

**CENTRE FOR CONTINUING EDUCATION
(PROFICIENCE-PROGRAMME)
INDIAN INSTITUTE OF SCIENCE, BENGALURU 560012**



AUGUST-DECEMBER-2016

COURSE INFORMATION ON REGULAR COURSES AUGUST - DECEMBER 2016

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Sl.No	Name of the Course	Credit
1	Innovative Product Development and Design Methods (Mon)	2+0
2.	Basic Course in Russian (Mon)	2+0
3	Introduction to Artificial Intelligence and Applications (Mon & Wed)	3+0
4	Photovoltaic Science and Technology (Mon)	2+0
5	Sustainability Analytics (Mon)	2+0
6	Project Management (Mon & Wed)	3+0
7	Finite Element Analysis of Laminated Composites (Tue)	2+0
8	Data Mining (Tue-Thu)	3+0
9	High Voltage Engineering (Tue)	2+0
10	Operating Systems Internals (Tue-Thu)	3+0
11	Optical Communications and Networks(Tue-Thu)	3+0
12	Basic Spectroscopy and Instrumentation (Wed)	2+0
13	Introduction to Numerical Grid Generation & Fluid Flow Computations (Wed)	2+0
14	Vibration and Noise Control in Engineering Structures and Systems (Wed)	2+0
15	Principles and Applications of NMR Spectroscopy (Thu)	2+0
16	Advances in Computational Fluid Dynamics (Fri)	2+0
17	Analysis and Design of Composite Structures (Fri)	2+0
18	Laboratory Animal Management (Fri)	2+0
19	Structural Analysis and Design Optimization of Engineering Structures and Systems (Fri)	2+0
20	Advances in Genetic Engineering & Transgenic Technology (Sat)	2+0
21	Basics of Data Analytics (Sat)	2+0
22	Cell and Molecular Biology of Aging and Diseases (Sat) 2 to 4 pm	2+0
23	Embedded System Design using Microcontrollers (Sat)	2+0
24	Finite Element Methods for Engineers (Sat) 2 to 4 pm	2+0
25	Logical and Linguistic Analysis: Perspectives from Computer Science and the Indic Tradition (Sat)	2+0
26	Nonlinear Finite Element Method (Sat)	2+0
27	Operation Research (Sat) 2 to 4 pm	2+0
28	Performance Modeling and Simulation (Sat)	3+0
29	Python Programming (sat)	2+C
30	Strategic Management (Sat)	3+0
31	Basics of Fracture Mechanics (Fri)	2+0

INTRODUCTION

Indian Institute of Science (IISc) established in 1909, is a Deemed University and Centrally Funded Technical Institution under the Department of Higher Education, Ministry of Human Resources Development, Government of India.

Rapid strides in science and technology make it imperative that the education of professionals be continued over their entire career rather than be confined to a single stretch. What is needed is a complete integration of education with work during their productive life span, which will be adequate to help them cope with new demands. Continuing Education embraces all the processes of education that one undergoes throughout a working life and which have a relevance to the practical problems likely to be encountered in one's career. It may be realized through formal and informal modes of teaching, or through mass media. In recent years, there has been a growing awareness on the part of Universities that imparting knowledge to people beyond their boundaries is an equally important part of their service to the community. With this broad perspective of their function in society, Universities have begun to seek ways of reaching out to professionals. The IISc has evolved several mechanisms to make the expertise and facilities available to qualified technical people in industries, Universities and research establishments. The need for forging links between academic institutions and industries and R&D organizations has been a goal set for the IISc by its illustrious founder, J.N. Tata.

CCE-PROFICIENCE was established with the objective of providing a sustained and rigorous continuing education program offering courses on subjects of topical interest to scientists and engineers in and around Bangalore. This program, believed to be the first of its kind in the country, is a joint venture between IISc and several Professional Institutions/Societies in Bangalore. The program name signifies the coming together of Professional Institutions and the Indian Institute of Science. It was started on an experimental basis in 1980 and has proved to be extremely popular and has attracted wide attention in academic and professional circles. The demand for some courses, especially on computers, microprocessors and management is so overwhelming that it has not been possible to admit all the

Eligible applicants. Every year, there has been a steady increase in the number of students as well as the types of courses offered indicative of the growing popularity of this Program. IISc is the custodian of the academic standards of all CCE-PROFICIENCE courses. It has the responsibility of evolving appropriate teaching norms, providing the venue and facilities for conducting courses, organizing the tests and examinations and issuing certificates to the successful participants. These tasks are coordinated by the Centre for Continuing Education (CCE).

COURSES

Continuing education program organized under CCE-PROFICIENCE offers semester long courses in areas of topical interest. The courses are organized during evening hours so that working professionals can participate without getting their normal work affected. All courses are normally at the postgraduate level and many of these are in fact offered to the IISc students regularly. Participants in certain selected courses are provided practical training in computer and other laboratories, as appropriate. The course contents are regularly upgraded on the basis of feedback from the faculty and the participants. Courses are offered during the period AUG-DEC and JAN-MAY and around 15-20 courses are scheduled during each semester.

Each course has lectures at the rate of two or three hours per week depending upon the number of course credits. Tests and examinations are conducted according to the IISc norms. A series of courses leading to different specializations are offered in a sequential manner, especially in the area of Computer Science and Engineering. This would enable the participants who start with the entry level courses progress towards more advanced ones and specialize in one of the streams.

EVALUATION

The total marks for assessment will be equally distributed between the seasonal work and end semester examination. The seasonal work consists of class tests, mid semester examination, and homework assignments etc. as determined by the instructor. The participants who maintain a minimum of 75% attendance both in the theory and computer/laboratory classes will be evaluated based on the combined performance in the end semester examination and seasonal work and assigned a letter grade.

NO RE-EXAMINATION SHALL BE CONDUCTED UNDER ANY CIR CUMSTANCES.

The letter grades carry a qualitative assessment as indicated below:

S-Outstanding; A-Excellent; B-Very Good; C-Good; D-Satisfactory; F-Fail.

CERTIFICATES

Certificates will be issued only to those who get at least a 'D' grade. Attendance certificates shall not be issued to anyone. This being a continuing education program meant especially for self-improvement, the credits accumulated cannot be equated with the credits earned through formal education. There shall be no claims for CCE-PROFICIENCE credits being counted towards partial fulfillment of credit requirements towards any degree/diploma or other formal recognitions offered by IISc.

Formal Course completion certificates will not be issued under any circumstances to any candidate.

FACULTY

The instructors for the courses are mostly Institute Faculty. However, competent professionals from other R&D organizations and industries are also involved in teaching some of the courses.

REGULAR COURSES

Computer Lab: A Computer Laboratory with adequate computer machines and a Silicon Graphics work station with a variety of latest software have been set up for the CCE-PROFICIENCE program. All these machines have been locally networked. A good collection of video cassettes pertaining to several courses is also available for viewing at the Centre for the participants.

Library: CCE-PROFICIENCE participants can avail of the facility of IISc Main Library and they can also make use of the books in CCE. The books at both the IISc Main Library and CCE are meant only for reference. The participants can avail of this facility by producing their ID card issued by CCE-PROFICIENCE.

Timings:

IISc Library - 8.00 a.m. - 9.00 p.m.

INSTRUCTIONS

HOW TO APPLY:

Details of the courses are available online at cce.iisc.ernet.in. Essential Qualification for any course is a degree in Engineering or a postgraduate degree in Science/Humanities as applicable with pre-requisites. Each participant will be admitted for a Maximum of Two Courses. Applying to courses is strictly through online portal of CCE. Please read all the instructions provided at our portal before applying. Payment of course fee is through payment gateway provided at our online portal and no other means of payment is accepted. The course fee is Rs. 5000/- per credit and registration fee is Rs. 300/- per course. Any other gateway charges must be borne by participant during online payment. For each application, participants must upload (BE, B.Tech / Post Graduation) Convocation/Degree Certificate without fail. (Class conducted: Week days 6 pm. to 8 pm) & (Saturday's 10 am to 1 pm & 2 pm to 4 pm)

FEES

The course fee is Rs. 5000/= per credit. Some of the courses include a limited exposure to computer operation and programming / Lab Fee (C). The additional fees of this are Rs. 5,000/- The course fee and laboratory fee should be paid in full at the time of joining the course.

REFUND OF COURSE FEE

Refund of course fee will not be made, unless the course is withdrawn officially, in which case, the course fee paid will be refunded in full. Application registration fee once paid will **NOT BE REFUNDED** under any circumstance.

CLASSES

Classes will be held in the Lecture Hall Complex of IISc. Lectures will be between 6.00 p.m. and 8.00 p.m. Monday through Friday and between 10 a.m. to 1 p.m. and 2pm to 4 pm on Saturday's.

LABORATORY CLASSES

The timings and days for laboratory classes will be fixed in the second week of the respective months (August & January) after the complete registration is known. This will be done, keeping in view the convenience of the faculty and all the students of the courses with laboratory component.

RESULTS:

Results of the courses will be announced normally around 1st week of January for August-December term and 1st week of June for January-May term. Certificates will be issued on or after the date of announcement of results and against surrendering the Identity Card.

IDENTITY CARD

Participants will be issued identity cards which should be shown on demand. The participants who have successfully completed should surrender the ID card at the time of receiving certificate, failing which the certificate(s) will not be issued to her/him. In the event of loss of identity card, the matter should be immediately reported to the Section Officer, PROFICIENCE office in writing. **NO REQUEST FOR CHANGE OF EITHER THE STIPULATED DATES, MODE OF PAYMENT, CHANGE OF COURSE OR SUBMISSION/VERIFICATION OF ENCLOSURE TO APPLICATION ETC., WILL BE ENTERTAINED UNDER ANY CIRCUMSTANCES**

COURSE SCHEDULE FOR AUGUST-DECEMBER 2016
REGULAR COURSES

SI No	Name of the Course	Credit	Faculty	Department
1	Innovative Product Development and Design Methods (Mon)	2+0	Dr. J E Diwakar Retd.IISc.& Prof. P. Achutha Rao	CPDM & NID R&D Campus
2.	Basic Course in Russian (Mon)	2+0	Mr. Yadnyavalkya	MS
3	Introduction to Artificial Intelligence and Applications (Mon & Wed)	3+0	Dr. H K Anasuya Devi	NDRF
4	Photovoltaic Science and Technology (Mon)	2+0	Mr. Kuruvilla Varghese & Dr. Saji Salkalachen	DESE/CEDT &
5	Sustainability Analytics (Mon)	2+0	Dr. P Balachandra & Dr.Hippu Salk Kristle Nathan	MS & NIAS
6	Project Management (Mon & Wed)	3+0	Dr. Parameshwar P Iyer	MS
7	Finite Element Analysis of Laminate Composites(Tue)	2+0	Prof. P C Pandey (Retd.) IISc.	Civil.Egg.
8	Data Mining (Tue-Thu)	3+0	Dr. V Susheela Devi	CSA
9	High Voltage Engineering (Tue)	2+0	Dr. Joy Thomas M	EE
10	Operating Systems Internals (Tue-Thu)	3+0	Prof. R.C Hansdah	CSA
11	Optical Communications and Networks(Tue-Thu)	3+0	Prof. T Srinivas	ECE
12	Basic Spectroscopy and Instrumentation (Wed)	2+0	Dr. S Sandhya	IPC
13	Introduction to Numerical Grid Generation & Fluid Flow Computations (Wed)	2+0	Dr. P S Kulkarni	AE
14	Vibration and Noise Control in Engineering Structures and Systems (Wed)	2+0	Dr. S B Kandagal	AE
15	Principles and Applications of NMR Spectroscopy (Thu)	2+0	Prof. H S Atreya	NMR RC
16	Advances in Computational Fluid Dynamics (Fri)	2+0	Dr. P S Kulkarni	AE
17	Analysis and Design of Composite Structures (Fri)	2+0	Dr. G Narayana Naik	AE
18	Laboratory Animal Management (Fri)	2+0	Dr. S. G. Ramachandra	CAF
19	Structural Analysis and Design Optimization of Engineering Structures and Systems (Fri)	2+0	Dr. S B Kandagal	AE
20	Advances in Genetic Engineering & Transgenic Technology (Sat)	2+0	Dr. N Ravi Sundaresan	MCBL
21	Basics of Data Analytics (Sat)	2+0	Dr. Gopala Krishna Sharma & Dr. Badarinath Ambati	Fiserv India Pvt. Ltd, & Altair. Engg.
22	Cell and Molecular Biology of Aging and Diseases (Sat) 2 to 4 pm	2+0	Dr. N Ravi Sundaresan	MCBL
23	Embedded System Design using Microcontrollers (Sat)	2+0	Mr. M Krishna Kumar Retd. IISc.	CEDT
24	Finite Element Methods for Engineers (Sat) 2 to 4 pm	2+0	Dr. K S Nanjunda Rao & Mr. B Sreehari Kumar	Civil Engg. & TCS
25	Logical and Linguistic Analysis: Perspectives from Computer Science and the Indic Tradition (Sat)	2+0	Prof. K Gopinath and Ms. Sangeetha Ramesh	CSA And Vyas International School
26	Nonlinear Finite Element Method (Sat)	2+0	Prof. P C Pandey (Retd.)IISc.	Civil.Egg.
27	Operations Research (Sat) 2 to 4 pm	2+0	Dr. Gopala Krishna Sharma & Dr. Badarinath Ambati	Fiserv India Pvt. Ltd, & Altair. Engg.
28	Performance Modeling and Simulation (Sat)	3+0	Prof. Shalabh Bhatnagar	CSA
29	Python Programming (sat)	2+C	Smt. Annapoornima Koppad & Dr. Parameshwar P. Iyer	IP Tel & MS
30	Strategic Management (Sat)	3+0	Dr. Parameshwar P. Iyer	MS
31	Basics of Fracture Mechanics (Fri)	2+0	Dr. R Vidya Sagar	Civil Engg.

FEE STRUCTURE AT A GLANCE

Regular Courses

Per Credit: Rs.5,000/-

Computer Lab Fee: Rs.5,000/-

1. Course with 2 credits # Rs. 10,000/-

2. Course with 2+C credits # Rs.15,000/-

3. Course with 3# credits # Rs. 15,000/-

4. Course with 3+C \$ Credits # Rs. 20,000/-

#credits = Lecture Hours per week

\$ C Stands for Computer Laboratory

Regular Courses

AUGUST-DECEMBER 2016

1. Innovative Product Development and Design Methods (2+0)

Objective

The globalization and digital connectivity has forced many organizations to look at the way new products are to be developed for customer acceptance in the changed competitive “global village”. Proven methods of the past which made many companies succeed in the “Sellers’ Market” are no longer valid. The organizations have to develop new approaches for design and innovation to meet the challenges of technology explosion and to increase the speed of development. There is an urgent need to adopt integrated innovative product development strategies to meet the ever-changing customer expectations. This Course aims to look at these issues and create an awareness of innovative product development process and various design methods to achieve success.

Syllabus:

- Creativity and Innovation
- Integrated Product Development
- Product Design
- Industrial design
- Quality Function Deployment
- Value Engineering
- Design to Cost
- Design for assembly and Manufacture
- Design for service
- Failure modes and effects analysis
- TRIZ (systematic Innovation)
- Concept generation methods
- Concept Selection methods

Target Group : Practicing Engineers, Managers involved in design and Development in Industries R&D Organizations etc., Academic Personal involved in teaching/practicing product design and development, fresh Engineers

Faculty:



Dr. J.E. Diwakar (Retd)
IISc.
Dept. of CPDM, Indian Institute of
Science
Email: jed@cpdm.iisc.ernet.in

Faculty:



Prof. P. ACHUTHA RAO
NID R & D Campus, Retd.,
E Mail: raopanambur@gmail.com

Reference Books:

1. New products Management, Merle Crawford Antony Di Benedetto; Tata Mcgraw hill Education Private Limited, 2011.
2. Winning at New products, Robrt G cooper; Basic Books, 2011
3. Creating Breakthrough Products: Innovation from Product Planning to Program Approval; Jonathan M. Cagan, Craig M. Vogel, FT Press, 2010.
4. Product Design and Development, Karl Ulrich and Steven Eppinger, McGraw-Hill/Irwin; 5 Edition May 2011

Who Can apply?

Graduation in Engineering

Course Fee: Rs. 10,000/-

Schedule:

Monday's: 6.00 pm to 8.00pm

2. BASIC COURSE IN RUSSIAN (2+0)

Objectives:

To train /teach basic Spoken and Written. Russian *≈ Level 1*

Syllabus:

Alphabets, phonetics, Grammar, Numbers, Genders Vocabulary building, Nominative Case

Target Group:

MNC Employees, Export Managers, R & D Units, DRDO Organizations.



Faculty:

Mr. Yadnyvalkya
Dept. of Management Studies
IISc.

Email: yad@mgmt.iisc.ac.in

REFERENCE BOOKS

1. Budai, Bagga & Menon
2. Russian for All - O N Nigehna
3. Russian Exercises
S Khavronina & A Shirochinskaya

Who Can apply?

B.E / MBA/M.Sc./M.Com/MA etc.,

Course Fee: Rs. 10,000/-

Schedule:

Monday's: 6.00 pm to 8.00 pm

3. Introduction to Artificial Intelligence and Applications (3+0)

Objectives:

To introduce the state of art of soft-computing methods, Human-Machine Interaction and the techniques involved in Artificial Intelligence to those who possess postgraduate degree in Science/Arts/Management/Engineering. To enhance the background and technical skills of IT professionals to use AI Technology in Industry and Management. Facilitates Teaching profession.

Syllabus:

Overview of AI – Knowledge Structures – Knowledge Engineering – Knowledge Representation – Knowledge Acquisition – AI perspectives for Managers - Logic Programming – Problem Solving Strategies – Inference and Control - Reasoning Techniques – Forward and Backward Chaining - Laboratory Work, Assignments and Problems – Agent Based Algorithms and Computing - Knowledge Based Systems – Machine Learning – AI Applications - Expert Systems -- Natural Language Processing – Pattern Recognition - Artificial Neural Networks – Project Work - Industry Applications.

Target Group

R&D Units, Defense, College Teachers , Managers.



Faculty:

Dr. H.K. ANASUYA DEVI

Prof. Research Lead & Tech. Advisor, NDRF

E-mail: hkadevi@yahoo.com

Reference Books

1. Satish Kumar.,
Neural Networks, Tata McGraw-Hill,
2004
2. George F Luger,
Artificial Intelligence: Structures & Strategies
for Complex Problem Solving, Pearson
Education (IV Ed), 2002.
3. Elaine Richie & Kevin Knight Introduction to
Artificial Intelligence, Tata McGraw-Hill, II
Ed, 1999.

Who can apply?

Those with B. E./M.Tech /MCA/MBA/PG in Science/PhD
in Science OR equivalent

Pre-requisite:

Knowledge of Mathematics upto graduation with knowledge
of programming.

Course Fee: Rs. 15,000/-

Schedule:

Mon & Wed - 6.00 pm to 7.30 pm

4. Photovoltaic Science and Technology(2+0)

Objectives:

To stimulate interest in:

Photovoltaic Education, Research, Engineering, Manufacturing & Generating Systems including: Materials, Principles, Processes & Utilization of Solar Energy.

Syllabus:

Solar spectrum, semiconductor basics, solar cell parameters & operation, design principles, Silicon material & processes, Solar Cell and Module manufacturing processes, high efficiency solar cell types, current research topics. Types of PV systems, Balance of System, system sizing, SPV power plants, energy yield, preventive maintenance, defect analysis, PV versus conventional power.

Target Group

Students (Engg & Science), Faculty (Engg & Science), Professional Staff (Solar/Renewable Energy Industry)



Faculty:
**Mr. Kuruvilla
Varghese**

Principal Research Scientist
DESE, Indian Institute of Science,
Bangalore 560012.

Email: edkuru@dese.iisc.ernet.in



Faculty:
Dr. Saji Salkalachen

(Ex-GM & Consultant in Photovoltaics
@ BHEL, Bangalore)

Email: sajisalk@gmail.com

Reference Books

1. "Solar Cells: Operating Principles, Technology & Systems Application", Martin A. Green, Prentice Hall 1982,
2. "Introduction to PV Technology", in Renewable Energy Sources for Fuel and Electricity; Eds. Thomas B. Johansson, Amulya K.N. Reddy, Robert H. Williams, Island Press July 1992,
3. "Progress in Photovoltaics: Research & Applications"; Bimonthly Journal, John Wiley & Sons Ltd.

Who can apply?

BE/B.Tech/AMIE/Post-Graduate (MSc)

Pre-requisite:

Interest in Renewable Energy/Solar Photovoltaics

Course Fee:

Rs. 10,000/-

Schedule:

Monday's 6.00 pm to 8.00 pm

5. Sustainability Analytics (2+0)

Objectives:

The course has three-prong objectives. First, is to learn the concept and application of sustainability. The second objective is to understand business strategies that incorporate principles of sustainability aimed at socially responsible development. Lastly, the course covers the sustainability assessment methods to identify un-sustainability risks and trends.

Syllabus:

Principles of Sustainable Development (SD), Evolution, perspectives, and challenges of SD and its business context, Business-environment-society interdependence, Sustainability issues and its impact on economy and society, SD frameworks, frameworks for measuring sustainability, SD indicators, SD metrics, Case study of different sectors, Strategies for a sustainable world.

Target Group

Industry professionals,
Firms and NGOs working in the area of sustainability,
Sustainability researchers and practitioners,
Citizens concerned about sustainability



Faculty:
Dr. P. Balachandra
Dept. of Management Studies,
Indian Institute of Science,
Bengaluru -12.
Email: patilb@mgmt.iisc.ernet.in;
p.balachandra@gamil.com



Faculty:
Dr. Hippy Salk Kristle Nathan,
Asst. Professor, NIAS, Bengaluru-12
Email :
hsknathan@nias.iisc.ernet.in,
happyhippu@gmail.com

Reference Books

1. Edward S. W. and J. G. Stead, Sustainable Strategic Management, PHI, India Edition, New Delhi. 2003.
2. Epstein, M. Making Sustainability Work: Best Practices in Managing and Measuring Corporate Social, Environmental and Economic Impacts, Greenleaf Publishing, UK, 2008
3. Lester Brown, Eco-Economy, Orient Longman, 2008

Who can apply?

B.E. and Master's Degree holders.

Course Fee: Rs. 10,000/-

Schedule:

Monday's - 6.00 pm to 8.00 pm

6. Project Management (3+0)

Objectives:

To impart knowledge and skills in the art of managing projects scientifically, so as to fulfil objectives Within the constraints of time, cost, and other resources. In addition, exposure to technical communication and software for project management will be provided.

Syllabus:

Introduction, need for project management; Systems approach; Work definition and breakdown; scheduling and network analysis; Costing, budgeting and financial assessment; Project control and management; Project Organisation; Leadership and teamwork; Role of computers in project management. Managerial Communication process; Technical communication; Case analysis; Oral communication and presentations of Study projects.

Target Group:

Scientists, Engineers, Managers of R&D, Administrators, Entrepreneurs in Knowledge-based organisation



Faculty:

Dr. Parameshwar P Iyer
Dept. of Management Studies, IISc.

E-mail: piyer@mgmt.iisc.ernet.in

Reference Books

1. Parameshwar P Iyer
Engineering Project Management with Case Studies, Apex Publishing, 2007.
2. J R Meredith and S J Mantel
Project Management: A Managerial Approach. John Wiley and Sons, Inc., 1995.
3. Windschuttle K and Elliot E
Writing, Researching, Communicating: Communication Skills for the Information Age, Irwin McGraw Hill, Sydney, 1999

Who can apply?

BE / B.Tech or PG in any discipline or Equivalent

Course Fee: Rs. 15,000/-

Schedule:

Monday & Wednesday's: 6.00 pm to 7.30 pm

7. Finite Element Analysis of Laminated Composites (2+0)

Objectives:

This is a higher level course covering some advanced topics in Finite Element Analysis. Analysis of Plates and Shells are usually not covered in the first level course of FEM. Also, the Mechanics of Composites are usually offered at Post-graduate level in few Institutions. However, engineers working in Industries come across many practical problems which require special skill of finite element modeling of laminated structures. The objective of this course is to introduce finite element analysis concepts involving laminated Plates and Shells.

Syllabus:

Review of Iso-parametric 2-D and 3-D finite elements. Finite Element formulation and modeling Strategy for isotropic Plates and shells. A brief introduction to Mechanics of Laminated Composites. Higher order theories. Finite Elements for Laminated Plates and Shells. Modeling and Computational Issues.



Faculty:

Prof. P. C. Pandey (Retd.) IISc.

Dept. of Civil Engineering.

E-mail: profpcpandey@yahoo.com /
pcpandey@civil.iisc.ernet.in

Reference Books

1. J N Reddy Mechanics of Laminated Composite Plates . CRC Press,1996
2. Madhujit Mukhopadhyay: Mechanics of Composite Materials and Structures. Universities Press, 2013.
3. Ever J Barbero: Finite Element Analysis of Composite Materials, CRC, 2008

Who can apply?

BE / BTech (Aero/ Mech / Civil) or Equivalent

Pre-requisites:

Knowledge of Basic FEM
Course Fee: Rs. 10,000/-

Schedule:

Tuesday's 6.00 pm to 8.00 pm

8. Data Mining (3+0)

Objectives :

To introduce the fundamental techniques and algorithms of data mining and explore the applications of data mining to web mining, bioinformatics, banking and financial sector.

Syllabus :

Introduction to Data Mining; Data preprocessing, data visualization and explanatory data analysis, data mining techniques like data condensation, feature selection, Principle component analysis; Pattern classification techniques like nearest neighbor classification, decision trees, rule based Systems, neural networks, support vector machines. Association rule mining, Apriority algorithm, FP tree, FP growth algorithm. Data clustering; Issues related to large data sets, Class imbalance problem, anomaly detection; Applications to web mining, bioinformatics, data mining in banking and finance, business intelligence, applications like fraud detection, stock market prediction, risk management.

Target Group:

Academic Institutions, Industries, Govt. R&D Organizations, IT professionals.



Faculty:

Dr. V SUSHEELA DEVI

Dept. of CSA, IISc

E-mail: susheela@csa.iisc.ernet.in

Reference Books

1. V Susheela Devi & M Narasimha Murthy, Pattern Recognition: An Introduction, Univ. Press, 2011
2. Pang-Ning Tan, Michael Steinbach, Vipin Kumar Introduction to Data Mining, Addison- Wesley, 2006.
3. M Narasimha Murty and V. Susheela Devi, Introduction to Pattern Recognition and Machine Learning World Scientific and IISc Press, 2015

Who can apply?

Those with B.E. / MCA / MSc (CS)

Course Fee: Rs. 15,000/-

Schedule:

Tuesday & Thursday's: 6.00 pm to 7.30pm

9. High Voltage Engineering 2+0

Objectives:

To introduce the students to various types of electrical insulations used in HV Power apparatus and their performance under different voltages including over voltages. They will be also introduced to different dielectric tests on HV equipments as per Indian and International standards. Generation and measurement of various types of voltages for dielectric testing will also be taught. Also different, non-destructive insulation diagnostics as well as condition monitoring techniques such as PD, $\tan \delta$ etc. will be introduced.

Syllabus:

Insulation Systems used in HV power apparatus, behavior of insulation under electric stress, HV dielectric tests, generation and measurement of ac, dc and impulse voltages, generation and measurement of impulse current, digital techniques in HV measurement, dry & wet tests, pollution tests on insulators, high current test on surge arresters, RIV and corona tests, non-destructive insulation diagnostics & condition monitoring of HV equipment's, partial discharges, C and $\tan \delta$, safety in HV labs.

Target Group : Engineers from electrical power equipment manufacturing industries, electrical engineers employed in state electricity boards/substations, high voltage testing labs, scientists from electrical R & D Labs, DRDO Labs & CPRI Labs etc.



Faculty:

Dr. Joy Thomas M.

Dept. of Electrical Engineering, IISc.

E-mail: jtm@ee.iisc.ernet.in

Reference Books

1. Kuffel E., Zaengl W.S. and Kuffel J. High Voltage Engineering Fundamentals Butterworth-Heineman Press, Oxford 2000
2. Rizk F. A. M. and Trinh G. N., High Voltage Engg., CRC Press, Newyork 2014
3. IEC standard 60060 Part 1 and 2

Who can apply?

*BE / B.Tech. in Electrical / Electronic Engineering or
M.Sc. in Physics / Electronics*

Course Fee: Rs. 10,000/-

Schedule:

Tuesday's 6.00 pm to 8.00 pm

10. Operating Systems Internals 3+0

Objectives:

This course is for software engineers who require an in-depth knowledge of the internals of operating systems for developing or modifying OS kernels in single core/multicore processors or developing applications in any operating systems. The course centres around operating systems for IA32, INTEL64, and ARM processors, but other variants of processors would also be covered to some extent.

Syllabus:

Fundamental Concepts of Multiprogrammed OS, Concepts and Techniques for the Implementation of Multiprogrammed OS, Brief Overview of IA32, INTEL64 and ARM Processors, and their multicore variants, Handling of Interrupts in CISC and RISC processors, Management of Timers and Interrupts in Multicore Processors, Realization of Process and Kernel Address Space, Implementation of System Calls, Management and Control of Processes and Threads, Traditional and Real-Time signals, A Framework for Process Scheduling in OS, Real-Time Scheduling, Critical Section Problem and Higher Level Synchronizing Primitives, Deadlocks, Concepts and Implementation of Virtual Memory(32-bit and 64-bit), Physical Memory Management, Concepts and Implementation of File Systems, Protection and Security, Introduction to Hypervisors and OS virtualization.

Target Group :

Industries/R&D units working to develop specialized operating systems or porting Unix-like OS from one platform to another will benefit from this course. Besides, Industries/R&D units which are developing applications that require an in-depth knowledge of internals of operating systems will also benefit from this course.



Faculty:
Prof. R C Hansdah
Dept. of CSA, IISc.

E-mail: rchansdah@gmail.com

Reference Books

1. Daniel P. Bovet and Marco Cesati, "Understanding the Linux Kernel", O'Reilly & Associates, Inc., 3rd Edition, 2005.
2. Yang Lixiang et al., "The ART of LINUX KERNEL DESIGN", CRC Press, 2014.
3. Randal E. Bryant and David R. O'Hallaron, "Computer Systems: A Programmer's Perspective", Pearson, Global Edition, 2016.

Who can apply?

BE / B.Tech . In CS / IT / IS / ECE / EE or MCA with Physics and Mathematics at the B.Sc. level or MSc.Level.

Pre Requisites

1. Knowledge of data structures and programming in C and Basic familiarity with microprocessors and assembly language programming,
2. Access to own laptop or desktop with Linux OS installed on it as the course requires certain programming assignments to be carried out in Linux OS.

Course Fee: Rs. 15,000/-

Schedule:

Tuesday and Thursday's 6.30 pm to 8.00 pm

11. Optical Communications and Networks 3+0

Objectives:

To Introduce and provide strong basics to understand optical communications and networks and recent developments.

Syllabus:

1. Introduction to Photonics
2. Basic Elements of optical communications- sources, detectors, optical fibers.
3. System design
4. Optical Network architectures
5. WDM Networks
6. Network management and fault tolerance
7. Emerging topics

Target Group :

Resent Graduate in ECE , College Lectures interested to Ph.D



Faculty:
Prof. T Srinivas
Dept. of ECE, IISc.

E-mail: tstrinu.iisc@gmail.com

Reference Books

1. G Keiser, Optical fiber communications, Mc GrawHill, 2000
2. R Ramaswami and K. Sivarajan, optical networks, Morgan Kaufman, 2009
3. Recent IEEE Papers.

Who can apply?

BE / B.Tech . (ECE) or M.Sc. (Physics) or Equivalent

Course Fee: Rs. 15,000/-

Schedule:

Tuesday and Thursday's 6.00 pm to 7.30 pm

12. Basic Spectroscopy and Instrumentation (2+0)

OBJECTIVES: To Understand the basic principles and techniques of various spectroscopic methods. This course addresses various aspects of spectroscopic analysis relevant to both research and Industry.

SYLLABUS: Introduction to separation techniques, Principle, Instrumentation and application of UV-Visible, Infra red, Raman and Fluorescence Spectroscopy, HPCL and Mass Spectroscopy for the identification of un known compounds.

Target Group: Academic Institutions and R & D Units.



Faculty :
Dr. S Sandya
Inorganic and Physical Chemistry
IISc.

Email: sandya@ipc.iisc.ernet.in

Reference Books

1. D L Pavia, G M Lampman and G S Kriz
"Introduction to Spectroscopy" 3rd Edition
2001
2. H Kaur, "Spectroscopy" 2011
3. Joseph R Lakowicz "Principles of
Fluorescence Spectroscopy" Spinger
Science

Who Can apply?

M.Sc. In Chemistry / Physics / Life Sciences

Course Fee: Rs. 10,000/-

Schedule:

Wednesday's: 6.00 pm to 8.00 pm

13 Introduction to Numerical Grid Generation and Fluid Flow Computations (2+0)

Objective:

To impart basic knowledge in fluid dynamics, and numerical methods used in computational fluid dynamics to a beginner. CFD has become a very important tool in design and analysis. It is necessary to understand the basic concepts of Mesh generation, governing equations of fluid dynamics and numerical methods. To impart certain CFD expertise to a practicing CFD Engineer in an industry.

Syllabus:

Introduction and Relevance of CFD, Governing equations of fluid dynamics and their various levels of approximations; Behaviour of Partial Differential Equations (PDE). Introduction to discretization, Various numerical techniques, FDM and FVM. Time Marching and Space Marching methods. Introduction to geometrical aspects of simple and complex bodies; Grid/Mesh generation Methods; Algebraic, PDE based Mesh generations with examples.

Target Group:

Aerospace Industries / National Laboratories/Private sectors involved in Fluid flow studies, Teaching Faculty in Colleges



Faculty:

Dr. P S KULKARNI

Computational Mechanics Lab,
Dept. of Aerospace Engg / JATP, IISc, Bengaluru

E-mail: psk@aero.iisc.ernet.in / pskdhar@gmail.com

Reference Books

1. Joe F Thompson, Warsi Zua & Wayne Martin C Numerical Grid Generation: Foundations & Applications, North Holland, 1985.
2. Weatherhill N P Grid Generation
3. John D Anderson, Jr Computational Fluid Dynamics: The basics with applications, Mc Graw-Hill, Inc., International Edition, 1995.

Who can apply?

Those with B.E./M.Sc. OR Equivalent

Course Fee: Rs. 10,000/-

Schedule:

Wednesday's - 6.00 pm to 8.00 pm

14. Vibration and Noise Control in Engineering Structures and Systems (2+0)

Objectives:

Growing awareness of vibration, noise and harshness feeling has necessitated the valid design criterion in the design of machines, automobiles, buildings, industrial facilities, etc, and the increasing number of standard regulations and human comfort associated with noise, harshness and vibration makes it mandatory to control vibration and noise leading to quieter technology in pumps, engines, compressors, chillers and other consumer products. There is a great demand to enhance ride comfort of bikes, cars, aircrafts and other automobiles. Vehicle Dynamics basics and growing awareness about noise pollution among the consumer necessitates the OEM companies to stress upon the products without NVH problems. Analytical, MATLAB and FEM based tools such as ANSYS, NASTRON, ABACUS and SYSNOISE helps to achieve the goals of NVH study. This course is for engineers/scientists/entrepreneurs/instructors in the industries/institutes to learn the analytical and experimental skills to tackle the problems related noise, vibration and harshness (NVH) during design and manufacturing stage for technically superior and commercially viable product.

Syllabus:

Vibration of structural systems. SDOF, 2-DOF, MDOF and continuous systems. Eigen values and vector estimation methods. Free and Forced vibration analysis. Torsional vibration and applications. Damping estimation methods Structural Vibration control elements: isolation, damping, balancing, resonators, absorption, barriers and enclosures. Vibration and noise standards. NVH measurement tools and techniques. Modal parameter (natural frequency, mode shape and damping) estimation techniques. Signal and system analysis. *Demonstration of vibration and noise experiments* - beam, plates, impulse excitation, electrodynamic shaker excitation, FFT analyzer, stroboscope and mode shape animation, sound level meter, microphones. Vibration transfer function (VTF) and noise transfer function (NTF)

Noise and its effects on man. Acoustic and sound field. Enclosures, shields and barriers-design. Silencer and suppression systems. Noise level interpolation and mapping. Harshness effects and measurements and solutions. NVH Parameters related to vehicle dynamics.

Case studies discussion (vibration reduction in passenger car, tiller, tractors, steering column/wheel vibration diagnosis, Modal analysis of Helicopter, Vibration diagnosis in diesel engine power plant, rot dynamic analysis of DWR and tracking antenna and engine and compressor noise attenuation and vibration isolation, engine-compressor mount design, vibration diagnosis in power plants, gear shift harshness, newspaper printing cylinder vibration diagnosis, engine filter bracket dynamic analysis, noise reduction for mixer grinders, field audit of industrial chimney for wind induced vibration, stability studies of sports bike, aerodynamic stability derivatives of scaled model of aerospace vehicles)

Target Group:

Mechanical, Civil, Aerospace, Automotive, Industrial Engineers, Construction Technologists, R & D Labs, New product design and development groups, entrepreneurs, Engineering college instructors and professionals to pursue higher postgraduate studies.



Faculty:

Dr. S B Kandagal

Dept. of Aerospace Engineering, IISc

E-mail: sbk@aero.iisc.ernet.in

Reference Books

1. Harris, C.W" Shock and vibration handbook" McGraw Hill, New York, 2006.
2. Ewins, D.J." Modal analysis: Theory and Practice", Research Studies Press Ltd, England, 2000
3. Gillespie, T.D., "Fundamentals of Vehicle Dynamics", Society of Automotive Engrs., Inc, 2002.
4. Beranek,L.L," Noise and Vibration Control", Wiley, 1988.

Who can apply?

BE, ME, /M.Sc. AMIE or Equivalent

Course Fee: Rs. 10,000/-

Schedule:

Wednesday's - 6.00 pm to 8.00 pm

15. Principles and Applications of NMR Spectroscopy (2+0)

OBJECTIVES:

To introduce the basic principles of NMR Spectroscopy together with applications in chemistry and Biology.

SYLLABUS:

1. Basic Theory of NMR
2. One Dimensional NMR
3. Analysis / Interpretation of 1D – NMR
4. Basics of 2D NMR; different Expts.
5. Application of 2D NMR for Structure Determination

Target Group:

1. Post-Graduates in M.Sc.
2. Teachers
3. Professionals working in Industry



Faculty :

Prof. H S Atreya
NMR RC IISc.

Email: hsatreya@gmail.com

Reference Books

1. Understanding NMR Spectroscopy- James Keeler
2. Spectroscopy – Pavia ET AL
3. One and Two Dimensional NMR – Horst Fibrolien

Who Can apply?

M.Sc. In Physics/Chemistry/Biology

Course Fee: Rs. 10,000/-

Schedule:

Thursday's: 6.00 pm to 8.00pm

16 Advances in Computational Fluid Dynamics (2+0)

Objective:

To Learn recent developments in the computational methods for fluid flow computations. CFD has become a very important tool in design and analysis. It is necessary to understand the basic concepts of Mesh generation, governing equations of fluid dynamics and numerical methods. To impart certain CFD expertise to a practicing CFD Engineer in an industry. Creating awareness of CFD while using commercial packages.

Syllabus:

Basics of fluid dynamics, Governing Equations, Boundary Conditions and PDE's, Various advanced Methods to solve model equations. Upwind methods, Flux Vector splitting methods like Roe's Van Leer and KFVS. Methods for In viscid and viscous fluids. Structured and unstructured Mesh Generation.

Target Group:

Practicing Engineers in Industry, Teaching Faculty in Colleges and Post graduate students.



Faculty:

Dr. P S KULKARNI

Computational Mechanics Lab,
Dept. of Aerospace Engg / JATP, IISc, Bengaluru

E-mail: psk@aero.iisc.ernet.in / pskdhar@gmail.com

Reference Books

1. Computational Fluid Mechanics and Heat Transfer "by John C. Tannehill, Dale A Anderson, Richard H Pletcher.
2. "Computational Techniques for Fluid Dynamics" Vol 1 & 2, by CAJ Fletcher
3. "Computational Fluid Dynamics - The Basics with Applications" by John D Anderson.
4. "Numerical Grid Generation" by N P Weather hill.

Who can apply?

B.E./MSc, ME,M Tech./ OR Equivalent

Pre Requisites:

Introductory Course in CFD offered in
CCE-PROFICIENCE

Course Fee: Rs. 10,000/-

Schedule: Friday's - 6.00 pm to 8.00 pm

17. Analysis and Design of Composite Structures (2+0)

Objectives:

Composites are future materials and have been finding applications in all fields of Engineering (Aero, Civil, Mechanical, Automobile, Marine, Chemical, Electrical, Electronics etc). Many FEM software packages like ANSYS, MSC-NASTRON, PATRAN, ABACUS, LS-DYNA, etc are available for analysis & Design. One should first understand the Mechanical behavior of the Composite Structures before using FEM packages for better quality of professional work and optimum usage of time, computing and human resources.

Syllabus:

Introduction: Basic Concepts and Terminology, different types of fibers and matrices, their properties and applications.

Micromechanics of Composites: Prediction of properties, etc.

Macromechanics of Lamina: The theory of elasticity, Constitutive equations of a lamina, transformations, numerical examples. **Failure theories** for composite lamina, numerical examples.

Mechanics of Laminated Composites: Development of ABD matrices, Analysis of laminates, numerical examples etc.

Hygrothermal Analysis, numerical examples.

Bending Analysis of Beams, numerical examples.

Analysis of Laminated composite plates: Classical and first order theories, **Energy Method, Boundary conditions,** numerical examples.

Buckling analysis of plates, numerical examples.

Design of laminates using Carpet plots, AML plots, numerical examples.

Target Group

1. Technologists/ Engineers/ Scientists/ Trainees/ Project Staff/ etc from Industries, R & D Organizations, Institutions, Colleges etc.
2. Faculty of Engineering/ Diploma Institutions etc.
3. Fresh Graduates, Post Graduates, Ph.D. Students, Research Fellows, SRFs, JRFs, Project Assistants/Associates etc.



Faculty:

Dr. G. NARAYANA NAIK,
Principal Research Scientist,
Department of Aerospace Engineering,
Indian Institute of Science, Bengaluru- 560 012.

E-mail: gnn@aero.iisc.ernet.in / gnnindia1@yahoo.co.in

Reference Books

1. Mechanics of Composite Materials:- Second Edition- Robert M. Jones. McGRAW-HILL KOGAKUSHA, LTD. - Year-1999.
2. Mechanics of Composite Materials and Structures - Madhujit Mukhopadhyay, Universities Press - Engg.- 2004.
3. Mechanics of Laminated Composite Plates and Shells -Theory and Analysis - J.N.Reddy, CRC Press - 2004

Who can apply?

B.E / B.Tech. / AMIE / M.Sc.(Engg.)/M.Sc./ AMAeSI (Engg.) (Mechanical, Aero, Civil, Automobile, Marine, Chemical, Metallurgy, Manufacturing, Ocean, Industrial Engg., Production Engg., Electrical, Electronics, etc) OR Equivalent

Course Fee: Rs. 10,000/

Schedule:

Friday's 6.00 pm - 8.00 pm

18. Laboratory Animal Management (2+0)

Objectives:

The use of animals in research and teaching imposes moral, scientific and legal obligations for humane care and treatment. This course provides essential information for the investigators/animal house managers about the standard practices to be followed in scientific management of the animal house, production of quality animals, current regulations and laboratory animal care.

Syllabus:

Includes introduction, uses of animals in biomedical research, selection of animals and models, animal acquisition, housing, animal husbandry and veterinary care, occupational health and safety, animal use protocol, personnel and facility management, quality control and CPCSEA guidelines.

Target Group:

- Biomedical Research Institutes
- R&D Units
- Veterinary/ Medical/Pharmacy Colleges
- Pharmaceutical Industries



Faculty:

Dr. S G Ramachandra

Central Animal Facility,
Indian Institute of Science, Bengaluru- 560 012.

E-mail : sgr@caf.iisc.ernet.in

Reference Books

1. The UFAW hand book on The Care and Management of Laboratory Animals'. Trevorpoole (ED) Blackwell Publishing Ltd., 1999.
2. Hand Book of Laboratory Animal Science. Vol. I and Vol. II CRC Press.2002
3. Laboratory Animal Medicine and Management, Reuter JD and Suckow MA (Eds). IVIS. 2003

Who can apply?

Those with BVSC. / B PHARMA, /
M PHARMA, / M.Sc

Course Fee: Rs. 10,000/

Schedule:

Friday's 6.00 pm to 8.00 pm

19. Structural Analysis & Design Optimization of Engineering Structures and Systems (2+0)

Objectives:

Advanced research in material science to enhance the life with reduced cost resulted in metal alloys, plastics, composites and nano materials. Structural design and optimization of components with unusual shapes became possible with current available finite element software tools such as ANSYS, NISA, NASTRON, ABACUS, SYSNOISE, LSDYNA and MATLAB etc. The fundamental knowledge of stress, strain, shear, torsion in relation to the structures and S-N curves in relation to the material becomes important. The interpretation of the FEM software output calls for the knowledge of analysis and design optimization of mechanical systems. This course essentially trains engineers / scientists / entrepreneurs /instructors in the industries/institutes to optimally design various mechanical systems and sub-systems for technically superior and commercially viable value added product.

Syllabus:

Applied mechanics, Strength of materials, SFD, BMD, solid mechanics, concept of stress, strain and fatigue. Constitutive laws. Mohr's Circle, Engineering materials and their properties. Structural analysis concepts, tension, compression, shear, torsion and S-N curves. Design of beams, torsion, compression members and fasteners. Stability of structures. Composite materials and their importance in structural analysis design optimization.

Principles of optimization, formulation of objective function and design constraints, classification of optimization problem. Single and multivariable optimization. Optimization with equality and inequality constraints.

Optimal design of mechanical elements – fasteners, springs, gears, bearings, belts, clutches, brakes, shafts and axles.

Procedures for product design, development and testing. Vibration of structures.

Case studies in structural analysis and optimal design of industrial products. (optimization of passenger car sub systems for vibration and noise reduction, Rail-coach CBC couplers, Car door window regulator, satellite tracking antenna and DWR antenna design, Tractor canopy, hydraulic crawler driller (drilling machine), Bike brake system, sluice valve design, failure analysis of piston drill bit, thermally insulated box, IP turbine blade failure analysis, design analysis of super pump impeller, Structural design aspects in power plants. Hydraulic jacks/Feed cylinder with intermediate supports, Industrial chimney design, optimization of box culverts, metal-composite sprocket for bikes, Thermal Analysis of heat exchangers, 6-DOF force balance, pitch flexure design for wind tunnel model studies for aero dynamic derivatives of aerospace vehicle and automobiles).

Target Group:

Mechanical, Civil, Aerospace, Automotive, Industrial engineers, R & D Labs, Construction technologists, New product design and development groups, Entrepreneurs and Engineering college instructors. Professionals to pursue postgraduate and higher studies.



Faculty:

Dr. S B Kandagal

Dept. of Aerospace Engineering, IISc

E-mail: sbk@aero.iisc.ernet.in

Reference books

1. Beer F P and Johnson, E.R, "Vector Mechanics for Engineers- Statics and Dynamics", Tata-MacGrawhill, sixth Edition, 2005.
2. Shigley, J.E and Mischke, C.R., "Mechanical engineering design" Tata-MacGrawhill, sixth Edition, 2003.
3. Johnson Ray, C." Optimum design of mechanical elements", Wiley, John & Sons, 2006.

Who Can apply?

BE, ME, M.Sc, AMIE or Equivalent

Course Fee: Rs.10,000/-

Schedule:

Friday's : 6.00 pm to 8.00 pm

20. Advances in Genetic Engineering & Transgenic Technology (2+0)

Objectives:

This course is proposed for those who wish to develop a strong background in technologies and principles involved in Genetic Engineering and generation of genetically modified experimental organisms.

Syllabus:

Construction of plasmid vectors, recombinant protein production in bacteria, yeast, and mammalian cells- Genome editing approaches such as TAL effector nucleases, Cas9/CRISPR-- and zinc finger nuclease technology- Next Generation Sequencing- Exome Sequencing- ChIP-Sequencing-Real time Quantitative PCR -Site directed mutagenesis - Protein Sequencing - RNA interference- RNAi, Lentiviral, retroviral and Adenoviral vectors- Gene therapy- Genetic Engineering of mammalian stem cells, Generation of induced pluripotent stem (iPS) cells, Mitochondrial genome editing. - Somatic cell nuclear transfer- Lentiviral and BAC transgenesis - Generation of transgenic and mutant *Caenorhabditis elegans*- Production of transgenic zebrafish and *Xenopus*- Generation of knock-out mice (Isolation and culture of embryonic stem (ES) cells, Gene targeting construct design, Transfection, Homologous recombination in ES Cells, Positive and negative selection; blastocyst injection, Breeding of germ-line chimeras Cre/lox and Flp/FRT system for inducible transgenics - Chemically inducible transgene expression systems. Use of transgenic technology in the modeling of human diseases, including cardiovascular diseases, diabetes, obesity, cancer, atherosclerosis, neurodegenerative diseases, muscle degeneration and aging.

Target Group:

- College students (Veterinary, Pharmacy, Biotechnology & Medical)
- Industry (Pharmaceutical Companies & Biotech Companies)
- Researchers, Postdocs and students in the field of biological sciences



Faculty:
Dr. N. RAVI SUNDARESAN
Assistant Professor,
Microbiology and Cell Biology,
Indian Institute of Science

Email: rsundaresan@mcbl.iisc.ernet.in,

Reference books

1. Principles of Gene Manipulation and Genomics by Sandy B. Primrose, R. Twyman Oxford press; 7th edition.
2. Transgenic Animal Technology: A Laboratory Handbook. Carl A. Pinkert Elsevier Science Publishing Co Inc; 3rd Revised edition.
3. Transgenic Mouse Methods and Protocols (Methods in Molecular Biology) Marten H. Hofker, Jan van Deursen. Humana Press. 2nd Edition.

Who Can apply?

B.Tech., B.Pharm., B.V.Sc., BS/M.Sc., M. Pharm., M.V.Sc., MS (Biotech), M.B.B.S., or Equivalent

Course Fee: Rs.10,000/-

Schedule:

Saturday's : 10.00 am to 12.00 Noon

21. Basics of Data Analytics (2+0)

Objective

To Introduce Concepts of data analysis, Laying the foundation for statistical analysis and forecasting and Concepts of Pattern recognition.

Syllabus:

Analytics, Basics of Probability and Statistics, Sampling, Trend, Cyclicity and Seasonality, Introduction to Forecasting, Smoothing and Regression Techniques. Auto Regression and Time Series, AR and MA Models, ARMA, ARIMA, and Concepts of Stochastic Processes.

Target Group: IT, Retail, Banking etc.

Faculty



**Dr. Gopal Krishna
Sharma**
Fiserv India Pvt. Limited.

Email :
gopalaks@yahoo.com

Faculty



Dr. Badarinath Ambati
Altair Engineering

Email :
abadarinath@yahoo.com

Reference Books:

1. Introduction to Probability with R
Kenneth Baclawski
Chapman and Hall, Feb 2008
2. Forecasting Methods and
Applications Spyros Makridakis and
Steven C Wheelwright Wiley, 1998

Who Can apply?

B.E. M.E / Post Graduation

Course Fee: 10,000

Schedule:

Saturday's: 10.00 am to 12.00 Noon

22. Cell and Molecular Biology of Aging and Diseases (2+0)

Objectives:

This course is proposed for those who wish to study cell and molecular biology in relation to the aging and the aging-related diseases like diabetes, obesity and heart failure. The course mostly deals with the cellular organelles, cellular signaling pathways and molecular events that cause aging and diseases.

Syllabus:

Cellular homeostasis, organelles, Cellular signaling pathways, Theories of Aging, Hormones involved in aging, Molecular mechanisms of aging- oxidative stress (ROS, RNS etc), damage to proteins and lipids, Damage to DNA and cellular organelles- mitochondria, ribosomes, lysosomes, Defects in Metabolism, Mechanisms of longevity, Caloric restriction, Aging related changes in organs, endocrine system, Aging related metabolic diseases: Diabetes, obesity, atherosclerosis, Aging of the cardiovascular system, heart failure, Aging of the Musculoskeletal Systems, Aging of the immune system, inflammation and aging, Genetic of Aging and Exceptional Longevity in humans, Strategies to avoid aging and aging-related diseases. Model organisms to study aging, Drugs that have potential to extend longevity

Target Group:

- College students (Veterinary, Pharmacy, Biotechnology & Medical)
- Industry (Pharmaceutical Companies & Biotech Companies)
- Researchers, postdocs and students in the field of biological sciences



Faculty:

Dr. N. RAVI SUNDARESAN

Assistant Professor

Microbiology and Cell Biology, Indian Institute of Science

Email : rsundaresan@mcbl.iisc.ernet.in,

Reference books

1. **Biology of the Cell** by Alberts B et al., 2008.
2. **Handbook of the Biology of Ageing, Seventh Edition**, by Edward J Masoro (Editor),
3. **Molecular Biology of Aging (Cold Spring Harbor Monograph Series)**, by Leonard Guarente, 2007.
4. **Aging and age- related diseases: the basics** by Karasek, M 2006.

Who Can apply?

B.Tech., B.Pharm., BVSc., BS/M.Sc., M Pharm., MVSc.,
MS (Biotech), MBBS or Equivalent

Course Fee: Rs.10,000/-

Schedule:

Saturday's : 2 pm to 4 pm

23. Embedded System Design using Microcontrollers (2+0)

OBJECTIVES:

To Train Engineers to design and develop Microcontroller based products.

SYLLABUS:

8051 Architecture, Software, Hardware interfacing with real world, Case studies of Projects, Overview of 16 bit Microcontrollers.

Target:

Electronic Industries, R & D Units like NAL, BHEL, BEL



Faculty :
Mr. M Krishna Kumar Retd.
CEDT, IISc.

Email: mkkumarcedt@gmail.com

Reference Books:

1. Microcontrollers by Kenneth Ayala.
2. Microprocessor and Microcontrollers by A P Godse ,D A Godse
3. NPTEL Notes (by M Krishna Kumar) on Microprocessors Microcontrollers

Who Can apply?

BE Electronics , Electrical , Instrumentation , Computer Science, Practicing Engineers

Pre Requisites : Basic Electronics

Course Fee: Rs. 10,000-

Schedule:

Saturday's : 10.00 am to 12.00 Noon

24. Finite Element Methods for Engineers (2+0)

OBJECTIVES:

Exposure to industrial (Aerospace, Civil, Automotive etc.) problems and approach to solve using numerical methods such as Finite Element Methods

SYLLABUS:

- Definition of Science, Technology & Engineering
- How codes of practices & engineering mechanics help to solve Industrial problems
- History of Finite Element Method (FEM)
- Recap of solid mechanics
- Concept of FEM, Types of finite elements (mass, stiffness, damping, 1D, 2D, 3D) & derivations of finite element equations, Common Errors in FE usage
- Approach to solve simple problems with Linear (statics & Dynamics) Approximation
Concept of Automation platforms such as plugins or API available in standards finite element software.

Target:

Students & Design validation groups in Industries (Aerospace, Civil, and Automotive) & Associated services sectors.



Faculty :
Dr. K S Nanjunda Rao
Department of Civil Engg.
IISc.
Email: ksn@civil.iisc.ernet.in



Faculty :
Mr. B Sreehari Kumar
Senior Consultant
Tata Consultancy Services
Email: Sreeharikumar.b@gmail.com

Reference Books:

- 1. Singiresu S. Rao, The Finite Element Method in Engineering, Elsevier, 20-Dec-2010**
- 2. Robert D. Cook, Malkus, Plesha, Robert J Witt, Concepts And Applications Of Finite Element Analysis, 4th Ed, John Wiley-India, 2007**
- 3. NAFEMS (National Agency for Finite Element Methods & Standards) Publications**

Who Can apply?

B.E./B.Tech. in Aerospace, Civil, Mechanical Engineering

Pre Requisites :
Engineering Mechanics

Course Fee: Rs. 10,000/-

Schedule:

Saturday's : 2 pm to 4 pm

25. Logical and Linguistic Analysis: Perspectives from Computer Science and the Indic Tradition (2+0)

OBJECTIVES:

Starting from 1st Principles, relate developments in logic and linguistic analysis historically, with a special emphasis on the Indic tradition (eg. Tarkasamgraha and Navyanyaaya). Current understanding of linguistic analysis and the corresponding Indic models.

SYLLABUS:

- 1.** Overview of logic and Tarkasamgraha
- 2.** Overview of Logic based Linguistic Analysis and Navyanyaaya
- 3.** Theory of Induction and logic of Paradoxes: Indic contributions and current computer science perspective.

Target:

Professionals who are interested in understanding foundations of Logic and Language analysis, esp those involved in computer-based translation.



Faculty :
Prof. K. Gopinath
Dept of CSA, IISc.
Email:
gopi@csa.iisc.ernet.in



Faculty :
Ms. Sangeeta Ramesh
Teaching Faculty
Vyas International School
Email:
sangeetaramesh90@gmail.com

Reference Books:

- 1.** Tarkasamgraha, Virupakshananda, 2010
- 2.** The Language of logic, Kulkarni/Joshi, 2013.
- 3.** Classical Indian Philosophy of Induction, Kisor Kumar Chakrabarti, 2010

Who Can apply?

B.E./Post graduation

Pre Requisites :

PROFICIENCE in an Indian Language or basic understanding of Sanskrit

Course Fee: Rs. 10,000-

Schedule:

Saturday's : 10 am to 12 noon

26. Nonlinear Finite Element Method (2+0)

Objectives:

This is a second level course covering some advanced topics in Finite Element Analysis. In particular, focus would be on Concepts and techniques of Nonlinear Finite element Analysis in this course.

Nonlinear FEM techniques are usually not covered in the first course of FEM. The FEM treatment of Nonlinear problems requires additional background of the inelastic behavior of materials and nonlinear-mechanics for better understanding but, such options are generally not available to graduate engineers or even to post-graduates. However, practicing engineers, especially structural analysts and designers, usually come across many practical problems which require nonlinear finite element analysis. Most of the commercial packages do have nonlinear analysis facilities. However, even to use such packages a good understanding of Nonlinear Finite Element analysis techniques is required. The objective of this course is to introduce basic concept of nonlinear finite element analysis with reference to solid mechanics applications.

Bucklings are included.

Syllabus:

Review of linear FEM with reference to Isoparametric 2-D and 3-D finite elements. Concept of Material, Geometric and Contact nonlinearities. Elements of Nonlinear Mechanics, Constitutive relations using Plasticity. Finite-Deformation, Finite Element Formulation of nonlinear problems in Solid Mechanics. General Solution Techniques, Computational Aspects and application.



Faculty:
Prof. P. C. Pandey (Retd.) Iisc.
Dept. of Civil Engineering

E-mail: profpcpandey@yahoo.com /
pcpandey@civil.iisc.ernet.in

Reference Books

- 1. Cook, R. D., et.al,**
Concepts & Applications of Finite Element Analysis, John Wiley & Sons, 2002 (IV Ed)
- 2. Zienkiewicz, O. C., and Taylor, R. L.,**
The Finite Element Method, V Edn., Vol 1 & 2, McGraw-Hill, 2002 (V Ed.).
- 3. Reddy J N**
An Introduction to Nonlinear Finite Element Analysis, Oxford University Press Inc, Oxford, 2004.

Who can apply?

B. E. /B.Tech /M.E (Civil/Mechanical/Aerospace)
OR Equivalent

Pre-requisites:

Basic knowledge of solid mechanics. An exposure to basic Finite Element Method

Course Fee: Rs.10,000/-

Schedule:

Saturday's 10am to 12 noon

27. Operations Research (2+0)

Objective

To Introduce Concepts of Operations Research, mathematical representations of complex systems, methodologies and techniques for effective decision making.

Syllabus:

Introduction to Operations Research, origin and growth; Mathematical representation of a physical problem, Constrained and unconstrained problems. Calculus method of Minimizing unconstrained problem, Lagrange Multipliers. Linear programming, Linear Programming Problem (LPP), graphical solution, Simplex Method, Duality and Dual Simplex method. Introduction to Integer Programming and Goal Programming, CPM, PERT. Introduction to Dynamic Programming (DP), Simple problems in DP. Basic concepts of Stochastic optimization.

Target Group: IT, Retail, Banking etc.

Faculty



**Dr. Gopal Krishna
Sharma**

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gopalaks@yahoo.com

Faculty



**Dr. Badarinath
Ambati**

Altair Engineering

Email :

abadarinath@yahoo.com

Reference Books

Operations Research : An Introduction Hamdy A Taha

Linear Programming :
Katta G Murthy, Wiley Publications

Who Can apply?

B.E. M.E / Post Graduation

Course Fee: 10,000/-

Schedule:

Saturday's: 2:00 pm to 4.00 pm

28. Performance Modeling and Simulation (3+0)

Objectives:

The course will deal with probability models as well as various aspects of simulation with the aim of studying performance modeling and analysis of systems. The course will give sufficient knowledge of the tools and techniques necessary to model and analyze complex discrete event systems.

Syllabus:

Probability theory-basics, conditional probability, Bayes' rule, independence, random variables, distributions, expectation, Variance, covariance, correlation coefficient, moment generating function, discrete event system modeling, Simulation, random number generation, discrete and continuous time Markov chains, performance analysis of single queues and networks, reliability, series and parallel systems, test cases and examples.

Target Group:

Industry / R & D / Local colleges



Faculty:
Prof. Shalabh Bhatnagar
Dept. of CSA, IISc.

E-mail: shalabh@csa.iisc.ernet.in

Reference Books

1. D.P. Bertsekas and J.N Tsitsiklis, Introduction to probability, Athena scientific, 2008 (2nd Edition)
2. S.M Ross, Simlation, McGraw Hill, 2012 (5th Edition)
3. K.S. Trivedi, Probability and statistics with reliability, queuing and computer science applications, Wiley, 2001

Who can apply?

B. E. /B.Tech /M.E. /M.Tech /M.Sc

Course Fee: Rs. 15,000/-

Schedule:

Saturday's 10am to 1 pm

29. Python Programming (2+C)

Objective:

1. Introduce to participant to Python programming.
2. Intermediate level and training.

Syllabus:

- Python Basics
- Lists, Strings,
- Dictionaries,
- File Handling,
- Class (Object oriented Programming)

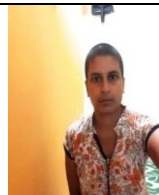
Target Group :

PG Industry waiting to exploit Python for their commercial purpose.



Faculty

Dr. Parameshwar P Iyer
Dept. of Management Studies,
IISc.
Email: piyer@mgmt.iisc.ernet.in



Faculty

Ms. Annapoornima Koppad
Office of IPTel IISc.
Email:
ipoff@admin.iisc.ernet.in,
annakoppad@gmail.com

Reference Books:

1. Introduction to Python Programming, Annapoornima Koppad, Amazon: B01F7XH8TU
2. Think Python, Allen B. Downey, Amazon
3. Dive into Python, Mark Pilgrim

Who Can apply?

B.E. / any Post Graduation

Pre Requisites: Basic Computer skills and basic arithmetic

Course Fee: Rs. 15,000-

Schedule:

Saturday's: 10.00 am to 1 pm

30. Strategic Management (3+0)

Objectives:

To teach basic concepts and practices in strategic management. To provide the participants the opportunity to make actual strategic decisions, realizing that the rationale for the decisions will be more important than the actual decisions themselves. Taught as a capstone course in MBA Curricula, this course will cover all aspects of mastering business policy and strategic management.

Syllabus:

Concept of strategic management; Vision and mission; External environment; Internal assessment; Strategies in action; Strategic analysis and choice; Implementing strategies: management issues; Marketing, finance, R&D, and Information Technology issues in Strategy; Strategic Management Cases.

Target Group:

All engineers and scientists in industry and research organizations, who have a stake in charting the organizational strategy.



Faculty:

Dr. Parameshwar P Iyer
Dept. of Management Studies, IISc.
E-mail: piyer@mgmt.iisc.ernet.in

Reference Books

1. Fred R. David, 2001. Strategic Management: Concepts and Cases. Prentice Hall, USA
2. G. Johnson and K. Scholes, 1996. Exploring Corporate Strategy: Text and Cases. Prentice Hall India.
3. R. Das, 2000. Crafting the Strategy. Tata McGraw Hill

Who can apply?

B.E./ B.Tech./ M.Sc. or Equivalent

Course Fee: Rs. 15,000/-

Schedule:

Saturday's 10 am to 1 pm

Basics of Fracture Mechanics (2+0)

Objectives :

This is a foundation course in Fracture mechanics aimed at Civil, Mechanical and Aerospace engineering professionals. Particularly this course would be beneficial to engineers who do not have any formal training in fracture mechanics. This course is designed to provide a basic introduction to fracture mechanics.

Syllabus :

Introduction: Kinds of failure; brittle and ductile fracture; modes of fracture failure

Energy release rate: Griffith's theory, surface energy, energy release rate (G), mathematical formulation for G. change in compliance approach, energy release rate for a DCB specimen, crack resistance, stable and unstable crack growth, R-curve for brittle and ductile materials; critical energy release rate (G_{ic}).

Stress intensity factor: Introduction, singularity, linear elastic fracture mechanics (LEFM); stress and displacement fields in front of crack tip in isotropic materials; stress intensity factor (SIF); relation between K_I and G_I, Critical stress intensity factor (K_{Ic}); SIF for important geometries;

Anelastic deformation at the crack tip: approximate shape and size of plastic zone; plastic zone shape for plane stress, plastic zone shape for plane strain; effective crack length; Irwin plastic zone correction; plastic zone size using Dugdale's approach, effect of plate thickness.

Elastic plastic analysis through J-integral: Definition of J-integral; Path independence; application to engineering problems; equivalence of G and J for elastic materials; J-integral of some common cases.

CTOD: crack tip opening displacement; relation between CTOD, K_I and G_I for small scale yielding, equivalence between CTOD and J.

Target Group:

Engineers working in industry and consulting firms



Faculty:

Dr. Vidya Sagar

Dept. of Civil Engg, IISc

E-mail: rvsagar@civil.iisc.ernet.in

Reference Books

1. Anderson T L. Fracture mechanics, fundamentals & Applications., CRC press, 2nd Edition, 1995
2. Ashok Saxena, Nonlinear fracture mechanics for engineers, CRC press, 1998
3. Prashanth Kumar, Elements of fracture mechanics, Wheeler publishers, New Delhi 1999.

Who can apply?

Those with B.E. Civil/Mech/Aeronautics/or AMIE/Post Graduation

Course Fee: Rs. 10,000

Schedule:

Friday's 6 pm to 8 pm



Centre for Continuing Education

(CCE-Proficiency Programme)

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Website: cce.iisc.ernet.in/Proficiency



Appendix 'A' PROFORMA NAME OF THE COLLEGE

PROVISIONAL CERTIFICATE

This is to certify that Sri / Smt.was a student of this
college studying in

Course **

branch during the session to

He / She has successfully completed the course as prescribed by the

.....
University with regard to course of study, attendance, sessional requirements etc.

He / She has passed the final * examination held during
.....securing.....class as per the results announced by the University. He /
She will be awarded the degree during the next convocation of
the University.

College Seal

PRINCIPAL

Date:

* Appropriate course to be filled in (B.E., M.E., M.Sc., and M.Com. M.B.B.S., etc)

** Mention Civil, Electrical, Electronics, Chemistry, Biology, etc.

IMPORTANT DATES			
Apply Online CCE Web Site	from To	20th June 2016 to 16th August 2016	MONDAY TUESDAY
Classes Commence		22nd August 2016	MONDAY
Final Exams	From	26th December 2016	MONDAY
	To	31st December 2016	SATURDAY

CCE-PROFICIENCE PROGRAMME

***SO/Coordinator, CCE-PROFICIENCE, Central Lecture
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so@cce.iisc.ernet.in / cce-prof@cce.iisc.ernet.in

URL: www.cce.iisc.ernet.in

Working Hours:

Monday through Friday: 0930 hrs to 1900 hrs

Saturday: 1000 hrs to 1300 hrs