SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY

Vidya Nagar, Palissery, Karukutty, Kerala 683576

# CRITERIA 1

## CURRICULAR ASPECTS

## 1.2: Academic Flexibility

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# 1.2.1/1.2.2 Number of Certificate/Value added courses offered and online courses of MOOCs, SWAYAM, NPTEL etc.

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# BROCHURE

# AND

# COURSE PLAN

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# Add on /Certificate/Value added programs and Online MOOC programs like NPTEL, Swayam

## 2022-23

| Sl. No | Name of the Add on /Certificate/Value added programs and Online MOOC programs like NPTEL, Swayam | Course code |
|---|---|---|
| 1 | Geospatial Data Processing & Analysis | CGA2223S01 |
| 2 | Microsoft Data Fundamentals | CMF2223S02 |
| 3 | Engineer Empower: Unleashing Your Professional Persona | CEP2223S03 |
| 4 | Autodesk AutoCAD | CAA2223S04 |
| 5 | Human rights and duties education | CHE2223S05 |
| 6 | New trends in artificial intelligence | CNI2223S06 |
| 7 | Air pollution and Control | NPT2223S01 |
| 8 | Retrofitting and Rehabilitation of Civil Infrastructure | NPT2223S02 |

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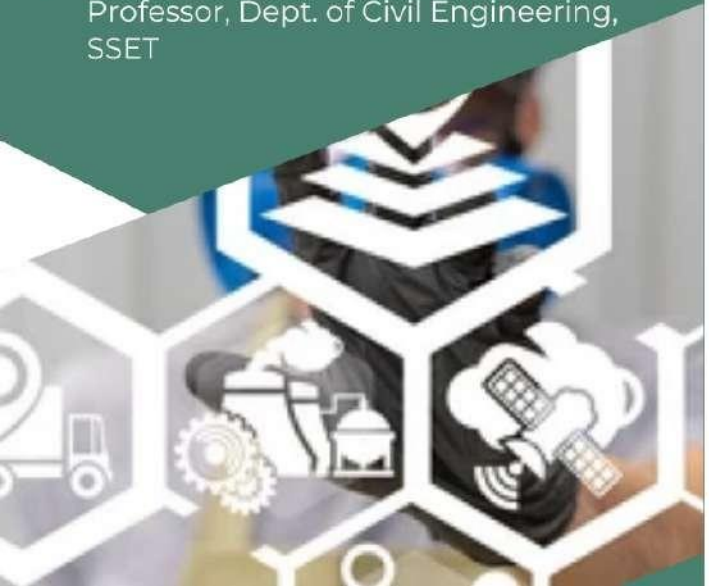
# RESOURCE PERSONS

- Dr. Sathish Kumar D, Associate Professor, Dept. of Civil Engineering, NIT Calicut
- Dr. Suresh Francis, Senior scientist, Kerala State Remote Sensing and Environment Centre (KSREC)
- Dr. Girish Gopinath, Head, Department of Climate Variability and Aquatic Ecosystems, KUFOS
- Mr. Jean Joy FRGS, GIS Consultant, Project Centre Ltd. UK
- Dr. Ratish Menon, Professor, Dept. of Civil Engineering, SSET
- Nisha L, Associate Professor, Dept. of Civil Engineering, SSET
- Dr. Praseeja A V, Assistant Professor, Dept. of Civil Engineering, SSET
- Ms. Merin Mathew, Assistant Professor, Dept. of Civil Engineering, SSET
- Ms. Meera Varghese, Assistant Professor, Dept. of Civil Engineering, SSET



SCMS
School of Engineering & Technology

## WHEN

FEB 20 – MAR 06

**15 DAYS PROGRAM**
**(6.00 – 8.00 PM DAILY)**
**ONLINE MODE**
**30 HOUR ADD ON COURSE**

## WHO CAN JOIN

**Research Scholars,**
**Faculty members,**
**B. Tech and M. Tech**
**Students**


Co-ordinators:
Dr. Praseeja A V
praseeja@scmsgroup.org
+91 85920 89108
Mr. Stifin Benny
stifinbenny@scmsgroup.org
+91 94972 83418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DEPT. OF CIVIL ENGINEERING,
SCMS SCHOOL OF ENGINEERING
AND TECHNOLOGY, KARUKUTTY
Presents


# GEOSPATIAL DATA PROCESSING AND ANALYSIS

30 HOUR ADD ON COURSE

FEB 20- MARCH 6 2023

## SESSION PLAN: 6PM-8PM

1. 20/02/23 Introduction to GIS, Coordinate system, Geometric Transformation, Data models
2. 21/02/23 Hands on : Introducing QGIS and Georeferencing
3. 22/02/23 Hands on : Digitizing and creation of shapefiles
4. 23/02/23 Hands on : Importing data into QGIS
5. 24/02/23 Hands on: Raster data analysis
6. 25/02/23 Hands on: Vector data analysis
7. 25/02/23 Hands on: Development of DEM
8. 27/02/23 Application of GIS in Environmental Engineering
9. 28/02/23 Introduction to Remote sensing
10. 01/03/23 Digital image processing
11. 02/03/23 Hands on : Digital image processing
12. 03/03/23 Geospatial technology in water resources management
13. 04/03/23 Hands on: Multicriteria Overlay analysis
14. 04/03/23 Hands on: Importing GIS data for water treatment/Drought mapping
15. 06/03/23 Role of granular spatial information in water management

## ABOUT SSET

The SCMS School of Engineering & Technology (SSET), promoted by the SCMS Group of Educational Institutions, has been in the forefront of providing quality professional education in Engineering & Technology since 2001. The college is envisaged as a premier institution offering technology-related education to students with due emphasis on ethical values in preparing them to meet the growing challenges of the industry and needs of the society. SSET has established state of the art facilities on a sprawling 29-acre campus at Karukutty in Ernakulam District. SSET is one of the first ten colleges to be set up in the State under the private self-financing scheme.

The Department of Civil Engineering, spearheaded with highly competent, well qualified and experienced faculty, has been in existence since the inception of SSET in 2001. The Department offers UG programmes in Civil Engineering and Civil and Environment Engineering also two PG programmes namely Computer Aided Structural Engineering and Environmental Engineering under KTU. The Department is an approved research centre of KTU with seven full fledged laboratories supplemented with modern equipment. The MIKE Computational Laboratory with advanced modeling tools for water resources studies as an industry academic collaboration with Danish Hydraulic Institute is a unique facility provided by the department. The Department is actively engaged in testing and consultancy activities for various governmental as well as non-governmental organizations.

## THE COURSE HIGHLIGHTS

1. Basics of Geographic Information System
2. Hands on training with QGIS software which covers:
   a. Georeferencing and Digitizing
   b. Data Importing
   c. Creation of shapefile
   d. Vector and Raster Data analysis
   e. Creating Digital Elevation Models
   f. Digital Image Processing
   g. Multicriteria Overlay analysis
3. Application of Geospatial technology in environmental engineering, water resource management, drought vulnerability assessment, public water distribution and land surveying.

# GEOSPATIAL DATA PROCESSING & ANALYSIS

Course duration: 30 hours

Course Coordinator: Dr. Praseeja A V, CED, SSET

## Course Description

**The 30 hour add on course on** GEOSPATIAL DATA PROCESSING & ANALYSIS intends to provide an Introduction to GIS, Coordinate system, Geometric Transformation, Data models and hands on training on application of QGIS software in Environmental engineering, water resource management, drought vulnerability assessment, public water distribution and land surveying.

## Course Objectives

At the end of this course, you will be able to create awareness about the

- Basic of GIS
- Fundamentals and application of QGIS Software
- Application of Geospatial Technology in Environmental engineering, water resource management, drought vulnerability assessment, public water distribution and land surveying.

## Course Outcomes

After completing the course, students will be able to:

- Understand the basics of Geospatial Information system
- Understand the Fundamentals and application of QGIS Software
- Apply Geospatial Technology in Environmental engineering, water resource management

# Syllabus

| Session | Date | Topic | Resource person |
|---|---|---|---|
| 1 | 20/02/23 | Introduction to GIS, Coordinate system, Geometric Transformation, Data models | Dr. Ratish Menon, Associate Professor Dept. of CE, SSET |
| 2 | 21/02/23 | Hands on : Introducing QGIS and Georeferencing | Ms. Meera Varghese, Assistant Professor Dept. of CE, SSET |
| 3 | 22/02/23 | Hands on : Digitizing and creation of shapefiles | Dr. Praseeja A V, Assistant Professor Dept. of CE, SSET |
| 4 | 23/02/23 | Hands on : Importing various data into QGIS | Ms. Merin Mathew, Assistant Professor Dept. of CE, SSET |
| 5 | 24/02/23 | Hands on: Raster data analysis | Dr. Ratish Menon, Associate Professor Dept. of CE, SSET |
| 6 | 25/02/23 | Hands on: Vector data analysis | Dr. Praseeja A V, Assistant Professor Dept. of CE, SSET |
| 7 | 25/02/23 | Hands on: Development of DEM | Ms. Merin Mathew, Assistant Professor Dept. of CE, SSET |
| 8 | 27/02/23 | Application of GIS in Environmental Engineering | Dr. Nisha L, Associate Professor Dept. of CE, SSET |
| 9 | 28/02/23 | Introduction to Remote sensing | Ms. Meera Varghese, Assistant Professor Dept. of CE, SSET |
| 10 | 01/03/23 | Digital image processing | Dr. Sathish Kumar D, Associate Professor, Dept. of CE, NITC |

| | | | |
|---|---|---|---|
| 11 | 02/03/23 | Hands on : Digital image processing | Dr. Sathish Kumar D, Associate Professor, Dept. of CE, NITC |
| 12 | 03/03/23 | Geospatial technology in water resources management | Dr. Girish Gopinath, Associate Professor, KUFOS |
| 13 | 04/03/23 | Hands on: Multicriteria Overlay analysis | Mr. Jean Joy, GIS Consultant, UK |
| 14 | 04/03/23 | Hands on: Importing GIS data for water treatment/Drought mapping | Ms. Devika & Ms. Ann Maria PG student, Dept. of CE, SSET |
| 15 | 06/03/23 | Role of granular spatial information in water management | Dr. Suresh Francis, Senior scientist, KSREC |

**Benefits:**

At the end of this course, you will be able to create awareness about the

- Basic of GIS
- Fundamentals and application of QGIS Software
- Application of Geospatial Technology in Environmental engineering, water resource management, drought vulnerability assessment, public water distribution and land surveying.

## Purpose of the course

The gap in syllabus for the subject CET 307 Hydrology and Water Resource Engineering on topics Application of GIS in plotting hydropgraphs, mass flow curves and reservoir planning was identified. An add on course titled GEOSPATIAL DATA PROCESSING & ANALYSIS for a duration of 30 hours is planned to overcome the gap in syllabus.

**Assessment Pattern**

Two assignments of 15 marks each

Final Assessment exam -50 marks, passed with a minimum of 20 marks

Viva-20 marks

Certificates will be awarded to students who completed the course with a minimum of 40 marks(total score) and a minimum of 20 marks in final exam.

Coordinator

HOD

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**ADD ON COURSE**

**ON**

# MICROSOFT DATA FUNDAMENTALS

CONDUCTED BY

## Department of Computer Science and Engineering

17/4/2023-21/4/2023

Forenoon session:9am to 12pm(3hrs)
Afternoon session:1pm to 4pm(3hrs)
Total:30 hrs(6 hrs per day)

# MICROSOFT DATA FUNDAMENTALS

Course duration: 30 hours

Course Coordinator: Ms.RoseBell

## Course Description

A Course on DATA FUNDAMENTALS was organized by Department of Computer Science and Engineering.

## Course Objectives

- To obtain programming skill development.
- To get introduced to concept of data base in Azure Microsoft enviornment
- To attain the knowledge of various applications of RDBMS in industry.

## Course Outcomes

After completing the course, students will be able to:

- To solve the given problems using SQL language
- Design cloud based DBMS.
- They got familiarized with various applications in real life and industry.

**Assessment Pattern**

Two assignments of 15 marks each

Final Assessment exam -50 marks, passed with a minimum of 20 marks
Viva-20 marks

Certificates will be awarded to students who completed the course with a minimum of 40 marks (total score) and a minimum of 20 marks in final exam. Minimum 75% attendance is mandatory to get the certificate.

## Syllabus

**MODULE 1: 6 Hours**

- Introduction of Data fundamentals
- Structuted,Unstructured and Semi Structuted data
- Delimited text files
- JavaScript Object Notation (JSON)
- Extensible Markup Language (XML)
- Relational databases

**MODULE 2: 6 Hours**

- Transactional data workloads
- Microsoft cloud services for data
- Azure Database for open-source relational databases
- Azure Cosmos DB

**MODULE 3: 6 Hours**

- Azure Stream Analytic Introduction to classes & objects
- Relational tables
- Normalization
- SQL,DML,DDL,DCL

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**MODULE 4: 6 Hours**

- SQL Server on Azure Virtual Machines
- Azure SQL Database Managed Instance
- Azure SQL Database Managed Instance
- Azure databases for open-source

**MODULE 5: 6 Hours**

- Benefits of Azure Database for MySQ
- Azure Database for MariaDB
- Azure Database for MariaDB
- Azure Database for PostgreSQL Flexible Server

Coordinator HOD PRINCIPAL

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**VIDYA NAGAR, KARUKUTTY, KERALA - 683576**

# VALUE ADDED COURSE

**ON**

# Engineer Empower: Unleashing Your Professional Persona

CONDUCTED BY

## BASIC SCIENCES AND HUMANITIES DEPARTMENT AND PLACEMENT CELL SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY

Forenoon session: 9:00 am-12:00pm (3 hours)

Afternoon session: 1:00 pm - 4:00 pm (3 hours)

Total: 30 hours (6 hours per day)

Course Dates: 20-6-2022, 21-6-2022, 27-6-2022, 28-6-2022, 4-7-2022

**Assessment Pattern**

Two assignments of 15 marks each

Final Assessment exam -50 marks, passed with a minimum of 20 marks
Viva-20 marks

Certificates will be awarded to students who completed the course with a minimum of 40 marks (total score) and a minimum of 20 marks in final exam. Minimum 75% attendance is mandatory to get the certificate.

**Engineer Empower: Unleashing Your Professional Persona**

## Course Objectives

- To train the students to meet the expectations of the industry.
- To build confidence in students and develop right attitude in them.
- To enhance their communication skills.

## Course Outcomes

After completing the course, students will be able to

- Develop strong communication skills.
- Develop confidence in facing different situations in job place.
- Understand the requirements of the industry.

## Syllabus

**Module 1 – 6 hours**
Goal setting and Time management-Communication skills

**Module 2 – 6 hours**
Project management essentials-Effective team work

**Module 3 – 6 hours**
Building professional network-Leveraging Linkedin

**Module 4 – 6 hours**
Continuous learning-Social development of yourself

**Module 5 – 6 hours**
Leadership skills-Business planning and funding options

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Course coordinator HOD Principal

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**ADD ON COURSE**

**ON**

# Autodesk-AutoCAD

CONDUCTED BY

## DEPARTMENT OF ELECTRICAL ENGINEERING

Forenoon session: 9:00 am-12:00pm (3 hours)

Afternoon session: 1:00 pm - 4:00 pm (3 hours)

Total: 30 hours (6 hours per day)

Course Dates:

16/02/2023,01/03/2023, 10/03/2023,13/03/2023,31/03/2023

Course duration: 30 hours

Course Coordinator: Jayalakshmi.S

## Course Description

At the end of this course, students will be able to enrich their technical knowledge in the field of CAD and its applications

## Course Objectives

- Learn Auto CAD
- Learn system design using AutoCAD

## Course Outcomes

After completing the course, students will be able to:

- Enrich their technical knowledge in the field of CAD and its applications
- Develop electrical system design

**Assessment Pattern**

Two assignments of 15 marks each

Final Assessment exam -50 marks, passed with a minimum of 20 marks
Viva-20 marks

Certificates will be awarded to students who completed the course with a minimum of 40 marks (total score) and a minimum of 20 marks in final exam. Minimum 75% attendance is mandatory to get the certificate.

## Syllabus

### Module 1

Screen layout, pull-down menus, screen icons, command line and dialogue boxes, status bar, toggles, file management

**Module 2**

Arc and ellipse, Rectangle Copy, offset,Move,trim, extend, scale,Status bar color,

Line type,Line Weight, Ltscale, Layer Property Manager

**Module 3**

Inquiry Commands, Dimension Up to Angular

Match Property, Qselect,Select Similar, Polyline edit, Block- Create,lnsert,Block Edit,copy

**Module 4**

Align, purge, Create view port & View port scale

Page Set up manager, Printing and plotting, Convert AutoCAD to pdf

**Module 5**

Electrical system drafting using AutoCad

Course Coordinator

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SCMS School of Engineering & Technology

**Department of Basic Science and Humanities**
**SCMS School of Engineering and Technology**

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# Value Added Course on
# HUMAN RIGHTS AND DUTIES EDUCATION

Scan QR to Register


EXTERNAL COURSE INSTRUCTOR

Mr. Jose James
Assistant Professor& HoD
Dept. of Political Science
SH College, Chalakudy.


Instructor Bio

Jose James graduated in B A Political Science from S N College Cherthala (M G University) and post graduation from University College, Trivandrum (Kerala University). Then he qualified UGC NET in Political science and awarded JRF in Dec. 2014.

## COURSE HIGHLIGHTS

**Internal Course Instructors:**


1. Mr. Akhil Baby
   Assistant Professor
   Dept. of BS&H
   SSET, Karukutty.
   Mobile : 9747799319

2. Ms. Rony Tresa Davis
   Assistant Professor
   Dept. of BS&H
   SSET, Karukutty.
   Mobile: 9656992815


**Mode of Delivery :** Online

**Number of Hours :** 30 Hours

**Target Audience :**
UG & PG students, SSET
**(Limited Seats available)**

**Course Start Date**: 19-03-23

**Online Class Schedule:**
2nd Saturdays and Sundays
04:00 pm to 06:00 pm (2 hours)
**Course Fees**: Rs.500/-

*(Amount will be refunded to students who successfully complete the course)*

***Successful completion will be counted towards KTU Activity point***

**Brief Introduction on the course**

"All human beings are born free and equal in dignity and rights. They are endowed with reason and conscience and should act towards one another in a spirit of brotherhood". Article 1 of the United Nations Universal Declaration of Human Rights (UDHR). Human rights are commonly understood as "inalienable fundamental rights to which a person is inherently entitled simply because she or he is a human being." Human rights are thus conceived as universal (applicable everywhere) and egalitarian (the same for everyone).

The primary objective of this value-added course **"Human Rights and Duties Education"** is to create an awareness among students on the fundamentals of human rights. The course is designed to provide fundamental knowledge about human rights, their framework, problems with implementation, solutions to those problems, the rights from a national and international perspective, and various categories of human rights.

**Course Outcomes:**

1. To understand the meaning of Human Rights and their evolution.
2. To understand norms and regulations of Human Rights.
3. To explain the Constitution of India and its features.
4. To show national issues related to the violation of human rights.

| | | |
|---|---|---|
| Week –1 | Inter-civilization approach to Human Rights | 2Hrs |
| Week –2 | Theoretical and developmental perspective | 2Hrs |
| Week –3 | Human Rights Movements and Universal Declaration of Human Rights | 2Hrs |
| Week –4 | Civil & Political Rights | 2Hrs |
| Week –5 | Economic, Social & Cultural Rights | 2Hrs |
| Week –6 | Rights against torture, discrimination & forced labor, Rights of the child | 2Hrs |
| Week –7 | Classification of Rights | 2Hrs |
| Week –8 | Classification of Rights (cont.) | 2Hrs |
| Week –9 | Human Rights norms in India and Implementation of Human Rights norms at the regional level | 4Hrs |
| Week –10 | Human Rights of Vulnerable Groups | 2Hrs |
| Week –11 | Implementation of human rights in India : NHRC | 2Hrs |
| Week –12 | Implementation of human rights in India : SHRC | 2Hrs |
| Week –13 | Implementation of human rights in India : Role of Courts and NGOs | 4Hrs |

**Criteria for successful completion of the course**

Student should have an attendance of 75% and submitted 80% of the assignments on time.

**Assessment**

After successful completion of the course, an assessment for 1hr out of a total of 25 marks will be conducted and based on the result the student will be awarded with a certificate.

**Certificate will be awarded to students securing 40% & above in the final score**

# Value Added Course
# in
# "Human Rights and Duties Education"

"All human beings are born free and equal in dignity and rights. They are endowed with reason and conscience and should act towards one another in a spirit of brotherhood". — Article 1 of the United Nations Universal Declaration of Human Rights (UDHR). Human rights are commonly understood as "inalienable fundamental rights to which a person is inherently entitled simply because she or he is a human being." Human rights are thus conceived as universal (applicable everywhere) and egalitarian (the same for everyone).

The Department of Basic Science and Humanities, planning to conduct a Value added course in **"Human Rights and Duties Education"**.

**Course Objective:**

The primary objective of this value-added course on **"Human Rights and Duties Education"** is to create an awareness among students on the fundamentals of human rights. The course is designed to provide fundamental knowledge about human rights, their framework, problems with implementation, solutions to those problems, the rights from a national and international perspective, and various categories of human rights.

**Course Timings:**

| Course | **Human Rights and Duties Education** |
|---|---|
| Duration | 30 hours |
| Mode | Online |
| Days | 2nd Saturday and on all Sundays |
| Time | 04:00 pm to 06:00 pm |
| Registration Fee | Rs. 500/- |
| Commencement of classes | 19/02/2023 |

**Course Tutors:**

| | | |
|---|---|---|
| **Mr. Arun Raveendran**<br>Assistant Professor<br>Department of Political Science<br>St. Stephen's College Uzhavoor | **Mr. Akhil Baby**<br>Assistant Professor<br>Department of Basic Science and Humanities<br>SSET | **Ms. Rony Tresa**<br>Assistant Professor<br>Department of Basic Science and Humanities<br>SSET |

## Course Outcome:

| | |
|---|---|
| CO 1 | To understand the meaning of Human Rights and their evolution. |
| CO 2 | To understand norms and regulations of Human Rights. |
| CO 3 | To explain the Constitution of India and its features. |
| CO 4 | To show national issues related to the violation of human rights. |

# COURSE SYLLABUS (30 Hours)

**Module – I: Evolution & Growth of Human Rights (6 hrs.)**

a. Inter-civilization approach to Human Rights.

b. Theoretical Perspective

c. Developmental Prospective

d. Human Rights Movements

**Module 2- Human Rights Norms (6hrs.)**

a. Universal Declaration of Human Rights

b. Civil & Political Rights

c. Economic, Social & Cultural Rights

d. Rights against torture, discrimination & forced labour.

e. Rights of the child.

**Module 3- Classification of Human Rights (8 hrs.)**

a. Classification of Rights

(i). I generation rights

(ii). II generation rights

(iii). III generation rights

b. Human Rights norms in India

(i). Preamble of Indian Constitution

(ii). Fundamental rights and directive principles

(iii). Protection of Human Right Act Paper

**Module 4- Special Issues relating to Violation of Human Rights and Redressal Mechanism (10hrs.)**

a. Implementation of Human Rights norms at the regional level

(i) European Convention

(ii) American Convention

(iii) African Convention.

b. Human Rights of Vulnerable Groups

(i) Women

(ii) Child

(iii) Migrant Workers

(iv) Refugees

(v) Stateless persons

(vi) Disabled Persons

(vii) Indigenous Persons

(viii) Older Persons

(ix) Minorities


c. Implementation of human rights in India

(i) NHRC (ii) SHRC (iii) Role of Courts (iv) Role of NGOs.

**Assessment**

Two assignments of 15 marks each

Final Assessment exam -50 marks, passed with a minimum of 20 marks

Viva-20 marks

Certificates will be awarded to students who completed the course with a minimum of 40 marks (total score) and a minimum of 20 marks in final exam. Minimum 75% attendance is mandatory to get the certificate.

Coordinator

HOD

Principal

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**ADD ON COURSE**

**ON**

# NEW TRENDS IN ARTIFICIAL INTELLIGENCE

CONDUCTED BY

## Department of Computer Science and Engineering

21/11/2022-25/11/2022

Forenoon session:9am to 12pm(3hrs)
Afternoon session:1pm to 4pm(3hrs)
Total:30hrs(6hrs per day)

# NEW TRENDS IN ARTIFICIAL INTELLIGENCE

Course duration: 30 hours

Course Coordinator: Ms.RoseBell

## Course Description

A Course on New trends in artificial intelligencewas organized by Department of Computer Science and Engineering.

## Course Objectives

- To obtain programming skill development.
- To get introduced to various trends in Artificial intelligence
- To attain the knowledge of various applications of AI in industry.

## Course Outcomes

After completing the course, students will be able to:

- To solve the given problems using AI
  They will get amiliarized with various applications in real life and industry.

**Assessment Pattern**

Two assignments of 15 marks each

Final Assessment exam -50 marks, passed with a minimum of 20 marks
Viva-20 marks

Certificates will be awarded to students who completed the course with a minimum of 40 marks (total score) and a minimum of 20 marks in final exam. Minimum 75% attendance is mandatory to get the certificate.

## Syllabus

**MODULE 1: 6 Hours**

- Introduction to neural networks and deep learning

**MODULE 2: 6 Hours**

Convolution neural networks, object detection and segmentation

**MODULE 3: 6 Hours**

- Recurrent neutral networks, sequential model

**MODULE 4: 6 Hours**

- Statistical decision making

**MODULE 5: 6 Hours**

- Future of AI in industry

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ERNAKULAM, KERALA-683 576

Coordinator

HOD

PRINCIPAL

# NPTEL SWAYAM course on Air Pollution and Control

**Prof. Bhola Ram Gurjar**
**IIT Roorkee**

**About the Course:**

The objective of the course is to impart the knowledge and understanding of causes and effects of air pollution and their controlling mechanisms. The course will provide a deeper understanding of air pollutants, pollution inventory and modelling. The course also imparts knowledge on the impacts of air pollution on different aspects such as policy, human health and various contemporary technological innovation for betterment of air quality.

**About the Instructor:** Dr. Bhola Ram Gurjar holds a PhD in the area of Environmental Risk Analysis from India's premier technological institution I.I.T. Delhi followed by Postdoctoral research at the Max Planck Institute for Chemistry (MPIC) in Mainz, Germany. He is a Professor of Environmental Engineering in Civil Engineering Department and a Joint Faculty in Centre of Excellence for Sustainable Transportation Systems (CTRANS) at I.I.T. Roorkee.

**Intended Audience** : UG and PG (including Pre-PhD)

**Industry Support**: Industries dealing with emissions and air pollution control may value this course.

**Duration:** 36 hours

## Course layout

**Week 1** : Air Pollution: Introduction and Impacts of air pollution on human health, vegetation, animals, building materials, structures, and atmosphere, soil and water bodies.
**Week 2 :** Sources, classification and formation/transformation of air pollutants: Meteorology and Atmospheric Stability.
**Week 3** : Lapse Rate, Plume Behaviour, and Air Quality Monitoring, Air Quality Index (AQI)
**Week 4** : Air Quality Modelling, Gaussian dispersion models: point, line and area source models
**Week 5** : Emissions Inventory: Transport, Industrial, Agricultural, Residential and Commercial sectors

**Week 6** : Application of Remote sensing/Satellite based data in emission inventory, Source apportionment using receptor modelling.
**Week 7** : Indoor air pollution: sources, types and health impacts. Sampling, assessment and evaluation of Indoor air quality.
**Week 8 :** Global and regional environmental issues of air pollution: Ozone depletion, Climate change, Global warming, Acid rain.
**Week 9** : Air pollution control devices, equipment and their design.
**Week 10** : Air pollution emission standards, National and international policies, acts, rules and regulations.
**Week 11** : Emerging technologies and strategies to mitigate air pollution, Current challenges and way forward.
**Week 12** : Lab-based measurements of air pollutants.

**Assessment Pattern for certificate courses**

A learner will pass and be certified only if Average assignment score (out of 100) >= 40 AND Final exam score (out of 100) >= 40.


# RETROFITTING AND REHABILITATION OF CIVIL INFRASTRUCTURE

**PROF. Sriman Kumar Bhattacharyya**
Department of Civil Engineering
IIT Kharagpur
**PROF. Swati Maitra**
Department of Civil Engineering
IIT Kharagpur

**INTENDED AUDIENCE :** M.E/M.Tech/PhD students from Civil, Architecture, Construction Engineering background or equivalent specialization and BE/B.Tech students from similar background can take this course as elective

**INDUSTRIES APPLICABLE TO :** All civil engineering design and consultancy firms, construction companies, material manufacturers related to concrete technology will recognize this course for its practical applications

**COURSE OUTLINE :**

The major objective of this course is to give an in-depth understanding of the various methods of repair, retrofitting and rehabilitation techniques for masonry and concrete structures. The causes and types of deterioration, the evaluation of the existing condition of infrastructure, the materials for repair and retrofitting, the maintenance and strengthening techniques is covered in detail in this course. Seismic retrofitting and design of retrofitted structural components using recent techniques and materials have been included in the course. The course covers the challenging issues for efficient retrofitting and rehabilitation in order to extend the durability of existing structure in a sustainable manner.

**ABOUT INSTRUCTOR :**

Prof. Swati Maitra is an Assistant Professor in Ranbir & Chitra Gupta School of Infrastructure Design and Management, IIT Kharagpur. She obtained her PhD from IIT Kharagpur and Masters' from IIT Bombay in Civil Engineering. She is a recipient of awards like DAAD Fellowship by the German Academic Exchange Service and Bihar PWD Medal by the Indian Roads Congress. Dr. Maitra's research area includes sustainable concrete and cementitious materials, retrofitting and rehabilitation, concrete pavement analysis, design and performance evaluation, concrete overlay or whitetopping. She has published nearly 35 technical papers in international and national journals, book chapters and proceedings of conferences, seminars and workshops. Prof. Sriman Kumar Bhattacharyya is a Professor in Civil Engineering Department and presently the Deputy Director of IIT Kharagpur. He was a Former Director of CSIR-Central Building Research Institute (CBRI). Prof. Bhattacharyya's research area includes sustainable building materials, fluid-structure interaction, structural health monitoring, FRP-concrete composite system, structural restoration, numerical modelling and structural fire engineering. He has published about 250 technical papers in several international and national journals, book chapters, proceedings of international and national conferences, seminars and workshops. He has developed web-based and video-based NPTEL courses titled 'Finite element method in Engineering' and 'Strength of Materials', which are currently running. He has several patents based on his research. Prof. Bhattacharyya has received several prestigious awards like 'Distinguished Alumnus Award' by IIEST (BESU Shibpur), 'Concrete Technologist of the year' by Indian Concrete Institute, 'Telkom Best Lecturer Award' for the best teacher in Civil Engineering at the University of Durban-Westville, South Africa and many others. Dr. Swati Maitra and Prof. S. K. Bhattacharyya jointly teach the course Retrofitting and Rehabilitation of Infrastructure (ID60016) in IIT Kharagpur for the last 4 years.

Prof. Sriman Kumar Bhattacharyya is a Professor in Civil Engineering Department and presently the Deputy Director of IIT Kharagpur. He was a Former Director of CSIR-Central Building Research Institute (CBRI). Prof. Bhattacharyya's research area includes sustainable building materials, fluid-structure interaction, structural health monitoring, FRP-concrete composite system, structural restoration, numerical modelling and structural fire engineering. He has published about 250 technical papers in several international and national journals, book chapters, proceedings of international and national conferences, seminars and workshops. He has developed web-based and video-based NPTEL courses titled 'Finite element method in Engineering' and 'Strength of Materials', which are currently running. He has several patents based on his research. Prof. Bhattacharyya has received several prestigious awards like 'Distinguished Alumnus Award' by IIEST (BESU Shibpur), 'Concrete Technologist of the year' by Indian Concrete Institute, 'Telkom Best Lecturer Award' for the best teacher in Civil Engineering at the University of Durban-Westville, South Africa and many others. Prof. S. K. Bhattacharyya teach the course Retrofitting and Rehabilitation of Infrastructure (ID60016) in IIT Kharagpur for the last 4 years.

**COURSE PLAN :**

**Week 1:** Overview of Retrofitting and Rehabilitation of Civil Infrastructure

**Week 2:** Condition Evaluation and Testing

**Week 3:** General Repair and Strengthening of Concrete Structures

**Week 4:** Fiber Reinforced Polymer Composites (FRPC) and its Characteristics

**Week 5:** Retrofitting by FRP Composites

**Week 6:** Retrofitting by FRP Composites (continued…)

**Week 7:** Retrofitting by FRP Composites (continued…)

**Week 8:** Concrete Overlay for Pavement Rehabilitation

**Week 9:** Retrofitting of Masonry Structures

**Week 10:** Retrofitting of Building structures damaged due to seismic event

**Week 11:** Retrofitting of Special structures damaged due to seismic events

**Week 12:** Retrofitting of Steel Structures

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