EMERGING TECHNOLOGY COURSES (ETC)

GREEN BUILDINGS

Course Code: ETC141/241 **Credits: 3:0:0**

Pre-requisites: Nil **Contact Hours: 42L**

Course Coordinator: Dr. Anil Kumar R

Course Content

Unit I

Introduction to the concept of cost-effective construction - Uses of different types of materials and their availability -Stone and Laterite blocks- Burned Bricks- Concrete Blocks- Stabilized Mud Blocks- Lime Pozzolana Cement- Gypsum Board- Light Weight Beams- Fiber Reinforced Cement Components- Fiber Reinforced Polymer Composite- Bamboo- Availability of different materials

- Pedagogy / Course delivery tools: Chalk and talk, Powerpoint Presentation
- Links:https://recyclecoach.com/blog/how-to-reuse-and-recycle-construction-materials/ https://theconstructor.org/building/quarrying-of-stones-construction-works/17284/

Self Study: Recycling of building materials – Brick- Concrete- Steel- Plastics - Environmental issues related to Quarrying of building materials

Unit II

Environment friendly and cost-effective Building Technologies - Different substitute for wall construction Flemish Bond - Rat Trap Bond – Arches – Panels - Cavity Wall - Ferro Cement and Ferro Concrete constructions – different pre cast members using these materials - Wall and Roof Panels – Beams – columns - Door and Window frames - - Filler Slab - Composite Beam and Panel Roof -Pre-engineered and ready to use building elements - wood products - steel and plastic. Contributions of agencies- Costford- Nirmithi Kendra- Habitat

- Pedagogy / Course delivery tools: Chalk and talk, Powerpoint Presentation
- Link for Septic tanks: https://www.dtox.org/blog/what-is-a-septic-tank-and-how-does-it-work

Unit III

Global Warming – Definition - Causes and Effects - Contribution of Buildings towards Global Warming -– Definition - Features- Necessity – Environmental benefit - Economical benefits - Health and Social benefits - Major Energy efficient areas for buildings – Embodied Energy in Materials. Green Materials - Comparison of Initial cost of Green V/s Conventional Building - Life cycle cost of Buildings.

- Pedagogy / Course delivery tools: Chalk and talk, Powerpoint Presentation
- Link for Global warming: https://www.nrdc.org/stories/global-warming-101
- Link for Carbon footprint: https://www.nature.org/en-us/get-involved/how-to-help/carbon-footprint-calculator/

Self Study: Carbon Footprint – Global Efforts to reduce carbon Emissions Green Buildings.

Unit IV

Green Building rating Systems - BREEAM – LEED - GREEN STAR -GRIHA (Green Rating for Integrated Habitat Assessment) for new buildings – Purpose - Key highlights - Point System with Differential weightage. Green Design – Definition - Principles of sustainable development in Building Design – Sustainably managed materials- Integrated Lifecycle design of Materials and Structures (concepts only)

- Pedagogy / Course delivery tools: Chalk and talk, Powerpoint Presentation
- Link for Rating systems: https://www.cedengineering.com/userfiles/Leed%20Rating%20System.pdf
- Link for sustainable buildings: https://www.mapleridge.ca/1780/Sustainable-Building-Features

Self Study: Characteristics of Sustainable Buildings

Unit V

Utility of Solar Energy in Buildings

Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings. Case studies of Solar Passive Cooled and Heated Buildings.

Green Composites for Buildings

Concepts of Green Composites. Water Utilisation in Buildings, Low Energy Approaches to Water Management. Management of Solid Wastes. Management of Sullage Water and Sewage.

- Pedagogy / Course delivery tools: Chalk and talk, Powerpoint Presentation
- Link for low energy cooling: https://www.atamate.com/atamate-blog/passive-cooling-for-low-energy-buildings
  https://www.gdrc.org/uem/green-const/index.html

Self Study: Low Energy Cooling, Urban Environment and Green Buildings. Green & Built environment

Text Books:

1. HarharaIyer G, Green Building Fundamentals, Notion Press
2. Dr. Adv. HarshulSavla, Green Building: Principles & Practices
3. Kibert, Charles J. Sustainable construction: green building design and delivery, Wiley, 2008. 2nd Edition.
4. TERI “Sustainable Building Design Manual- Volume I & II” Tata Energy Research Institute.

Reference Books:

1. Prof. Dr. Michael Bauer, Peter Mösle and Dr. Michael Schwarz (2010) “Green Building –Guide book for Sustainable Architecture” Springer.
2. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison (2001) “Green Building Handbook” Volume1-Spon Press.
3. Mili Majumdar,(2002) “Energy-efficient buildings in India” Tata Energy Research Institute.

Web links & Video Lectures

- https://www.youtube.com/watch?v=THgQF8zHBW8
- https://www.youtube.com/watch?v=DRO_rIkywxQ

Course Outcomes (COs):

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

1. Select different building materials for construction
2. Apply effective environmental friendly building technology
3. Analyze global warming due to different materials in construction
4. Analyse buildings for green rating
5. Use alternate source of energy and effective use water

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks		
Assessment Tool	**Marks**	**Course outcomes attained**
Internal Assessment-I	30	CO1, CO2, CO3
Internal Assessment-II	30	CO3, CO4, CO5
Average of the two internal tests will be taken for 30marks		
Other Components		
Assignment	10	CO1, CO2
Assignment	10	CO3, CO4, CO5
Semester End Examination (SEE)	100	CO1, CO2, CO3, CO4, CO5

OPERATION AND MAINTENANCE OF SOLAR ELECTRIC SYSTEMS

Course Code: ETC142/242 **Credits: 3:0:0**

Pre-requisites: Nil **Contact Hours: 42L**

Course Coordinator: Dr. Hemachandra Gudimindla

Course Content

Unit I

Solar Resource and Radiation: Solar resources, Quantifying solar radiation, The effect of the Earth's atmosphere on solar radiation, Sun geometry, Geometry for installing solar arrays.

PV Industry and Technology: Semiconductor devices, Mainstream technologies, Monocrystalline silicon, M multi-crystalline/polycrystalline silicon, Thin film solar cells, Contacts, Buying solar modules, Standards, Certifications, Warranties, Emerging technologies, Dye-sensitized solar cells, Sliver cells, Heterojunction with an intrinsic thin layer (HIT) photovoltaic cells, III-V Semiconductors, Solar concentrators.

PV Cells, Modules and Arrays: Characteristics of PV cells, Graphic representations of PV cell performance, Connecting PV cells to create a module, Specification sheets, Creating a string of modules, Creating an array, Photovoltaic array performance, Irradiance, Temperature, Shading.

Unit II

Inverters and Other System Components: Introduction, Inverters, Battery inverters, Grid interactive inverters, Transformers, Mainstream inverter technologies, String inverters, Multi-string inverters, Central inverter, Modular inverters, Inverter protection systems, Self-protection, Grid protection, Balance of system equipment: System equipment excluding the PV array and inverter, Cabling, PV combiner box, Module junction box, Circuit breakers and fuses, PV main disconnects/isolators, Lightning and surge protection, System monitoring, Metering, Net metering, Gross metering. Mounting Systems: Roof mounting systems, Pitched roof mounts, Pitched roof mounts for tiled roofs, Pitched roof mounts for metal roofs, Rack mounts, Direct mounts, Building-integrated systems, Ground mounting systems, Ground rack mounts, Pole mounts, Sun-tracking systems, Wind loading, Lightning protection.

Unit III

Site Assessment: Location of the PV array, Roof specifications, Is the site shade-free? Solar Pathfinder, Solmetric Suneye, HORI catcher, iPhone apps, Software packages, Available area, Portrait installation, Landscape installation, Energy efficiency initiatives, Health, safety and environment (HSE) risks, Local environment, Locating balance of system equipment, Site plan.

Designing Grid-connected PV Systems: Design brief, Existing system evaluation, choosing system components, Modules, Mounting structure, Inverters, Cabling, Voltage sizing, Current sizing, Monitoring, System protection, Over-current protection, Fault-current protection, Lightning and surge protection, Grounding/earthing, Mechanical protection, Array protection, Subarray protection, Extra low voltage (ELV) segmentation.

Sizing a PV System: Introduction, Matching voltage specifications, Calculating maximum voltage, Calculating minimum voltage, Calculating the minimum number of modules in a string, Calculating the maximum voltage, Calculating the maximum number of modules in a string, Calculating the minimum voltage, Calculating the minimum number of modules in a string, Matching current specifications, Matching modules to the inverter's power rating, Losses in utility-interactive PV systems, Temperature of the PV module, Dirt and soiling, Manufacturer's tolerance, Shading, Orientation and module tilt angle, Voltage drop, Inverter efficiency, Calculating system yield.

Unit IV

Installing Grid-connected PV Systems: PV array installation, DC wiring, Cabling routes and required lengths, Cable sizing, PV combiner box, System grounding/ earthing, Inverter installation, Installation checklist, Interconnection with the utility grid, Required information for installation, Safety.

System Commissioning: Introduction, Final inspection of system installation, Testing, Commissioning, System documentation.

System Operation and Maintenance: System maintenance, PV array maintenance, Inverter maintenance, System integrity, Troubleshooting, Identifying the problem, Troubleshooting PV arrays, Troubles hooting underperforming systems, Troubleshooting inverters, Other common problems.

Unit V

Marketing and Economics of Grid-connected PV Systems: Introduction, PV system costing, Valuing a PV system, Simple payback and financial incentives, Simple payback, Feed-in tariffs, Rebates, Tax incentives, Loans, Renewable portfolio standards and renewable energy certificates, Marketing, Insurance.

Text Book:

1. Geoff Stapleton and Susan Neill, Grid-connected Solar Electric Systems, The Earthscan Expert Handbook for Planning, Design and Installation, Earthscan, 1st Edition, 2012

Course outcomes (COs):

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

1. Apprehend solar systems and PV Technology
2. Realize Inverter components, cabling and protection
3. Select the site and size of Grid-connected PV systems.
4. Recognize Installation, Commissioning, Operation & Maintenance of Grid Connected PV systems
5. Know the Marketing and Economics of Grid-connected PV systems.

INTRODUCTION TO SUSTAINABLE ENGINEERING

Course Code: ETC143/243 **Credits: 3:0:0**

Pre-requisites: Nil **Contact Hours: 42L**

Course Coordinator: Dr. Ramasivakiran Reddy

Course Content

Unit I

Sustainable Development and Role of Engineers: Introduction, Why and What is Sustainable Development, THE SDFs, Paris Agreement and Role of Engineering, Sustainable Development and the Engineering Profession, Key attributes of the Graduate Engineering

Sustainable Engineering Concepts: Key concepts – Factor 4 and Factor 10: Goals of sustainability, System Thinking, Life Cycle Thinking and Circular Economy.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: https://nptel.ac.in/courses/127105018
  https://nptel.ac.in/courses/107103081

Unit II

Sustainable Engineering and Concepts, Principles and Frame Work: Green Economy and Low Carbon Economy, Eco Efficiency, Triple bottom Line, Guiding principles of sustainable engineering, Frameworks for sustainable Engineering.

Tools for sustainability Assessment: Environmental Management System, Environmental Auditing, Cleaner Production Assessment, Environmental Impact Assessment, Strategic Environmental

- Pedagogy / Course delivery tools: Chalk and talk
- Links: https://nptel.ac.in/courses/127105018
  https://nptel.ac.in/courses/107103081

Unit III

Fundamentals of Life Cycle Assessment

Why and What is LCA, LCA Goal and Scope, Life cycle inventory, Life Cycle Impact Assessment, Interpretation and presentation of Results, Iterative Nature of LCA, Methodological Choices, LCI Databases and LCA Softwares, OpenLCA, Strength and Limitations of LCA.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: https://nptel.ac.in/courses/127105018
  https://nptel.ac.in/courses/107103081

Unit IV

Environmental Life Cycle Costing, Social Life Cycle Assessment, and Life Cycle Sustainability Assessment: Introduction, Environmental Life Cycle Costing, Social

Life Cycle Assessment, Life Cycle Sustainability, LCA Applications in Engineering, Environmental Economics

- Pedagogy / Course delivery tools: Chalk and talk
- Links: https://nptel.ac.in/courses/127105018
  https://nptel.ac.in/courses/107103081

Unit V

Integrating Sustainability in Engineering Design: Problems Solving in Engineering, conventional to Sustainable Engineering Design Process, Design for Life Guidelines and Strategies, Measuring Sustainability, Sustainable Design through sustainable procurement criteria, Case studies on sustainable Engineering Design Process.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: https://nptel.ac.in/courses/127105018
  https://nptel.ac.in/courses/107103081

Text Books:

1. Introduction to Sustainability for Engineers, Toolseeram, Ramjeawon, CRC Press, 1st Edn., 2020
2. Shaked, S., Crettaz, P., Saade-Sbeih, M., Jolliet, O., & Jolliet, A. (2015). Environmental life cycle assessment. CRC Press.

Reference Books:

1. Sustainability Engineering: Concepts, Design and Case studies, Prentice Hall, 1st Edn, 2015
2. System Analysis for sustainable Engineering: Theory and applications, Ni bin Chang, McGraw Hill Publications, 1st Edn., 2010
3. Engineering for Sustainable development: Delivery a sustainable development goals, UNESCO, International Centre for Engineering Education, France, 1st Edn., 2021
4. Introduction to Sustainable Engineering, Rag. R.L. and Ramesh Lakshmi Dinachandran, PHI Learning Pvt. Ltd., 2nd Edn, 2016

Course Outcomes (COs):

On successful competition of the course students will be able to

1. Understanding Sustainable Development. (PO-1, PO-7, PO-6, PSO-1)
2. Solving sustainability problems with available tools and techniques. (PO-1, PO-7, PO-6, PSO-1)
3. Understanding fundamentals of life cycle assessment. (PO-1, PO-7, PO-6, PO-12, PSO-1)
4. Understanding sustainability costing and economics. (PO-1, PO-7, PO-6, PO-12, PSO-1)
5. Developing sustainable management system. (PO-1, PO-7, PO-6, PSO-1)

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks		
Assessment Tool	**Marks**	**Course outcomes attained**
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal tests shall be taken for 30 marks.		
Other Components		
Assignment/Mini Project	10	CO1, CO2, CO3, CO4, CO5
Quiz/Presentations	10	CO1, CO2, CO3, CO4, CO5
Semester End Examination (SEE)	100 (Scale down to 50 Marks)	CO1, CO2, CO3, CO4, CO5

RENEWABLE ENERGY SOURCES

Course Code: : ETC144/244 **Credits: 3:0:0**

Pre-requisites: Nil **Contact Hours: 42L**

Course Coordinators: Vinayak Talugeri and Gururaj

Course Content

The Students shall:

1. To understand energy layout, energy sources and their utilization.
2. To explore society's present needs and future energy demands.
3. To Study the principles of renewable energy conversion systems.
4. To exposed to energy conservation methods.

Unit I

Introduction: Principles of renewable energy; energy and sustainable development, fundamentals and social implications, renewable energy availability in India, applications of renewable energy, Introduction to Internet of energy (IOE).

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, animated videos
- Lab component/Practical topics: NCES lab
- Links: Introduction of renewable energy: https:// www.youtube.com/watch?v=A2KvSLoonGs
- Links: Introduction to Internet of energy (IOE): https://www.youtube.com/watch?v=jnfaM197I0

Unit II

Solar Energy: Fundamentals; Solar Radiation; Estimation of solar radiation on horizontal and inclined surfaces; Solar radiation Measurements- Pyrheliometers, Pyrometer, Sunshine Recorder. Solar Thermal systems: Flat plate collector; Solar distillation; Solar pond electric power plant.

Solar electric power generation- Principle of Solar cell, Photovoltaic system for electric power generation, advantages, Disadvantages and applications of solar photovoltaic system.

- Pedagogy/ Course delivery tools: Chalk and talk, Power point presentation
- Lab component/Practical topics: NCES lab
- Links: Solar radiation Measurements: https://www.youtube.com/watch?v=PmkbJx1jdV4
- Links: Solar cell: https://www.youtube.com/watch?v=mCgXsEyQZSI

Unit-III

Wind Energy: Properties of wind, availability of wind energy in India, wind velocity and power from wind; major problems associated with wind power, Basic components of wind energy conversion system (WECS); Classification of WECS- Horizontal axis- single, double and muliblade system. Vertical axis- Savonius and darrieus types.

Biomass Energy: Introduction; Photosynthesis Process; Biofuels; Biomass Resources;

Biomass conversion technologies -fixed dome; Urban waste to energy conversion; Biomass gasification (Downdraft).

- Pedagogy/ Course delivery tools: Chalk and talk, Power point presentation, animated videos,
- Lab component/Practical topics: NCES lab
- Links: Wind energy: https://www.youtube.com/watch?v=f0p0Fria5TY
- Links: Biomass energy: https://www.youtube.com/watch?v=5cQD_xZph9U

Unit IV

Tidal Power: Tides and waves as energy suppliers and their mechanics; fundamental characteristics of tidal power, harnessing tidal energy, advantages and limitations.

Ocean Thermal Energy Conversion: Principle of working, OTEC power stations in the world, problems associated with OTEC.

Geothermal Energy Conversion: Principle of working, Geothermal sources, problems associated with geothermal energy conversion, advantages and limitations.

- Pedagogy/ Course delivery tools: Chalk and talk, Power point presentation, animated videos
- Lab component/Practical topics: NCES lab
- Links: Tidal energy: https://www.youtube.com/watch?v=pnK5rv5PoSU
- Links: OTEC energy: https://www.youtube.com/watch?v=ala3ruvZMho

Unit V

Green Energy: Introduction, Fuel cells: Classification of fuel cells – H2; Operating principles, Zero energy Concepts. Benefits of hydrogen energy, hydrogen production technologies (electrolysis method only), hydrogen energy storage, applications of hydrogen energy, problem associated with hydrogen energy.

- Pedagogy/ Course delivery tools: Chalk and talk, Power point presentation,
- Lab component/Practical topics: NCES lab
- Links: Fuel cells: https://www.youtube.com/watch?v=6oeN9VDFLig&t=3s
- Links: Hydrogen energy: https://www.youtube.com/watch?v=LdRelOJKMCs

Text Books:

1. **Nonconventional Energy sources**, G D Rai, Khanna Publication, Fourth Edition.
2. **Energy Technology,** S.Rao and Dr. B.B. Parulekar, Khanna Publication. Solar energy, Subhas P Sukhatme, Tata McGraw Hill, 2nd Edition, 1996

Reference Books:

1. **Principles of Energy conversion,** A. W. Culp Jr.,, McGraw Hill, 1996
2. **Non-Convention Energy Resources,** Shobh Nath Singh, Pearson, 2018

Web links and video lectures (e-Resources)

- https://www.pdfdrive.com/non-conventional-energy-sources-e10086374.html
- https://www.pdfdrive.com/non-conventional-energy-systems-nptel-d17376903.html

- https://www.pdfdrive.com/renewable-energy-sources-and-their-applications e33423592.html
- https://www.pdfdrive.com/lecture-notes-on-renewable-energy-sources-e34339149.html
- https://onlinecourses.nptel.ac.in/noc18ge09/preview

Course Outcomes (COs):

At the end of the course, the student will be able to

1. Identify the various sources of renewable energy sources and their applications.
2. Understand the working principles of solar energy extraction and its measurements.
3. Describe the classifications, energy conversation and problems associated with wind energy and Biomass energy.
4. Recognize the energy harvesting of Tidal energy, OTEC and geothermal energy.
5. Understand the operation of fuel cell and hydrogen energy extraction.

INTRODUCTION TO INTERNET OF THINGS (IoT)

Course Code: : ETC145/245 **Credits: 3:0:0**

Pre-requisites: Nil **Contact Hours: 42L**

Course Coordinators: Dr Shobha K R, Dr Neelamsetti Kiran Kumar & Akshatha Kori

Course Content

Unit I

Basics of Networking: Introduction, Network Types, Layered network models
Emergence of IoT: Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components

- Pedagogy / Course delivery tools: Chalk and talk
- Links: https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31

Unit II

IoT Sensing and Actuation: Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31

Unit III

IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design, Selection Considerations, Processing Offloading.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31

Unit IV

Associated IoT technologies

Cloud Computing: Introduction, Virtualization, Cloud Models, Service-Level Agreement in Cloud Computing, Cloud Implementation, Sensor-Cloud: Sensors-as-a-Service.
IoT Case Studies: Agricultural IoT – Introduction and Case Studies

- Pedagogy / Course delivery tools: Chalk and talk
- Links: https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31

Unit V

IoT Case Studies And Future Trends: Vehicular IoT – Introduction, Healthcare IoT – Introduction, Case Studies, IoT Analytics – Introduction

- Pedagogy / Course delivery tools: Chalk and talk
- Links: https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31

Text Books:

1. Sudip Misra, Anandarup Mukherjee, Arijit Roy, "Introduction to IoT", Cambridge University Press 2021

Reference Books:

1. Waher, Peter. Mastering the Internet of Things. 1st ed. Packt Publishing, 2018. Web. 14 Oct. 2022.
2. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, By David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry Published Jun 13, 2017, by, Cisco Press. Part of the Fundamentals series.
3. S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.
4. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014.
5. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.

Web links and video lectures (e-Resources)

1. https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31/

Course Outcomes (COs):

At the end of the course, the student will be able to

1. Describe the evolution of IoT, IoT networking components, and addressing strategies in IoT. (PO-1, PO-2, PO-3, PO-9, PO-11, PO-12, PSO-1, PSO-2, PSO-3)
2. Understand various sensing devices and actuators. (PO-1, PO-2, PO-3, PO-6, PO-7, PO-9, PO-11, PO-12, PSO-1, PSO-2, PSO-3)
3. Demonstrate the various processing techniques used in IoT. (PO-1, PO-2, PO-3, PO-6, PO-7, PO-9, PO-11, PO-12, PSO-1, PSO-2, PSO-3)
4. Explain Associated IoT Technologies. (PO-1, PO-2, PO-3, PO-6, PO-7, PO-9, PO-11, PO-12, PSO-1, PSO-2, PSO-3)
5. Illustrate and analyze the requirements of various IoT Applications. (PO-1, PO-2, PO-3, PO-6, PO-7, PO-9, PO-11, PO-12, PSO-1, PSO-2, PSO-3)

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks		
Assessment Tool	**Marks**	**Course outcomes attained**
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal tests shall be taken for 30 marks.		
Other Components		
Assignment/Quiz	10	CO1, CO2, CO3, CO4, CO5
Mini Project	10	CO1, CO2, CO3, CO4, CO5
Semester End Examination (SEE)	100 (Scale down to 50 Marks)	CO1, CO2, CO3, CO4, CO5

INTRODUCTION TO CYBER SECURITY

Course Code: ETC146/246 **Credits: 3:0:0**

Pre-requisites: Nil **Contact Hours: 42L**

Course Coordinator: C Sharmila Suttur

Course Content

Unit I

Introduction to Cybercrime: Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, Cybercrimes: An Indian Perspective, Hacking and the Indian Laws, A Global Perspective on Cybercrimes.

- Pedagogy/Course delivery tools: Chalk and talk
- Links: https://onlinecourses.swayam2.ac.in/nou19_cs08/preview

Unit II

Cyber offenses: How Criminals Plan Them: Introduction, How Criminals Plan the Attacks, Social Engineering, Cyberstalking, Cybercafe and Cybercrimes.

Botnets: The Fuel for Cybercrime, Attack Vector.

- Pedagogy/Course delivery tools: Chalk and talk
- Links: https://onlinecourses.swayam2.ac.in/nou19_cs08/preview

Unit III

Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDOS Attacks, Attacks on Wireless networks.

- Pedagogy/Course delivery tools: Chalk and talk
- Links: https://onlinecourses.swayam2.ac.in/nou19_cs08/preview

Unit IV

Phishing and Identity Theft: Introduction, Methods of Phishing, Phishing Techniques, Spear Phishing, Types of Phishing Scams, Phishing Toolkits and Spy Phishing, Phishing Countermeasures, Identity Theft (ID Theft)

- Pedagogy/Course delivery tools: Chalk and talk
- Links: https://onlinecourses.swayam2.ac.in/nou19_cs08/preview

Unit V

Understanding Computer Forensics: Introduction, Historical Background of Cyberforensics, Digital Forensics Science, The Need for Computer Forensics, Cyberforensics and Digital Evidence, Digital Forensics Life cycle, Chain of Custody Concept, Network Forensics.

- Pedagogy/Course delivery tools: Chalk and talk
- Links: https://onlinecourses.swayam2.ac.in/nou19_cs08/preview

Text Book:

1. Sunit Belapure, Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley India Pvt Ltd, ISBN: 978-81- 265-21791, 2011, First Edition (Reprinted 2018).

Reference Book:

1. Thomas J. Mowbray, "Cybersecurity: Managing Systems, Conducting Testing, and Investigations", John Wiley & Sons, ISBN: 978-1-118-69711-5, 2014.

Course Outcomes (COs):

At the end of the course, the student will be able to

1. Explain the Cybercrime Terminologies. (PO-3, PO-6, PO-8)
2. Describe Cyber offenses andBotnets. (PO-3, PO-6, PO-8)
3. Illustrate Tools and Methods used in Cybercrime. (PO-5, PO-6, PO-8)
4. Explain Phishing and Identity Theft. (PO-3, PO-6, PO-8)
5. Justify the Need of Computer Forensics. (PO-3, PO-6, PO-8)

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks		
Assessment Tool	**Marks**	**Course outcomes attained**
Internal Test-I	30	CO1, CO2
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal tests shall be taken for 30 marks.		
Other Components		
Quiz	10	CO1, CO2
Assignment	10	CO3, CO4, CO5
Semester End Examination (SEE)	100 (Scale down to 50 Marks)	CO1, CO2, CO3, CO4, CO5