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</table>

### REGULAR COURSES

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>1</td>
<td>Design of Medical Micro-Devices, Sensors and Intellectual Property Rights (Mon-Wed)</td>
<td>3+0</td>
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<tr>
<td>2</td>
<td>Innovative Product Development and Design Methods (Mon)</td>
<td>2+0</td>
</tr>
<tr>
<td>3</td>
<td>Renewable Energy Resources: Principles, Technology and Utilization (Mon)</td>
<td>2+0</td>
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<td>4</td>
<td>Derivatives and Portfolio Management (Tue &amp; Thur)</td>
<td>3+0</td>
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<td>5</td>
<td>Internet of Things and Nano Sensors (Tue &amp; Thur)</td>
<td>3+0</td>
</tr>
<tr>
<td>6</td>
<td>Semiconductor Device Technologies</td>
<td>2+0</td>
</tr>
<tr>
<td>7</td>
<td>Basics of NMR Spectroscopy with Applications in Chemistry and Biology (Tue)</td>
<td>2+0</td>
</tr>
<tr>
<td>8</td>
<td>Analysis and Design of Composite Structures (Tue)</td>
<td>2+0</td>
</tr>
<tr>
<td>9</td>
<td>Design Thinking and Innovation (Tue)</td>
<td>2+0</td>
</tr>
<tr>
<td>10</td>
<td>Vibration and Noise Control in Engineering Structures and Systems (Wed)</td>
<td>2+0</td>
</tr>
<tr>
<td>11</td>
<td>Embedded System on ARM Platform (Wed)</td>
<td>2+0</td>
</tr>
<tr>
<td>12</td>
<td>Service Design Thinking (Thurs)</td>
<td>2+0</td>
</tr>
<tr>
<td>13</td>
<td>IoT for Smart Cities and Smart Campuses (Thur)</td>
<td>2+0</td>
</tr>
<tr>
<td>14</td>
<td>Structural Analysis &amp; Design Optimization of Engineering Structures and Systems (Fri)</td>
<td>2+0</td>
</tr>
<tr>
<td>15</td>
<td>Intellectual Property: Creation, Protection and Commercialization (Fri)</td>
<td>2+0</td>
</tr>
<tr>
<td>16</td>
<td>Basics of Data Analytics (Sat)</td>
<td>2+0</td>
</tr>
<tr>
<td>17</td>
<td>Nonlinear Finite Element Method (Sat)</td>
<td>2+0</td>
</tr>
<tr>
<td>18</td>
<td>Micro and Nano Materials Characterization Techniques (Sat)</td>
<td>3+0</td>
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<tr>
<td>19</td>
<td>Basics of Nanoscience and Nanotechnology (Sat)</td>
<td>3+0</td>
</tr>
<tr>
<td>20</td>
<td>Introduction to Industrial Design &amp; Ergonomics (Sat)</td>
<td>3+0</td>
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<tr>
<td>21</td>
<td>Strategic Management (Sat)</td>
<td>3+0</td>
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<td></td>
<td>Course</td>
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<tr>
<td>22</td>
<td>Reinforcement Learning (Sat)</td>
<td>3+0</td>
</tr>
<tr>
<td>23</td>
<td>Analog and Digital (DAQ) Circuits and Systems for Microscale Sensors and Transducers (Sat)</td>
<td>3+0</td>
</tr>
<tr>
<td>24</td>
<td>Smart Design Methods and Processes in Automotive Industry-Foundation (Sat)</td>
<td>2+0</td>
</tr>
<tr>
<td>25</td>
<td>Computational Machine Learning (Sat)</td>
<td>3+0</td>
</tr>
<tr>
<td>26</td>
<td>Smart design methods and processes in Automotive Industry-Advanced (Sat)</td>
<td>2+0</td>
</tr>
<tr>
<td>27</td>
<td>Basic Concepts of Finite Element Method (Sat)</td>
<td>2+0</td>
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<tr>
<td>28</td>
<td>Basics of Machine Learning (Sat)</td>
<td>2+0</td>
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<tr>
<td>29</td>
<td>Principles and Applications in Genetic Engineering (Sat)</td>
<td>2+0</td>
</tr>
<tr>
<td>30</td>
<td>Biopharmaceutical Technology and Drug Development</td>
<td>2+0</td>
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</tbody>
</table>
INTRODUCTION

Indian Institute of Science (IISc) established in 1909, is a Deemed University and Centrally Funder 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 CIRCUMSTANCES.**

The letter grades carry a 10 point grading assessment as indicated below

<table>
<thead>
<tr>
<th>Grade</th>
<th>A+</th>
<th>A</th>
<th>B+</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F (Fail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade Points</td>
<td>10</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

**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-PROFICIENCY 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 CCEPROFICIENCY 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-PROFICIENCY 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 am - 9.00 pm**

**INSTRUCTIONS**

**HOW TO APPLY:**

Details of the courses are available online at cce.iisc.ernet.in and also download CCE App from Google Playstore. 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. Refund of fees in case of dropped courses will take minimum 3-4 weeks.

**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 May 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. Police authorized by lodging and compliant and then request the Section Officer, CCE to issue duplicate ID during submitting police compliant and Rs.100/- on penalty In the event of loss of identity card, the matter should be immediately reported to the Officer-in-Charge, CCE-PROFICIENCE 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 CIRCUMSTANCE
<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the Course</th>
<th>Credit</th>
<th>Faculty</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Design of Medical Micro-Devices, Sensors and Intellectual Property Rights (Mon-Wed)</td>
<td>3+0</td>
<td>Dr. Hardik J Pandya &amp; Dr. Lipika Sahoo</td>
<td>DESE &amp; Lifeintelect Consultancy Pvt. Ltd.</td>
</tr>
<tr>
<td>2.</td>
<td>Innovative Product Development and Design Methods (Mon)</td>
<td>2+0</td>
<td>Dr. J E Diwakar (Retd.) &amp; Prof. P. Achutha Rao (Retd.)</td>
<td>CPDM &amp; NID R&amp;D Campus</td>
</tr>
<tr>
<td>3.</td>
<td>Renewable Energy Resources: Principles, Technology and Utilization (Mon)</td>
<td>2+0</td>
<td>Prof. L Umanand Dr. Saji Salkalachen</td>
<td>CEDT &amp; (Ex.GM &amp; Consultant at BHEL, B’Luru)</td>
</tr>
<tr>
<td>4.</td>
<td>Derivatives and Portfolio Management (Tue &amp; Thur)</td>
<td>3+0</td>
<td>Dr. Shashi Jain</td>
<td>MS</td>
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<tr>
<td>5.</td>
<td>Internet of Things and Nano Sensors (Tue &amp; Thur)</td>
<td>3+0</td>
<td>Dr. Vijay Mishra</td>
<td>CeNSE</td>
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<tr>
<td>6.</td>
<td>Semiconductor Device Technologies</td>
<td>2+0</td>
<td>Dr. Digbijoy N Nath</td>
<td>CeNSE</td>
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<tr>
<td>7.</td>
<td>Basics of NMR Spectroscopy with Applications in Chemistry and Biology (Tue)</td>
<td>2+0</td>
<td>Dr. Hanudatta Atreya</td>
<td>NMR RC</td>
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<tr>
<td>8.</td>
<td>Analysis and Design of Composite Structures (Tue)</td>
<td>2+0</td>
<td>Dr. G Narayana Naik</td>
<td>AE</td>
</tr>
<tr>
<td>9.</td>
<td>Design Thinking and Innovation (Tue)</td>
<td>2+0</td>
<td>Dr. J E Diwakar (Retd.) &amp; Prof. P. Achutha Rao (Retd.)</td>
<td>CPDM &amp; NID R&amp;D Campus</td>
</tr>
<tr>
<td>10.</td>
<td>Vibration and Noise Control in Engineering Structures and Systems (Wed)</td>
<td>2+0</td>
<td>Dr. S B Kandagal</td>
<td>AE</td>
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<td>11.</td>
<td>Embedded System on ARM Platform (Wed)</td>
<td>2+0</td>
<td>Mr. Haresh Dagale</td>
<td>DESE</td>
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<tr>
<td>12.</td>
<td>Service Design Thinking (Thurs)</td>
<td>2+0</td>
<td>Dr. J E Diwakar, (Retd.) Prof. P. Achutha Rao, (Retd.) &amp; Prof. TVP Chowdry</td>
<td>CPDM, NID R&amp;D Campus &amp; CST</td>
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<tr>
<td>13.</td>
<td>IoT for Smart Cities and Smart Campuses (Thur)</td>
<td>2+0</td>
<td>Dr. Pavan Kumar Tallapragada &amp; Mr Ganesh Hassan</td>
<td>EE &amp; Founder &amp; MD Flux Gen Engg. Tech Pvt. Ltd. B’luru.</td>
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<tr>
<td>14.</td>
<td>Structural Analysis &amp; Design Optimization of Engineering Structures and Systems (Fri)</td>
<td>2+0</td>
<td>Dr. S B Kandagal</td>
<td>AE</td>
</tr>
<tr>
<td>15.</td>
<td>Intellectual Property: Creation, Protection and Commercialization (Fri)</td>
<td>2+0</td>
<td>Dr. R N Narahari &amp; Prof. Prof. S Dasappa</td>
<td>CeNSE &amp; CST</td>
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<tr>
<td>16.</td>
<td>Basics of Data Analytics (Sat)</td>
<td>2+0</td>
<td>Dr. Gopal Krishna Sharma, Dr. Badarinath Ambati &amp; Prof. M Sekhar</td>
<td>Fiserv India Ltd., Altair Engineering, &amp; Civil Engg.</td>
</tr>
<tr>
<td>17.</td>
<td>Nonlinear Finite Element Method (Sat)</td>
<td>2+0</td>
<td>Prof. P C Pandey (Retd.) IISc.</td>
<td>Distinguished Prof. Gitam Univ.</td>
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<tr>
<td>18.</td>
<td>Micro and Nano Materials Characterization Techniques (Sat)</td>
<td>3+0</td>
<td>Dr. Suresha S J</td>
<td>CeNSE</td>
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<tr>
<td>19.</td>
<td>Basics of Nanoscience and Nanotechnology (Sat)</td>
<td>3+0</td>
<td>Dr. Sanjeev Kumar Shrivastava</td>
<td>CeNSE</td>
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<td>No.</td>
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<td>-------------------------------------------------</td>
</tr>
<tr>
<td>20</td>
<td>Introduction to Industrial Design &amp; Ergonomics (Sat)</td>
<td>3+0</td>
<td>Dr. J E Diwakar, (Retd.) Prof. P. Achutha Rao, (Retd.) &amp; Prof. TVP Chowdry</td>
<td>CPDM, NID R&amp;D Campus &amp; CST</td>
</tr>
<tr>
<td>21</td>
<td>Strategic Management (Sat)</td>
<td>3+0</td>
<td>Prof. R Srinivasan (Emeritus Professor)</td>
<td>MS</td>
</tr>
<tr>
<td>22</td>
<td>Reinforcement Learning (Sat)</td>
<td>3+0</td>
<td>Shalabh Bhatnagar</td>
<td>CSA</td>
</tr>
<tr>
<td>23</td>
<td>Analog and Digital (DAQ) Circuits and Systems for Microscale Sensors and Transducers (Sat)</td>
<td>3+0</td>
<td>Dr. Hardik J. Pandya</td>
<td>DESE</td>
</tr>
<tr>
<td>24</td>
<td>Smart Design Methods and Processes in Automotive Industry-Foundation (Sat)</td>
<td>2+0</td>
<td>Prof. Anindya Deb &amp; Mr. Kalyan Kumar K V</td>
<td>CPDM &amp; Founder &amp; Director, Abhiyantara Technologies</td>
</tr>
<tr>
<td>25</td>
<td>Computational Machine Learning (Sat)</td>
<td>3+0</td>
<td>Mrs. Anandi Giridharan and Prof. Vijay Kumar</td>
<td>ECE &amp; MSRIT</td>
</tr>
<tr>
<td>26</td>
<td>Smart design methods and processes in Automotive Industry-Advanced (Sat)</td>
<td>2+0</td>
<td>Prof. Anindya Deb &amp; Mr. Kalyan Kumar K V</td>
<td>CPDM &amp; Founder &amp; Director, Abhiyantara Technologies</td>
</tr>
<tr>
<td>27</td>
<td>Basic Concepts of Finite Element Method (Sat)</td>
<td>2+0</td>
<td>Prof. P C Pandey (Retd.) IISc.</td>
<td>Distinguished Prof. Gitam Univ.</td>
</tr>
<tr>
<td>28</td>
<td>Basics of Machine Learning (Sat)</td>
<td>2+0</td>
<td>Dr. Gopal Krishna Sharma, Dr. Badarinath Ambati &amp; Prof. M Sekhar</td>
<td>Fiserv India Ltd., Altair Engineering, &amp; Civil Engg.</td>
</tr>
<tr>
<td>29</td>
<td>Principles and Applications in Genetic Engineering (Sat)</td>
<td>2+0</td>
<td>Dr. N Ravi Sundaresan</td>
<td>MCB</td>
</tr>
<tr>
<td>30</td>
<td>Biopharmaceutical Technology and Drug Development</td>
<td>2+0</td>
<td>Dr. N Ravi Sundaresan</td>
<td>MCB</td>
</tr>
</tbody>
</table>
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+0 credits #  Rs. 15,000/-

4. L Stands with 2+L Credits # Rs. 15,000/-

# Credits = Lecture Hours per week

$C$ Stands for Computer Laboratory

$L$ Stands for Online Course
1. Design of Medical Micro-Devices, Sensors and Intellectual Property Rights (3+0)

Objectives:
This course is aimed at introducing the audience to the state-of-the art in medical microdevices: their design, fabrication methods and vibrant fields of application and introduce them to the importance of protecting their intellectual property through a detailed overview of IPR protection specific to the field of biomedical devices. Medical microdevices is an emerging and fast changing field and this course will give a systematic overview of how to innovate in this highly competitive field and how to protect the respective ideas/inventions at important junctures of the prototype/product life cycle. Specifically, the course will attempt to meet the following objectives:

- Understand the various types of medical microdevices currently under active research and their different fields of application
- Understand the IC Technology, equipment and processes used in fabrication of such devices.
- Understand wafer cleaning, mask designing, metal deposition, photolithography, wet etching, dry etching, PDMS-silicon bonding, Characterization of fabricated device.
- Know the Fabrication process of a microengineered device for use in electronics/biology/medicine.
- Introduction to Intellectual Property Rights and familiarization with various terminologies used in the patent space
- Hands on module on Patent search with detailed journey through the patent application process, prior art search and other tools to equip the inventor to protect and save their innovation

Syllabus:

Introduction to medical micro-devices: Devices for flow cytometry/sorting, microchips using dielectrophoresis, microengineered devices for medical therapeutics, blood pressure sensors, devices for drug delivery, devices for minimally invasive surgery, for measuring antibiotic susceptibility, devices for testing immunotherapy etc.

Microfabrication technology: Introduction to the clean room, Contaminants, Wafer cleaning processes (DI water, RCA, metallic impurities, etc.), Substrate materials, Techniques of metallization: PVD [(Sputtering – DC, RF, and Magnetron), thermal evaporation, e-beam evaporation, PLD], Types of masks, Hard and soft Lithography, Wet etching, Dry etching (RIE and DRI), Design of process flow for device fabrication including microfluidics, Bio-MEMS, Microcantilever, Interdigitated electrodes, Device inspection in Class 10000 clean room (biochips, microheater, microfluidic chips).


Target Group:
People working in industry, Academicians, Fresh/experienced graduates in science and engineering, management and law, R&D institutions

Faculty:
Dr. Hardik Jeetendra Pandya
Electronic Systems Engineering
Indian Institute of Science, Bangalore
E-mail: hjpandya@iisc.ac.in
http://beeslab.dese.iisc.ac.in

Faculty:
Dr. Lipika Sahoo
Founder & CEO
Lifeintelect Consultancy Pvt. Ltd.
Bangalore,
E-mail: lipika@lifeintelect.com

Reference Books
1. Lecture notes on some topics will be provided by the instructor.
3. WIPO INTELLECTUAL PROPERTY HANDBOOK
5. Indian Trademark and Design Act (http://www.ipindia.nic.in)

Who can apply?
Graduate in Science/Engineering/Law

Course Fee: Rs. 15,000/-
Schedule: Monday & Wednesday - 6.00 pm to 7.30 pm
## 2. Innovative Product Development and Design Methods (2+0)

**Objectives:**
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, through theory classes, 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) - Overview
- Concept generation methods
- Concept Selection Methods

**Target Group:**

<table>
<thead>
<tr>
<th>Faculty:</th>
<th>Faculty:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. J E Diwakar (Retd.)</td>
<td>Prof. P Achutha Rao</td>
</tr>
<tr>
<td>CPDM., IISc., Bengaluru.</td>
<td>Retired from NID R &amp; D Campus,</td>
</tr>
<tr>
<td>(O) 22933125</td>
<td>Bengaluru.</td>
</tr>
<tr>
<td>Email: <a href="mailto:jed@cpdm.iisc.ernet.in">jed@cpdm.iisc.ernet.in</a></td>
<td>Mobile: 9886055955</td>
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<td></td>
<td>E-Mail: <a href="mailto:raopanambur@gmail.com">raopanambur@gmail.com</a></td>
</tr>
</tbody>
</table>

**Reference Books**
2. Winning at New Products, Robert G Cooper; Basic Books, 2011

**Who Can apply?**
Graduation in Engineering, MANAGEMENT

**Course Fee:** Rs. 10,000/-

**Schedule:** Monday’s 6.00 p.m. to 8.00 p.m.
### Objectives:
The course introduces various financial instruments traded in the market. At the end of the course, the participant will have the knowledge on the use of derivatives, their valuation, and managing risks associated with these derivatives. The course also covers portfolio management and optimal allocations.

### Syllabus:
1. Introduction to Financial Derivatives
2. Bonds and other Interest rate Derivatives
3. Option Derivatives
4. Trading Strategies for Options
5. Valuation of Options, Binomial trees, Monte Carlo methods
6. The Black Scholes Model
7. Modern Portfolio Theory
8. Valuation of Projects using Real Options

### Target Group:
Banks and other Financial Institutions, Individuals Interested in Investments, Consultancy Firms.

### Faculty:
**Dr. Shashi Jain**
Asst. Prof.,
Dept. of M S.,
IISc, Bengaluru.
Email: shashijain@iisc.ac.in

### Reference Books:
1. John Hull, Options, Futures and other Derivatives,
2. Bodle, Kane, Marcus and Mohanty, Investments.

### Who Can apply?
BE/B.Tech.

**Pre-requisites:** Basic Mathematics, Probability, Basic Knowledge of a Programming Language of Choice.

**Course Fee:** Rs. 15,000/-

**Schedule:** Tuesday-Thursday - 6.00 p.m. to 7.30 p.m.
4. Renewable Energy Sources: Principles, Technology and Utilization (2+0)

Objectives:
To provide and stimulate interest in:

Syllabus:


Target Group:
Students (Engg & Science), Faculty (Engg. & Science), Professionals (Renewable Energy/Solar Industry), and Entrepreneurs.

Faculty:
Prof. L Umanand
DESE, IISc
Email: lums@iisc.ac.in

Faculty:
Dr. Saji Salkalachen
(Former GM & Consultant at BHEL, Bengaluru)
Email: sajisalk@gmail.com

Reference Books

Who Can apply?
BE/BTech/AMIE & MSc
Pre-requisites: Interest in Renewable Energy/Solar Photovoltaic Power
Course Fee: Rs. 10,000/-
Schedule: Mondays : 6.00 p.m. to 8.00 p.m.
### 5. Internet of Things and Nano Sensors (3+0)

**Objectives:**
- To teach basic concepts and practices in development of IoT Prototypes for real world applications with special reference to Nano Sensors.

**Syllabus:**
- Signal Processing, as well as other aspects of Digital and Wireless Communication Systems
- Circuit Design and Performance
- The Components of Embedded Systems
- Web Applications and Computer Security Risks that can be Related to IoT Devices
- Biochips, Biosensors, Implantable Systems and other Emerging IoT Technology
- Sensor Nanofabrication and Micro and Nano Characterization

**Target Group:**
All Engineers and Scientists in Industry and Research Organizations, involved in development of products, willing to make IoT based startups, who have a stake in charting their organizational strategy.

**Faculty:**
Dr. Vijay Mishra  
CeNSE, IISc., Bengaluru.  
(O) 23601143  
Email: vijaymishra@iisc.ac.in

**Reference Books**
1. Internet of Things from Hype to Reality: The Toad to Digitization, Springer, 1st ed. 2017  
   (2 November 2016), Ammar Rayes, Samer Salam, Tata McGraw Hill.

2. Micro and Smart Systems, G K Ananthasuresh et al., 2011, Wiley India


**Who Can apply?**
BE/B.Tech./M.Sc./ or equivalent

**Course Fee:** Rs. 15,000/-  
**Schedule:** Tuesday-Thursday 6.00 p.m. to 7.30 p.m.
6. Semiconductor Device Technologies (2+0)

Objectives:
- Familiarization of the basics of semiconductor device physics
- Explaining the working of basic semiconductor devices (various transistor types, LEDs, detectors)
- Introduction to devices for power/RF electronics, logic/memor, opto-electronics
- Introduction to micro/nano-fabrication techniques used in the development of semiconductor devices

Syllabus:
Basics of semiconductor (energy band, doping, Fermi level, drift-diffusion, etc.), p-n junction, diodes, MOSFET, BJT/HBT, heterojunction, compound semiconductors, HEMT, RF & power transistors, IR/visible/UV LEDs and detectors, solar cells basics. Memory/logic devices, low noise transistors. Scaling & Moore’s law, beyond Moore. Fabrication techniques: lithography, ion implantation, etching, deposition and epitaxy, annealing, oxidation.

Target Group:
Teachers/lecturers from engineering/general colleges,
Engineers in electronics industry, scientists/engineers from R&D centres/national labs

Faculty:
Dr. Digbijoy N Nath
CeNSE.,
IISc., Bengaluru.
Email: digbijoy@iisc.ac.in

Reference Books
2. Introduction to Semiconductor Materials and Devices, M. S. Tyagi, Wiley, 2008

Who Can apply?
BE/B.Tech./M.Sc.

Course Fee: Rs. 10,000/-
Schedule: Tuesday - 6.00 p.m. to 8.00 p.m.
### Objectives:
To cover the basic aspect of one-dimensional and two-dimensional NMR spectroscopy with application to small molecules and peptides.

### Syllabus:
- Principles of NMR spectroscopy;
- NMR hardware;
- NMR data acquisition;
- Data processing;
- 1D NMR-practical aspects of recording data;
- 1D proton and 13C NMR spectral interpretation with examples of small molecules;
- Principles of 2D NMR Spectroscopy;
- Basic 2D NMR experiments;
- Application of 2D NMR for structure determination of organic molecules and peptides;
- Application of NMR for ligand binding and drug discovery.

### Target Group:
Students pursuing M.Sc. in physics/chemistry/biology; Researchers in all areas of chemical and biological sciences; Scientists from Pharmaceutical and Biotechnology Companies such as Dr. Reddy's laboratories, Cipla Pharma, Biocon etc.

### Faculty:
**Dr. Hanudatta S. Atreya**  
Asst. Prof.  
NMR Research Centre, IISc., Bengaluru  
Email: hsatreya@iisc.ac.in

### Reference Books
1. NMR Spectroscopy by James Keeler  
2. Spin Dynamics by Malcolm H. Levitt  
3. NMR of biomolecules by K. V. R. Chary and G. Govil

### Who Can apply?
M. Sc (Physics or chemistry or Biology)

### Course Fee: Rs. 10,000/-

### Schedule: **Tuesday's** 6.00 p.m. to 7.30 p.m.
8. Analysis & Design of Composite Structures (2+0)

Objectives:

Composites are future materials and have been finding applications in all fields of Engineering. Many FEM software packages 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,
Macromechanics of Lamina: The theory of elasticity, Constitutive equations of a lamina, transformations, numerical examples.
Failure theories for composite lamina, numerical examples.
Bending Analysis of Beams.
Analysis of Laminated composite plates: Classical and first order theories, Energy Method, numerical examples.
Buckling analysis of plates.
Design of laminates using Carpet plots, AML plots and numerical examples on design of laminates.

Target Group:

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

Faculty:

Dr. G. Narayana Naik,
Principal Research Scientist,
Dept. of AE., IISc.,
Bengaluru- 560 012.
E-mail: gnn@iisc.ac.in

Reference Books


Who Can apply?

B.E / B.Tech. / AMIE / M.Sc.(Engg.)/ AMAEI (Engg.) (Mechanical, Aero, Civil, Automobile, Marine Engg., etc) OR equivalent

Course Fee: Rs. 10,000/-

Schedule: Tuesday's 6.00 p.m. to 8.00 p.m.
# 9. Design Thinking and Innovation (2+0)

**Objectives:**
The globalization and technology explosion has thrown new challenges to the most successful organizations. Barriers to competition have fallen precipitously as regulations have eased and markets have become more global. The tools and methods which were useful in the past are not enough to solve complex/wicked problems faced by these organizations due to unpredictability and dynamic global environment. These management tools have actually taken them away from viable competitive positions. A company’s innovation capabilities will determine its future growth potential. **Design Thinking has been making waves in the business world. This new approach promises to foster potential 21st century competencies.** Design thinking is now known as a creative-problem solving approach designers use to create new values that are different and create positive impact. Design thinking has gained popularity as the **approach to innovate.** The course will expose the participants, through theory sessions, to the design thinking process and the various proven tools used to achieve innovative, breakthrough solutions to complex problems.

**Syllabus:**
- Creativity and Innovation
- Design, Design thinking,
  - Empathies
  - Define
  - Ideate
  - Prototype
  - Test
  - Design Thinking in New Product/Service Development
  - Design Thinking Tools.

**Target Group:**

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| Faculty: Dr. J E Diwakar (Retd.) CPDM., IISc., Bengaluru. (O) 22933125 Email: jed@cpdm.iisc.ernet.in |
| Faculty: Prof. P Achutha Rao Retired from NID R & D Campus, Bengaluru. Mobile: 9886055955 E-Mail: raopanambur@gmail.com |

**Reference Books**
1. Design Thinking: Integrating Innovation, Customer Experience, and Brand Value; Thomas Lockwood, Allworth Press: 2009

**Who Can apply?**
Graduation in Engineering, MANAGEMENT

**Course Fee:** Rs. 10,000/-

**Schedule:** Tuesday’s 6.00 p.m. to 8.00 p.m.
10. 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 rowing 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 to achieve “EMPOWER INDIA WITH SKILL AND Knowledge”.

**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)


**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, rotodynamic 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 and Engineering College Instructors. Professionals to pursue Postgraduate and Higher Studies

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<th>Faculty:</th>
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<tr>
<td>Dr. S B Kandagal</td>
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<tr>
<td>Dept of AE</td>
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<td>IISc., Bengaluru.</td>
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<tr>
<td>Email: <a href="mailto:ksb@iisc.ac.in">ksb@iisc.ac.in</a></td>
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**Reference Books**

**Who Can apply?**
BE, ME, MSc , AMIE, or equivalent

**Course Fee:** Rs. 10,000/-

**Schedule:** Wednesday’s 6.00 p.m. to 8.00 p.m.
# 11. Embedded System on ARM Platform (2+0)

**Objectives:**
To Design and prototype Embedded System using ARM Cortex M3/M4 Microcontroller.

**Syllabus:**
Development toolchain (Compiler, Linker and Debugger), ARM Cortex processor architecture, caching, interfacing and programming peripherals, interrupt driven standalone system, introduction to RTOS.

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<th>Faculty:</th>
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<tbody>
<tr>
<td><strong>Mr. Haresh Dagale</strong></td>
</tr>
<tr>
<td>PRS, Dept of ESE (CEDT), IISc, Bengaluru</td>
</tr>
<tr>
<td>Email. <a href="mailto:haresh@iisc.ac.in">haresh@iisc.ac.in</a></td>
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<tr>
<th>Reference Books:</th>
<th>Who can apply?</th>
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<tbody>
<tr>
<td>1. Joseph Yiu</td>
<td><strong>BE or MCA</strong></td>
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<tr>
<td>Definitive Guide to the ARM Cortex M3</td>
<td><strong>Pre Requisites:</strong> C Programming Language</td>
</tr>
<tr>
<td>2. Ying Bai</td>
<td><strong>Course Fee:</strong> Rs. 10,000/-</td>
</tr>
<tr>
<td>Practical Microcontroller Engineering with ARM Technology</td>
<td><strong>Schedule:</strong> <strong>Wednesday's</strong> - 6.00 pm to 8.00 pm</td>
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<tr>
<td>3. Jonathan Valvano</td>
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<tr>
<td>Embedded Systems – RTOS for ARM Cortex M3</td>
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<td>4. John Levine</td>
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<td>Linker &amp; Loaders</td>
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Who can apply?

BE or MCA

Pre Requisites: C Programming Language

Course Fee: Rs. 10,000/-

Schedule: Wednesday's - 6.00 pm to 8.00 pm
# 12. Service Design Thinking (2+0)

**Objective**

The globalization and digital connectivity has forced many organizations to look at the way new products/services are to be developed for customer acceptance in the changed competitive “global digital world”. The economy is shifting from manufacturing economy to Service and Knowledge economy. Service economy is an economy based on providing services rather than manufacturing or producing goods.

There is increased importance of the service sector in industrialized economies. The current list of Fortune 500 companies contains more service companies and fewer manufacturers than in previous decades. Many products are being transformed into services. Design of services is gaining more prominence and becoming a specialized field of expertise. This course will look at various aspects of service design thinking through theory sessions and discussion. The participants will become aware of many aspects of service design.

**Syllabus:**

- Innovation, Creativity, Embedded mindset to creative thinking. Barriers to creativity.
- Product economy to Service Economy
- Service design Thinking
- Fields of service design
- Principles of Service Design
- Marketing: connecting with people, creating customer Value
- Product design: Developing products with Service applications
- Social design: Delivering Positive social impact
- Strategic Management
- Operations management
- Tools of Service design thinking

**Target Group:**

Practicing Engineers, Managers Responsible for developing engineering services, Professional in Design and Development in Industries, R & D Organizations etc., Academic Personal in teaching/practicing Product design/Service design, Product engineering, Design and Development and fresh engineers interested in Design and Innovation; Start up entrepreneurs.

**Faculty:**

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<tr>
<td>Dr. J. E. Diwakar</td>
<td>Prof. P. Achutha Rao (Retd.)</td>
<td>Prof. TVP Chowdry</td>
</tr>
<tr>
<td>Dept. of CPDM., IISc., Bengaluru. Email: <a href="mailto:jed@cpdm.iisc.ernet.in">jed@cpdm.iisc.ernet.in</a></td>
<td>NID R &amp; D Campus. E Mail: <a href="mailto:raopanambur@gmail.com">raopanambur@gmail.com</a></td>
<td>Project Scientist CST E mail: <a href="mailto:tvpchowdry@gmail.com">tvpchowdry@gmail.com</a></td>
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</table>

**Reference Books:**

1. This is Service Design thinking: Basics, Tools Cases: Marc Stickdorn; Wiley
2. Service Design: From insight to implementation; Andy Polaine, Rosenfeld Media
3. Change by design: How Design Thinking Transforms Organizations and Inspires Innovation; by Tim Brown
4. Designing Services with Innovative Methods: Satu Miettinen, Mikko Koivisto; University of Art and Design Helsinki

**Who Can apply?**

Graduation in Engineering/Post Graduation in Management (MBA). Post-Graduation in any discipline

**Course Fee**: Rs. 10,000/-

**Schedule**: Thursday’s: 6.00 pm. to 8.00 pm
# 13. IoT for Smart Cities and Smart Campuses  (2+0)

## Objectives:
It introduces IoT for smart cities and smart campuses and pertaining concepts. The course is well balanced in domains of Engineering and Business. It deals with challenges involved in implementing smart cities. The course will give you a good understanding of various layers of IoT, which will include communication technologies, Embedded systems, Could technologies, security of IoT systems and various IoT platforms available. At the end of the course the students will be able to design basic IoT systems that could be implemented into Smart cities and also work around interesting business models, which could give the students a head start to enterprise into IoT for smart cities.

## Syllabus:
The course familiarizes the students to handle IoT based system design for Smart Cities and Smart Campus. Course unfolds as: IoT—Introduction Distinction from IoT sphere – Sensors and Actuators · Embedded Systems · Wireless Technology – Mobile application platform · Cloud access and control – Design Thinking Security in Smart Cities and Smart Campus – Case studies of Smart Cities · Applications – Other technologies for Smart Cities and Smart Campuses– Artificial Intelligence-AR/VR-Blockchain–Big data analytics – Launching a Smart City product/service – MVP-Entrepreneurship in Smart City Products

## Target Group:
Working professionals in Embedded, Automation, R&D, Resource Management, Professionals, Smart Cities and Villages developers, Mobile app developers, Business Development Managers, Technical Sales Engineers, Policy makers, Entrepreneurs and Aspiring Entrepreneurs

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<th>Faculty:</th>
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<tr>
<td><strong>Mr. Ganesh Hassan Shankar</strong>&lt;br&gt;Founder &amp; Managing Director of FluxGen Engg.Tech. Pvt. Ltd. Bengaluru. E-mail: <a href="mailto:ganesh@fluxgentech.com">ganesh@fluxgentech.com</a></td>
<td><strong>Dr. Pavan Kumar Tallapragada</strong>&lt;br&gt;Dept. Of EE IISc., Bengaluru. E-mail: <a href="mailto:pavant@iisc.ac.in">pavant@iisc.ac.in</a></td>
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## Reference Books:

## Who can apply?
B.E / B.Tech, ME/M.Tech & MCA

## Pre-requisites:
Basic Electronics and Basic Programming

## Course Fee:
Rs. 10,000/

## Schedule:
**Thursday’s** 6.00 pm - 8.00 pm

#### 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, NASTRAN, 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 fatigue life 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 and achieve “EMPOWER INDIA WITH SKILL AND Knowledge”.

#### Syllabus:
- **Applied mechanics, Strength of materials, SFD, BMD, AFD, solid mechanics, concept of stress, strain and fatigue.**


- 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 if 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, roll flexure design for wind tunnel model studies for aerodynamic derivatives of aerospace vehicle and automobiles).

#### Target Group:
Mechanical, Civil, Aerospace, Automotive, Industrial Engineers, Construction Technologists, R & D Labs, 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 AE  
IISc., Bengaluru.  
Email: ksb@iisc.ac.in

#### Reference Books

#### Who Can apply?
BE, ME, MSc, AMIE, or equivalent

**Course Fee:** Rs. 10,000/-

**Schedule:** Friday’s 6.00 p.m. to 8.00 p.m.
## 15. Intellectual Property: Creation, Protection and Commercialization (2+0)

**Objectives:**
To introduce participants to the broad field of Intellectual Property, in brief on Indian IP laws. Scouting for IP in academic research. This course aims to impart theoretical and practical aspects of IP Protection and commercialization - patents in particular.

**Syllabus:**
Equipping with English language to gear-up for IP analysis and writing. Scouting for IP in blue-sky/basic research; Discovery V/s invention. Inventive ideas to vendible products with IP Protection. Various forms of IP; inculcating IP culture in an academic environment. Patenting an Invention – disclosure to drafting claims. Avenues of commercialization of IP.

**Target Group:**
All engineers and scientists in R&D establishments, institutions and industry who have a stake in creating IP.

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| Dr. R.N. Narahari  
CeNSE  
IISc., Bengaluru.  
Email: naraharirn@iisc.ac.in, | Prof. S Dasappa  
CST  
IISc., Bengaluru.  
Email: dasappa@iisc.ac.in, |

**Reference Books**
1. Universal’s “Intellectual Property Laws” 2017  


**Who Can apply?**
B.E./ B.Tech./ Masters in Science/commerce.

**Course Fee:** Rs. 10,000/-

**Schedule:** Friday’s 6.00 p.m. to 8.00 p.m.
# 16. Basics of Data Analytics (2+0)

## Objective

To introduce various aspects of Data Science and prepare the students for future education in advanced topics of data science.

## Syllabus:

Basics of Probability and Stochastic Processes, Forecasting, Smoothing Techniques, Bivariate and Multivariate Regression, Non-Linear Regression, Univariate Data, Auto Correlation and Partial Auto Correlation, Box – Jenkins ARIMA, Introduction to AI, Neural Network, Machine Learning and NLP.

## Target Group:
Any Industry dealing with Data.

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<th>Faculty</th>
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<tbody>
<tr>
<td>Dr. Gopal Krishna</td>
<td>Dr. Badarinath</td>
<td>Prof. Muddu</td>
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<td>Sharma</td>
<td>Ambati</td>
<td>Sekhar</td>
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<tr>
<td>Fiserv India Ltd.,</td>
<td>Altair Engineering,</td>
<td>Dept. of Civil</td>
</tr>
<tr>
<td>Bengaluru.</td>
<td>Bengaluru.</td>
<td>Engineering,</td>
</tr>
<tr>
<td>Email: gopalaks@yaho</td>
<td>Email: abadarinath@yah</td>
<td>IISc., Bengaluru.</td>
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<td>o.com</td>
<td>Email: <a href="mailto:muddu@iisc.ac.in">muddu@iisc.ac.in</a></td>
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## Reference Books:


## Who Can apply?
Any Engineering Degree with Mathematics

## Course Fee:
Rs. 10,000/-

## Schedule:
Saturday's: 10.00 am. to 12.00 Noon
# 17. 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:


<table>
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<tr>
<th>Faculty:</th>
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<tbody>
<tr>
<td>Prof. P. C. Pandey (Retd. IISc.)</td>
</tr>
<tr>
<td>Distinguished Professor, GITAM University,</td>
</tr>
<tr>
<td>E-mail: <a href="mailto:profpcpandey@yahoo.com">profpcpandey@yahoo.com</a>/pcpandey@civil.iisc.ernet.in</td>
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## Reference Books:


<table>
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<th>Who can apply?</th>
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<tbody>
<tr>
<td>BE/ B.Tech. (Civil/Mechanical/Aerospace), OR equivalent</td>
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<tr>
<th>Pre-requisites:</th>
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<tr>
<td>Basic knowledge of Solid Mechanics. An Exposure to Basic Finite Element Method</td>
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</table>

| Course Fee: |
| Rs.10,000/- |

| Schedule: |
| Saturday’s – 10 am to 12 noon |
# 18. Micro and Nano Materials Characterization Techniques (3+0)

**Objectives:**

This course will introduce a range of advanced techniques available for the characterization of engineering materials, including electron microscopy, scanning probe microscopy, spectroscopy and thermal analysis. Discuss the basic underlying principles, capabilities, limitations and applications of different characterization methods.

Real-world examples of materials characterization will be presented throughout the course, including characterization of thin films, surfaces, interfaces, and nanostructured materials. This course also involves Laboratory demonstration to provide practical understanding of materials characterization.

**Syllabus:**

Introduction to Structure of Materials, X-ray Diffraction: Principles and Applications, Scanning Electron Microscopy (SEM), Basics of Transmission electron microscopy (TEM) and diffraction, Focused ion beam (FIB), Atomic Force Microscopy and Applications

Electrical resistivity, Hall effect, UV-VIS spectroscopy, FTIR and Raman spectroscopy

Brief survey on surface characterization (XPS, RBS, SIMS) as well as thermal (DSC, TGA) and mechanical Characterization (Nanoindentation, Micro UTM) techniques.

**Target Group:**

Lecturers, Assistant/Associate Professors, (Engineering Colleges), Engineers, Scientist, Research Staffs in industry and Research Organizations.

**Faculty:**

**Dr. Suresha S J**  
CeNSE,,  
IISc., Bengaluru  
Mobile: 9482773717, (O) 080-22933253  
Email: sureshasj@iisc.ac.in

**Reference Books**

1. Microstructural Characterization of Materials –  
   D. Brandon and W.D. Kaplan, John Wiley and Sons, 2008

2. Elements of X-ray Diffraction,  
   B.D. Cullity, Addison- Wesley Publishing Co Inc. 1978

3. Scanning Electron Microscopy and X-ray Microanalysis,  

4. Transmission Electron Microscopy:  

**Who Can apply?**

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

**Course Fee:** Rs. 15,000/-

**Schedule:** Saturday’s 10.00 a.m. to 1.00 p.m.
19. Basics of Nanoscience and Nanotechnology (3+0)

Objectives:
The field of nanoscience and nanotechnology in which the manipulation of matter on an atomic, molecular and supramolecular scale and is used to obtain entirely new configuration and materials behavior. Nanotechnology and nanoscience are broad and interdisciplinary areas that include (bio) chemistry, physics, biology, materials science, electrical and electronics engineering and more. The course main objective is to enhance, original, and innovative thinking. The course encourages diverse group work, constructing international 'think tank' for the creation of new ideas.

The main objectives of this course are:
1. To understand the fundamentals of Nanoscience Nanotechnology
2. To give a general overview of different classes of Nanomaterials
3. To impart basic knowledge on various synthesis and characterization techniques involved in Nanotechnology
4. To make the learner familiarize with nanotechnology prospective

Syllabus:
- Basic concepts of Nanoscience and Nanotechnology (9 hours)
- Different classes of Nanomaterials (9 hours)
- Overview of Fabrication and characterization techniques (15 hours)
- Research Trends & IP Protection (3 hours)
- Various Applications (3 hours)
- How to prepare good research proposal? (3 hours)
- A tour to the National Nano Fabrication and Characterization facilities at CeNSE (3 hours)

Target Group:
Faculty teaching undergraduates courses on Science and Engineering
Undergraduate students(BE/MSc)/PhD students

Faculty:
Dr. Sanjeev Kumar Shrivastava
National Coordinator & Chief Operating Officer (I-STEM & INUP)
Project Management Office
SF-35, Centre for Nano Science and Engineering (CeNSE)
IISc., Bengaluru
Email: sanjeevs@iisc.ac.in

Reference Books

Who Can apply?
B.E/ B.Tech/ M.Sc./Faculty Teaching Similar Courses in Engineering Colleges.

Course Fee: Rs. 15,000/-
Schedule: Saturday’s 10.00 a.m. to 1.00 p.m.
20. Introduction to Industrial Design & Ergonomics (3+0)

**Objective**
In the Introduction to Industrial Design & Ergonomics course, students are introduced to what industrial designers do. They redesign a simple product, learn and practice technical drawing techniques, and are introduced to how products are designed (Product Design Process). Finally, they are introduced to Ergonomics. This course serves as an introduction to the world of industrial design and its wide-ranging applications. The students will learn about the history of design and design concepts and methodology through lectures, discussions, and small projects; and will explore, develop, and execute a design assignment as part of a class project as the course progresses. The main goals of this course are to develop a better understanding of the perspective of an industrial designer and to gain experience in the practice of industrial design & ergonomics.

**Syllabus:**
- Innovation, Creativity, Embedded mindset to creative thinking. Barriers to creativity.
- History of Design and Evolution of Industrial Design Profession
- Design Communication
- Product Design Process/ Methodology
- Elements of Design
- Design Principles
- Ergonomics in Product Design

**Target Group:**
Practicing Engineers, Managers Responsible for developing engineering services, Professional in Design and Development in Industries, R & D Organizations etc., Academic Personal in teaching/practicing Product design/Service design, Product engineering, Design and Development and fresh engineers interested in Design and Innovation; Start up entrepreneurs.

**Faculty:**
- **Dr. J. E. Diwakar**
  Dept. of CPDM.,
  IISc., Bengaluru.
  Email: jed@cpdm.iisc.ernet.in
- **Prof. P. Achutha Rao (Retd.)**
  NID R & D Campus.
  E Mail: rapanambur@gmail.com
- **Prof. TVP Chowdry**
  Project Scientist CST
  E mail: tvpchowdry@gmail.com

**Reference Books:**

**Who Can apply?**
Graduation in Engineering. Architecture.

**Course Fee:** Rs. 15,000/-

**Schedule:** Saturday’s: 1.00 pm. to 4.00 pm
# 21. Strategic Management (3+0)

**Objectives:**
To Expose the Present day executives to the nuances of Strategic Management which is the most sought offer.

**Syllabus:**
- Strategic Management Process
- Challenge of Globalisation
- Strategic Planning in India
- Corporate Governance
- Board of Directors
- Role and Functions of top Management
- Environmental Scanning
- Industry Analysis
- Internal Scanning
- Organizational Analysis
- Strategic Formulation

**Target Group:**
- Industry
- R&D Units
- Educational Institutions with Management Programmes

## Faculty:
**Prof. R. Srinivasan**
Emeritus Professor,
Dept. of MS.,
IISc., Bengaluru.
Email: sri@mgmt.iisc.ernet.in

## Reference Books:
1. R. Srinivasan,
   Strategic Management – The Indian Context,

2. R. Srinivasan,
   Case Studies in Marketing – The Indian Context,

## Who can apply?
Executing with Engineering Degree

**Course Fee:** Rs.15,000/-

**Schedule:** Saturday’s - 10.00 am to 1.00 pm
# 22. Reinforcement Learning (3+0)

**Objectives:**
Teach Students about this emerging field of Reinforcement Learning because of its wide applicability.

**Syllabus:**
Introduction to Reinforcement learning, Multi-armed bandits, Finite Markov decision processes, Dynamic Programming, Monte-Carlo Methods, Temporal difference methods, on-policy prediction and control, algorithms.

**Target Group:**
All People interested in Artificial Intelligence in Industry as well as Academia should find the course useful.

## Faculty:

**Prof. Shalabh Bhatnagar**  
Chairman, Dept. of CSA, IISc.  
E-mail: shalabh@iisc.ac.in

## Reference Books

1. R. S. Sutton and A. G. Barto  
   Reinforcement learning: An Introduction, MIT Press, 2018

2. D. P. Bertsekas and J. N. Tsitsiklis  

## Who can apply?

B.Tech/M.Tech/MCA  
Or M.Sc (Math/CS)

**Course Fee:** Rs. 15,000/-

**Schedule:** Saturdays 10.00 am to 1.00 pm
23. Analog and Digital (DAQ) Circuits and Systems for Microscale Sensors and Transducers (3+0)

Objectives:
This course is a design-oriented course aimed at understanding the microfabrication technology used for fabricating integrated circuits, MEMS-based sensors, and devices. Additionally, the course is focused on acquisition of the sensor data using LabVIEW and their related signal conditioning circuits for accurate measurement of the signal in to the PC. The course will enable the students to get an idea of working in a Class 10000 clean room environment and will give a hands-on experience on using microscope, data acquisition system (CDAQ) and inspecting several microengineered devices. Additionally, this course is intended to focus on the design of sensors, fabrication processes with MOSFET as an example, and their signal conditioning circuits with hands-on experience on acquisition of signal in to the PC using LabVIEW. At the end of the course the students should be able to:

- Understand the protocol of working in a Class 10000 clean room environment.
- Understand the IC Technology and equipment used in fabrication.
- Understand wafer cleaning, mask designing, metal deposition, photolithography, wet etching, dry etching, PDMS-silicon bonding, Characterization of fabricated device.
- Implement process flow for device fabrication.
- Know the Fabrication process of a microengineered device for use in electronics/biology/medicine.
- Develop skills to troubleshoot problems in microfabrication.
- Describe the principles of instrumentation, Data Acquisition techniques, measurement techniques and safety considerations in electronic systems
- Design signal conditioning circuits for the sensors using Op-Amps.
- Interface and Validate different sensors and actuators to PC and verify its functionality

Syllabus:
Introduction to microfabricated devices (devices for flow cytometry/sorting, microchips using dielectrophoresis, force measurement with cantilevers, microengineered devices for medical therapeutics, blood pressure sensors, devices for drug delivery, devices for minimally invasive surgery). Microfabrication technology: Introduction to the clean room, Contaminants, Wafer cleaning processes (DI water, RCA, metallic impurities, etc.), Substrate materials, Techniques of metallization: PVD ([Sputtering – DC, RF, and Magnetron], thermal evaporation, e-beam evaporation, PLD), Types of masks, Hard and soft Lithography, Wet etching, Dry etching (RIE and DRIE), Design of process flow for device fabrication including microfluidics, Bio-MEMS, Microcantilever, Interdigitated electrodes, Device inspection in Class 10000 clean room (biochips, microheater, microfluidic chips).
Introduction to DAQ and its components, Sampling and aliasing, Quantization theory, ADC (Basic Concepts, V/F Converters, Dual Slope Converters, Successive Approximation Converter), DAC (R2R Ladder), Excitation Circuits, Current Generators, Voltage Generators
Characteristics of a sensor, Classification of Sensor, Sensors Selection
Working Principles of sensors: Distance sensors, Movement sensors, Proximity sensors, Electrical strain measurement, Force measurement, Encoders, Temperature measurement, Pressure measurement, Accelerometer

Target Group:
Teachers, Engineers, R&D, Industry, Science Labs, Research Scholars.

Faculty: Dr. Hardik Jeetendra Pandya
Electronic Systems Engineering
Indian Institute of Science, Bangalore
E-mail: hjpandya@iisc.ac.in
http://beeslab.dese.iisc.ac.in

Reference Books:
1. Lecture notes on some topics will be provided by the instructor.

Who can apply?
B.E / B.Tech./M.Sc.

Pre-requisites:
Basic Electronics

Course Fee: Rs. 15,000/-

Schedule: Saturday’s 10.00 am – 1.00 pm
## 24. Smart Design Methods and Processes in Automotive Industry-Foundation (2+0)

### Objectives:
- In depth training on design methods in Automotive industry
- Industry design methods in the area of automotive design viz Powertrain systems (Engine, Engine subsystems, Transmission and Axies).
- In depth view in to manufacturing process such as Casting design, sheet metal design, forgings, other advanced methods such as hydro-forming.
- Overall, this program is designed to enhance the understanding of design processes and methods for young design engineers when they get employed in the Industry.

### Syllabus:
1. Introduction to Smart design methods and processes in Automotive Industry.
2. Introduction to Automotive domain processes.
3. Overview of product development process in Car/Truck
4. Overview of Automotive Standards
5. Introduction to Manufacturing processes.
6. Automotive power train design.
7. Automotive Transmission
8. Automotive Axies
9. Introduction to CAE applications in Automotive Design.

### Target Group:
- Trainee engineers from Automotive OEM R&D centers (Eg. GM, FORD, Mercedes-Benz and others)
- Trainee engineers from Engineering Service providers (Eg. TCS, L&T Technologies, Infotech and others)
- Fresh graduates from engineering colleges looking for employment in above companies

### Faculty:

**Faculty :**

**Prof. Anindya Deb**  
Professor,  
Dept. of CPDM, IISc.  
Email: adeb@cpdm.iisc.ac.in

**Faculty :**

**Mr. Kalyan Kumar K.V**  
Founder & Director  
Abhiyantara Technologies  
Bengaluru -94.  
Email: kalyan.kumar@abhiyantara.com

### Reference Books:
2. Vehicular Engine Design by Devin L. Hoag
3. Internet sources in public domain

### Who can apply?
B.E. /B.Tech /M.Tech (Mechanical, Automobile and IP)

**Course Fee:** Rs. 10,000/-

**Schedule:** Saturday’s: 12.00 pm. to 2.00 pm.
# 25. Computational Machine Learning (3+0)

**Objectives:**
- Learn machine learning, deep learning and AI concepts.
- Provide hands-on training so that students can write applications in AI.
- Provide ability to run real machine learning production examples.
- Understand programming techniques that underlie the production software.
- Provide a jump-start to a great career in AI.
- Provide ability to make the right career choices, and gain exposure to the vast and varied opportunities.
- Help take up research positions in academia or venture into start-up world or get into positions in large enterprises.

**Syllabus:**
1. Learning Julia: arrays, broadcasting, indexing, concatenation, linear algebra etc.
2. Unsupervised machine learning including SVD, PCA, etc.
3. Deep Learning and Back propagation
4. Multi-layer perceptrons
5. Data preparation and cleansing techniques
6. Convolutional Neural Nets
7. Recurrent Neural Networks
8. Applications speech, natural language processing, handwriting recognition.

**Target Group:**
Students, R&D groups & Industry

<table>
<thead>
<tr>
<th>Faculty:</th>
<th>Faculty:</th>
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| **Mrs. Anandi Giridharan**  
PRS., Dept. of ECE.,  
IISc., Bengaluru.  
Email: anandi@iisc.ac.in | **Dr. Vijaya Kumar B P**  
Professor and Head,  
Information science and Engg.,  
M S Ramaiah Institute of Technology,  
Bangalore - 560054, India  
Email: vijaykbp@yahoo.co.in |

**Reference Books**
1. Avik Sengupta, Packt
2. 2016Christopher M. Bishop, Springer
3. 2006Sunila Gollapudi, Packt, 2016

**Who can apply?**
Any Engineering Graduate with at least 2 courses in Mathematics and 1 course in programming.

**Pre-requisites:**
Basic Programming and Basics of Linear Algebra

| Course Fee: Rs. 15,000/- |
| Schedule: Saturday’s – 1.00 pm. to 4.00 p.m. |
26. Smart design methods and processes in Automotive Industry-Advanced (2+0)

**Objectives:**
- In depth training on design methods in Automotive industry
- Industry design methods in the area of automotive design viz Vehicle dynamics, Chassis, chassis aggregates, Automotive body and Vehicle architecture and packaging.
- Overall, this program is designed to enhance the understanding of design processes and methods for young design engineers when they get employed in the Industry.

**Syllabus:**
1. **Introduction to Vehicle dynamics**
   - Longitudinal
   - Lateral
   - Vertical
2. **Automotive Chassis and aggregates design**
   - Chassis frame design
   - Suspension systems
   - Steering systems
   - Braking systems
3. **Automotive Body Design/BWIW**
   - Vehicle packaging
   - BIW
   - Interiors
   - Exteriors
4. **CAE Applications in Automotive Design**

**Target Group:**
- Trainee engineers from Automotive OEM R&D centers (Eg. GM, FORD, Mercedes-Benz and others)
- Trainee engineers from Engineering Service providers (Eg. TCS, L&T Technologies, Infotech and others)
- Fresh graduates from engineering colleges looking for employment in above companies

**Faculty :**
- Prof. Anindya Deb
  Professor, Dept. of CPDM, IISc.
  Email: adeb@cpdm.iisc.ac.in
- Mr. Kalyan Kumar K.V
  Founder & Director
  Abhiyantara Technologies
  Bengaluru -94.
  Email: kalyan.kumar@abhiyantara.com

**Reference Books:**
2. Heisler and Heinz
   Advanced Vehicle Technology
3. Thomas D Gillespie
   Fundamentals of Vehicle Dynamics

**Who can apply?**
B.E. /B.Tech /M.Tech (Mechanical, Automobile and IP)

**Course Fee:** Rs. 10,000/

**Schedule: Saturday’s:** 2.00 pm. to 4.00 pm.
27. Basic Concepts of Finite Element Method (2+0)

Objectives:
This is a foundation course in Finite Element Method (FEM) aimed at Civil, Mechanical and Aerospace Engineering professionals. In particular, it would be beneficial to engineers who do not have any formal training in FEM, even though; they may have skill to use a FEM package. The course is designed to provide a basic introduction to FEM with emphasis on stress and structural analysis. It is believed that it would be of interest to engineers working in industries, consulting firms and teachers of engineering colleges.

Syllabus:
Concept of Stiffness and Flexibility in structural analysis. Basic foundations of elasticity and energy principles. Introduction to displacement based FEM with reference to continuum and skeletal structures. Element formulation and Applications to Plane stress, Plane strain, Axisymmetric and 3-D problems. Isoparametric concept, equation solvers, Post-processing. Adaptivity, Programming and Computational aspects as well as practical applications would be discussed.

Faculty:
Prof. P. C. Pandey (Retd. IISc.)
Distinguished Professor, GITAM University,
E-mail: profpcpandey@yahoo.com / pcpandey@civil.iisc.ernet.in

Reference Books:
1. Logan Daryl L
   A first Course in Finite Element Method Thomson, 5th Edition 2012..
2. Chandrupatla, T.R. and Belegundu A.D.
3. Cook, R.D. et.all

Who can apply?
BE/ B.Tech.
(Civil/Mechanical/Aerospace), OR equivalent

Course Fee: Rs.10,000/-

Schedule: Saturday’s -2.00 pm to 4.00 pm
28. Basics of Machine Learning (2+0)

Objective

The Course attempts to give a basic knowledge on Machine Learning Concepts. This would enable the students to go forward.

Syllabus:

Basic concepts of Machine Learning, Definition, Supervised and Unsupervised Learning, Regression and Classification, Neural Networks, Bayesian estimation, Hidden Markov Models, Kernel Methods, Basics of Graphical Model, Principal Component Analysis, Sequential Data-Hidden Markov Models.

Target Group: IT Industry, Academics Interested in Data Science, Any other Industry dealing with Data Analysis.

Faculty

Dr. Gopal Krishna Sharma
Fiserv India Pvt. Ltd., Bengaluru.
Email: gopalaks@yahoo.com

Dr. Badarinath Ambati
Altair Engineering, Bengaluru.
Email: abadarinath@yahoo.com

Prof. Muddu Sekhar
Dept. of Civil Engineering, IISc., Bengaluru.
Email: muddu@iisc.ac.in

Reference Books:


Who Can apply?

Any Engineering Degree with Mathematics

Course Fee: Rs. 10,000/-

Schedule: Saturday’s: 2.00 pm. to 4.00 pm
29. Principles and Applications in Genetic Engineering (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:**

**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. Ravi Sundaresan N  
Asst. Prof.  
Dept. of MCBL.  
IISc., Bengaluru.  
Email: rsundaresan@mcbl.iisc.ernet.in

**Reference Books:**


**Who Can apply?**
B.Tech., B.Pharam., BVSc., BS/M.Sc., M.Pharm., MVSc., MS (Biotech), MBBS or Equivalent.

**Course Fee:** Rs. 10,000/-

**Schedule:** Saturday’s - 9.00 am to 11.00 am
30. Biopharmaceutical Technology and Drug Development (2+0)

Objectives:
This course is for professionals and students interested in understanding the drugs, mechanism and action of drugs, their development and manufacturing process in the pharmaceutical and biotech industry. This course will also focus on the clinical development of new drugs.

Syllabus:

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. Ravi Sundaresan N
Asst. Prof.,
Dept. of MCBL,
IISc., Bengaluru.
Email: rsundaresan@mcbl.iisc.ernet.in.

Reference Books:
1. Katzung, B.G.,
2. Troy, D.B (Ed.),
   “Remington: The Science and Practice of Pharmacy”,
   21st Edition. Vol I & II.,
   Lippincott Williams & Wilkins., New York 2006
3. Laurence L. Brunton, Bruce A. Chabner, Bjorn C. Knollmann. Goodman & Gilman’s The Pharmacological Basis of Therapeutics.

Who Can apply?
B.Tech., B.Pharam., BVSc., BS/M.Sc., M.Pharm., MVSc., MS (Biotech), MBBS or Equivalent.
Course Fee: Rs. 10,000/-
Schedule: Saturday’s - 11.00 am to 1.00 pm

Who Can apply?
B.Tech., B.Pharam., BVSc., BS/M.Sc., M.Pharm., MVSc., MS (Biotech), MBBS or Equivalent.
Course Fee: Rs. 10,000/-
Schedule: Saturday’s - 11.00 am to 1.00 pm
<table>
<thead>
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<th>Appendix ‘A’ PROFORMA</th>
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</table>

**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 have 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  
Date:  
PRINCIPAL  

*Appropriate course to be filled in (B.E., M.E., M.Sc., and M.Com. MBBS. Etc.)  
**Mention Civil, Electrical, Electronics, Chemistry, Biology, Etc.
IMPORTANT DATES

<table>
<thead>
<tr>
<th>Event</th>
<th>From</th>
<th>To</th>
<th>Date</th>
<th>Day</th>
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<tbody>
<tr>
<td>Download application forms from CCE Web Site</td>
<td></td>
<td></td>
<td>21st June 2018</td>
<td>Thursday</td>
</tr>
<tr>
<td>Receipts of application along with fees (upto)</td>
<td>21st June</td>
<td>27th July</td>
<td></td>
<td>Thursday</td>
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<tr>
<td>Classes Commence</td>
<td>06th August</td>
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<td>Monday</td>
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<tr>
<td>Final Exams</td>
<td>03rd December</td>
<td>08th December</td>
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<td>Monday</td>
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</table>

CCE-PROFICIENCY
Coordinator,
Indian Institute of Science,
Bangalore - 560 012

Phone: + 91 080 22932508
E-mail: prof.cce@iisc.ac.in
URL: www.cce.iisc.ac.in/proficien

Working Hours:
Monday through Friday: 09.30 hrs. to 19.00 hrs.
Saturdays*: 10.00 hrs. to 16.00 hrs.