, booleans, arrays, case structures, sequences – for loops, while loops – I/O reading and writing to files, paths, graphing, timed loops, signal generation/processing, waveform types - connecting to hardware, DAQ.

Unit V - Modeling Approaches

Finite Element Methods: Introduction to 1D FEM – Problems in wave propagation and structural mechanics using 2D elements- Plane stress and plane strain analysis, 3D stress analysis-Simulation packages – ABAQUS-COMSOL Multiphysics-Modeling Applications.

COURSE OBJECTIVES

- To introduce Programming tools in C language, MATLAB and LABView which will be useful for further research studies
- To prepare the students to use MATLAB/LABVIEW in their project works.
- To provide a foundation in use of these softwares for real time applications

MAPPING OF COs with POs

Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
1. Familiarize with the computational tools available in MATLAB, LabVIEW and COMSOL for variety of physical problems.	P1, P5
2. Model the structural behavior using various simulation tools	P2, P6
3. Articulate importance of software's in research by simulation work	P2, P4, P6
4. Operate the computational tools for signal processing related problems.	P4, P5, P6
5. In-depth knowledge of providing virtual instruments on LabVIEW Environment.	P1,P3,P5,P10

COURSE PLAN – PART II

COURSE OVERVIEW

- The elective course (Code:PH-674) is offered to the M.Tech –NDT, M.Sc (Physics) and Ph.D course work.
- The subject has 3 credit weightage for theory.



COURSE TEACHING AND LEARNING ACTIVITIES			(Add more rows)
S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	14-19 Jan.2019	C Programming basics - arithmetic operators– library functions – data input and output Relational operators – control statements looping arrays functions.	Chalk & Talk, CD
2	21-25 Jan.2019	Simple programs user defined functions – pointers, Passing pointers to functions structures.	Chalk & Talk, CD, PPT
3	28-01 Jan.- Feb.2019	MATLAB environment – working with data sets – data input/output Logical variables and operators array and X-Y Plotting	Chalk & Talk, CD, PPT
4	04-08 Feb.2019	Simple graphics data types matrix, string, cell and structure. File input and output – matlab files Simple Programs.	Chalk & Talk, CD, PPT
5	11-15 Feb.2019	Applications of MATLAB Matrices and array operation elemental matrix functions – file functions – application of matlab.	Chalk & Talk, CD, PPT
6	18-22 Feb.2019	solving linear algebraic equations curve fitting interpolation numerical integration Basic 2D Plots overlay plots specialized 2D plots 3D plots view	Chalk & Talk, CD, PPT
7	25-01 Feb.-Mar.2019	Introduction to LABVIEW tools palette, controls & functions palette, data types, conversion Front panel, block diagram construction.	Chalk & Talk, CD, PPT
8	04-08 Mar.2019	Parallel data flow, create indicators/controls/constants math operations.	Chalk & Talk, CD, PPT
9	11-15 Mar.2019	Booleans, arrays, case structures, sequences – for loops, while loops.	Chalk & Talk, CD, PPT
10	18-22 Mar.2019	I/O reading and writing to files paths, graphing, timed loops.	Chalk & Talk, CD, PPT
11	25-29 Mar.2019	signal generation/processing waveform types connecting to hardware, DAQ	Chalk & Talk, CD



12	01-05 Apr.2019	Finite Element Methods Introduction to 1D FEM.	Chalk & Talk, CD, PPT
13	08-12 Apr.2019	Problems in wave propagation and structural mechanics using 2D elements.	Chalk & Talk, CD
14	15-19 Apr.2019	Plane stress and plane strain analysis, 3D stress analysis.	Chalk & Talk, CD, PPT
15	22-26 Apr.2019	Simulation Packages ABAQUS- COMSOL Multiphysics-Modeling Applications.	Chalk & Talk, CD, PPT

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Cyclic Test - I	Feb. 2 nd Week	60 min	20
2	Quiz/Seminar	Mar. 1 st Week	30 min	10
3	Cyclic Test - II	Mar. 4 th Week	60 min	20
CPA	Compensation Assessment	Apr. 2 nd Week	60 min	20*
4	Final Assessment	Apr. 4 th Week	180 min	50
Total Marks				100

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

- Asking summary of each class at the end of class.
- Performance in the assessment methods.
- Questionnaire about the effectiveness of the delivery method, topics and the knowledge gained.

COURSE POLICY (including compensation assessment to be specified)

MODE OF CORRESPONDENCE (email/ phone etc)

- Both e-mail and phone

COMPENSATION ASSESSMENT POLICY

- It is a test with duration of 60 min. Appropriate weightage (20 or 10) will be calculated.



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, IF ANY

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

1. S.Chandra, Applications of Numerical Techniques with C, Narosa Publishing House Pvt. Limited, (2006)
2. R.Pratap, Getting Started with MATLAB: A Quick Introduction for Scientist and Engineers, Oxford University Press, (2010)
3. K.L. Ashley, Analog Electronics with LabVIEW, Prentice Hall Professional, 2003.
4. R. Chandrupatla and A. D. Belegundu, Introduction to Finite Elements in Engineering, Prentice Hall, 4th edition, (2011)

FOR APPROVAL

Course Faculty CC- Chairperson HOD
(D.S) (D.S) (D.S)



Guidelines

- a) The number of assessments for any theory course shall range from 4 to 6.
- b) Every theory 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.
- d) The passing minimum shall be as per the regulations.

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or (Class average/2) whichever is greater.		(Peak/3) or (Class Average/2) whichever is lower		40%

- 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.