

**CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY**  
**List of University Elective Courses**  
**3<sup>rd</sup> Semester Undergraduate Programme**  
**(Academic year 2020-21)**

| <b>Sr. No.</b> | <b>Course Code &amp; Course Name</b>                      | <b>Department / Faculty offering the Course</b> |
|----------------|---|---|
| <b>1</b>       | EC281.01: Introduction to MATLAB Programming              | EC / FTE  |
| <b>2</b>       | CE281.01: Art of Programming                              | CE / FTE  |
| <b>3</b>       | CL281.01: Environmental Sustainability and Climate Change | CL / FTE  |
| <b>4</b>       | CL283: SDG Handprint Laboratory                           | CL / FTE  |
| <b>5</b>       | EE283: Python for Electrical Engineers                    | EE/FTE  |
| <b>6</b>       | IT281.01: ICT Resources and Multimedia                    | IT/FTE  |
| <b>7</b>       | ME281.01: Engineering Drawing                             | ME/FTE  |
| <b>8</b>       | PH233.01: Fundamentals of Packaging                       | RPCP/FPH  |
| <b>9</b>       | PD260.01: Basic Laboratory Techniques                     | PDPIAS/FAS                                      |
| <b>10</b>      | NR251.01: First Aid & Life Support                        | NURSING / FMD                                   |
| <b>11</b>      | PT191.01: Health Promotion and Fitness                    | ARIP / FMD                                      |
| <b>12</b>      | CA224: Introduction to Web Designing                      | CMPICA / FCA                                    |
| <b>13</b>      | BM231: Banking and Insurance                              | I2IM / FMS                                      |
| <b>14</b>      | PD261: Astrophysics, Space and Cosmos-1 (ASC-1)           | PDPIAS/FAS                                      |

**CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY**  
**FACULTY OF TECHNOLOGY & ENGINEERING**  
**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**  
**EC281.01: INTRODUCTION TO MATLAB PROGRAMMING**  
**B TECH 3<sup>rd</sup> SEMESTER (UNIVERSITY ELECTIVE)**

**Credit and Hours:**

| Teaching Scheme | Theory | Practical | Total | Credit |
|-----------------|--------|-----------|-------|--------|
| Hours/week      | -      | 2         | 2     | 2      |
| Marks           | -      | 100       | 100   |        |

**A. Objective of the Course:**

The course, intended for students with no programming experience, provides the foundations of programming in MATLAB. Variables, arrays, conditional statements, loops, functions, and plots are covered. At the end of the course, students should be able to use MATLAB in their own work and be prepared to deepen their MATLAB programming skills and tackle other programming languages.

**B. Outline of the Course:**

| Sr. No. | Title of the Unit               | Minimum Number of Hours |
|---------|---------------------------------|-------------------------|
| 1.      | Introduction to MATLAB Basics   | 3                       |
| 2.      | Basic MATLAB Functions          | 8                       |
| 3.      | Interactive computation         | 8                       |
| 4.      | Scripts and Functions in MATLAB | 8                       |
| 5.      | Applications                    | 3                       |

**Total Hours (Theory): 0**

**Total Hours (Lab): 30**

**Total Hours: 30**

### C. Detailed Syllabus:

|           |   |                |            |
|-----------|---|----------------|------------|
| <b>1.</b> | <b>Introduction to MATLAB Basics</b>          | <b>3</b>       | <b>10%</b> |
|           | <b>Hours</b>                                  |                |            |
| 1.1       | MATLAB windows, On-line help                  |                | 1Hr        |
| 1.2       | Input- Output, File Types                     |                | 1 Hr       |
| 1.3       | General commands to remember                  |                | 1 Hr       |
| <b>2.</b> | <b>Basic MATLAB Functions</b>                 | <b>8</b>       | <b>25%</b> |
|           | <b>Hours</b>                                  |                |            |
| 2.1       | Working with Arrays of Number                 |                | 1Hr        |
| 2.2       | Creating and Printing Simple Plots            |                | 1Hr        |
| 2.3       | Creating, Saving, and Executing a Script File |                | 2Hrs       |
| 2.4       | Creating and Executing a Function File        |                | 2Hrs       |
| 2.5       | Working with Files and Directories            |                | 2Hrs       |
| <b>3.</b> | <b>Interactive computation</b>                | <b>8</b>       | <b>25%</b> |
|           | <b>Hours</b>                                  |                |            |
| 3.1       | Matrix and Vectors                            |                | 1Hr        |
| 3.2       | Matrix and Array Operations                   |                | 3Hrs       |
| 3.3       | Creating and Using Inline Functions           |                | 2Hrs       |
| 3.4       | Using Built in Functions                      |                | 2Hrs       |
| <b>4.</b> | <b>Scripts and Functions in MATLAB</b>        | <b>8</b>       | <b>25%</b> |
|           | <b>Hours</b>                                  |                |            |
| 4.1       | <b>Scripts Files</b>                          |                | 2Hrs       |
| 4.2       | <b>Function Files</b>                         |                | 3Hrs       |
| 4.3       | <b>Language-Specific Features</b>             |                | 3Hrs       |
| <b>5.</b> | <b>Applications</b>                           | <b>3 Hours</b> | <b>15%</b> |
| 5.1       | Solving a Linear system                       |                | 1Hr        |
| 5.2       | Finding eigenvalues and eigenvectors          |                | 1 Hr       |
| 5.3       | Matrix Factorizations                         |                | 1 Hr       |

### D. Instructional Methods and Pedagogy

- Chapter wise Assignments

- Quiz
- Audio Visual Presentations
- Chalk + Board
- White Board
- Online Demo

### **E. Student Learning Outcomes:**

Students will acquire the following skills:

- Be fluent in the use of procedural statements--assignments, conditional statements, loops, function calls--and arrays.
- Be able to design, code, and test small MATLAB programs that meet requirements expressed in English. This includes a basic understanding of top-down design.

### **F. Recommended Study Materials**

|  |
|--|
| <b>❖ Reference Book &amp; Text Book:</b>   |
| <ol style="list-style-type: none"> <li>1. Getting Started with MATLAB, Rudrapratap (IISc, Bangalore), Oxford University Press.</li> <li>2. A Guide to MATLAB, Brian R Hunt, Ronald L Lipsman, Cambridge University Press.</li> </ol> |
| <b>❖ Web Materials / Reading Materials:</b>  |
| <ol style="list-style-type: none"> <li>1. Lecture notes</li> <li>2. Handouts</li> <li>3. Chapter wise Assignment</li> </ol>  |

**CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY**  
**FACULTY OF TECHNOLOGY & ENGINEERING**  
**U & P U. PATEL DEPARTMENT OF COMPUTER ENGINEERING**  
**CE281.01: ART OF PROGRAMMING**  
**B TECH 3<sup>RD</sup> SEMESTER (UNIVERSITY ELECTIVE)**

**Credit and Hours:**

| Teaching Scheme | Theory | Practical | Total | Credit |
|-----------------|--------|-----------|-------|--------|
| Hours/week      | -      | 2         | 2     | 2      |
| Marks           | -      | 100       | 100   |        |

**C. Objective of the Course:**

- To be able to understand the various data structures available in programming language and apply them in solving computational problems.
- To be able to do testing and debugging of code written programming language.
- To create students' interest for programming related subjects and to make them aware of how to communicate with computers by writing a program.
- To foster the ability of solving various analytical and mathematical problems with algorithms within students.
- To make them learn regarding different data structures and memory management in the programming language.
- To promote skills like Development of logic and implementation of basic mathematical and other problems at individual level.
- To make them learn and understand coding standards, norms, variable naming conventions, commenting adequately and how to form layout of efficient program.
- To explain them concepts of pointer & file management concepts.

**D. Outline of the Course:**

| Sr.No | Title of the Unit                | Minimum number of Hours |
|-------|----------------------------------|-------------------------|
| 1.    | Introduction to Computer Systems | 02                      |
| 2.    | Data Storage and Operations      | 03                      |
| 3.    | Algorithms and Flow charting     | 04                      |
| 4     | Algorithm to Program             | 06                      |
| 5     | Loops and Controls Construct     | 04                      |
| 6     | Errors and Debugging             | 04                      |
| 7     | Structured Programming           | 04                      |

|   |                    |    |
|---|--------------------|----|
| 8 | Coding Conventions | 03 |
|---|--------------------|----|

**Total Hours (Theory):30**

**Total Hours (Lab): 00**

**Total Hours: 30**

### C. Detailed Syllabus:

|     |   |                 |            |
|-----|---|-----------------|------------|
| 1.  | <b>Introduction to Computer Systems</b>   | <b>02 Hours</b> | <b>7%</b>  |
| 1.1 | Basic computer organisation, operating system, editor, compiler, interpreter, loader, linker, program development.  |                 |            |
| 2.  | <b>Data Storage and Operations</b>  | <b>03 Hours</b> | <b>10%</b> |
|     | Various data representation techniques, data types, constants, variables (local and global), arrays, various arithmetic and logical operations in a typical programming environment, working with numbers, String and operators, finding pattern in string. |                 |            |
| 3.  | <b>Algorithms and Flow charting</b>   | <b>04 Hours</b> | <b>13%</b> |
|     | Introduction to computer problem solving, concepts and algorithms and flow chart, tracing of an algorithms, writing conditional code,   |                 |            |
| 4   | <b>Algorithm to Program</b>   | <b>06 Hours</b> | <b>21%</b> |
|     | Specifications, top down development and stepwise refinement as per programming environment needs. Imperative style of correct and efficient programming, introductory concepts of time and space complexities.   |                 |            |
| 5   | <b>Loops and Controls Construct</b>   | <b>04 Hours</b> | <b>13%</b> |
|     | Conditional and unconditional execution.Simple versus nested controls.Variious aspects of repetitive executions, iterative versus recursive programming styles, assertions and loop invariants.   |                 |            |
| 6   | <b>Errors and Debugging</b>   | <b>04 Hours</b> | <b>13%</b> |
|     | Types of errors, error handling, debugging, tracing/stepwise execution of program, watching variables values in memory  |                 |            |
| 7   | <b>Programming</b>  | <b>04 Hours</b> | <b>13%</b> |
|     | Introduction to modular approach of problem solving, concepts of procedure and functions for effective programming,Making code modular  |                 |            |
| 8   | <b>Coding Conventions</b>   | <b>03 Hours</b> | <b>10%</b> |
|     | Variable naming, function naming, indentation, usage and significance of comments for readability and program maintainability.  |                 |            |

## D. Instructional Methods and Pedagogy

- Quiz
- Audio Visual Presentations
- White Board
- Online Demo

## E. Student Learning Outcomes

- Students will get acquainted with basic components and capabilities of a typical computing system.
- Students will be able to critically think about basic problems and develop algorithms to solve, validate and verify with computing systems.
- Students will be able to identify appropriate language constructs and approach to computational problems.
- Students will be acquainted with coding standards including documentation which are required to be used for the development of effective, efficient and maintainable programs.

## F. Recommended Study Materials

|   |
|---|
| <b>❖ Reference Book &amp; Text Book:</b>  |
| <ol style="list-style-type: none"><li>3. Joyce Farrell, Programming Logic and Design Comprehensive, Cenage Learning</li><li>4. Sedgewick R., Algorithms in C, Addison Wesley</li><li>5. V. Rajaraman, Fundamentals of Computers, Prentice Hall of India</li></ol> |
| <b>❖ Web Materials / Reading Materials:</b>   |
| <ol style="list-style-type: none"><li>4. Lecture notes</li><li>5. Handouts</li><li>6. Chapter wise Assignment</li></ol>   |

**CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY**  
**FACULTY OF TECHNOLOGY & ENGINEERING**  
**MANUBHAI S. PATEL DEPARTMENT OF CIVIL ENGINEERING**

**CL281.01: ENVIRONMENTAL SUSTAINABILITY AND CLIMATE CHANGE**

**3<sup>RD</sup> SEMESTER (UNIVERSITY ELECTIVE)**

**Credits and Hours:**

| Teaching Scheme | Theory | Tutorial | Practical | Total | Credit |
|-----------------|--------|----------|-----------|-------|--------|
| Hours/week      | -      | -        | 2         | 2     | 2      |
| Marks           | -      | -        | 100       | 100   |        |

**A. Objectives of the Course:**

The main objectives of the course are:

- To provide a basic understanding of the major environmental problems that need to be addressed to ensure sustainable development
- To provide a basic understanding about various management approaches towards a sustainable development
- To introduce students to the environmental aspects of specific industrial sectors, such as energy, transport, land and water use, and the built environment
- To provide basic understanding about climate changes, their causative factors and the possible mitigation

**B. Outline of the Course:**

| Sr. No. | Title of the Unit  | Minimum Number of Hours |
|---------|--|-------------------------|
| 1       | Introducing Sustainability Basics and Environmental Management | 03                      |
| 2       | Environmental Challenges                                       | 03                      |
| 3       | Principles of Environmental Management                         | 08                      |
| 4       | Environmental Sustainability                                   | 04                      |
| 5       | Introduction to Climate Change                                 | 07                      |
| 6       | Climate Change-Mitigation                                      | 05                      |

**Total Hours (Theory): 30**

**Total Hours (Lab): 00**

**Total Hours: 30**



### C. Detailed Syllabus:

|          |   |                 |            |
|----------|---|-----------------|------------|
| <b>1</b> | <b>Introducing Sustainability Basics and Environmental Management</b> | <b>03 Hours</b> | <b>10%</b> |
| 1.1      | What is Unsustainable?  |                 |            |
| 1.2      | What is Sustainability? Defining the Terms                            |                 |            |
| 1.3      | Development & Environment   |                 |            |
| 1.4      | Environmental Strategy: The New Business Playing Field                |                 |            |
| 1.5      | Environmental Management  |                 |            |
| <b>2</b> | <b>Environmental Challenges</b>                                       | <b>03 Hours</b> | <b>10%</b> |
| 2.1      | Depletion of Water Resources  |                 |            |
| 2.2      | Population  |                 |            |
| 2.3      | Agriculture   |                 |            |
| 2.4      | Land Degradation  |                 |            |
| 2.5      | Energy Security   |                 |            |
| <b>3</b> | <b>Principles of Environmental Management</b>                         | <b>08 Hours</b> | <b>26%</b> |
| 3.1      | Environmental Concerns in India                                       |                 |            |
| 3.2      | International Environmental Movement                                  |                 |            |
| 3.3      | Definition, Goals, Need, Tools of Environmental Management            |                 |            |
| 3.4      | Participants in EM  |                 |            |
| 3.5      | Ethics and the Environment  |                 |            |
| 3.6      | Ecology and the Environment   |                 |            |
| 3.7      | Environmental Management Systems & Standards                          |                 |            |
| <b>4</b> | <b>Environmental Sustainability</b>                                   | <b>04 Hours</b> | <b>14%</b> |
| 4.1      | Strategies for Sustainability   |                 |            |
| 4.2      | Land Use and Urban Planning   |                 |            |
| 4.3      | Energy and Climate Change   |                 |            |
| 4.4      | Transportation  |                 |            |
| 4.5      | Balancing Population with Food and Water Resources                    |                 |            |
| <b>5</b> | <b>Introduction to Climate Change</b>                                 | <b>07 Hours</b> | <b>23%</b> |
| 5.1      | Climate Change-Way & Means  |                 |            |
| 5.2      | What Do We Know and Don't Know?                                       |                 |            |
| 5.3      | The Physical Science of Climate Change                                |                 |            |
| 5.4      | Causes of Climate Change  |                 |            |
| 5.5      | Global Atmospheric Composition  |                 |            |
| 5.6      | Greenhouse Gases and Aerosols   |                 |            |
| 5.7      | Extreme Weather Events & Sea Level Rise                               |                 |            |
| 5.8      | Climate Projections and their Uncertainties                           |                 |            |
| <b>6</b> | <b>Climate Change-Mitigation</b>                                      | <b>05 Hours</b> | <b>17%</b> |
| 6.1      | Global Carbon Cycle   |                 |            |
| 6.2      | Concept of Carbon Sequestration                                       |                 |            |
| 6.3      | Carbon Credits and Carbon Footprints                                  |                 |            |
| 6.4      | Policy Perspective: UNFCCC, IPCC, Kyoto Protocol, MoEFCC              |                 |            |

### D. Instructional Method and Pedagogy:

At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.

- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures.
- Internal exams will be conducted as per pedagogy as a part of internal theory evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
- Surprise tests/Quizzes/Seminar will be conducted as per pedagogy as a part of internal theory evaluation.

### **E. Students Learning Outcomes:**

On the completion of the course the students will be able to:

- Understand & appreciate for the value of quantitative, systems and transdisciplinary thinking of Environmental Sustainability
- Expand their awareness about the environment as an increasing part of the core business model and day-to-day operations of many organizations
- Develop an environmental blueprint for action
- Think strategically and act entrepreneurially to create sustainable future
- Review on Climate Change and related strategies

### **F. Recommended Study Materials:**

#### **Text Books:**

1. Environmental Management, T. V. Ramchandra & Vijay Kulkarni, Teri Press, New Delhi, 2009.
2. Handbook of Environmental Laws, Acts, Guidelines, Compliances & Standard Policy, R. K. Trivedy, B.S. Publishers, 2010.
3. Climate Change & India, Vulnerability Assessment and Adaption, P. R. Shukla, University Press, Hyderabad, 2003.

#### **Reference Books:**

1. Environmental Management, Principles and Practice, C. J. Barrow, Psychology Press, 1999.
2. Environmental Management in Practice, Nath B., Hens, L., Compton, P. and Devuyt, D, Vol I, Routledge, London and New York, 1998.
3. Handbook of Environmental Management and Technology: Gwendolyn Holmes, Ben Ramnarine Singh, and Louis Theodore, Wiley, 2004.

4. Corporate Environmental Management: Welford R, University Press, Hyderabad, 1999.

**Web Materials:**

1. <http://nptel.ac.in/courses/122102006/7>
2. <http://envfor.nic.in/>
3. <http://cpcb.nic.in/>
4. <http://gpscb.gov.in/>
5. <http://nptel.ac.in/courses/119106008/40>
6. <https://unccelearn.org/course/>
7. <http://www.open.edu/openlearn/nature-environment/the-environment/climate-change/content-section-0>
8. <http://www.openlearningworld.com/>

**CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY**  
**FACULTY OF TECHNOLOGY & ENGINEERING**  
**MANUBHAI S. PATEL DEPART. OF CIVIL ENGINEERING**  
**CL283: SDG Handprint Laboratory**

**LEVEL-2: 3<sup>rd</sup> SEMESTER**

**Credits and Hours:**

| Teaching Scheme | Theory | Tutorial | Practical | Total | Credit |
|-----------------|--------|----------|-----------|-------|--------|
| Hours/week      | -      | -        | 2         | 2     | 2      |
| Marks           | -      | -        | 100       | 100   |        |

**A. Objectives of the Course:**

The main objectives of the course are:

- To provide a unique learning environment to youth orienting them to the Sustainable Development Goals (SDGs) and relating it to issues of a local area and using their skills and knowledge to conduct research and executing handprint activities.
- To familiarize students through action research with all aspects of project management ranging from problem identification, development of measurement indicators, setting of targets and development of strategies, to implementation and evaluation of outcomes in specific SD goal areas of their choice.
- To develop understanding of key environmental concepts and terminology and provide with a knowledge and appreciation of the inter-related problems and challenges of sustainable development.
- To provide a contextual understanding of the vision and principles underlying the UN Sustainable Development Goals (SDGs) and multi-disciplinary nature of sustainable development with a view to address the globally accepted UN mandated goals or SDGs.
- Understand the ethical dimensions of Sustainable development and Earth Charter.
- To introduce the students to the concept of Handprint in the context of sustainable development.
- To introduce students to field study method to encourage observation, use of survey techniques and interaction with different stakeholders in the context of a particular sustainability issue.
- To familiarize students with the different approaches to data analysis using different scientific and statistical methods.
- To introduce the students to the method of critical and holistic visioning of an issue

and derive integrated strategies to address the issue.

- To provide practical experience in developing potentially effective and creative approaches and skills for communication of key messages evolving out of the strategy developed.
- To inculcate a sense of global citizenship among students along with a sound and holistic understanding of real world sustainability issues and creative problem solving skills.

#### **A. Outline of the Course:**

| <b>Sr. No.</b> | <b>Title of the Unit</b>  | <b>Minimum Number of Hours</b>               |
|----------------|---|--|
| 1              | Introducing Sustainable Development Concepts and Sustainable Development Goals( SDGs)   | 04   |
| 2              | Selection of the SDG Target, group formation and Familiarization with the geographical area<br>1. Group Formation and selection of SDG target<br>2. Field trip to familiarize the students with the geographical area | 10 (2 hours Classroom + 8 hours field visit) |
| 3              | Sustainable Rural Development   | 02   |
| 4              | Compilation and Analysis of Available Statistical and Geospatial Information  | 02   |
| 5              | Ground Reality Check<br>1. Understanding/developing methodology<br>2. Baseline study  | 16   |
| 6              | Developing Project Strategy and Plan of Action<br>1. Analysis of data<br>2. Developing the plan of Action   | 04   |
| 7              | Presentation of Strategy and Ethical Evaluation   | 02   |
| 8              | Project Implementation and Handprint Action   | 16   |
| 9              | Submission of Project Report<br>Presentation, Evaluation and Certification  | 04   |

**Total Hours:** 20 (10 session/2 hours each)

**Total Hours Field Visit:** 40 (5 days @ 8 hours per day)

**Total Hours:** 60

**Total Number of Sessions:** 15 sessions (10 classroom and 5 Field visits)

Detailed Syllabus:

| <b>1</b> | <b>Introducing Sustainable Development Concepts and SDGs</b>   | <b>04 Hours</b> | <b>07%</b> |
|----------|--|-----------------|------------|
| 1.1      | Understanding the key Concepts <ul style="list-style-type: none"> <li>• Global population patterns and trends and world population growth over time</li> <li>• Demographic transition: Population growth by the level of development</li> <li>• Carbon footprint and Ecological Footprint</li> <li>• Climate Change</li> <li>• Sustainability and Sustainable Consumption</li> </ul> |                 |            |
| 1.2      | Leapfrogging Sustainable Development <ul style="list-style-type: none"> <li>• Three Pillars of sustainable development</li> <li>• Visual framework of SD: Planetary boundaries vs Social boundaries</li> </ul>   |                 |            |
| 1.3      | Sustainable Development Goals and the global processes that led to the formation of SD goals   |                 |            |
| 1.4      | SDGs and targets and their interconnectedness  |                 |            |
| 1.5      | Handprint  |                 |            |
| 1.6      | SDG Handprint Lab  |                 |            |
| <b>2</b> | <b>Selection of the SDG Target, Group Formation and Familiarization to the geographical area</b>   | <b>10 Hours</b> | <b>16%</b> |
| 2.1      | Localizing the SDGs: Understanding SDGs in the National, State and selected geographic area context  |                 |            |
| 2.2      | Project Selection: Choosing the SDG target and group formation   |                 |            |
| 2.3      | Presentation by groups on selected project   |                 |            |
| 2.4      | Exposure visit to the Geographic Area to understand the specific aspects of the area related to the project selected   |                 |            |
| <b>3</b> | <b>Sustainable Rural Development</b>   | <b>02 Hours</b> | <b>03%</b> |
| 3.1      | Understanding Sustainable Rural Development in the Indian context - issues, challenges and opportunities (specific to the state of Gujarat)  |                 |            |
| 3.2      | Orientation on Rural development programmes, projects and policies, role of different organisations (Government, Non government bodies, CSR and other key stakeholders)  |                 |            |
| 3.3      | Different approaches to the management of natural resources in the   |                 |            |

|          |   |                 |            |
|----------|---|-----------------|------------|
|          | rural context - sharing of case studies   |                 |            |
| <b>4</b> | <b>Compilation and Analysis of available Statistical and Geospatial Information</b>   | <b>02Hours</b>  | <b>03%</b> |
| 4.1      | Providing Guidelines and approaches for baseline study  |                 |            |
| 4.2      | Introduction to Methods of acquiring, interpreting and analyzing geospatial information with an understanding of the appropriate contexts for their use |                 |            |
| 4.3      | Development of methodology and plan of action for the baseline study  |                 |            |
| <b>5</b> | <b>Ground Reality Check</b>   | <b>16 hours</b> | <b>27%</b> |
| 5.1      | Baseline study and data collection from the geographical area on the selected project.  |                 |            |
| 5.2      | Approaches to data analysis: Understand the gaps; identify opportunities and entry points for strategic intervention                                    |                 |            |
| 5.3      | Sharing of Learnings: Presentation of the analysis of baseline study  |                 |            |
| <b>6</b> | <b>Developing Project Strategy and Plan of Action</b>   | <b>04 Hours</b> | <b>7%</b>  |
| 6.1      | Guidelines on Ethics, Earth Charter and criteria for evaluating the strategy  |                 |            |
| 6.2      | Formulation of intervention strategy and plan of action for implementation of Handprint Action  |                 |            |
| <b>7</b> | <b>Presentation of Strategy and Ethical Evaluation</b>  | <b>02 Hours</b> | <b>3%</b>  |
| 7.1      | Session with Experts: Presentation by groups and inputs from mentors/experts  |                 |            |
| 7.2      | General guidelines for field level intervention   |                 |            |
| <b>8</b> | <b>Project Implementation and Handprint Action</b>  | <b>16 Hours</b> | <b>27%</b> |
| 8.1      | Implement the Handprint action in the selected geographical area  |                 |            |
| 8.2      | Guidelines for Report writing and Presentation  |                 |            |
| <b>9</b> | <b>Submission of Project Report<br/>Presentation, Evaluation and Certification</b>  | <b>04 Hours</b> | <b>7%</b>  |

|     |   |  |  |
|-----|---|--|--|
| 9.1 | Preparation and submission of SDG Handprint Lab Report          |  |  |
| 9.2 | Sharing the Learning: SDG Handprint Lab Presentation/Exhibition |  |  |
| 9.3 | Evaluation and Certification                                    |  |  |

## **B. Instructional Method and Pedagogy:**

At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.

- Sessions will be conducted with the aid of multi-media projector, black/white board and using activities etc.
- Attendance is compulsory.
- Surprise tests/Quizzes/Seminar/Poster Presentation will be conducted as per pedagogy as a part of internal evaluation.
- Presentation with report, Group Project, Case Studies, Surveys etc. along with the External Viva will be conducted as a part of the External Evaluation.

## **C. Students Learning Outcomes:**

On the completion of the course the students will be able to:

- Identify and explain about the social and environmental dimensions of sustainability issues and the complex inter-relationships between society and nature with particular emphasis on relationship between environment and development.
- Demonstrate the ability to link key academic concepts used in relation to environmental issues and sustainability and adopt a critical approach to analyzing global environmental issues
- Get familiar with the SDGs and would be able to connect local sustainability issues to global challenges and agenda.
- Learn about multiple approaches to understand analyse a sustainability issue and will be acquainted with the tools to identify key challenges pertaining to a particular sustainability issue in a given geographic area.
- Learn to use a scientific approach to needs assessment and be able to evaluate and take action on feasibility of implementation in terms of cost, speed, effectiveness, durability of the solution etc. and the need for immediate, short-term and long-term strategies.



- Recognize and define ethical issues and be able to ethically evaluate how their intervention would affect different groups.
- Develop skills of reading, writing and presentation.

## **D. Recommended Study Materials:**

### **Text Books:**

### **Mandatory Reading:**

1. Global Environment Issues, Francis Harris (Editor), John Wiley & Sons, Ltd, England 2004
2. Sustainable Development at Risk: Ignoring the Past, By Joseph H. Hulse, Cambridge University Press India Pvt. Ltd., 2007
3. A safe and safe space for Humanity: [https://www-cdn.oxfam.org/s3fs-public/file\\_attachments/dp-a-safe-and-just-space-for-humanity-130212-en\\_5.pdf](https://www-cdn.oxfam.org/s3fs-public/file_attachments/dp-a-safe-and-just-space-for-humanity-130212-en_5.pdf)
4. A Guide To SDG Interactions: From Science To Implementation, International Council for Science (<https://council.science/cms/2017/05/SDGs-Guide-to-Interactions.pdf>)
5. Planetary boundaries: Guiding human development on a changing planet ([http://precaution.org/lib/steffen\\_planetary\\_boundaries\(incl\\_supplemental\).150213.pdf](http://precaution.org/lib/steffen_planetary_boundaries(incl_supplemental).150213.pdf))
6. Handbook of Rural Development, Ed. Gary Paul Green, Published by Edward Elgar (2013)
7. Rural Development: Putting the last first, Robert Chambers, Published by Routledge(2013)
8. <https://niti.gov.in/content/overview-sustainable-development-goals>
9. <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>
10. <https://www.india.gov.in/topics/rural>
11. <https://sustainabledevelopment.un.org/topics/ruraldevelopment/decisions>

## **Suggested Readings:**

1. Report of the World Commission on Environment and Development: Our Common Future  
(<https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf>)

2. Climate change- An Indian Perspective, Sushil kumar Dash, Centre for Environment Education, Ahmedabad
3. Water - Sustainable and Efficient use, Suhas Paranjape, K. J. Joy, Centre for Environment Education, Ahmedabad
4. Sustainable Development Goals, Published by CEE
5. Environmental Management, Principles and Practice, C. J. Barrow, Psychology Press, 1999.
6. Environmental Management in Practice, Nath B., Hens, L., Compton, P. and Devuyst, D, Vol I, Routledge, London and New York, 1998.
7. Handbook of Environmental Management and Technology: Gwendolyn Holmes, Ben Ramnarine Singh, and Louis Theodore, Wiley, 2004.
8. Corporate Environmental Management: Welford R, University Press, Hyderabad, 1999.
9. Environmental Management, T. V. Ramachandra& Vijay Kulkarni, Teri Press, New Delhi, 2009.
10. Handbook of Environmental Laws, Acts, Guidelines, Compliances & Standard Policy, R. K. Trivedi, B.S. Publishers, 2010.
11. Climate Change & India, Vulnerability Assessment and Adaption, P. R. Shukla, University Press, Hyderabad, 2003.

1. <https://www.thebetterindia.com/sustainable-development-goals/>
2. <http://nptel.ac.in/courses/122102006/7>
3. <http://envfor.nic.in/>
4. <http://cpcb.nic.in/>
5. <http://gpcb.gov.in/>
6. <http://nptel.ac.in/courses/119106008/40>
7. <https://unccelearn.org/course/>
8. <http://www.open.edu/openlearn/nature-environment/the-environment/climate-change/content-section-0>
9. <http://www.openlearningworld.com/>

**CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY**  
**FACULTY OF TECHNOLOGY & ENGINEERING**  
**DEPARTMENT OF ELECTRICAL ENGINEERING**

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**EE283: PYTHON FOR ELECTRICAL ENGINEERING**  
**3<sup>rd</sup> Semester and 2<sup>nd</sup> Year (Level II)**

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**Credit Hours:**

| Teaching Scheme | Theory | Practical | Total |
|-----------------|--------|-----------|-------|
| Hours/week      | -      | 2         | 2     |
| Marks           | -      | 100       | 100   |

**A. Objective of the Course:**

In this world of digitization, as an electrical engineer it is very important to opt for a precise computational alternative. The objectives of the course are:

- To introduce the students with the fundamentals and detail knowledge of Python. (1, 4, 5)
- To learn how to develop the program using basic commands of Python. (2, 4,6)
- To develop programs and user defined algorithms to provide optimized output. (1,5,6,7)
- Ability to perform and develop different computational skills using software recognized worldwide. (3,6)
- To Learn how to implement this computational techniques in solving problems of power system. (9)
- To be able to participate in Python based coding competition. (11)

**B. Examination Scheme:**

| Theory Marks |          | Practical Marks |          | Total Marks |
|--------------|----------|-----------------|----------|-------------|
| Internal     | External | Internal        | External |             |
| -            | -        | 50              | 50       | 100         |

### C. Outline of the Course:

### D.

| Sr. No. | Title of Units                                 | Number of Hours |
|---------|--|-----------------|
| 1       | Variables and type                             | 05              |
| 2       | Function, Basic recursion                      | 05              |
| 3       | Control flow: Branching and repetition         | 05              |
| 4       | Introduction to objects: Strings and lists     | 05              |
| 5       | Python modules, debugging programs             | 05              |
| 6       | Introduction to data structures : Dictionaries | 05              |

**Total Hours: 30**

### E. Revised Bloom's Taxonomy

The below specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary from the below table.

| level       |               |             |         |          |        |
|-------------|---------------|-------------|---------|----------|--------|
| Remembrance | Understanding | Application | Analyze | Evaluate | Create |
| 05          | 15            | 20          | 20      | 25       | 15     |

### F. Course Outcomes (Learning Outcomes):

Upon successful completion of this course, a student will be able to

- Students will be aware about the use of Python for various problem solving.
- To strengthen the fundamentals of mathematics
- To enhance the programming skills in Python for electrical engineering.

## **G. Instructional Methods and Pedagogy**

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Laboratories will be conducted with the aid of multimedia projector.
- A student has to prepare a laboratory term work as per instruction given by lab instructor.
- A student has to prepare a laboratory term work as per instruction given by lab instructor.
- Attendance is compulsory in laboratory, which carries five marks of the overall evaluation.
- Two viva voce will be conducted during the semester and average of two will be considered as a part of overall evaluation.

## **H. Recommended Study Material:**

### **Text Books:**

1. Think Python – How to Think like a Computer Scientist, Allen Downey, Green Tea Press.

### **Reference Books:**

1. Python Programming: A Complete Guide for Beginners to Master, PythonProgramming Language , Brian Draper
2. Python: The Complete Reference, Martin C. Brown, Tata McGraw Hill

### **Web Material:**

1. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-0001-introduction-to-computer-science-and-programming-in-python-fall-2016>
2. <https://www.python.org/about/gettingstarted>
3. [https://onlinecourses.nptel.ac.in/noc18\\_cs21/preview](https://onlinecourses.nptel.ac.in/noc18_cs21/preview)

**FACULTY OF TECHNOLOGY & ENGINEERING**  
**DEPARTMENT OF INFORMATION TECHNOLOGY**  
**IT281.01: ICT RESOURCES AND MULTIMEDIA**  
**3RD SEMESTER (UNIVERSITY ELECTIVE)**

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**Credits and Hours:**

| Teaching Scheme | Theory | Practical | Tutorial | Total | Credit |
|-----------------|--------|-----------|----------|-------|--------|
| Hours/week      | -      | 2         | -        | 2     | 2      |
| Marks           | -      | 100       | -        | 100   |        |

**A. Objective of the Course:**

The main objectives for offering the course ICT RESOURCES AND MULTIMEDIA are:

1. To provide you the conceptual and technological developments in the field of information technology with the emphasis on comprehensive knowledge of Internet.
2. To introduce the fundamental elements of multimedia.
3. Understand to use the packages of presentation in detail.
4. Understand the impact of Information Technology on the Society and Various applications.

**B. Outline of the Course**

| Sr. No. | Title of the Unit                  | Minimum Number of Hours |
|---------|------------------------------------|-------------------------|
| 1       | ICT Utilities and Tools            | 8                       |
| 2       | Introduction to Multimedia         | 4                       |
| 3       | Presentation Package               | 6                       |
| 4       | Networking Concepts                | 6                       |
| 5       | Information Technology and Society | 6                       |

**Total hours (Theory): 30**

**Total hours (Lab): 00**

**Total hours: 30**

### C. Detailed Syllabus:

Following contents will be delivered to the students during laboratory sessions.

|           |   |                 |             |
|-----------|---|-----------------|-------------|
| <b>1.</b> | <b>ICT Utilities and Tools</b>  | <b>08 Hours</b> | <b>30%</b>  |
|           | Compression Utilities: WinZip, PKZIP, Concept of compression, Defragmenting Hard, disk using defrag, Scan Disk for checking disk space, lost files and recovery, Formatting Hard disk, Setting System Date and Time, Antivirus.<br><br>Tools: Prezi, Macromedia Director & Flash, Gliffy, Edmodo, Google Classroom, Glogster. |                 |             |
| <b>2.</b> | <b>Introduction to Multimedia</b>   | <b>04 Hours</b> | <b>10 %</b> |
|           | What is multimedia, Components of multimedia, Web and Internet multimedia applications, Transition from conventional media to digital media.  |                 |             |
| <b>3.</b> | <b>Presentation Package</b>   | <b>06 Hours</b> | <b>20%</b>  |
|           | Microsoft PowerPoint: Slide layout, Slide design (Proper selection based on audience), Header and Footer in slides, Slide transition, Slide Master, Insert Picture-Smart Art, Insert animations to different objects, Hide Slide, Rehearse Timings, Record slide show. How to prepare professional presentation.              |                 |             |
| <b>4.</b> | <b>Networking Concepts</b>  | <b>06 Hours</b> | <b>20%</b>  |
|           | What is Networking, Local Area Networking (LANs), Metropolitan Area Network , MAN), Wide Area Network (WAN), Networking Topologies, Transmission media & method of communication.   |                 |             |
| <b>5.</b> | <b>Information Technology and Society</b>   | <b>06 Hours</b> | <b>20%</b>  |
|           | Indian IT Act, Intellectual Property Rights – issues. Application of information Technology in Railways, Airlines, Banking, Insurance, Inventory Control, Financial systems, Hotel management, Education, Video games, Telephone exchanges, Mobile phones, Information kiosks, special effects in Movies.                     |                 |             |

#### Instructional Method and Pedagogy:

- In the very beginning, the course delivery pattern, prerequisites of the subject will be discussed.
- Multimedia and overhead Projectors, Chalk - Board and White - Board will be used for Class room teaching.
- Quiz / Q-A session will be conducted by the concerned faculty / for the theory.
- Audio Visual Presentations through electronic means and related software, and on-line demonstrations from the authentic web sites of the other premium institutes.
- Internal tests (as per the directions from the head and dean) will be conducted as a part of the regular curriculum.
- Seminars on advanced topics related to this subject will be key features.
- Academic counselling will reduce the formal distance between / amongst the students and faculty every fortnight.
- Students will be provided the latest updates such as technical articles, e-resources, printed materials and projects from magazines and journals.
- Attendance is compulsory in lectures which is part of overall evaluation.

#### **D. Student Learning Outcomes:**

At the end of the course the students will be able to:

- A student will be having the basic knowledge of the Information Technology.
- A student will be able to understand effectively use miscellaneous utilities such as: Compression, CD writing, Antivirus etc.
- A student will be able to use different tools for analysis and presentation.
- A student will be able to know the impact of ICT tools and Information Technology in Society.

#### **E. Recommended Study Material:**

##### ❖ Text Books:

- ITL Educational Society, “Introduction to IT”, Pearson Education, 2009.
- William Stallings, “Data and Computer Communication”, Prentice, Hall of India Private Limited.
- Mavis Beacon, “All-in-one MS Office” CD based views for self-learning, BPB Publication, 2008
- Li & Drew, “Fundamentals of Multimedia”, Pearson Education, 2009.

##### ❖ Reference Books:

- Tay Vaughan, “Multimedia making it work”, Tata McGraw-Hill, 2008.
- Parekh Ranjan, “Principles of Multimedia”, Tata McGraw-Hill, 2007.

##### ❖ Web Materials:

- <https://www.tutorialspoint.com>
- <http://computingcareers.acm.org>



**CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY**  
**FACULTY OF TECHNOLOGY &ENGINEERING**  
**DEPARTMENT OF MECHANICAL ENGINEERING**  
**ME 281.01: ENGINEERING DRAWING**  
**B TECH 3<sup>RD</sup> SEMESTER (UNIVERSITY ELECTIVE)**

**Credits Hours:**

| Teaching Scheme | Theory | Practical | Total | Credit |
|-----------------|--------|-----------|-------|--------|
| Hours/week      | -      | 2         | 2     | 2      |
| Marks           | -      | 100       | 100   |        |

**A. Objective of the Course:**

- To introduce the student to the universal language and tool of communication of engineers.
- To make them thorough in understanding and using the various concepts of Engineering Drawing.

**B. Outline of the Course:**

| Sr. No. | Title of the Unit                      | Minimum number of hours |
|---------|--|-------------------------|
| 1       | Introduction to Engineering Drawing    | 05                      |
| 2.      | Visualization of Objects               | 10                      |
| 3.      | Sectional View of Objects              | 08                      |
| 4.      | Assembly and Detailed Drawing          | 04                      |
| 5.      | Introduction to Computer Aided Drawing | 03                      |

**Total hours (Theory): 30**

**Total hours (Lab): 00**

**Total: 30**

**C. Detailed Syllabus:**

- 1 Introduction to Engineering Drawing 05 Hours 17%**
- 1.1 Basic of engineering graphics.
- 1.2 Lines, types of lines, use of different line in engineering drawing.
- 1.3 Dimensioning, placing of dimensions, general rules of dimensions.

|  |                     |
|--|---------------------|
| <b>2 Visualization of Objects</b>  | <b>10 Hours 34%</b> |
| 2.1 Principle of visualization of objects, need of visualization, methods of visualization of three dimensional objects. |                     |
| 2.2 Interpretation of line and area in orthographic drawing.   |                     |
| 2.3 Visualization of objects -pictorial view and orthographic view.  |                     |
| 2.4 Visualization of objects- Isometric view.  |                     |
| <b>3 Sectional view of Objects</b>   | <b>08 Hours 27%</b> |
| 3.1 Principle of sectional view of objects,  |                     |
| 3.2 Classification of sectional views,   |                     |
| 3.3 Full sectional views, half sectional views, convention for sectioning.   |                     |
| <b>4 Assembly and Detailed Drawing</b>   | <b>04 Hours 12%</b> |
| 4.1 Assembly drawing with sectioning from given detailed   |                     |
| 4.2 Detail drawing from given assembly   |                     |
| <b>5. Introduction to Computer Aided Drawing</b>   | <b>03 Hours 10%</b> |
| 5.1 Introduction to 2D Drawing facilities in CAD software  |                     |
| 5.2 Introduction to 3D modeling & its relationship with 2D drawing views   |                     |

#### **D. Instructional Methods and Pedagogy**

- At the starting of the course, delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures.
- Internal exams/Unit tests/Surprise tests/Quizzes/Seminar/Assignments etc. will be conducted as a part of continuous internal theory evaluation.
- In the lectures discipline and behavior will be observed strictly.

#### **E. Student Learning Outcomes / objectives:**

Upon successful completion of this course, the student will be able to:

1. Understand the basics of drawing which is used in industries.
2. To convert sketches to engineered drawings will increase.
3. Improve their visualization skills so that they can apply these skills in developing new products.

4. Know the fundamental of Computer Aided Drawing & 3D Modeling.

#### **F. Recommended Study Material:**

##### **Text Books:**

1. Shah, P.J., Engineering Drawing Vol. I & II, S. Chand & Co.
2. Bhatt, N.D., Engineering Drawing, Charotar Publishing House

##### **Reference books:**

1. Gopal Krishna K.L., Engineering Drawing, Subhas Publications
2. Venugopal, K., Engineering Drawing made Easy, Wiley Eastern Ltd.
3. Agrawal, M.L. & Garg, R.K., Engineering Drawing Vol-I, Dhanpatrai & Co.
4. French, T.E., Vierck, C.J. & Foster, R.J., Graphic Science and Design, McGraw Hill
5. Luzadder, W.J. & Duff, J.M., Fundamentals of Engg. Drawing, Prentice Hall
6. Venugopal, K., Engg. Drawing and Graphics, New Age International Pvt. Ltd.

##### **Web Materials:**

1. [users.rowan.edu/~eyerett/courses/lfrclil/Lectures/Draw.ppt](http://users.rowan.edu/~eyerett/courses/lfrclil/Lectures/Draw.ppt)
2. [mechanical-engineering-drawing.ppt.fyxm.net](http://mechanical-engineering-drawing.ppt.fyxm.net)

**CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**FACULTY OF PHARMACY**  
**Ramanbhai Patel College of Pharmacy**  
**University Level Elective for Undergraduate Students of CHARUSAT**  
**SEMESTER III**  
**Fundamentals of Packaging [PH233.01]**

**Credit and Schemes:**

| Se<br>m | Cours<br>e Code | Course<br>Name                    | Credit<br>s | Teachin<br>g<br>Scheme | Evaluation Scheme |              |              |              |           |
|---------|-----------------|-----------------------------------|-------------|------------------------|-------------------|--------------|--------------|--------------|-----------|
|         |                 |                                   |             | Contact<br>Hr/Wee<br>k | Theory            |              | Practical    |              | Tota<br>l |
|         |                 |                                   |             |                        | Interna<br>l      | Externa<br>l | Interna<br>l | Externa<br>l |           |
| III     | PH233           | Fundamen<br>-tals of<br>Packaging | 02          | 02                     | -                 | -            | 30           | 70           | 100       |

**Course Objectives**

The course is structured to introduce the students, with diversified background, to different types of packaging materials generally employed and evaluation methods to be adopted for those packages.

**Pre requisite: None**

**Methodology and Pedagogy:**

During the sessions the students will be exposed to the concept with suitable examples, and are expected to learn through active learning, by preparing, e.g case studies, seminars, theoretical projects etc. The exercises will be given in groups of 2-3 students. Audio – Visual and IT resources will be used to transact the components of studies.

**Learning Outcome:**

Up on completion of the course, students would be able to,

1. Describe and indentify different types of packages
2. Be able to describe significance of tests to be performed to evaluate packages as well to suggest the type of tests to be performed for different type of packages
3. Suggest the type of material likely to be adopted for particular product
4. Describe the steps involved in aseptic manufacturing and packing of products
5. Able to identify different component of aerosol packages and be able to describe role of each of those component

**Outline of the Course**

| Sr No. | Unit   |
|--------|--|
| 1      | Introduction to Packaging  |
| 2      | Packaging of oral solid formulation                                      |
| 3      | Sterilization and Sterile Products Packaging including Aerosol Packaging |

**Detailed Syllabus**

| Sr.No | Units                                    |
|-------|--|
| 1     | Introduction to Pharmaceutical Packaging |

|   |  |
|---|--|
|   | Definition, introduction to packaging, role of packaging, components of packaging, Overview of the Packaging Development and various aspects of it, Evaluation of packages and Physicochemical characteristics |
| 2 | Packaging of Oral Solids   |
|   | Flexible Packaging Materials – Introduction to Plastic, Cellulose and Semi Synthetic Polymeric Materials , Overview of Packaging of Tablets, Capsules and Powders  |
| 3 | <b>Sterilization and Sterile Products Packaging</b><br>Over view of Sterilization Processes, Aseptic Packaging, Packaging Systems, Assessment of Sterility   |
|   | <b>Aerosol Packaging</b>   |

### Core Books

1. Encyclopedia of Pharmaceutical Technology Vol.1-3, Swarbric, J and Bolyln, J. C., Marcel Dekker, Inc., New York.
2. Smart Packaging Technologies for fast moving consumer goods, Editor Joseph Kerry and Paul Butler, Wiley
3. Pharmaceutical Packaging Technology, Dean, D. A. Evans, E. R. and Hall, j. H., Taylor and Francis, London.
4. Handbook of Packaging Technology, by Eiri Board (Engineers India Research Institute).

### Reference Books

1. Packaging of Pharmaceutical & Healthcare products, H. Lockhart, F. A. Paine, Champman and Hall, London.
2. Packaging of Pharmaceuticals, C.F. Ross, Newnes-Butterworth.
3. The Theory and Practice of Industrial pharmacy, Lachmann, L., Lieberman, H.A. & Kanig, J.I., Lea and Fibiger, CBS Publishers and Distributors, New Delhi.

### Web References

1. <http://www.creativebloq.com/branding/packaging-design-resources-4131480>
2. <https://www.greenerpackage.com/newsletter>

# **CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY**

## **University Elective (UG)**

### **PD260.01 BASIC LABORATORY TECHNIQUES**

Credit: 2

#### **A. Objective of the course.**

The objectives of this course is to introduce students to the use of various electrical/electronic instruments, their construction, applications, principles of operation, standards and units of measurements; and provide students with opportunities to develop basic skills in the design of electronic equipment.

#### **B. Outline of the Course**

|           |   |                      |
|-----------|---|----------------------|
| <b>1.</b> | Error and uncertainty in measurements:<br>Accuracy and precision, Significant figures, Error and uncertainty analysis, Types of errors: Gross error, systematic error, random error. Statistical analysis of data, (Arithmetic mean, deviation from mean, average deviation, standard deviation, chi-square), and curve fitting, Gaussian distribution. | (10<br>Lecture<br>s) |
| <b>2.</b> | Basic of Measurement:<br>Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects. Multimeter: Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance.  | (5<br>Lecture<br>s)  |
| <b>3.</b> | DC and AC indicating Instruments: Ideal Constant-voltage and Constant-current Sources, Voltmeter, Ammeters, Cathode Ray Oscilloscope  | (5<br>Lecture<br>s)  |
| <b>4.</b> | Signal Generators and Analysis Instruments:<br>Block diagram, explanation and specifications of low frequency signal generators. pulse generator, and function generator. Brief idea for testing, specifications. Distortion factor meter, wave analysis.   | (5Lecture<br>res)    |
| <b>5.</b> | Digital Instruments:<br>Principle and working of digital meters. Comparison of analog & digital instruments. Characteristics of a digital meter. Working principles of digital voltmeter, working of a digital multimeter   | (5Lecture<br>res)    |

#### **C. Instructional Methods and Pedagogy:**

The topics will be discussed in interactive class room sessions using classical black-board teaching to power-point presentations. Unit tests will be conducted regularly as a part of continuous evaluation and suggestions will be given to student in order to improve their performance.

#### **D. Student Learning Outcomes / objectives:**

Upon successful completion of this course, the student will be able to (Knowledge based) identify electronics/ electrical instruments, their use, peculiar errors associated with the instruments and how to minimise such errors.

#### **E. Recommended Study Material:**

1. Gupta B. R. (2003). Electronics and Instrumentation. Published by S. Chand and Company Ltd, New Delhi, India.

2. Measurement, Instrumentation and Experiment Design in Physics and Engineering, M. Sayer and A. Mansingh, PHI Learning Pvt. Ltd.
3. Experimental Methods for Engineers, J.P. Holman, McGraw Hill
4. Introduction to Measurements and Instrumentation, A.K. Ghosh, 3rd Edition, PHI Learning Pvt. Ltd.
5. Principles of Electronic Instrumentation, D. Patranabis, PHI Learning Pvt. Ltd.

**CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY**  
**FACULTY OF MEDICAL SCIENCES**  
**ManikakaTopawala Institute of Nursing**

**University Level Elective for Undergraduate students:**  
**NR 251.01- First Aid & Life Support (FALS)**

**I. Credits & Scheme:**

| Sem | Course Code | Course Name                     | Credits | Teaching Scheme    | Evaluation Scheme |          |           |          |       |
|-----|-------------|---------------------------------|---------|--------------------|-------------------|----------|-----------|----------|-------|
|     |             |                                 |         | Contact Hours/Week | Theory            |          | Practical |          | Total |
|     |             |                                 |         |                    | Internal          | External | Internal  | External |       |
| III | NR 251      | First Aid & Life Support (FALS) | 02      | 02                 | --                | --       | 30        | 70       | 100   |

**II. Course Objectives:** Upon completing the course, students will be able to

- Demonstrate basic first aid skills needed to control bleeding and immobilize injuries.
- Demonstrate the skill needed to assess the ill or injured person.
- Demonstrate skills to assess and manage foreign body airway obstruction in infants, children and adults.
- Demonstrate skills to provide one- and two- person cardiopulmonary resuscitation to infants, children and adults

**Course Outline:**

| Unit No. | Title of Unit  | Hours |
|----------|--|-------|
| I.       | <b>Introduction and Basics of First Aid:</b> <ul style="list-style-type: none"> <li>• Rescuer Duties, Victim and Rescuer Safety</li> <li>• Looking for Help</li> <li>• After the emergency</li> </ul>  | 2     |
| II.      | <b>Medical emergencies and their first aid:</b> <ul style="list-style-type: none"> <li>• Breathing Problems</li> <li>• Choking in an Adult</li> <li>• Allergic Reactions</li> <li>• Heart Attack</li> <li>• Fainting</li> <li>• Diabetes and Low Blood Sugar</li> <li>• Stroke</li> <li>• Shock</li> </ul> | 12    |



|       |  |          |
|-------|--|----------|
|       | Abdominal maneuver, CPR, ventilation etc.  |          |
| III.  | Injuries emergencies and their first aid:<br><ul style="list-style-type: none"> <li>• Bleeding: You Can See/ You Can't See</li> <li>• Wounds</li> <li>• Burns and Electrical Injuries</li> <li>• Fractures</li> </ul> Bandaging, immobilization, transferring etc. | 8        |
| IV.   | Environmental Emergencies and first aid:<br><ul style="list-style-type: none"> <li>• Bites and Stings</li> <li>• Poison Emergencies</li> <li>• Heat-Related Emergencies</li> <li>• Cold-Related Emergencies</li> </ul>   | 7        |
| V.    | Preparation of First Aid Kit   | 1        |
| Total |  | 30 Hours |

#### IV. Instruction Method and Pedagogy

The course is based on theory & practical learning. Teaching will be facilitated by reading material, discussion, microteaching, task-based learning, assignments, field visit and various interpersonal activities like group work, independent and collaborative research, presentations etc. Practical will be facilitated by demonstrations and preparing check-lists etc.

- V. **Evaluation:** The students will be evaluated continuously in the form of internal as well as external examinations. The evaluation (Theory) is schemed as 30 marks for internal evaluation and 70 marks for external evaluation in the form of University examination.

#### Internal Evaluation

The students' performance in the course will be evaluated on a continuous basis through the following components:

| Following components: |                                    |                        |                     |             |
|-----------------------|------------------------------------|------------------------|---------------------|-------------|
| Sl. No.               | Component                          | Number                 | Marks per incidence | Total Marks |
| 1                     | Assignments                        | 1                      | 8                   | 8           |
| 2                     | Internal Test/ Model Exam          | 1                      | 12                  | 12          |
| 3                     | Attendance and Class Participation | Minimum 80% attendance |                     | 10          |
| Total                 |                                    |                        |                     | 30          |

#### External Evaluation

The University Theory examination will be of 70 marks and will test the logic and critical thinking skills of the students by asking them theoretical as well as application based questions. The examination will avoid, as far as possible, grammatical errors and will focus on applications.

| Sl. No.      | Component      | Number | Marks per incidence | Total Marks |
|--------------|----------------|--------|---------------------|-------------|
| 1            | Practical Exam | 01     | 70                  | 70          |
| <b>Total</b> |                |        |                     | <b>70</b>   |

**VI. Learning Outcomes:** At the end of the course, learners will be able to:

- Demonstrate bandaging and immobilization of patient
- Demonstrate the skill for transferring injured person
- Demonstrate skills to clear airway & ventilate the patient
- Demonstrate skills to perform CPR

**CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY**  
**FACULTY OF MEDICAL SCIENCES**  
**ASHOK & RITA PATEL INSTITUTE OF PHYSIOTHERAPY**  
**Semester III (University Elective)**  
**PT191.01HEALTH PROMOTION&FITNESS**

**CREDIT HOURS:**

| Hrs. / Wk. |   |   | Credits |   |   | Total Marks |           | Total |
|------------|---|---|---------|---|---|-------------|-----------|-------|
| L          | P | T | L       | P | T | Theory      | Practical |       |
| -          | 2 | 2 | -       | 2 | 2 | -           | 100       | 100   |

**A. OBJECTIVES OF THE COURSE:**

This course will introduce students to the basic concept of health promotion, fitness and screening and basic assessment of fitness.

**B. OUTLINE OF THE COURSE:**

| Sr. No. | Title of the unit                                      | Minimum number of hours |
|---------|--|-------------------------|
| 1.      | BASIC CONCEPT OF HEALTH PROMOTION                      | 12                      |
| 2.      | EPIDEMIOLOGY AND HEALTH PROMOTION IN DIFFERENT SETTING | 12                      |
| 3.      | BASIC CONCEPT OF FITNESS                               | 12                      |
| 4.      | FITNESS ASSESMENT                                      | 12                      |

Total hours (Theory) : 48

Total hours (Practical): 00

Total hours:48

### C. DETAILED SYLLABUS:

|          |  |               |
|----------|--|---------------|
| <b>1</b> | <b>BASIC CONCEPT OF HEALTH PROMOTION</b>   | <b>12hrs</b>  |
| 1.1      | Meaning of health and Wellness   |               |
| 1.2      | Cultural & Social determinants of Health   |               |
| 1.3      | Physical, Environmental, Emotional & Psychological health  |               |
| 1.4      | Promotion of Healthy Lifestyles through Physical Activity, Diet, Stress Management, Avoiding Tobacco – Alcohol                                     |               |
| 1.5      | Promotion of Personal Hygiene, Treatment Seeking Behavior, Treatment Compliance and Reducing Stigma  |               |
| 1.6      | Need of health promotion in India  |               |
| <b>2</b> | <b>EPIDEMIOLOGY AND HEALTH PROMOTION IN DIFFERENT SETTING</b>  | <b>12hrs</b>  |
| 2.1      | Health Statistics: Analysis and Interpretation of Data Related to Health Promotion   |               |
| 2.2      | Use of Health Management Information System and Information Technologies in  |               |
| 2.3      | Health Promotion   |               |
| 2.4      | Health promotion in different settings - emergency and disaster<br>Different areas of health promotion in India as compared to developed countries |               |
| <b>3</b> | <b>BASIC CONCEPT OF FITNESS</b>  | <b>12 Hrs</b> |
| 3.1      | Introduction definition of term :Fitness   |               |
| 3.2      | Basic Concepts Of Fitness  |               |
| 3.3      | Mental and physical fitness  |               |
| 3.4      | Health benefits of activity and Fitness  |               |
| <b>4</b> | <b>FITNESS ASSESSMENT</b>  | <b>12Hrs</b>  |
| 4.1      | Multifactorial fitness assessment and screening : Physical activity screening :Identify risk factors,height,weight,BMI,Physically active hours     |               |
| 4.2      | Aerobic fitness,Muscular Fitness,Activity and Weight control<br>Vitality and Longevity   |               |
| 4.3      | Clinical preventive screening for infants  |               |
| 4.4      | Nutritional screening  |               |

#### **D. INSTRUCTIONAL METHOD AND PEDAGOGY:**

- ❖ Interactive class room sessions using black-board and audio-visual aids.
- ❖ Using the available technology and resources for E- learning.
- ❖ Students will be focused on self-learning, practical learning which will be guided and facilitated by the faculty.
- ❖ Students will be enabled for continuous evaluation.
- ❖ Case study, group discussions, role-plays and simulation exercises.

#### **E. STUDENT LEARNING OUTCOMES/OBJECTIVES:**

At the end of the semester the student will be able:

- ❖ To review the basics health, Promotion& Fitness
- ❖ To understand the need of Health Promotion
- ❖ To understand basic concept of fitness
- ❖ To develop necessary skill to screen and assess basics of fitness

#### **F. RECOMMENDED STUDY MATERIAL:**

##### **TEXTBOOKS:**

1. Textbook of Preventive & Social Medicine- Dr. K. Park
2. Textbook of community medicine: V. K. Mahajan
3. Chiropractic, Health,Promotion and Wellness –Meridell.Gatterman MA, DC,Med
4. Health ,Promotion and Wellness :evidence based guide to clinical preventive services—Cheryl Hawk & Will Evas
5. Fitness and Health – 6th edition – Brian J Sharkey,PhD

#### **G. REFERENCE BOOKS:**

- ❖ Principles Of Health Education And Health Promotion, (2<sup>nd</sup>edition), J. Thomas Butler, Morton Publishing Company, Englewood, Colorado
- ❖ Foundations Of Health Education, R. M. Eberst, Editor, Coyote Press, San Bernardino: 1998-99
- ❖ Evaluation in health promotion – principles and perspective- WHO Regional Publications, European Series, No. 92
- ❖ Principles and foundation of health promotion and education(5th edition) by Randall R. Cottrell, James T. Girvan, James F. McKenzie

# CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY

## CA 224 Introduction to Web Designing

### Credits and Hours:

| Teaching Scheme | Theory | Practical | Total | Credit |
|-----------------|--------|-----------|-------|--------|
| Hours/week      | -      | 2         | 2     | 2      |
| Marks           | -      | 100       | 100   |        |

**A. Objective:** The objective of the course is to provide basic understanding of designing professional web page templates with Markup Language Tags.

**Pre-requisite:** None.

**Methodology & Pedagogy:** During the sessions, topics related to design the pages of a website will be covered with suitable examples and students will be required to design and develop entire web sites using several Markup Language Tags and suitable editors.

**Learning Outcome:** Upon successful completion of the course, students will understand basic concepts of internet and web page designing and design and develop entire web sites using several web designing editors and HTML scripting language.

### B. Outline of the Course:

| Week No. | Content  |
|----------|--|
| 1        | Overview of Internet and WWW, Basic elements of the Internet, Internet services, Internet Browsers and Servers, Hardware and Software requirements to connect to the internet, Internet Service Provider (ISP), Introduction to Internet Protocols |
| 2        | Introduction to Web Page, Web Site, Web Browser, Overview of HTML, Structure of HTML Documents, HTML comments  |
| 3        | HTML Basics Tags :Paragraph Tags, Horizontal Rule Tag, Heading Tags, Block quote Tags, Address Tags, PRE Tag,  |
| 4        | Other HTML tags:- Formatting tags , Marquee tag, DIV tag, and SPAN tag   |
| 5        | HTML List & Hyperlink in HTML (text link, image link, email link and many more)  |
| 6        | HTML Images:- <img> tag and <map> tag  |
| 7-8      | HTML Table   |
| 9-10     | HTML Form  |
| 11-12    | HTML Frames  |

**Total Hours (Practical): 24**

### ❖ Core Books:

1. Harley Hahn: The Internet Complete Reference, 2 nd Edition, Tata McGraw-HILL Edition.
2. Thomas a Powell: The Complete reference HTML, 3rd Edition, McGraw Hill,2001.
3. A. Whyte: Basic HTML, 2nd Edition, Payne-Gallway, Oxford, 2003.

4. Farrar : HTML Example book, BPB,2007.

❖ **Reference Books:**

1. Ivan Bayross: Web Enabled Commercial Application Development using HTML, JavaScript, DHTML and PHP, 4<sup>th</sup> revised edition, BPB Publication.
2. Jeremy Keith : HTML5 for Web Designers, A Book Apart Jeffrey Zeldmann, 2010
3. Peter Morville & Louis Rosenfeld, Information Architecture for WWW , 3rd Edition, O'Reilly Publication, 2006.

❖ **Web References:**

1. <http://www.w3schools.com/html/>[ HTML notes ]
2. <http://www.tutorialspoint.com/html/> [HTML Materials]
3. <http://www.tutorialspoint.com/html5/>[HTML5 notes ]

# CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY

## BM231: BANKING AND INSURANCE (B & I) (Choice Based Credit System – University Elective) YEAR 2, SEMESTER 3

I. Number of Credits : 2

II. Course Objectives

The objectives of this course are:

- To equip the students with the knowledge of basic banking operation and Insurance industry.
- To recognize opportunities brought about by the dramatic changes that have occurred in the past decade in the banking and insurance industry.

III. Course Outline

| Module No. | Title/Topic   | Classroom Contact Sessions |
|------------|---|----------------------------|
| 1          | <b>Evolution of Banking</b> <ul style="list-style-type: none"><li>• <i>Brief Structure of Banks</i></li><li>• <i>Systems of Banking-Mixed, Branch, Unit, Group, Chain</i></li><li>• <i>RBI-Organization &amp; Functions</i></li><li>• <i>Methods of Credit Control &amp; Credit Creation.</i></li><li>• <i>Commercial Banking</i></li><li>• <i>Universal Banking</i></li></ul>                  | 5                          |
| 2          | <b>Bank Management</b> <ul style="list-style-type: none"><li>• <i>Sources and Uses of Funds in Banks</i></li><li>• <i>Balance sheet of a Bank</i></li><li>• <i>Value Chain Analysis in Banking Industry</i></li><li>• <i>Emerging trends in Banking</i></li><li>• <i>Credit Cards</i></li><li>• <i>E-Banking</i></li></ul>  | 5                          |
| 3          | <b>Retail Banking – An Introduction</b> <ul style="list-style-type: none"><li>• <i>Open Market Conditions and Role of Banks and Financial Institutions</i></li><li>• <i>Retail Banking – Concept and Importance.</i></li><li>• <i>Retail Banking Products- Housing Loan, Conveyance Loan, Personal Loan, Educational Loan, Loan for Retail Traders</i></li><li>• <i>Plastic Money</i></li></ul> | 5                          |
| 4          | <b>Marketing of Banking Services – Banking Products and Services</b> <ul style="list-style-type: none"><li>• <i>Distribution, Pricing and Promotion Strategy for Banking Services</i></li><li>• <i>Attracting and Retaining Bank Customers</i></li><li>• <i>Marketing Strategy of Credit Cards, Debit Cards, Saving Accounts and Different Types of Loans</i></li></ul>                         | 5                          |



| Module No. | Title/Topic  | Classroom Contact Sessions |
|------------|--|----------------------------|
| 5          | <b>Introduction to Insurance Sector</b> <ul style="list-style-type: none"> <li>• <i>Concept of Risk: Types of Risk, Risk Appraisal, Transfer and Pooling of Risks, Concept of Insurable Risk.</i></li> <li>• <i>Concept of Insurance: Relevance of Insurance</i></li> <li>• <i>Types of Insurance Organisations</i></li> <li>• <i>Intermediaries in Insurance Business</i></li> <li>• <i>Formation of Insurance Contract: Life, Fire, Marine and Motor Insurance Contracts</i></li> <li>• <i>Principles of Insurance: Utmost Good Faith, Indemnity, Insurable Interest.</i></li> </ul> | 5                          |
| 6          | <b>Practice of Life Insurance</b> <ul style="list-style-type: none"> <li>• <i>Insurance Products, a Hedge Against Personal Risk (s)</i></li> <li>• <i>Insurance Products, Alternative to Investment Products</i></li> <li>• <i>Insurance Products, Collateral Security in the Rising Hire-Purchase Market Scenario</i></li> <li>• <i>Marketing of Insurance Products- Life and Non Life Products</i></li> <li>• <i>I.T in Insurance Business: Internet Based Delivery of Insurance Products, Servicing of Policies</i></li> </ul>  | 5                          |
|            | <b>Total</b>   | <b>30</b>                  |

#### IV. Pedagogy

The course will emphasise self-learning and active classroom interaction based on students' prior preparation. The course instructor is expected to prepare a detailed session-wise schedule, showing the topics to be covered, the reading material and case material for every session. Wherever the material for any session is drawn from sources beyond the prescribed text-book, reference books, journals and magazines in the library, or from websites and other resources not accessible to the students, the course instructor should make the material available to the students well in advance, so that the students can come prepared for the classes. The pedagogical mix will be as follows:

|   |                            |     |                   |
|---|----------------------------|-----|-------------------|
| • | Classroom Contact Sessions | ... | About 24 Sessions |
| • | Assignments                | ... | About 04 Sessions |
| • | Feedback                   | ... | About 02 Sessions |

The exact division among the above components will be announced by the instructor at the beginning of the semester as a part of detailed session-wise schedule.

#### V. Internal Evaluation

The students' performance in the course will be evaluated on a continuous basis through the following components:

| Sl. No. | Component | Number | Marks per incidence | Total Marks | Percentage of total internal evaluation |
|---------|-----------|--------|---------------------|-------------|---|
| 1       | Quizzes   | 3      | 10                  | 30          | 10                                      |

|              |                               |   |    |            |            |
|--------------|-------------------------------|---|----|------------|------------|
| 2            | Presentations/Case Discussion | 2 | 30 | 60         | 20         |
| 3            | Synthesis Reports             | 2 | 60 | 120        | 40         |
| 4            | Viva-voce                     | 1 | 60 | 60         | 20         |
| 5            | Attendance and Participation  |   |    | 30         | 10         |
| <b>Total</b> |                               |   |    | <b>300</b> | <b>100</b> |

The total marks will be divided by 10 and declared as Institute-level evaluation marks for the course. The Institute-level evaluation will constitute 30% of the total marks for the course.

#### **VI. External Evaluation**

The University examination will be for 70 marks and will be based on practical and a viva-voce.

#### **VII. Learning Outcomes**

At the end of the course, the student should have learnt:

- Knowledge about various functions associated with banking.
- Practice and procedures relating to deposit and credit, documentation, monitoring and control.
- An insight into banking services and banking technology.
- Understanding about the insurance sector and its products.

#### **VIII. Reference Material**

##### ***Text-Book***

1. BhartiPathak, Indian Financial System, Pearson Education, Latest Edition
2. Gupta, P K. , Fundamentals of Insurance, Himalaya Publishing House, Latest Edition

##### ***Reference-Books***

1. Latest Publications of Insurance Regulatory Authority of India
2. Khan M A, Introduction to Insurance, Educational Publication House, Aligarh, Latest Edition

##### ***Journals / Magazines / Newspapers***

1. Journal on Banking Financial Services and Insurance Research
2. The Indian Banker

**CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY**  
**FACULTY OF APPLIED SCIENCES**  
**DEPARTMENT OF PHYSICAL SCIENCE**

**PD261 : Astrophysics, Space and Cosmos-1 (ASC-1)**

**University Elective**  
**Semester 3 Undergraduate Programme**  
**Semester 1 Postgraduate Programme**

**Prerequisite:**

Student having exposure of 10+2 level of Physics, and studying in bachelor and master program from any institute can join this course.

**Credit and Hours:**

| Teaching Scheme | Theory | Practical | Total | Credit |
|-----------------|--------|-----------|-------|--------|
| Hours/week      | -      | 2         | 2     | 2      |
| Marks           | -      | 100       | 100   |        |

**E. Objective of the Course:**

There have been frontier developments in recent months and past couple of years which involve major coming together of cosmology, physics and engineering sciences, such as the gravitational waves detected by LIGO and the fascinating images of shadows of the ultra-compact objects (e.g. black hole) at the center of our neighbouring galaxy M87. This development have spurred major interest in young students, citizens as well as scientific community as a whole and major research activities have started throughout the world & internationally in the academic centres. There is a huge interest in CHARUSAT students also. To meet up this demand & to create frontier research activity in terms of projects and proposals this course Astrophysics, Space and Cosmos has been devised. These will create important dividends in terms of frontier research emerging from CHARUSAT.

## F. Outline of the Course:

| Sr. No. | Title of the Unit             | Minimum Number of Hours |
|---------|-------------------------------|-------------------------|
| 1.      | Basic Astronomical Techniques | 10                      |
| 2.      | The Frontier of Space         | 06                      |
| 3.      | The Life and Death of Stars   | 08                      |
| 4.      | The Universe                  | 06                      |

**Total Hours (Theory): 0**

**Total Hours (Lab): 30**

**Total Hours: 30**

## C. Detailed Syllabus:

|           |  |               |
|-----------|--|---------------|
| <b>1.</b> | <b>Basic Astronomical Techniques</b>   | <b>10 Hrs</b> |
|           | Description of Telescopes, Methods of observation, electromagnetic spectral window, resolution, sensitivity, noise, signal to noise ratio, background, aberrations, Telescopes at different wavelengths, Detectors at different wavelengths, Imaging techniques, spectroscopy, calibration, Atmospheric effects at different wavelengths, Astronomical data analysis, H-R diagram, sun and solar system, Sky Gazing. | 6 (L) + 4 (P) |
| <b>2.</b> | <b>The Frontier of Space</b>   | <b>6 Hrs</b>  |
|           | Outer reaches of earth's Atmosphere, Earth's Atmospheric Layers and Orbital Mechanism: Types of Orbits Launching of Satellites, Basics of Satellite subsystems, channel and link.<br><br>Satellite Applications: Earth Observation, Scientific Study, Weather Forecast, Military Applications, GPS.  |               |
| <b>3.</b> | <b>The Life and Death of Stars</b>   | <b>8 Hrs</b>  |
|           | Stars and Galaxies, The story of collapsing stars: Star formation and evolution, Interstellar Nebula, Red Giant, Planetary Nebulae, Planetary Dynamics, White Dwarfs, Red super Giant, Supernovae- Neutron star, Black hole, naked singularity. Gravitational Lensing, Accretion disks Around Compact Objects, Binary pulsar, Gravitational Waves.   |               |
| <b>4.</b> | <b>The Universe</b>  | <b>6 Hrs</b>  |
|           | Universe in different scale: solar scale, Galactic scale, Cosmological scale, vastness of our universe, Expanding universe (Big bang, inflation), some interesting facts of our universe.  |               |

## **D. Instructional Methods and Pedagogy**

The topics will be discussed in interactive class room sessions using classical black-board teaching, ICT, hands-on-experiments and demonstration of experiments, whichever is relevant. Assignments, small projects and lab-exercise will be to the students. Student's needs to submit solution/report/results of above mentioned work, which will be eventually used for the evaluation purpose. Occasionally seminar/viva presentation will also be used as one of the evaluation tools.

## **F. Student Learning Outcomes:**

Students will get preliminary knowledge about Astrophysics, Space and Cosmology. This is a level one course, which provides basis for the second level course. After completion of this course, students can start taking small project in this or allied fields.

## **F. Recommended Study Materials**

| <b>❖ Reference Book &amp; Text Book:</b>   |
|--|
| <ol style="list-style-type: none"><li>6. The Story of Collapsing Stars: Black Holes, Naked Singularities, and the Cosmic Play of Quantum Gravity, Prof. Pankaj S. Joshi</li><li>7. An Introduction to Cosmology 3ed, J.V. Narlikar</li><li>8. An introduction to modern cosmology, Andrew R. Liddle</li><li>9. Astronomy: Astronomy for Beginners: The Magical Science of Stars, Galaxies, Planets, Black Holes, Wormholes and much, much more! (Astronomy, Astronomy Textbook, Astronomy for Beginners), Miles Clarke</li><li>10. Satellite Communication, Dennis Roddy, Mc-Graw Hill publication</li><li>11. Satellite Communication, Timothy Pratt, Charles Bostian, Jeremy Allnut, John Wiley and Sons publication</li></ol> |