

	Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering Mechanical Engineering Research Center
PhD Course Work	

Ph.D. course work shall be of **18 credits**

The course work shall be treated as prerequisite for Ph.D. programme.

The Ph. D. Course work shall consist of the following components:

Course 1 700001	Research Methodology (Including Quantitative methods, Computer applications, research ethics and review of published research in the relevant field, training, field work, etc)	4 credits
Course 2 700002	Writing of Research Proposal for obtaining financial assistance from national funding agencies	1 credits
	Writing of Review	1 credits
	Seminars	2 credits
Course 3 700003	Subject specific advanced level courses	8 credits
Course 4 CPE-RPE	Research and Publication Ethics (CPE-RPE)	2 credits

STRUCTURE FOR Ph.D. COURSE WORK (common for all branches)

CODE	Name of Course	Contact Hours	Examination Scheme			Credits
			CA	ESE	Total	
700001	Research Methodology	4	--	100	100	4
700002	Writing of Research Proposal	2	25		25	1
	Writing of Review	2	25		25	1
	Seminars	4		50	50	2
700003	Faculty Specific Topics for Engineering Research Part-A (700003-A) Mathematics for Engineering Research Part-B (700003-B) Branch Specific Topics	8	100	100	200	8
CPE-RPE	Research and Publication Ethics (CPE-RPE)	2	25	25	50	2
Total		22	175	275	450	18

AWARD OF GRADE:

For each course, undertaken by the students, he/she shall be assigned a letter grade based on the total marks obtained by him/her in all the heads of examination of that course. The letter grades and the guidelines for conversion of marks to letter grades shall be as given in Table-1.

Grade	Percentage of Marks obtained	Remark
P	55-100	Pass
F	Below 55	Fail
FX	-----	Detained, Repeat the course
II	-----	Incomplete-Absent for Exam but continue the course

- The grade ‘**P**’ is passing grade. The candidate acquiring ‘P’ grade in a course shall be declared to have passed that course.
- The grade ‘**F**’ shall be treated as failure grade. The candidate acquiring ‘F’ grade in a course shall be declared to have failed in that course. The student with F grade in any course shall have to pass the concerned course by re-appearing for the examination as and when it is conducted by the research centre.
- The grade ‘**FX**’ in a course is awarded by the research centre, if the student does not maintain the minimum attendance in the theory/class as prescribed by the University and/or his /her performance during the semester is not satisfactory.
- Grade ‘**II**’ shall be awarded to a candidate in a course in which he has the minimum attendance as prescribed by the University and satisfactory in-semester performance but could not appear for the end semester examination. Such a student shall have to appear for the End Semester Examination as and when it is conducted by the research centre.

Schedule of Activities:

Date of Commencement: 07nd June 2021

Date of Conclusion of Coursework Schedule: 14th Oct 2021

Declaration of Result: 28th Oct 2021

Please refer the attached calendar for details of the schedule

SYLLABUS
Ph.D. COURSEWORK UNDER FACULTY of ENGINEERING

700001: Research Methodology

Teaching Scheme:

Contact Hours: 4 hrs/week

Credits: 4

Marking Scheme:

End Semester Examination: 100 Marks

Objectives

- Learn to focus on a research problem using scientific methods
- Learn methods to devise and design an experimentation set-up
- Learn basic instrumentation and data collection methods
- Learn parameter estimation and related modelling methods

Unit 1: Research Problem

Meaning of research problem, Sources of research problem, Criteria / Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem.

Unit 2: Basic instrumentation

Instrumentation schemes, Static and dynamic characteristics of instruments used in experimental set up, Performance under flow or motion conditions, Data collection using a digital computer system, Linear scaling for receiver and fidelity of instrument, Role of DSP is collected data contains noise.

Unit 3: Applied statistics

Regression analysis, Parameter estimation, Multivariate statistics, Principal component analysis, Moments and response curve methods, State vector machines and uncertainty analysis.

Unit 4: Modelling and prediction of performance

Setting up a computing model to predict performance of experimental system, Multiscale modelling and verifying performance of process system, Nonlinear analysis of system and asymptotic analysis, Verifying if assumptions hold true for a given apparatus setup, Plotting family of performance curves to study trends and tendencies, Sensitivity theory and applications.

Unit 5: Developing a Research Proposal

Format of research proposal, Individual research proposal, Institutional proposal, Proposal of a student – a presentation and assessment by a review committee consisting of Guide and external expert only. Other faculty members may attend and give suggestions relevant to topic of research.

Reference Books:

1. 'Research methodology: an introduction for science & engineering students', by Stuart Melville and Wayne Goddard
2. 'Research Methodology: An Introduction' by Wayne Goddard and Stuart Melville

3. 'Research Methodology: A Step by Step Guide for Beginners', by Ranjit Kumar, 2nd Edition
4. 'Research Methodology: Methods and Trends', by Dr. C. R. Kothari
5. 'Operational Research' by Dr. S.D. Sharma, Kedar Nath Ram Nath & co.
6. Software Engineering by Pressman

700002: Seminar, Writing of Review, Writing of Research Proposal

a) Writing of Research Proposal for obtaining Financial assistance from national funding agencies	1 credit
b) Writing of Review	1 credit
c) Seminars	2 credits

700002: Seminar, Writing of Review, Writing of Research Proposal

Teaching Scheme:

Contact Hours: 4 hrs/week

Credits: 4

Marking Scheme:

Continuous Assessment: 50 Marks

End Semester Examination: 50 Marks

Unit 1: Formulating Problem Statement

Overview of research process: Formulating the Research Problem, Extensive Literature Review, Developing the objectives, preparing the Research Design including Sample Design, Collecting the Data, Analysis of Data, Generalization and Interpretation, preparation of the Report or Presentation of Results-Formal write-ups of conclusions reached. Problem statement – Conditions and steps in selecting a research problem, Understanding the Key research area of interest, How to get new ideas (Criticizing a paper), Finding a good problem: Top-down and Bottom-up approach, Creative thinking techniques, Coming up with a problem statement
Defining objectives – How to find objectives, characteristics of objectives

Unit 2: Literature survey

Overview – What is literature survey, Functions of literature survey, maintaining a notebook, developing a Bibliography, Methods of data collection – Observation, survey, contact methods, experimental, determining sample design, Searching for publications – Publication databases, search engines and patent databases, Find some/all of the references for a given paper, including those that are not on the web Online tools – google, CiteSeer, ACM Digital Library, IEEE, The on-line Computer Science bibliography, Survey papers, Finding material not on the web, Searching patents

Unit 3: How to study a scientific paper

Summarizing paper – Reading abstracts and finding ideas, conclusion, Advantages of their approach, the drawbacks of the papers (What is lacking – can be found in the sections such as

future work) Generalize results from a research paper to related research problems Comparing the approach - Identify weaknesses and strengths in recent research articles in the subject

Unit 4: Publishing a paper

How to write scientific paper - Structure of a conference and journal paper, how (and How Not) to write a Good Systems Paper: Abstract writing, chapter writing, discussion, conclusion, references, bibliography, and In-class discussion of technical writing examples, Poster papers, review papers, how to organize thesis/ Project report, How to write a research proposal? How research is funded? Research ethics – Legal issues, copyright, plagiarism, General advice about writing technical papers in English - Tips for writing correct English

Unit 5: How to present scientific paper

Talk structure, basic presentations skills, Documentation and presentation tools – LATEX, Microsoft office, PowerPoint and SLIDESHOW