POORNIMA
COLLEGE OF ENGINEERING
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1.2.2 Details of MOOCs, SWAYAM, and NPTEL Courses (Brochure)

(2023-24)

ISI-6, RIICO Institutional Area, Sitapura, Jaipur-302022 (Rajasthan)
• Phone: +91-9829255102, +91-9414728922 • E-mail: principal.pce@poornima.org
• Website: www.pce.poornima.org

Automation In Manufacturing

By Prof. Shrikrishna N. Joshi | IIT Guwahati

Learners enrolled: 6776 | Exam registration: 2242

Automation in Manufacturing [Intro Video]

ABOUT THE COURSE:

Manufacturing industry contributes a major share in the GDP of our country. Application of automated systems is certainly improving the productivity of the manufacturing industry. In view of this, a course on “Automation in Manufacturing” is designed with the primary focus on the design and development of automated systems in the manufacturing. Initially the course introduces various automated systems being used in the manufacturing industry. Then the building blocks of a typical automated system are described. It presents a study on the principle of operation and construction details of sensors/transducers, actuators, drives and mechanisms, hydraulic and pneumatic

systems. It also cov rocessor technology, programming and CNC technology. The contents are lucidly presented with real-life examples. C on manufacturing industry applications are discussed.

INTENDED AUDIENCE : UG, PG students of Mechanical, Production, Industrial Engineering, Mechatronics Engineering. Practicing engineers.

PREREQUISITES : Knowledge of basic electronics and electrical engineering.

INDUSTRIES SUPPORT : All automobile manufacturing, mobile phone manufacturing industry, aviation industry

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Mechanical Engineering ◦ Manufacturing Processes and Technology
Credit Points :	3
Level :	Undergraduate/Postgraduate
Start Date :	24 Jul 2023
End Date :	13 Oct 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	18 Aug 2023
Exam Date :	29 Oct 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Dr. Mahesh Bundele
B.E., M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR


(https://swayam.gov.in/)

(https://swayam.gov.in/nc_details/NPTEL)

Course layout

Week 1: Introduction: Importance of automation in the manufacturing industry. Use of mechatronics. Systems required.
Week 2: Design of an automated system: Building blocks of an automated system, working principle and examples.
Week 3: Fabrication: Fabrication or selection of various components of an automated system. Specifications of various elements. Use of design data books and catalogues.
Week 4: Sensors: study of various sensors required in a typical automated system for manufacturing. Construction and principle of operation of sensors.
Week 5: Microprocessor Technology: signal conditioning and data acquisition, use of microprocessor or micro controllers. Configurations. Working.
Week 6: Drives: electrical drives – types, selection criteria, construction and operating principle.
Week 7: Mechanisms: Ball screws, linear motion bearings, cams, systems controlled by camshafts.
Week 8: Mechanisms: Electronic cams, indexing mechanisms, tool magazines, and transfer systems.
Week 9: Hydraulic systems: hydraulic power pack, pumps, valves.
Week 10: Hydraulic systems: designing of hydraulic circuits.
Week 11: Pneumatic systems: configurations, compressors, valves, distribution and conditioning.
Week 12:CNC technology: basic elements, interpolators and programming.

Books and references

1. HMT Ltd. Mechatronics, Tata McGraw-Hill, New Delhi, 1988.
2. Boltan, W., Mechatronics: electronic control systems in mechanical and electrical engineering, Longman, Singapore,1999.
3. Regtien, P. P. L., Sensors for mechatronics, Elesevier, USA,2012.
4. Tonshoff, H.K. and I. Inasaki, Sensors in manufacturing,Wiley-VCH, 2001.
5. Gaonkar, R. S., Microprocessor architecture, programming,and applications with the 8085, Penram International Publishing (India), Delhi, 2000.
6. Bradley, D. A., Dawson D., Burd, N. C. and Loader A. J.,Mechatronics: Electronics in products and processes, CRC Press, Florida, USA, 2010.
7. Rothbart, H. A., CAM Design Handbook, McGraw-Hill, 2004.• Norton, R. L., Cam Design and Manufacturing Handbook,Industrial press Inc, 2002.
8. Mechatronics, HMT, Tata McGraw-Hill Education, 1998.
9. Groover, M. P., Automation, Production Systems, and Computer-Integrated Manufacturing, Prentice Hall, 2001.
10. Parr, A. A., Hydraulics and pneumatics, Elsevier, 1999.
11. Smid, P., CNC Programming Handbook, Industrual Press,New York, USA, 2008.
12. Rao, P. N., CAD/CAM Principles and Applications, Tata McGraw Hill, New Delhi, 2010.

Instructor bio

Prof. Shrikrishna N. Joshi

IIT Guwahati

Dr. Shrikrishna N. Joshi has completed his doctoral studies in the area of Intelligent process modeling and optimization of electric discharge machining process from IIT Bombay, Mumbai, India in 2009. Currently, he is working as an Associate Professor in the Department of Mechanical Engineering at Indian Institute of Technology Guwahati, India. He was a visiting faculty at the Asian Institute of Technology (AIT), Bangkok, Thailand in 2015. His research interests include mechatronics and manufacturing automation, CAD/CAM, advanced and precision manufacturing processes with a focus on applications of laser in manufacturing, thin-wall machining and single point diamond turning. Four PhD students have been graduated under his supervision and right now, about 7 students are working on cutting-edge research problems. He has published about 60 research papers and tweleve book chapters in refereed international journals and conferences. He has edited two books on "Laser-based manufacturing" and a book on Advances in Computational Methods in Manufacturing with Springer Nature. He has carried out sponsored and consultancy research work of about INR ten millions. The consultancy work was aimed at "Mechanization of Food Grain Handling Operations at FCI Godowns". Dr. Joshi has also developed a web course on Mechatronics and Manufacturing Automation under the scheme of NPTEL of MHRD, Govt. of India. The course was very well appreciated among the engineering industry, academia and research community. He has conducted this course at IIT Guwahati four times for B.Tech final year, M.Tech. and Ph.D students.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **29 October 2023** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
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CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

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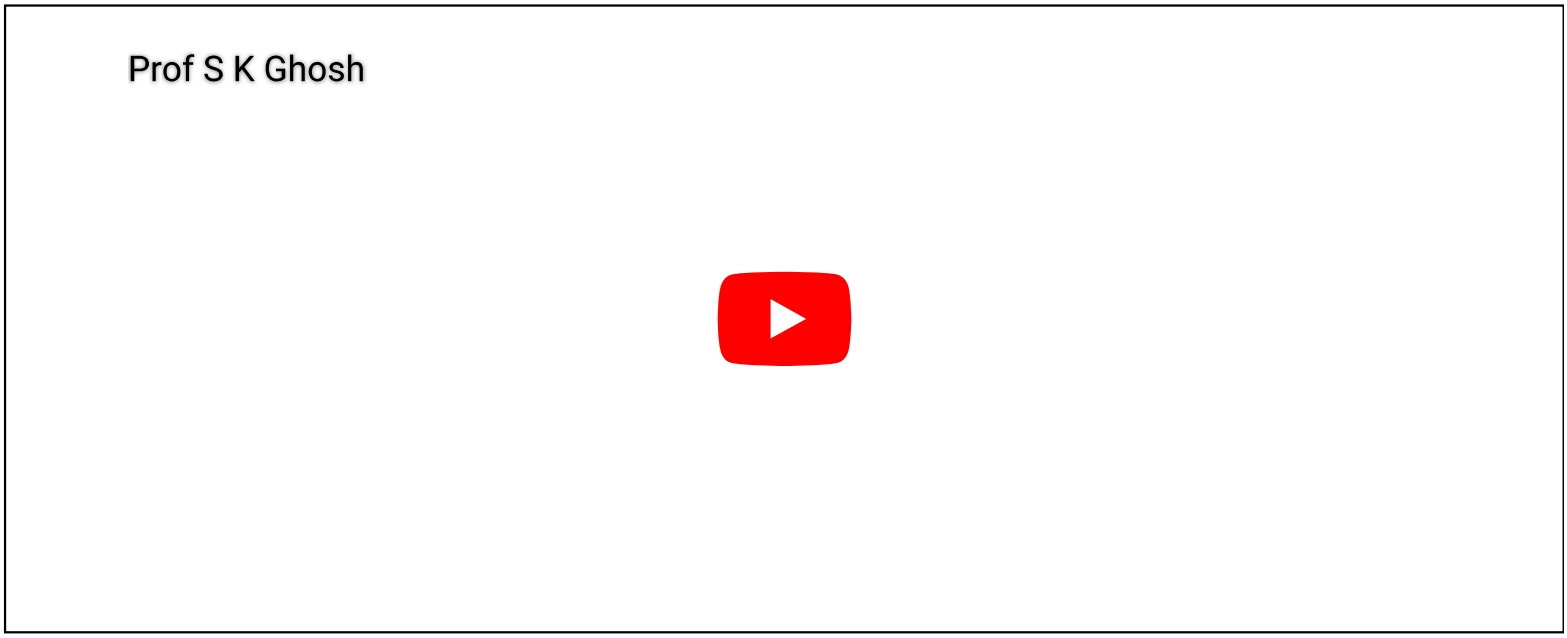
Cloud Computing

By Prof. Soumya Kanti Ghosh | IIT Kharagpur

Learners enrolled: 75222 | Exam registration: 25675



ABOUT THE COURSE :

Cloud computing is a scalable services consumption and delivery platform that provides on-demand computing service for shared pool of resources, namely servers, storage, networking, software, database, applications etc., over the Internet. It is a model for enabling ubiquitous, on-demand access to a shared pool of configurable computing resources, which can be rapidly

provisioned and minimal management effort. This course will introduce various aspects of cloud computing, including fundamental issues, security challenges and future research trends. This will help students (both UG and PG levels) and researchers to use and explore the cloud computing platforms.

INTENDED AUDIENCE : CSE,ECE,EE

PREREQUISITES : Basics of Computer Architecture and Organization, Networking

INDUSTRY SUPPORT : IT industries

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering ◦ Programming ◦ Systems
Credit Points :	3
Level :	Undergraduate
Start Date :	24 Jul 2023
End Date :	13 Oct 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	18 Aug 2023
Exam Date :	28 Oct 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1: Introduction to Cloud Computing
Week 2: Cloud Computing Architecture
Week 3: Service Management in Cloud Computing
Week 4: Data Management in Cloud Computing
Week 5: Resource Management in Cloud
Week 6: Cloud Security
Week 7: Open Source and Commercial Clouds, Cloud Simulator
Week 8: Research trend in Cloud Computing, Fog Computing
Week 9: VM Resource Allocation, Management and Monitoring
Week 10: Cloud-Fog-Edge enabled Analytics
Week 11: Serverless Computing and FaaS Model
Week 12: Case Studies and Recent Advancements

Books and references

1. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley,2011
2. Enterprise Cloud Computing - Technology, Architecture, Applications, Gautam Shroff, Cambridge University Press, 2010
3. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
4. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley- India,2010

Instructor bio

Prof. Soumya Kanti Ghosh

IIT Kharagpur

Prof. Soumya K ... e Ph.D. and M.Tech. degrees from Department of Computer Science and Engineering, Indian Institute of Tech ... gpur, India. Presently, he is a Professor with Department of Computer Science and Engineering, IIT Kharagpur. Before joining IIT Kharagpur, he worked for the Indian Space Research Organization in the area of satellite remote sensing and geographic information systems. He has more than 200 research papers in reputed journals and conference proceedings. His research interests include spatial data science, spatial web services and cloud computing.

Course certificate

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Only the e-certificate will be made available. Hard copies will not be dispatched.

Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

Consumer Psychology

By Prof. Naveen Kashyap | IIT Guwahati

Learners enrolled: 8114 | Exam registration: 3550

Consumer Psychology [Introduction Video]

ABOUT THE COURSE :

Human beings have basic needs that they fulfill by making transactions in the market.Transactions mostly in the form of monetary exchange for goods and services are very basic for the survival of the human race. The present course is designed to study how consumers behave on the market and what the consequences of various behavior patterns. Additionally, the present

course also loo ıological factors that shape the behavior and actions of the consumer in the global market.

INTENDED AUDIENCE: UG/PG/PhD

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	8 weeks
Category :	◦ Humanities and Social Sciences ◦ Psychology
Credit Points :	2
Level :	Undergraduate
Start Date :	24 Jul 2023
End Date :	15 Sep 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	21 Aug 2023
Exam Date :	24 Sep 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course la

Week 1: Introduction to Consumer Psychology
Week 2: Overview of foundation of consumer behavior.
Week 3 : Consumer Decision Making
Week 4 : Purchase process and consumption; Consumer learning and brand loyalty
Week 5 : Low involvement decision making; Situational influences.
Week 6 : The Individual Consumer; Consumer perceptions; Consumer information processing and acquisition
Week 7 : Attitudes; Attitude reinforcement and change
Week 8 : Marketing Communications.

Books and references

1. Henry Assael, Consumer Behavior and Marketing Action, Cengage Learning
2. Jay Lindquist, Consumer Behavior, Cengage Learning
3, Leon Schiffman, Consumer Behavior, Pearson Press
4, Zubin Sethna, Consumer Behaviour

Instructor bio

Prof. Naveen Kashyap

IIT Guwahati

Naveen Kashyap, Ph.D is as Associate Professor of Psychology at the Indian Institute of Technology Guwahati. His research interests are sleep and human cognitive processes. Dr Kashyap has been teaching courses like cognitive psychology, introduction to psychology, consumer psychology, advance cognitive process and research methodology to UG and PG students of IITG Guwahati for the past 10 years.

Course certificate

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The exam is op s 1000/- (Rupees one thousand only)
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CRITERIA TO GET A CERTIFICATE

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- NPTEL team

Data Base Management System

By Prof. Partha Pratim Das, Prof. Samiran Chattopadhyay | IIT Kharagpur

Learners enrolled: 45650 | Exam registration: 12093

Prof P P Das

ABOUT THE COURSE :

Databases form the backbone of all major applications today – tightly or loosely coupled, intranet or internet based, financial, social, administrative, and so on. Structured Database Management Systems (DBMS) based on relational and other models have long formed the basis for such databases. Consequently, Oracle, Microsoft SQL Server, Sybase etc. have emerged as leading commercial systems while MySQL, PostgreSQL etc. lead in open source and free domain.

While DBMS's differ in the details, they share a common set of models, design paradigms and a Structured Query Language (SQL). In this background the course examines data structures, file organizations, concepts and principles of DBMS's, data analysis, database design, data

modeling, database m query optimization, and database implementation. More specifically, the course introduces relational data models; entity-rel g, SQL, data normalization, and database design. Learners will also learn query coding practices using MySQL (or any other open system) through various assignments. Design of simple multi-tier client / server architectures based and Web-based database applications is also introduced.

INTENDED AUDIENCE : Students from all disciplines can enroll for this course.

PRE-REQUISTES :1. Procedural and / or Object-Oriented Programming (C / C++ / Java / Python)
2. Data Structures
3. Algorithms

INDUSTRY SUPPORT : DBMS is so fundamental that all companies dealing with systems as well as application development (including web, IoT, embedded systems, data mining, machine learning) have a need for the same. These include – Microsoft, Samsung, Xerox, Yahoo, Google, IBM, TCS, Infosys, Amazon, Flipkart, etc.

Summary

Course Status :	Completed
Course Type :	Core
Language for course content :	English
Duration :	8 weeks
Category :	◦ Computer Science and Engineering ◦ Programming
Credit Points :	2
Level :	Undergraduate/Postgraduate
Start Date :	24 Jul 2023
End Date :	15 Sep 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	21 Aug 2023
Exam Date :	24 Sep 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1: Course Overview. Introduction to RDBMS
Week 2: Structured Query Language (SQL)
Week 3: Relational Algebra. Entity-Relationship Model
Week 4: Relational Database Design
Week 5: Application Development. Case Studies. Storage and File Structure
Week 6: Indexing and Hashing. Query Processing
Week 7: Query Optimization. Transactions (Serializability and Recoverability)
Week 8: Concurrency Control. Recovery Systems. Course Summarization.

Books and references

Text Books / Basic Material

1. Database System Concepts by Abraham Silberschatz, Henry F. Korth, and S. Sudarshan, 6th Edition, McGraw-Hill Education, 2010.
2. Presentations used in the Course

Reference (Advanced) Material

This is a first level course. So the textbook would be the primary resource also for the advanced chapters. In addition, some references will be specified for every topic during the course.

Instructor bio

Prof. Partha Pratim Das

IIT Kharagpur

Prof. Partha Pratim Das received his BTech, MTech and PhD degrees in 1984, 1985 and 1988 respectively from IIT Kharagpur. He served as a faculty in Department of Computer Science and Engineering, IIT Kharagpur from 1988 to 1998. In 1998, he joined Alumnus Software Ltd as a Business Development Manager. From 2001 to 2011, he worked for Interra Systems, Inc. as a Senior Director and headed its Kolkata Center. In 2011, he joined back to Department of Computer Science and Engineering, IIT Kharagpur as Professor. Dr. Das has also served as a Visiting Professor with Institute of Radio Physics and Electronics, Calcutta University from 2003 to 2013.

Dr. Das is currently the Head of Rajendra Mishra School of Engineering Entrepreneurship, the Professor-inCharge of the upcoming Research Park of IIT Kharagpur at Rajarhat, Kolkata, and the Joint Principal Investigator of National Digital Library of India project of MHRD.

Dr. Das has taught several courses in Computer Science including Software Engineering, Object-Oriented Systems, Programming and Data

Structure, Compiler De nalysis of Algorithms, Information System Design, Database Management Systems, Computational Geometry, Principles o nguages, Embedded Systems, and Image Processing. Jointly with 2 others, he has also offered a course on Introduction to Design of Algorithms under the T10KT program of NME-ICT, MHRD (https://www.facebook.com/t10kt.algorithms/) to nearly 7000 teachers. Further, Dr. Das has been offering Programming in C++ and Object-Oriented Analysis and Design in NPTEL-NOC. Both courses are regularly attended by thousands of students.

Dr. Das has published over 40 technical papers in international journals in areas of Digital Geometry, Image Processing, Parallel Computing and Knowledge-based Systems. In 2013 he has co-authored a research monograph titled Digital Geometry in Image Processing (CRC Press). His current interests include Human-Computer Interactions, Computer Analysis of Indian Classical Dance, Object-Oriented Systems Analysis and Design, Software Engineering, Compiler Technology, and Technology Enabled Learning. Dr. Das is a member of Association of Computing Machinery (ACM), The Institute of Electrical and Electronics Engineers (IEEE), and Indian Unit for Pattern Recognition and Artificial Intelligence (IUPRAI).

Prof. Samiran Chattopadhyay

Samiran Chattopadhyay obtained his B Tech and M Tech degree in 1987 and 1989 respectively from IIT Kharagpur. He obtained his PhD degree from Jadavpur University in 1993. He served as a faculty in the Department of Computer Science and Engineering, Jadavpur University from 1989 to 1993. In 1993, he moved to industry and joined back the same department in Jadavpur University as an Associate Professor in 1997. Since 2001, he is a Professor of Information Technology in Jadavpur University.

Dr. Chattopadhyay is also a visiting fellow of the University of Northumbria, Newcastle upn Tyne UK. He was an adjunct faculty at IIT Kharagpur for the Distributed Systems course and a visiting faculty member for the MTech course by IIT Kharagpur which was offered in distance learning mode.
Dr. Chattopadhyay has more than two decades of experience of serving reputed Industry houses including Mindware, Computer Associates TCG Software, Interra Systems India Ltd. He is also a project consultant of the prestigious National Digital Library Mission of Government of India.

Dr. Chattopadhyay has taught several courses in Computer Science including Software Engineering, Object-Oriented Systems, Programming and Data Structure, Compiler Design, Design and Analysis of Algorithms, Information System Design, Database Management Systems, Ad hoc Wireless Networks, Cloud Computing. Dr. Chattopadhyay has been a co-faculty in Database Management Systems in NPTEL-NOC.

Dr. Chattopadhyay has published over 60 technical papers in international journals in the areas of Wireless Networks, Network Security, Machine learning applications. He has co- authored a research monograph titled 'Digital Geometry in Image Processing', a textbook titled 'Data Structures through C' and 'Big Data in e-Healthcare'. His current research interests include Network Security, Machine learning, Wireless network and Pervasive computing..

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- NPTEL team

Data Structure And Algorithms Using Java

By Prof. Debasis Samanta | IIT Kharagpur

Learners enrolled: 32077 | Exam registration: 5403

Introduction to the course on Data Structures and algorithms using Java

ABOUT THE COURSE :

With the growth of Information and Communication Technology, there is a need to develop large and complex software. For developing large software, software developers should have enough proficiency of data structures and algorithms. Further, those software should be platform independent, Internet enabled, easy to modify, secure, and robust. To meet this requirement object-oriented paradigm has been developed and based on this paradigm the Java programming language emerges as the best programming environment. Now, Java programming language is being used for mobile programming, Internet programming, and many other applications compatible to distributed systems. This course aims to cover the essential topics of data structures and algorithms and how the same can be implemented using Java programming language. The participants of the proposed course will be able to improve their skills, to cope with the current demand of IT industries and solve many problems in their own filed of studies.

INTENDED AUDIENCE : The undergraduate students from the engineering disciplines, namely CSE, IT, EE, ECE, etc. might be interested for this course.
PREREQUISITES : This course requires that the students are familiar with programming language such as C/C++/Java, data structures and algorithms.
INDUSTRIES SUPPORT : All IT companies.

Summary

(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering ◦ Programming
Credit Points :	3
Level :	Undergraduate
Start Date :	24 Jul 2023
End Date :	13 Oct 2023
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Exam Date :	29 Oct 2023 IST

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Course layout

Week 1: 1D array, list and vector, 2D matrices and tables of objects
Week 2: Java implementation of 1D and 2D arrays and its operations
Week 3: Linked lists and its various operations, stack and queue
Week 4: Java implementation of linked lists, stack and queue
Week 5: Binary trees: Representation and operations. Variations of binary tree: Binary search tree, Height balanced search tree, Heap tree
Week 6: Java implementation of binary trees and its variations
Week 7: Graph : Structure, representation and operations
Week 8: Java implementations of graph data structures
Week 9: Algorithms (Part-I): Searching and sorting algorithms
Week 10: Java implementation of Part-I algorithms

Week 11: Algorithms (Part-II): shortest path algorithms
Week 12: Java implementation ms

Books and references

1.Classic Data Structures (2nd Edition)Debasis Samanta, Prentice Hall India
2.Java: The Complete ReferenceHebert Schildt, Mc Graw Hill
3.Object-Oriented Programming with C++ and Java Debasis Samanta, Prentice Hall India
4.Swayam-NPTEL online course entitles Programming in Java Debasis Samanta

Instructor bio

Prof. Debasis Samanta

IIT Kharagpur

Debasis Samanta holds a Ph.D. in Computer Science and Engineering from Indian Institute of Technology Kharagpur. His research interests and work experience spans the areas of Computational Intelligence, Data Analytics, Human Computer Interaction, Brain Computing and Biometric Systems. Dr. Samanta currently works as a faculty member at the Department of Computer Science & Engineering at IIT Kharagpur.

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Developing Soft Skills And Personality

By Prof. T. Ravichandran | IIT Kanpur

Learners enrolled: 39326 | Exam registration: 13482

Introduction - Developing Soft Skills and Personality - Prof. T. Ravichandran, IIT Kanpur

ABOUT THE COURSE :

The course aims to cause a basic awareness about the significance of soft skills in professional and inter-personal communications and facilitate an all-round development of personality. Hard or technical skills help securing a basic position in one's life and career. But only soft skills can ensure a person retain it, climb further, reach a pinnacle, achieve excellence, and derive fulfilment and supreme joy. Soft skills comprise pleasant and appealing personality traits as self-confidence, positive attitude, emotional intelligence, social grace, flexibility, friendliness and effective communication skills.

INTENDED AUDIENCE: Students, Teachers, Professionals, Trainers, Leaders, Employers

INDUSTRY SUPPORT : All industry/companies/organisations will recognize and value this course and recommend this for their employees and trainee programs.

Summary

(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

About Swayam (https://swayam.gov.in/about) | All Courses | ()

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	8 weeks
Category :	◦ Humanities and Social Sciences
Credit Points :	2
Level :	Undergraduate
Start Date :	24 Jul 2023
End Date :	15 Sep 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	21 Aug 2023
Exam Date :	24 Sep 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1: Lecture 1: Introduction: A New Approach To Learning
Lecture 2: Planning And Goal-Setting
Lecture 3: Human Perceptions: Understanding People
Lecture 4: Types Of Soft Skills: Self-Management Skills
Lecture 5: Aiming For Excellence: Developing Potential And Self-Actualisation
Lecture 6: Need Achievement And Spiritual Intelligence

Week 2: Lecture 7: Conflict Resolution Skills: Seeking Win-Win Solution
Lecture 8: Inter-Personal Conflicts: Two Examples
Lecture 9: Inter-Personal Conflicts: Two Solutions

Lecture 10: Types Of C... A Conflict Resolution Expert
Lecture 11: Types Of S... Tips For Stress
Lecture 12: Regulating Stress: Making The Best Out Of Stress

Week 3: Lecture 13: Habits: Guiding Principles
Lecture 14: Habits: Identifying Good And Bad Habits
Lecture 15: Habits: Habit Cycle
Lecture 16: Breaking Bad Habits
Lecture 17: Using The Zeigarnik Effect For Productivity And Personal Growth
Lecture 18: Forming Habits Of Success

Week 4: Lecture 19: Communication: Significance Of Listening
Lecture 20:Communication: Active Listening
Lecture 21:Communication: Barriers To Active Listening
Lecture 22:Telephone Communication: Basic Telephone Skills
Lecture 23:Telephone Communication: Advanced Telephone Skills
Lecture 24: Telephone Communication: Essential Telephone Skills

Week 5: Lecture 25: Technology And Communication: Technological Personality
Lecture 26: Technology And Communication: Mobile Personality?
Lecture 27: Topic: Technology And Communication: E-Mail Principles
Lecture 28: Technology And Communication: How Not To Send E-Mails!
Lecture 29: Technology And Communication: Netiquette
Lecture 30: Technology And Communication: E-Mail Etiquette

Week 6: Lecture 31: Communication Skills: Effective Communication
Lecture 32: Barriers To Communication: Arising Out Of Sender/Receiver's Personality
Lecture 33: Barriers To Communication: Interpersonal Transactions
Lecture 34: Barriers To Communication: Miscommunication
Lecture 35: Non-Verbal Communication: Pre-Thinking Assessment-1
Lecture 36: Non-Verbal Communication: Pre-Thinking Assessment-2

Week 7: Lecture 37: Nonverbal Communication: Introduction And Importance
Lecture 38: Non-Verbal Communication: Issues And Types
Lecture 39: Non-Verbal Communication: Basics And Universals
Lecture 40: Non-Verbal Communication: Interpreting Non-Verbal Cues
Lecture 41: Body Language: For Interviews
Lecture 42: Body Language: For Group Discussions

Week 8: Lecture 43: Presentation Skills: Overcoming Fear
Lecture 44: Presentation Skills: Becoming A Professional
Lecture 45: Presentation Skills: The Role Of Body Language
Lecture 46: Presentation Skills: Using Visuals
Lecture 47: Reading Skills: Effective Reading
Lecture 48: Human Relations: Developing Trust And Integrity

Books and refere (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

1. Dorch, Patricia. *What Are Soft Skills*? New York: Execu Dress Publisher, 2013.
2. Kamin, Maxine. *Soft Skills Revolution: A Guide for Connecting with Compassion for Trainers, Teams, and Leaders*. Washington, DC: Pfeiffer & Company, 2013.
3. Klaus, Peggy, Jane Rohman & Molly Hamaker. *The Hard Truth about Soft Skills*. London: HarperCollins E-books, 2007.
4. Petes S. J., Francis. *Soft Skills and Professional Communication*. New Delhi: Tata McGraw-Hill Education, 2011.
5. Stein, Steven J. & Howard E. Book. *The EQ Edge: Emotional Intelligence and Your Success*. Canada: Wiley & Sons, 2006.

Instructor bio

Prof. T. Ravichandran

IIT Kanpur

Dr. T. RAVICHANDRAN is presently a Professor of English in the Department of Humanities and Social Sciences at the Indian Institute of Technology Kanpur, Uttar Pradesh, India. He has written about fifty research articles/book chapters, supervised six doctoral theses, edited a special issue on Cyberpunk Literature for the Creative Forum Journal, and published a book on Postmodern Identity. He is a recipient of the Fulbright-Nehru Academic and Professional Excellence Fellowship (2014-15) for his research/teaching at Duke University, North Carolina, USA. He is honored with Champa Devi Gangwal Chair Professorship at IIT Kanpur. In his distinguished twenty-five years of teaching career, he has taught various courses in English Language and Literature. His NPTEL Video and Web courses on Communication Skills are well-acclaimed nationally and internationally. His NPTEL MOOC on Developing Soft Skills and Personality became hugely popular and well-received by about fifteen thousand participants from India and abroad.

Course certificate

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CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 6 assignments out of the total 8 assignments given in the course.
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Final score = Average assignment score + Exam score

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Only the e-certificate will be made available. Hard copies will not be dispatched.

Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

APPRECIATIONS AND COMMENTS BY THE CURRENT AND PREVIOUS BATCH STUDENTS:

I wish to convey a heartfelt thank you for the wonderful course on enhancing soft skills and personality. It is a blessing especially to people who are about to start their careers. They could be saved from committing many mistakes that could actually ruin their lives. I greatly appreciate the tremendous and sincere efforts that have been put in to design this course and make it available for all. Sir, you are very gentle in your speech and I have been looking forward each day to learning something new from you. I admire the way you explain with so many examples and quotes. It was a great learning experience for me. Thank you so much!- **Manali Mehta**

The entire course was well organized and was tailored to effectively deliver the intended objective of enhancing soft skills. You actually did justice to the course in every way- content, the distribution of modules over the week for them to co relate and be effective at each juncture that they were placed, overall delivery to the last bit of providing timely solutions to queries. I must congratulate you and your team for doing fantastic work in structuring this course and on its very successful completion. I look forward to the next! - **Dr. Vineeta Saluja, Principal - Mata Gujri Mahila Mahavidyalaya, Jabalpur (12-05-2019)**

Dear Sir, I am writing this mail to thank you. You just made my day. I went through your course on personality development on YouTube and it charged me. I am so relieved after watching your lecture on TECHNOLOGY AND COMMUNICATION: MOBILE PERSONALITY that I cannot express it in words. Sir, your video has saved my life. It is life changing. I request you to bless me so that I can move on the path shown by you. Once again thank you so much for providing such a beneficial video on very important issue of life.- **P. K. Rai (10-04-2019)**

Thank You sir for this Awesome Course. This course really was a great work of you. I now understand how much practice and hard work you been undergone to deliver such awesome and easy to understand lectures. My more thanks to you sir for lecture on habits [Week 3]. Concepts in lectures are difficult to understand and I don't think I could understood those without your guidance. - **Siddharth Bhusari**

I would like to thank you for providing this wonderful course with lots of subject information, examples and life examples . . . . Looking forward to more courses like this from NPTEL. My special thanks to the Professor for guiding and explaining elaborately and neatly about the subject. Also eagerly waiting to enroll for the next Enhancing course. - **Ranjani**

This course helped me a lot. I can experience the change in my life style. I am suggesting others at least to watch the videos. Thank you very much for the wonderful course. **- Indugu Rushiraj (M. Tech (Digital Systems and Instrumentation-ETC) IIEST, Shibpur Howrah-711103)**

The course is an enriching and transforming one. This course has helped me understand myself and develop in many ways. I appreciate the way you have designed this course. Thank you very much! I look forward to doing the next level. - **Pankaj Haryan, pankajharyan8@gmail.com**

This course is really helpec e of thing I was searching since 2 years. But I never found stuff that I needed. This is the course which provides me quality learnin s to you sir . . . I'm blessed that I get chance to learn from you . . . Thank you..!! - **Durga Charan (M.Tech Student PEC, Chandigarh), dcharan44@gmail.com**

I am very excited and happy to convey my sincere feelings to you. This course not just only helped me in my teaching but also it helped to develop my personality in terms of my attitude. Sir, as you said in the presentations that it is not just to learn or get certificate but we should be in a position to implement and follow in our day to day life then only it will become life changing course. That's true Sir. Once again my best warm wishes to you sir for your wonderful efforts. - **A. Praveen**

Dear Sir, I am very blessed to have you as my guru. Sir, you have motivated and inspired me to become the human being with the essence of sensitiveness and mindfulness that everyone must possess. I promise you that I will imbibe all the necessary skills with regular practice. With all the valuable motivational tips and suggestions I learned in this course, had bought many essential changes in my thinking pattern. - **Dilip Kumar**

This was the perfect course which I sought one year back. The way you delivered the lectures were lucid. Lot of examples, new technical words were adding credits to it. This course brought Awareness on Communication Skill, Conflict Resolution methods, Non-verbal communication, Self-Actualisation, Interview Skill and Group Discussion. Apart from exam perspective I am satisfied in following this course for 8 weeks successfully bringing awareness around me. Thank you sir. – **Gowtham**

I have completed the course today. Today I feel equally proud as well as happy to have been a part of such a wonderful course. You and your supporting team is great. Thank you for putting this great course for us people. I am looking forward to the advance course in this series. Thank you sir. - **Rahul Parwal (B.Tech, 2016, JIET Jodhpur)**

I am feeling sentimental about end of this course! Two months have passed in no time, I became happy! Everyday in the evening after coming from office I used to watch your videos religiously. Sir I am from technical background, and have never learnt soft skill. Before this course I was knowing that Personality means simply the outlook/dress up/makeup, etc., of a person. After doing this course, I have change a lot and now I have forgotten the term “Anger”. Now I am able to understand the term “Humans and Humanity”. All the short stories used in the lecture were simple but highly effective. Your Etiquette session was superb! And the last week lecture was splendid! The most interesting was the summary in single slide. Keep sharing such thoughts so that humans behave like humans. The whole world has become selfish and inhuman. Most people have removed the word called humanity from their dictionary. I promise you sir I will apply these thoughts in the life. Thank you once again for the splendid course and reminding us that we are HUMANS. – **Vinod Kumar**

Dear Prof. T. Ravichandran, This is the first ever course I have pursued from NPTEL and my journey has been a fruitful one. The content and the structure of the course was well designed. Your short stories throughout the course were amazing. Your questions during the course were thought provoking. My intent of undergoing this course is full-filled and I am immensely grateful to you. - **Richa Baid 29 October 2018**

Respected Prof. Ravichandran, Thanks for your valuable lectures and interesting presentation. I had an excellent journey through the course, learnt so much about myself and my peers. I could map all my activities with the course contents. Thanks for this wonderful opportunity, will never forget this course in my lifetime. It became part and parcel of life & hand in hand in my routine . . . . – **sandanalakshmi@pec.edu**

Respected Sir, At first, whe not think this course would help me. But, today after the exam, I did realize the wonderfulness of the learning through the course res have definitely made me change into a better version of myself. I would really appreciate the team of students and teachers who have been registered and working in the background to answer the queried in the forum and also to conduct those 2 live sessions. So with a big Thank you. I will be definitely registering for Enhancing Soft Skills and Personality. Thank you Sir, - **Yours Sincerely, Sanjith P Hemagiri**

Statistics of Developing Soft Skills and Personality Course:

Timeline	Course Enrollment	Exam Registration
Jul-Sep 2016	14644	2537
Jul-Sep 2017	18054	2237
Aug-Oct 2018	38959	13102
Aug-Oct 2019	50380	17958
Sep-Nov 2020	35163	11265
Aug-Oct 2021	39324	14215
Jul-Dec 2022	41910	16810

Statistics of Enhancing Soft Skills and Personality Course:

Timeline	Course Enrollment	Exam Registration
Feb-Apr 2017	18559	2867
Feb-Mar 2018	16525	3053
Feb-Apr 2019	38562	11126
Feb-Apr 2020	53027	4172
Feb-Apr 2021	44695	12224
Feb-Apr 2022	44033	14085
Jan-Apr 2023	54175	18235

Distributed Systems

By Prof. Rajiv Misra | IIT Patna

Learners enrolled: 3869 | Exam registration: 982

Distributed Systems - Introduction - Dr. Rajiv Misra

ABOUT THE COURSE :

A distributed system is a software system in which components located on networked computers communicate and coordinate their actions by passing messages. The components interact with each other in order to achieve a common goal. Distributed applications (distributed apps) are applications or software that runs on multiple computers within a network at the same time

and can be st r with cloud computing. This course provides an in-depth understanding of fundamental principles and t the theory, algorithms, and systems aspects of distributed computing. New/Emerging topics such as Peer-to-Peer computing, Distributed Hash Table, Google File System, HDFS, Spark, Sensor Networks and Security in Distributed Systems will also be covered for significant impact. Upon completing this course, students will have intimate knowledge about how things work in a distributed environment.

INTENDED AUDIENCE : Any Interested Learners.

PREREQUISITES :

- Minimum: Data Structures and Algorithms
- Ideal: Basic networking concepts, Basic OS concepts (e.g., processes, threads, synchronization, file systems, scheduling etc.), Advanced Programming (Good knowledge in C and C++).

INDUSTRY SUPPORT : Microsoft Research has conducted this course. Various companies like Google, IBM, Cisco, etc, Distributed systems Group and Distributed systems start-ups are working on this field.

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	8 weeks
Category :	◦ Computer Science and Engineering
Credit Points :	2
Level :	Undergraduate/Postgraduate
Start Date :	24 Jul 2023
End Date :	15 Sep 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	21 Aug 2023
Exam Date :	24 Sep 2023 IST

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This is an AICTE approved FDP course

Course layout

Week 1: Introduction to DS, Message Passing, Leader Election, Distributed Models, Causality and Logical Time
Week 2: Logical Time, Global State & Snapshot and Distributed Mutual Exclusion-Non-Token and Quorum based approaches
Week 3: Distributed Mutual Exclusion-Token based approaches, Consensus & Agreement, Checkpointing & Rollback Recovery
Week 4: Deadlock Detection, DSM and Distributed MST
Week 5: Termination Detection, Message Ordering & Group Communication, Fault Tolerance and Self-Stabilization
Week 6: Distributed Randomized Algorithms, DHT and P2P Computing
Week 7: Case Studies: GFS, HDFS, Map Reduce and Spark
Week 8: Case Studies: Sensor Networks, Authentication & Security in DS

Books and references

Nil

Instructor bio

Prof. Rajiv Misra

IIT Patna

Dr. Rajiv Misra is working in Department of Computer Science and Engineering at Indian Institute of Technology Patna, India. He obtained his Ph.D degree from IIT Kharagpur, M.Tech degree in Computer Science and Engineering from the Indian Institute of Technology (IIT) Bombay, and Bachelor's of engineering degree in Computer Science from MNIT Allahabad. His research interests spanned a design of distributed algorithms for Mobile, Adhoc and Sensor Networks, Cloud Computing and Wireless Networks. He has contributed significantly to these areas and published more than 70 papers in high quality journals and

conferences, ar . His h-index is 10 with more than 590 citations. He has authored papers in IEEE Transactions on Mobile Com ution for Parallel and Distributed Systems, IEEE Systems Journal, Ad hoc Networks, Computer Network, Journal of Parallel and Distributed Computing. He has edited a book titled as “Smart Techniques for a Smarter Planet: Towards Smarter Algorithms” for the "Studies in Fuzziness and Soft Computing" book series, Springer (2018). He has supervised four Phd students and currently four Phd students working under his supervision in the area of big data, cloud computing, distributed computing, and sensor networks. He is a senior member of the IEEE and fellow of IETE. He has completed as the Principal Investigator of R&D Project Sponsored by DeiTY entitled as “Vehicular Sensor and Mesh Networks based Future ITS”. He has mentored the online courses on Cloud Computing, Advanced Graph Theory and Distributed Systems in the platform of NPTEL.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
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CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 6 assignments out of the total 8 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

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Enclosure Design Of Electronics Equipment

By Prof. N.V.Chalapathi Rao | IISc Bangalore

Learners enrolled: 1125 | Exam registration: 137

Enclosure Design of Electronics Equipment INTRO

ABOUT THE COURSE:

The purpose of this course is to sensitise a registrant to various aspects of an electronics product. Specifically onnon electrical aspects like mechanical design and detailing. Starting from a need translated into specifications, leading to design and prototyping and ending up in a manufacturable physical prototype.

INTENDED AUDIENCE : 3rd Year UG and PG

PREREQUISITES : 12th Standard

Summary

Course Status : Completed

Course Type :	Elective
Language for course content	English
Duration :	12 weeks
Category :	Electrical, Electronics and Communications Engineering
Credit Points :	3
Level :	Undergraduate/Postgraduate
Start Date :	24 Jul 2023
End Date :	13 Oct 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	18 Aug 2023
Exam Date :	29 Oct 2023 IST

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This is an AICTE approved FDP course

Course layout

1. Introduction to Products
2. Industrial Design and Product Design
3. Types of products ID as per ICSID and WIPO
4. Creativity in Product Design
5. Needs VS features
6. Product Conceptualisation
7. Sketching Basics
8. Sketching as a design tool
9. Using illustration software
10. Role of packaging and enclosures
11. Use of IP approved sets
12. Design of purpose built enclosures
13. Physical simulation of a small system
14. Basics of building a prototype mock up
15. Skills and specification in alternate material
16. Use of off the shelf electronic system

17. Gumstix, Beagle, Raqsbe
18. Kit application. Adaption
19. Development of Enclosures with Laser tools. Use of Flat Plastics
20. Product Specific Enclosure design
21. Application of CAD tools (dessault, Siemens. Autodesk, McNeil)
22. Design for FDM (3d printing)
23. Specifics of Design for production scale-up
24. Design of I/o interfaces Front panel layout and graphics
25. Basics of ergonomis
26. Connectors and wiring
27. Integration and Validation
28. Manufacturing documentation
29. Applicability for industry specific detailing
30. Sourcing and logistics of hardware
31. Areas for specialisation and future study
32. Review of course

Books and references

Nil

Instructor bio

Prof. N.V.Chalapathi Rao

IISc Bangalore

N.V.Chalapathi Rao has worked in Defense R & D for 8 years. Has been delivering lectures since 1984 on topics related to equipment design at CEDT, DESE and CPDM of IISc. Has guided and and built more than 100 projects at M. Tech level

Course certificate

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CRITERIA TO GET A CERTIFICATE

Engineering Thermodynamics

By Prof. V. Raghavan | IIT Madras

Learners enrolled: 1765 | Exam registration: 146

ENGINEERING THERMODYNAMICS - Introduction video

ABOUT THE COURSE:

Engineering Thermodynamics is the first level thermodynamics course for undergraduate students from ME, CH, AE, MM departments. This is a core course. This course will be helpful for the preparation of competitive exams such as GATE.

The objectives of this course are:

(i) To understand the concepts & laws of energy conversion involving heat and work interactions

(ii) To learn about the property changes occurring in substances during energy conversion processes

(iii) To be able to ur ing principles of energy conversion devices
(iv) To appreciate th ng) conversion and estimate the maximum performance attainable in practical devices.

INTENDED AUDIENCE: Under Graduate students

Summary

Course Status :	Completed
Course Type :	Core
Language for course content :	English
Duration :	12 weeks
Category :	◦ Mechanical Engineering ◦ Chemical Engineering
Credit Points :	3
Level :	Undergraduate
Start Date :	24 Jul 2023
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Course layout

Week 1: Basic concepts
Week 2: Tutorial - 1, Work and heat

Week 3: Tutorial - 2 odynamics for systems
Week 4: First law of f(r systems, Tutorial - 3
Week 5: Pure substances, Tutorial - 4
Week 6: Tutorial - 5
Week 7: First law of thermodynamics for control volumes, Tutorial - 6
Week 8: Second law of thermodynamics
Week 9: Tutorial - 7
Week 10: Entropy
Week 11: Tutorial - 8
Week 12: Thermodynamic Cycles, Tutorial - 9

Books and references

1. Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., 2003, 6th Edition, Fundamentals of Thermodynamics, John Wiley and Sons.
2. Moran, M. J. and Shapiro, H. N., 1999, Fundamentals of Engineering Thermodynamics, John Wiley and Sons.
3. Babu, V., Fundamentals of Engineering Thermodynamics, ANE Books Pvt. Ltd. 2018.
4. Venkatesh, A. Basic Engineering Thermodynamics, Universities Press (India) Limited, 2007.

Instructor bio

Prof. V. Raghavan

IIT Madras

Dr. Vasudevan Raghavan is currently working as Professor in the Department of Mechanical Engineering, Indian Institute of Technology Madras (IITM), India. He obtained his PhD degree from IITM and has carried out his post-doctoral research in the University of Nebraska-Lincoln, USA, microgravity droplet combustion simulations. His areas of research include Computational Fluid Dynamics applied to reacting flows, laminar flames, fire modelling, evaporation and combustion of liquid fuel droplets, flame spread and liquid fuel pool combustion, gasification and combustion of coal and biomass. Prof. Raghavan has graduated 10 PhD students and 18 MS students till July 2020. He has authored about 112 international peer reviewed journal articles, 60 international conference articles and a book on Combustion Technology ‚Äì Essentials of Flames and Burners, published by ANE Publishers and John Wiley & Sons Ltd., UK, 2016. He teaches graduate courses such as Theory of Fire Propagation, Fundamentals of Combustion, Combustion Technology and Applied Thermodynamics at the Department of Mechanical Engineering in IITM.

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Fabrication Techniques For Mems-Based Sensors : Clinical Perspective

By Prof. Hardik Jeetendra Pandya | IISc Bangalore

Learners enrolled: 1166 | Exam registration: 203

Intro - Fabrication Techniques for MEMs-based sensors clinical perspective

ABOUT THE COURSE:

This course is designed with an aim of educating students in the area of microtechnology and its use to fabricate sensors and systems. The students will have an exposure to sensors and its importance in the real world. The students will also able to understand how to fabricate some of those sensors. Several examples of engineering devices used in clinical research will be also covered. Class 10000 non-conventional clean room and some equipment within it will also be shown. Below are some of the course outcomes. Ability to understand microfabrication process Understand sensors used in electronics and biomedical areas Understand Clean Room (Class 1 to Class 10000) Understand Microengineering Technology Design the process flow for fabricating microheater required in gas sensors. Design the process flow for fabricating forces sensors for biomedical application. Design microheater for gas sensors as per specifications. Design forces sensors as per

specifications. Unders f microfluidic platforms, micro-cantilevers, flexible force sensors, inter-digitated electrodes, polymer-glass bonding etc. for

INTENDED AUDIENCE : Engineering Students, Faculty from Engineering Colleges

PREREQUISITES : Basic Electronics

INDUSTRY SUPPORT : Companies working in semiconductors and integrated circuits: Intel, AMD, Samsung, Texas Instruments, Analog Devices etc.

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Electrical, Electronics and Communications Engineering
Credit Points :	3
Level :	Undergraduate
Start Date :	24 Jul 2023
End Date :	13 Oct 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	18 Aug 2023
Exam Date :	29 Oct 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Week 1 : Introduction to microengineering devices and its applications

Week 2 : Clean room, contaminants, wafer cleaning processes (DI water, RCA, metallic impurities, etc.).

Week 3 : Introduction to the microheater, force sensors, microfluidic devices, its specifications, and applications.

Week 4 : Masks: Types of masks, Types of Photoresists, Spin Coaters Lithography process: optical lithography, x-ray, and e-beam lithography, lift-off techniques, soft lithography, Use of resists (spin coating, positive and negative photoresists), photoresist pre-baking, exposure, and development.

Week 5 : Etching: Isotropic/anisotropic, selectivity, wet and plasma assisted etching.

Week 6 : Types of wafers and orientations. Techniques of metallization: PVD [(Sputtering – DC, RF, and Magnetron), thermal evaporation, e-beam evaporation].

Week 7 : Chemical Vapor Deposition: Dielectric films (Plasma Enhance Chemical Vapor Deposition (PECVD)), Atomic Layer Deposition

Week 8 : Understanding and designing the process flow for fabricating microengineering devices. Process flow for microheater, force sensors, and microfluidic devices.

Week 9 : Wafer dicing and bonding techniques. Microfluidic Chips

Week 10 : Process Flow for Fabricating Flexible Force Sensors and Force Sensors on Silicon, Process Flow for Fabricating VOC sensors, Biochips

Week 11 : Clinical Research: Problems and Solutions using Microengineering Device

Week 12 : Visit to non-conventional Class 10000 Clean Room and discussing few equipment within

Books and references

1.J.D. Plummer, M.D. Deal, P.G. Griffin, Silicon VLSI Technology, Pearson Education, 2001. S.A. Campbell,

2.The Science and Engineering of Microelectronic Fabrication, Oxford University Press, 2001. S.M. Sze (Ed), VLSI Technology, 2nd Edition, McGraw Hill, 1988 Senturia

3.S. D., Microsystem Design, Kluwer Academic Publisher, 2001 Madou, M Fundamentals of Microfabrication, CRC Press, 1997. Gad-el-Hak, M., Ed.;

4.The MEMS Handbook; CRC Press: New York, NY, 2002.

Instructor bio

Prof. Hardik Jeetendra Pandya

IISc Bangalore

Biodata (Self Introduction): Dr. Hardik J. Pandya is an assistant professor in the Department of Electronic Systems Engineering, Division of Electrical Sciences, IISc Bangalore where he is developing Advanced Microsystems and Biomedical Devices Facility for Clinical Research and Biomedical and Electronic (10-6-10-9) Engineering Systems Laboratory to carry out cutting-edge research on novel devices to solve unmet

problems in biology a recipient of prestigious Early Career Research Award from Science and Engineering Research Board, Government of India a grant of 2.28 Lacs from IISc. He has taught Design of Analog CMOS Integrated Circuits, VLSI technology, and Semiconductor Devices to undergraduate and graduate students from Electronic Engineering, Instrumentation Engineering, and Applied Physics. He seek to understand and exploit novel ways of fabricating microengineering devices using glass, silicon, polymers and integrate with unusual classes of micro/nanomaterials. His research interests include integrating biology/medicine with micro- and nanotechnology to develop innovative tools to solve unmet clinical problems. His current research focuses on flexible sensors for smart catheters, microsensors, microfluidic devices, and microelectromechanical systems, all lately with an emphasis on cancer diagnosis, therapeutics, e-nose, and biomedical device technologies. Before joining IISc, he worked as a postdoctoral scientist in the Department of Mechanical Engineering, Maryland Robotics Center, University of Maryland, College Park and in the Department of Medicine, Brigham and Women's Hospital–Harvard Medical School affiliated with Harvard-MIT Health Science and Technology. His work has resulted in several patents and publications. His work has been highlighted as "Breaking Research News" by The Physicians Committee for Responsible Medicine and has been featured on IEEE Transactions on Biomedical Engineering July 2016 issue cover image as well as IEEE TBME July 2016 feature article for the website and monthly highlights. The work on portable cancer diagnosis tool was also featured on Science Translational Medicine as an Editorial Choice, Breast Cancer Diagnosis, March 2016 and has been highlighted on CapeRay blog as "Biochips and Diagnostic tools" in April 2016. His work has been published in high-quality journals including Lab on a Chip, IEEE Transactions on Biomedical Engineering, IEEE Journal of Microelectromechanical Systems, Sensors and Actuators B, Biosensors and Bioelectronics, Nanoscience and Nanotechnology Letters, Sensors and Transducers, and Journal of Micromechanics and Micromachining.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **29 October 2023** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IISc Bangalore.It will be e-verifiable at nptel.ac.in/noc (http://nptel.ac.in/noc).

Only the e-certificate will be made available. Hard copies will not be dispatched.

Once again, thanks for your interest in our online courses and certification. Happy learning.

Dr. Mahesh Bundele
B.E., M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

Fundamentals Of Artificial Intelligence

By Prof. Shyamanta M. Hazarika | IIT Guwahati

Learners enrolled: 15382 | Exam registration: 2947

Fundamentals of Artificial Intelligence [Introduction]

ABOUT THE COURSE:

What does automatic scheduling or autonomous driving have in common with web search, speech recognition, and machine translation? These are complex real-world problems that span across various practices of engineering! Aim of artificial intelligence (AI) is to tackle these problems with rigorous mathematical tools. The objective of this course is to present an overview of the principles and practices of AI to address such complex real-world problems. The course is designed to develop a basic understanding of problem solving, knowledge representation, reasoning and learning methods of AI.

INTENDED AUDIENCE: Final Year B.Tech; M.Tech and PhD

PREREQUISITES: Basic Course in Probability and Linear Algebra

Summary

(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Course Status :	Completed ()
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Multidisciplinary ◦ Robotics
Credit Points :	3
Level :	Postgraduate
Start Date :	24 Jul 2023
End Date :	13 Oct 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	18 Aug 2023
Exam Date :	28 Oct 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1: AI and Problem Solving by Search
Week 2: Problem Solving by Search
Week 3: Problem Solving by Search
Week 4: Knowledge Representation and Reasoning
Week 5: Knowledge Representation and Reasoning
Week 6: Knowledge Representation and Reasoning
Week 7: Reasoning under Uncertainty

Books and references

1. Patrick Henry Winston, **Artificial Intelligence**, Third Edition, Addison-Wesley Publishing Company, 2004.
2. Nils J Nilsson, **Principles of Artificial Intelligence**, Illustrated Reprint Edition, Springer Heidelberg, 2014.
3. Stuart Russell and Peter Norvig, **Artificial Intelligence: A Modern Approach**, 3rd Edition, PHI 2009.
4. Nils J. Nilsson, **Quest for Artificial Intelligence**, First Edition, Cambridge University Press, 2010.

Instructor bio

Prof. Shyamanta M. Hazarika

IIT Guwahati

Shyamanta M Hazarika is a Professor of Mechanical Engineering at IIT Guwahati and leads the Biomimetic Robotics and Artificial Intelligence Lab. His research interest is in Rehabilitation Robotics. This translates into interest in Artificial Intelligence, Biomimetic Robotics and Robotic Neurorehabilitation. Prior to joining IIT Guwahati, he was with the Department of Computer Science and Engineering, Tezpur University. He has been a Vertretungsprofessur of Cognitive Systems and NeuroInformatics, University of Bremen, Germany. Prof. Hazarika holds a B.E. in Mechanical Engineering from Assam Engineering College, Guwahati, India; M.Tech. in Robotics from Center for Robotics, IIT Kanpur, India. He completed his PhD in Artificial Intelligence (Knowledge Representation and Reasoning) from School of Computing, University of Leeds, England.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **28 October 2023** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.

Dr. Mahesh Bundele
B.E., M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

Google Cloud Computing Foundations

By Prof. Soumya Kanti Ghosh | IIT Kharagpur

Learners enrolled: 32388 | Exam registration: 7393

Course Introduction

Those enrolling for the course should ideally:

- Have basic IT knowledge and be interested in learning more about Cloud and ML.
- Have competency in at least one language (such as Python, Java).
- Be familiar with the basics of shell scripting, SQL.

Summary

(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	8 weeks
Category :	◦ Computer Science and Engineering
Credit Points :	2
Level :	Undergraduate
Start Date :	21 Aug 2023
End Date :	13 Oct 2023
Enrollment Ends :	21 Aug 2023
Exam Registration Ends :	15 Sep 2023
Exam Date :	29 Oct 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Books and references

https://cloud.google.com/docs/ (https://www.google.com/url?q=https://cloud.google.com/docs/&sa=D&source=hangouts&ust=1577270183094000&usg=AFQjCNEgAX6BTsqWV7wjGs_zPmsoby7Ilw)
https://www.qwiklabs.com/ (https://www.google.com/url?q=https://www.qwiklabs.com/&sa=D&source=hangouts&ust=1577270200298000&usg=AFQjCNFMhDzNeGFgjDHD2SqZPmO9--cTGg)

Instructor bio

Prof. Soumya Kanti Ghosh

IIT Kharagpur

Prof. Soumya K. Ghosh received the Ph.D. and M.Tech. degrees from Department of Computer Science and Engineering, Indian Institute of Technology (IIT), Kharagpur, India. Presently, he is a Professor with Department of Computer Science and Engineering, IIT Kharagpur. Before joining IIT Kharagpur, he worked for the Indian Space Research Organization in the area of satellite remote sensing and geographic information systems. He has more than 200 research papers in reputed journals and conference proceedings. His research interests include spatial data science, spatial web services and cloud computing.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **29 October 2023** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 6 assignments out of the total 8 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

Innovation By Design

By Prof. B.K. Chakravarthy | IIT Bombay

Learners enrolled: 2010 | Exam registration: 327

Course Introduction: Innovation by Design

ABOUT THE COURSE :

In today's world, there are so many challenges and problems that needs to be addressed. In this situation, innovation is what provides the solution that will benefit the maximum number of users. And such innovation is often enabled by design. This course familiarizes you with the concept of "innovation" and the journey of a design idea from the identification of a problem to a final

solution that ha t on a large community of users. Through case studies that focus on the "seven concerns of innovation", you vation process requires empathy, effective error, constant user interaction and effective collaboration.

INTENDED AUDIENCE : Open to all

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	4 weeks
Category :	◦ Design Engineering ◦ Patents and Intellectual Property Rights
Credit Points :	1
Level :	Undergraduate
Start Date :	24 Jul 2023
End Date :	18 Aug 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	21 Aug 2023
Exam Date :	24 Sep 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course lay (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Week 1 :

- Module 1 – Introduction,
- Module 2 - First C: The Cause

Week 2 :

- Module 3 - Second C: The Context,
- Module 4 - Third C: The Comprehension

Week 3 :

- Module 5 - Fourth C: The Check,
- Module 6 - Fifth C: The Conception

Week 4 :

- Module 7 - Sixth C: The Crafting,
- Module 8 - Seventh C: The Connection

Books and references

References

1. Chakku 7C's Link (http://www.idc.iitb.ac.in/~chakku/chakku7Cs.pdf)
2. Collaborative Model For Innovation Link (http://www.idc.iitb.ac.in/~chakku/COLLABORATIVE_MODEL_FOR_INNOVATION.pdf)
3. Pitfalls in the Innovation process Link (http://www.idc.iitb.ac.in/~chakku/Pitfalls_in_the_innovation_process.pdf)
4. Innovation By Design – Collaboration is the key to cross the Pitsfalls in the Innovation Process Link (http://www.idc.iitb.ac.in/~chakku/Innovation_by_Design.pdf)

Instructor bio

Prof. B.K. Chakravarthy

IIT Bombay

Prof. B. K. Chakr novation by Design at the Industrial Design Centre (IDC), IIT Bombay. He has set up the Shenoy Innovation Studi udents and young designers are given the opportunity to work on live projects and benefit from expertise in a range of interrelated fields. Prof. Chakravarthy works closely with other academics engaged in cutting-edge research at IIT Bombay and has played a key role in translating such research into products that reach the hands of users. A Collaborative Model for New Product Innovation, an outcome of Prof. Chakravarthys doctoral research, has had wide application in the industry. Prof. Chakravarthy has also worked frequently with government departments and occupational communities engaged in essential services.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **24 September 2023** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 3 assignments out of the total 4 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IIT Bombay.It will be e-verifiable at nptel.ac.in/noc (http://nptel.ac.in/noc).

Only the e-certificate will be made available. Hard copies will not be dispatched.

Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

Integrated Waste Management For A Smart City

By Prof. Brajesh Kumar Dubey | IIT Kharagpur

Learners enrolled: 5223 | Exam registration: 2091

Prof Brajesh Kumar Dubey

ABOUT THE COURSE:

This course has emphasises on Integrated Solid Waste Management aspects within the broad subject area of Integrated Waste Management for a Smart City. The issues of Municipal Solid Waste (MSW) management, Construction and Demolition (C&D) Waste and Electronic Waste Management will be covered in this course. The topics will include: generation rates and waste composition; Integrated waste management issues, collection, recovery, reuse, recycling, energy-from-waste, and landfilling; Biological treatment of the organic waste fraction - direct land application, composting, and anaerobic digestion. The environmental impact of waste management and its relationship on the big picture sustainable development and smart city development will be discussed. A major focus of this course will be the role of MSW management within the various initiatives of the Govt. of India including: Swachh Bharat Mission, Smart Cities as well as Make in India. The challenges of waste management for smart cities will also be discussed taking case studies from the first list of 20 smart cities identified in the first phase for this program. This will be followed by overview of the Construction and Demolition (C&D) Waste and Electronic Waste (E-Waste) management issues in India in general and for the smart cities in particular. The new rules with respect of C&D Waste and E-Waste Management will be covered. The challenges of managing these waste streams effectively will be discussed.

INTENDED AUDIENCE The course will be beneficial for B.Tech/M.Tech/B.Sc/M.Sc/Research Scholars/Faculty members from different institutions. In addition, we will strongly encourage engineers/professionals working in any area related to waste management should consider taking advantage from this unique application orientated course. Regulators (SPCB, CPCB and MOEF professionals) and policy makers will also benefit from this course.

PRE-REQUISITES Environmer duction to Environmental Engineering
INDUSTRY SUPPORT - Larsen and p of Industries, Aditya Group of Industries, M&D Environment

Summary

About Swayam (https://swayam.gov.in/about) | All Courses | ()

Course Status :	Completed
Course Type :	Core
Language for course content :	English
Duration :	12 weeks
Category :	◦ Civil Engineering ◦ Environment
Credit Points :	3
Level :	Postgraduate
Start Date :	24 Jul 2023
End Date :	13 Oct 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	18 Aug 2023
Exam Date :	29 Oct 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1: Introduction to Solid Waste Management
Week 2: Municipal Solid Waste Characteristics and Quantities
Week 3: MSW Rules 2016, Swachh Bharat Mission and Smart Cities Program
Week 4: Municipal Solid Waste Collection, Transportation, Segregation and Processing
Week 5: Disposal of Municipal Solid Waste: Landfill
Week 6: Biochemical Processes and Composting
Week 7: Energy Recovery from Municipal Solid Waste
Week 8: Current Issues in Solid Waste Management and Review of MSW Management Status in First List of 20 Smart Cities in the Country
Week 9: Construction and Demolition (C&D) Waste Management - Overview
Week 10: C&D Waste – Regulation, Beneficial Reuse of C&D Waste Materials
Week 11: Electronic Waste (E-Waste) Management – Issues and Status in India and Globally

Books and references

1) William A Worrell and P. Aarne Veslind Solid Waste Engineering, 2nd Edition (SI Edition) Cengage Learning, 2012 (ISBN-13: 978-1-4390-6217-3)
2) George Tchobanoglous, Hilary Theisen and Samuel A Vigil, Integrated Solid Waste management, Tata McGraw Hill
3) Manual on Solid Waste Management, prepared by The Central Public Health and Environmental Engineering Organization(CPHEEO), India
4) MSW Management Rules 2016, Govt. of India, available online at CPCB website.
5) Electronic Waste Management Rules 2016, Govt. of India, available online at CPCB website

Instructor bio

Prof. Brajesh Kumar Dubey

IIT Kharagpur

Professor Brajesh Kr. Dubey has his bachelors degree in Civil Engineering (Hons) from Indian Institute of Technology (IIT) Kharagpur, India and PhD in Environmental Engineering Sciences, University of Florida, Gainesville, Florida, USA. He is presently Associate Professor (Integrated Waste Management and Sustainable Engineering) in the Division of Environmental Engineering and Management at Indian Institute of Technology (IIT), Kharagpur, India. Dr. Dubey has more than 17 years of research, teaching, training and industrial outreach experience in the areas of Integrated Solid and Hazardous Waste Management, and Sustainable Engineering and Application of Life Cycle Assessment techniques. He also works in the area of Life Cycle Analysis and Sustainable Engineering. He has been teaching courses in the area of Solid Waste Management, Hazardous Waste Management, Life Cycle Analysis and Environmental Risk Assessment among other courses for nearly a decade. He has taught at several universities in USA, Canada, New Zealand, China andIndia. He has also conducted training programs in the Integrated Waste Management areas including that for Electronics Waste. Dr. Dubey has authored/co- authored more than 200 publications in his area of expertise and have presented at several national and international conferences. He has worked as Waste Management Expert for UN agencies and World Bank.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **29 October 2023** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not

Introduction To Algorithms And Analysis

By Prof. Sourav Mukhopadhyay | IIT Kharagpur

Learners enrolled: 5789 | Exam registration: 893

Introduction to Algorithms and Analysis

ABOUT THE COURSE :

This course provides an introduction to mathematical modeling of computational problems. It covers the common algorithms, algorithmic paradigms, and data structures used to solve these problems. The course emphasizes the relationship between algorithms and programming, and introduces basic performance measures and analysis techniques for these problems.

INTENDED AUDIENCE : UG,PG, B. Tech., M. Tech., M. Sc.
INDUSTRY SUPPORT : IT companies

Summary

Course Status : Completed

Course Type :	Elective
Language for course conter	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering
Credit Points :	3
Level :	Undergraduate/Postgraduate
Start Date :	24 Jul 2023
End Date :	13 Oct 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	18 Aug 2023
Exam Date :	28 Oct 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1: Sorting problem, time complexity, asymptotic analysis.
Week 2: Solving recurrence, Divide-and-Conquer.
Week 3: Quicksort and Heap Sort, Decision Tree.
Week 4: Linear time Sorting, Order Statistics.
Week 5: Hash Function, Binary Search Tree (BST) Sort.
Week 6: Randomly build BST, Red Black Tree, Augmentation of data structure.
Week 7: Van Emde Boas, Amortized analysis, Computational Geometry.
Week 8: Dynamic Programming, Graphs, Prim's Algorithms.
Week 9: BFS & DFS, Shortest path problem, Dijktra, Bellman Ford.
Week 10: All pairs shortest path, Floyd-Warshall, Johnson Algorithm.
Week 11: More amortized analysis, disjoint set data structure.
Week 12: Network flow, computational complexity.

Books and refere

1) Cormen, Thomas, Charles Leiserson, Ronald Rivest, and Clifford Stein. Introduction to Algorithms. 3rd ed. MIT Press, 2009. ISBN: 9780262033848.
2) "Computational Geometry- Algorithms and applications" by Mark de Berg, Otfried Cheong, Marc Van Kreveld and Mark Overmars. 3rd Edition, Springer

Instructor bio

Prof. Sourav Mukhopadhyay

IIT Kharagpur

Sourav Mukhopadhyay is an Associate Professor, Department of Mathematics at Indian Institute of Technology Kharagpur. He has completed his B.Sc (Honours in Mathematics) in1997 from University of Calcutta, India. He has done M.Stat (in statistics) and M.Tech (in computer science) from Indian Statistical Institute, India, in 1999 and 2001 respectively. He worked with Cryptology Research Group at Indian Statistical Institute as a PhD student and received his Ph.D. degree in Computer Science from there in 2007. He was a Research Assistant at the Computer Science department of School of Computing, National University of Singapore (NUS). He visited Inria Rocquencourt, project CODES, France and worked as a post-doctoral research fellows at the School of Computer Engineering, Nanyang Technological University (NTU), Singapore. He was a post-doctoral research fellows and a part time Lecturer with School of Electronic Engineering, Dublin City University (DCU), Ireland.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **28 October 2023** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

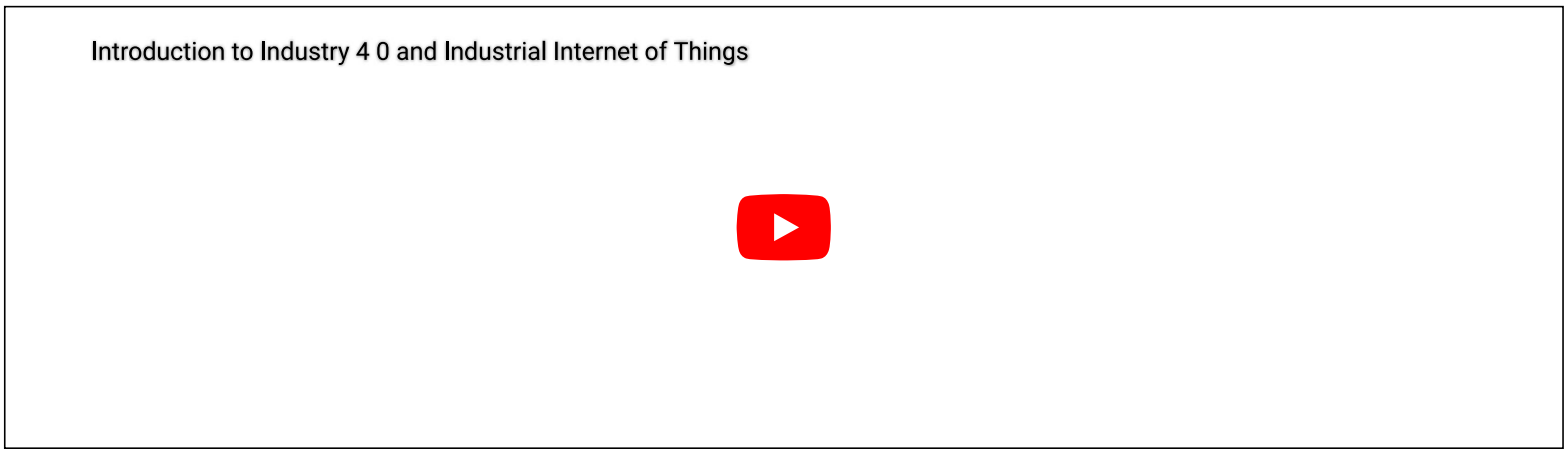
YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IIT Kharagpur .It will be

Introduction To Industry 4.0 And Industrial Internet Of Things

By Prof. Sudip Misra | IIT Kharagpur

Learners enrolled: 21258 | Exam registration: 10770



ABOUT THE COURSE :

Industry 4.0 concerns the transformation of industrial processes through the integration of modern technologies such as sensors, communication, and computational processing. Technologies such as Cyber Physical Systems (CPS), Internet of Things (IoT), Cloud Computing, Machine Learning, and Data Analytics are considered to be the different drivers necessary for the transformation. Industrial Internet of Things (IIoT) is an application of IoT in industries to modify the various existing industrial systems. IIoT links the automation system with enterprise, planning and product lifecycle.This course has been organized into the following modules:

INTENDED AUDIENCE : CSE, IT, ECE, EE, Instrumentation Engg, Industrial Engineering, Industry Professionals
PRE-REQUISITES : Basic knowledge of computer and internet
INDUSTRY SUPPORT : All Industrial Sectors

Summary

Course Status :	Completed
Course Type :	Core
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering
Credit Points :	3

Level :	Postgraduate
Start Date :	24 Jul 2023
End Date :	13 Oct 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	18 Aug 2023
Exam Date :	28 Oct 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1 : Introduction: Sensing & actuation, Communication-Part I, Part II, Networking-Part I, Part II
Week 2 : Industry 4.0: Globalization and Emerging Issues, The Fourth Revolution, LEAN Production Systems, Smart and Connected Business Perspective, Smart Factories
Week 3 : Industry 4.0: Cyber Physical Systems and Next Generation Sensors, Collaborative Platform and Product Lifecycle Management, Augmented Reality and Virtual Reality, Artifical Intelligence, Big Data and Advanced Analysis
Week 4 : Cybersecurity in Industry 4.0, Basics of Industrial IoT: Industrial Processes-Part I, Part II, Industrial Sensing & Actuation, Industrial Internet Systems.
Week 5 : IIoT-Introduction, Industrial IoT: Business Model and Referece Architerture: IIoT-Business Models-Part I, Part II, IIoT Reference Architecture-Part I, Part II.
Week 6 : Industrial IoT- Layers: IIoT Sensing-Part I, Part II, IIoT Processing-Part I, Part II, IIoT Communication-Part I.
Week 7 : Industrial IoT- Layers: IIoT Communication-Part II, Part III, IIoT Networking-Part I, Part II, Part III.
Week 8 : Industrial IoT: Big Data Analytics and Software Defined Networks: IIoT Analytics - Introduction, Machine Learning and Data Science - Part I, Part II, R and Julia Programming, Data Management with Hadoop.
Week 9 : Industrial IoT: Big Data Analytics and Software Defined Networks: SDN in IIoT-Part I, Part II, Data Center Networks, Industrial IoT: Security and Fog Computing: Cloud Computing in IIoT-Part I, Part II.
Week 10 : Industrial IoT: Security and Fog Computing - Fog Computing in IIoT, Security in IIoT-Part I, Part II, Industrial IoT- Application Domains: Factories and Assembly Line, Food Industry.
Week 11 : Industrial IoT- Application Domains: Healthcare, Power Plants, Inventory Management & Quality Control, Plant Safety and Security (Including AR and VR safety applications), Facility Management.
Week 12 : Industrial IoT- Application Domains: Oil, chemical and pharmaceutical industry, Applications of UAVs in Industries, Real case studies :
Case study - I : Milk Processing and Packaging Industries
Case study - II: Manufacturing Industries - Part I
Case study - III : Manufacturing Industries - Part II
Case study - IV : Student Projects - Part I
Case study - V : Student Projects - Part II
Case study - VI : Virtual Reality Lab
Case study - VII : Steel Technology Lab

Books and references

1) S. Misra, A. Mukherjee, and A. Roy, 2020. *Introduction to IoT*. Cambridge University Press.
Availability: https://www.amazon.in/Introduction-IoT-Sudip-Misra/dp/1108959741/ref=sr_1_1?dchild=1&keywords=sudip+misra&qid=1627359928&sr=8-1 (https://www.amazon.in/Introduction-IoT-Sudip-Misra/dp/1108959741/ref=sr_1_1?dchild=1&keywords=sudip+misra&qid=1627359928&sr=8-1)
2) S. Misra, C. Roy, and A. Mukherjee, 2020. *Introduction to Industrial Internet of Things and Industry 4.0.* CRC Press.

Dr. Mahesh Bundele
B.E., M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

Availability: https://www.amazon.in/dp/10 _3?dchild=1&keywords=sudip+misra&qid=1627359971&sr=8-3 (https://www.amazon.in/dp/1032146753/ref=sr_1_3?dchild=1&keywords=sudip+misra&qid=162 (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)
3) Research Papers

Instructor bio

Prof. Sudip Misra

IIT Kharagpur

Dr. Sudip Misra is a Professor in the Department of Computer Science and Engineering at the Indian Institute of Technology Kharagpur. Prior to this he was associated with Cornell University (USA), Yale University (USA), Nortel Networks (Canada) and the Government of Ontario (Canada). He received his Ph.D. degree in Computer Science from Carleton University, in Ottawa, Canada. He has several years of experience working in the academia, government, and the private sectors in research, teaching, consulting, project management, architecture, software design and product engineering roles.His current research interests include Wireless Ad Hoc and Sensor Networks, Internet of Things (IoT), Computer Networks, Learning Systems, and algorithm design for emerging communication networks. Dr. Misra is the author of over 260 scholarly research papers, including 140+ reputed journal papers. He has won seven research paper awards in different conferences. Recently, he and his students won Samsung Innovation Award and the IEEE ComSoc Student Competition. He was awarded the fellow of NASI. He was also awarded the IEEE ComSoc Asia Pacific Outstanding Young Researcher Award at IEEE GLOBECOM 2012, Anaheim, California, USA. He was also the recipient of several academic awards and fellowships such as the Young Scientist Award (National Academy of Sciences, India), Young Systems Scientist Award (Systems Society of India), Young Engineers Award (Institution of Engineers, India), (Canadian) Governor General's Academic Gold Medal at Carleton University, the University Outstanding Graduate Student Award in the Doctoral level at Carleton University and the National Academy of Sciences, India - Swarna Jayanti Puraskar (Golden Jubilee Award).Dr. Misra was also awarded the Canadian Government's prestigious NSERC Post-Doctoral Fellowship and the Humboldt Research Fellowship in Germany. Dr. Misra has been serving the editorial boards of distinguished journals such as the Transactions on Vehicular Technology, Transactions on Mobile Computing, International Journal of Communication Systems (Wiley) and the IET Wireless Sensor Systems (UK). In the past, he served as the Associate Editor/Editorial Board Member of the Telecommunication Systems Journal (Springer), Security and Communication Networks Journal (Wiley), and the EURASIP Journal of Wireless Communications and Networking, IET Communications Journal, and the Computers and Electrical Engineering Journal (Elsevier).Dr. Misra has published 10 books in the areas of wireless ad hoc networks, wireless sensor networks, wireless mesh networks, communication networks and distributed systems, network reliability and fault tolerance, and information and coding theory, published by reputed publishers such as Cambridge University Press, Springer, Wiley, and World Scientific.

Course certificate

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The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
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Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRİTERİA TO GET A CERTİFICATE

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

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Introduction To Internet Of Things

By Prof. Sudip Misra | IIT Kharagpur

Learners enrolled: 60188 | Exam registration: 28690

Prof Sudip Misra

ABOUT THE COURSE :

Internet of Things (IoT) is presently a hot technology worldwide. Government, academia, and industry are involved in different aspects of research, implementation, and business with IoT. IoT cuts across different application domain verticals ranging from civilian to defence sectors. These domains include agriculture, space, healthcare, manufacturing, construction, water, and mining, which are presently transitioning their legacy infrastructure to support IoT. Today it is possible to envision pervasive connectivity, storage, and computation, which, in turn, gives rise to building different IoT solutions. IoT-based applications such as innovative shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT based systems. Therefore, it is very important to learn the fundamentals of this emerging technology.

INTENDED AUDIENCE : CSE, IT, ECE, EE, Instrumentation Engg, Industrial Engineering

PREREQUISITES : Basic vledge (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Summary

About Swayam (https://swayam.gov.in/about) | All Courses | ()

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering ◦ Programming ◦ Systems
Credit Points :	3
Level :	Undergraduate
Start Date :	24 Jul 2023
End Date :	13 Oct 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	18 Aug 2023
Exam Date :	29 Oct 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1: Introduction to IoT: Part I, Part II, Sensing, Actuation, Basics of Networking: Part-I
Week 2: Basics of Networking: Part-II, Part III, Part IV, Communication Protocols: Part I, Part II
Week 3: Communication Protocols: Part III, Part IV, Part V, Sensor Networks: Part I, Part II

Week 4: Sensor Networks, Part V, Part VI, Machine-to-Machine Communications
Week 5: Interoperability in IoT, Arduino Programming: Part I, Part II, Integration of Sensors and Actuators with Arduino: Part I, Part II
Week 6: Introduction to Python programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi
Week 7: Implementation of IoT with Raspberry Pi (contd), Introduction to SDN, SDN for IoT
Week 8: SDN for IoT (contd), Data Handling and Analytics, Cloud Computing
Week 9: Cloud Computing(contd), Sensor-Cloud
Week 10: Fog Computing, Smart Cities and Smart Homes
Week 11: Connected Vehicles, Smart Grid, Industrial IoT
Week 12: Industrial IoT (contd), Case Study: Agriculture, Healthcare, Activity Monitoring

Books and references

1) S. Misra, A. Mukherjee, and A. Roy, 2020. *Introduction to IoT*. Cambridge University Press.
Availability: https://www.amazon.in/Introduction-IoT-Sudip-Misra/dp/1108959741/ref=sr_1_1?dchild=1&keywords=sudip+misra&qid=1627359928&sr=8-1 (https://www.amazon.in/Introduction-IoT-Sudip-Misra/dp/1108959741/ref=sr_1_1?dchild=1&keywords=sudip+misra&qid=1627359928&sr=8-1)
2) S. Misra, C. Roy, and A. Mukherjee, 2020. *Introduction to Industrial Internet of Things and Industry 4.0.* CRC Press.
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3) Research Papers

Instructor bio

Prof. Sudip Misra

IIT Kharagpur

Dr. Sudip Misra is a Professor in the Department of Computer Science and Engineering at the Indian Institute of Technology Kharagpur. Prior to this he was associated with Cornell University (USA), Yale University (USA), Nortel Networks (Canada) and the Government of Ontario (Canada). He received his Ph.D. degree in Computer Science from Carleton University, in Ottawa, Canada. He has several years of experience working in the academia, government, and the private sectors in research, teaching, consulting, project management, architecture, software design and product engineering roles.His current research interests include Wireless Ad Hoc and Sensor Networks, Internet of Things (IoT), Computer Networks, Learning Systems, and algorithm design for emerging communication networks. Dr. Misra is the author of over 260 scholarly research papers, including 140+ reputed journal papers. He has won seven research paper awards in different conferences. Recently, he and his students won Samsung Innovation Award and the IEEE ComSoc Student Competition. He was awarded the fellow of NASI. He was also awarded the IEEE ComSoc Asia Pacific Outstanding Young Researcher Award at IEEE GLOBECOM 2012, Anaheim, California, USA. He was also the recipient of several academic awards and fellowships such as the Young Scientist Award (National Academy of Sciences, India), Young Systems Scientist Award (Systems Society of India), Young Engineers Award (Institution of Engineers, India), (Canadian) Governor General's Academic Gold Medal at Carleton University, the University Outstanding Graduate Student Award in the Doctoral level at Carleton University and the National Academy of Sciences, India - Swarna Jayanti Puraskar (Golden Jubilee Award).Dr. Misra was also awarded the Canadian Government's prestigious NSERC

Post-Doctoral Fellowship Research Fellowship in Germany. Dr. Misra has been serving the editorial boards of distinguished journals such as the Tran ...ular Technology, Transactions on Mobile Computing, International Journal of Communication Systems (Wiley) and the IET Wireless Sensor Systems (UK). In the past, he served as the Associate Editor/Editorial Board Member of the Telecommunication Systems Journal (Springer), Security and Communication Networks Journal (Wiley), and the EURASIP Journal of Wireless Communications and Networking, IET Communications Journal, and the Computers and Electrical Engineering Journal (Elsevier).Dr. Misra has published 10 books in the areas of wireless ad hoc networks, wireless sensor networks, wireless mesh networks, communication networks and distributed systems, network reliability and fault tolerance, and information and coding theory, published by reputed publishers such as Cambridge University Press, Springer, Wiley, and World Scientific.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
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Date and Time of Exams: **29 October 2023** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
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CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

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Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

Introduction To Machine Learning - IITKGP

By Prof. Sudeshna Sarkar | IIT Kharagpur

Learners enrolled: 24981 | Exam registration: 5481

Introduction

ABOUT THE COURSE :

This course provides a concise introduction to the fundamental concepts in machine learning and popular machine learning algorithms. We will cover the standard and most popular supervised learning algorithms including linear regression, logistic regression, decision trees, k-nearest neighbour, an introduction to Bayesian learning and the naïve Bayes algorithm, support vector machines and kernels and neural networks with an introduction to Deep Learning. We will also cover the basic clustering algorithms. Feature reduction methods will also be discussed. We will introduce the basics of computational learning theory. In the course we will discuss various issues related to the application of machine learning algorithms. We will discuss hypothesis space, overfitting, bias and variance, tradeoffs between representational power and learnability, evaluation strategies and cross-validation. The course will be accompanied by hands-on problem solving with programming in Python and some tutorial sessions.

INTENDED AUDIENCE B... UG, PG, BE, ME, MSc, M.S, PhD

PRE-REQUISITES Basic programming skills (in Python), algorithm design, basics of probability & statistics

INDUSTRY SUPPORT Data science companies and many other industries value machine learning skills.

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	8 weeks
Category :	◦ Computer Science and Engineering ◦ Artificial Intelligence ◦ Data Science ◦ Programming ◦ Robotics
Credit Points :	2
Level :	Undergraduate/Postgraduate
Start Date :	24 Jul 2023
End Date :	15 Sep 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	21 Aug 2023
Exam Date :	24 Sep 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

About Swayam (https://swayam.gov.in/about) | All Courses | ()

Week 1: Introduction: Basic definitions, types of learning, hypothesis space and inductive bias, evaluation, cross-validation
Week 2: Linear regression, Decision trees, overfitting
Week 3: Instance based learning, Feature reduction, Collaborative filtering based recommendation
Week 4: Probability and Bayes learning
Week 5: Logistic Regression, Support Vector Machine, Kernel function and Kernel SVM
Week 6: Neural network: Perceptron, multilayer network, backpropagation, introduction to deep neural network
Week 7: Computational learning theory, PAC learning model, Sample complexity, VC Dimension, Ensemble learning
Week 8: Clustering: k-means, adaptive hierarchical clustering, Gaussian mixture model

Books and references

1. Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997.
2. Introduction to Machine Learning Edition 2, by Ethem Alpaydin

Instructor bio

Prof. Sudeshna Sarkar

IIT Kharagpur

Prof. Sudeshna Sarkar is a Professor and currently the Head in the Department of Computer Science and Engineering at IIT Kharagpur. She completed her B.Tech. in 1989 from IIT Kharagpur, MS from University of California, Berkeley, and PhD from IIT Kharagpur in 1995. She sered briefly in the faculty of IIT Guwahati and at IIT Kanpur before joining IIT Kharagpur in 1998. Her research interests are in Machine Learning, Natural Language Processing, Data and Text Mining.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **24 September 2023** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
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CRITERIA TO GET A C (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Average assignment score = 25% of average of best 6 assignments out of the total 8 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

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Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

Introduction To Machine Learning

By Prof. Balaraman Ravindran | IIT Madras

Learners enrolled: 37866 | Exam registration: 8505

ABOUT THE COURSE :

With the increased availability of data from varied sources there has been increasing attention paid to the various data driven disciplines such as analytics and machine learning. In this course we intend to introduce some of the basic concepts of machine learning from a mathematically well motivated perspective. We will cover the different learning paradigms and some of the more popular algorithms and architectures used in each of these paradigms.

INTENDED AUDIENCE : This is an elective course. Intended for senior UG/PG students. BE/ME/MS/PhD

PREREQUISITES : We w students know programming for some of the assignments.If the students have done introductory courses on probability f gebra would be helpful. We will review some of the basic topics in the first two weeks as well.
INDUSTRY SUPPORT : Any company in the data analytics/data science/big data domain would value this course.

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering ◦ Artificial Intelligence ◦ Data Science ◦ Programming ◦ Robotics
Credit Points :	3
Level :	Undergraduate/Postgraduate
Start Date :	24 Jul 2023
End Date :	13 Oct 2023
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Course layout (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Week 0: Probability Theory, Linear Algebra, Convex Optimization - (Recap)
Week 1: Introduction: Statistical Decision Theory - Regression, Classification, Bias Variance
Week 2: Linear Regression, Multivariate Regression, Subset Selection, Shrinkage Methods, Principal Component Regression, Partial Least squares
Week 3: Linear Classification, Logistic Regression, Linear Discriminant Analysis
Week 4: Perceptron, Support Vector Machines
Week 5: Neural Networks - Introduction, Early Models, Perceptron Learning, Backpropagation, Initialization, Training & Validation, Parameter Estimation - MLE, MAP, Bayesian Estimation
Week 6: Decision Trees, Regression Trees, Stopping Criterion & Pruning loss functions, Categorical Attributes, Multiway Splits, Missing Values, Decision Trees - Instability Evaluation Measures
Week 7: Bootstrapping & Cross Validation, Class Evaluation Measures, ROC curve, MDL, Ensemble Methods - Bagging, Committee Machines and Stacking, Boosting
Week 8: Gradient Boosting, Random Forests, Multi-class Classification, Naive Bayes, Bayesian Networks
Week 9: Undirected Graphical Models, HMM, Variable Elimination, Belief Propagation
Week 10: Partitional Clustering, Hierarchical Clustering, Birch Algorithm, CURE Algorithm, Density-based Clustering
Week 11: Gaussian Mixture Models, Expectation Maximization
Week 12: Learning Theory, Introduction to Reinforcement Learning, Optional videos (RL framework, TD learning, Solution Methods, Applications)

Books and references

1. The Elements of Statistical Learning, by Trevor Hastie, Robert Tibshirani, Jerome H. Friedman (freely available online)
2. Pattern Recognition and Machine Learning, by Christopher Bishop (optional)

Instructor bio

Prof. Balaraman Ravindran

IIT Madras

Prof. Balaraman Ravindran is currently an Professor in Computer Science at IIT Madras and Mindtree Faculty Fellow . He has nearly two decades of research experience in machine learning and specifically reinforcement learning. Currently his research interests are centered on learning from and through interactions and span the areas of data mining, social network analysis, and reinforcement learning.

Course certific (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

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- NPTEL team

Introduction To Operating Systems

By Prof. Chester Rebeiro | IIT Madras

Learners enrolled: 16146 | Exam registration: 2521

#1 Introduction to the Course | Introduction to Operating Systems

ABOUT THE COURSE :

Operating systems (OS) provide the crucial interface between a computer's hardware and the applications that run on it. It allows us to write programs without bothering much about the hardware. It also ensures that the computer's resources such as its CPU, hard disk, and memory, are appropriately utilized. In this course, we dwell into how the OS manages to do all this in an efficient manner. This is an introductory course, for students with prior knowledge of computer organization. The course is based on an OS called xv6, which in many ways is similar to the Linux operating systems.

INTENDED AUDIENCE B.E./Msc (Computer Science)

PRE-REQUISITES Good k mputer Organization and Architecture, x86 Assembly level programming.

(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Summary

Course Status :	Completed
Course Type :	Core
Language for course content :	English
Duration :	8 weeks
Category :	◦ Computer Science and Engineering ◦ Systems
Credit Points :	2
Level :	Undergraduate
Start Date :	24 Jul 2023
End Date :	15 Sep 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	21 Aug 2023
Exam Date :	24 Sep 2023 IST

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Course layout

Week 1 : Introduction
Week 2 : Memory Management
Week 3 : Processes
Week 4 : Interrupts and Context Switching
Week 5 : Scheduling
Week 6 : Synchronization
Week 7 : Deadlocks
Week 8 : Operating System Security

Books and refe (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

1. "xv6: a simple, Unix-like teaching operating system", Revision 8, by Russ Cox, Frans Kaashoek, Robert Morris
2. "Operating System Concepts", 8th edition, by Adraham Silberschatz, Pert B. Galvin, and Greg Gagne, Wiley-India edition
3. "Modern Operating Systems", 3rd edition, by Andrew S. Tanenbaum, PHI Learning Private Limited, New Delhi
4. The xv6 source code is available via git clone git://pdos.csail.mit.edu/xv6/xv6.git

Instructor bio

Prof. Chester Rebeiro

IIT Madras

Chester Rebeiro is an Assistant Professor at IIT Madras. He completed his PhD from IIT Kharagpur and a post-doc from Columbia University. His research interests are in cryptography, system security, especially hardware and operating system security.
(webpage : http://www.cse.iitm.ac.in/~chester/)

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **24 September 2023** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 6 assignments out of the total 8 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IIT Madras .It will

be e-verifiable at nptel.a el.ac.in/noc).

(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Only the e-certificate will be made available. Hard copies will not be dispatched.

About Swayam (https://swayam.gov.in/about) | All Courses | ()

Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

Laser Based Manufacturing

By Prof. Shrikrishna N. Joshi | IIT Guwahati

Learners enrolled: 2584 | Exam registration: 778

Laser Based Manufacturing [Intro Video]

About the Course:

This is a basic course on applications of laser technology in manufacturing. The subject laser technology has a very wide range of applications in the product development, manufacturing, surface engineering, and instrumentation. The course emphasizes the fundamental concepts of the laser technology viz. principle of working, characteristics, types, monitoring and control. There is a comprehensive coverage of physical concepts, process characteristics, mathematical formulations along with examples of various laser based manufacturing processes such as of laser machining (cutting), laser forming, laser welding, laser surface treatment and laser based additive manufacturing. There is a state-of-the-art description of newer and advanced applications of the laser in industry. This

course will be very u nts, practicing engineers and researchers. After completion of the course, the students will have a strong foundation o and will be able to apply the basic principles, process characteristics in the practical scenarios.

INTENDED AUDIENCE: B. Tech., M. Tech. and Ph. D. students of Mechanical / Manufacturing / Production/Industrial Engineering, practicing engineers in small and medium scale industry and tool rooms

PREREQUISITES: Should have knowledge of fundamental manufacturing processes.

INDUSTRY SUPPORT: All Small Scale Industries (SSIs). Companies and research labs of automotive; aerospace; defense; and MEMS sectors. Tool Rooms.

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	8 weeks
Category :	◦ Mechanical Engineering
Credit Points :	2
Level :	Undergraduate/Postgraduate
Start Date :	21 Aug 2023
End Date :	13 Oct 2023
Enrollment Ends :	21 Aug 2023
Exam Registration Ends :	15 Sep 2023
Exam Date :	29 Oct 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1: Introduction
Week 2: Laser cutting (machining)
Week 3: Laser welding
Week 4: Laser Bending or Forming
Week 5: Laser surface treatment
Week 6: Additive manufacturing
Week 7: Lasers for automation and sensing
Week 8: Advanced applications

Books and references

1. Steen, W. M., Laser Material Processing, Springer-Verlag, London, 2005.
2. Dahotre, N. and Samant, A., Laser Machining of Advanced Materials, CRC Press, London, 2015.
3. Joshi, S. N. and Dixit, U. S., Laser Based Manufacturing, Springer India, 2015.
4. Sugioka, K., Meunier, M., and Piqué, A., Laser Precision Microfabrication, Springer-Verlag, Berlin, Heidelberg, 2010.
5. Ion, J. C., Laser Processing of Engineering Materials, Elsevier, 2005

Instructor bio

Prof. Shrikrishna N. Joshi

IIT Guwahati

Dr. Shrikrishna N. Joshi has completed his doctoral studies in the area of Intelligent process modeling and optimization of electric discharge machining process from IIT Bombay, Mumbai, India in 2009. Currently, he is working as an Associate Professor in the Department of Mechanical Engineering at Indian Institute of Technology Guwahati, India. He was a visiting faculty at the Asian Institute of Technology (AIT), Bangkok, Thailand in 2015. His research interests include mechatronics and manufacturing automation, CAD/CAM, advanced and precision manufacturing processes with a focus on applications of laser in manufacturing, thin-wall machining and single point diamond turning. Four PhD students have been graduated under his supervision and right now, about 7 students are working on cutting-edge research problems. He has published about 60 research papers and twelve book chapters in refereed international journals and conferences. He has edited two books on "Laser-based manufacturing" and a book on Advances in Computational Methods in

Manufacturing with e has carried out sponsored and consultancy research work of about INR ten millions. The consultancy work w anization of Heavy Engineering Corporation Ltd. Ranchi. He also developed a web course on Mechatronics and Manufacturing Automation under the scheme of NPTEL of MHRD, Govt. of India. The course was very well appreciated among the engineering industry, academia and research community. He has conducted this course at IIT Guwahati four times for B.Tech final year, M.Tech. and Ph.D students.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **29 October 2023** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
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CRITERIA TO GET A CERTIFICATE

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Only the e-certificate will be made available. Hard copies will not be dispatched.

Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

Municipal Solid Waste Management

By Prof. Ajay Kalamdhad | IIT Guwahati

Learners enrolled: 7743 | Exam registration: 3698

Municipal Solid Waste Management [Intro Video]

ABOUT THE COURSE:

The problems affiliated with solid waste management (SWM) in today's sprawling civilized and urbanized society are intricate because of the quantity and varied nature of wastes, the funding restriction for public disposal, interference of technology (energy and raw materials), and complex infrastructure development network in urban cities. As a result, if SWM is to achieve in consummate approach, the fundamentals aspects need to be identified. Thus, there is dire need to group the activities from the generation to the disposal point. The six different functional elements (generation, handing and separations, storage and processing at source, collection, the transformation of wastes, transfer and transport, and final disposal) for the engineering comparison and treatment need to be understood in detail. The understanding of the functional element is important because it helps in evaluating the impacts of projected changes and technological developments. Solid waste management is an essential part of every society, but it is also one of the most neglected one. An in-depth understanding of the subject is required to tackle the

current solid waste man ectively. This course attempts to familiarize various steps involved in solid waste management.

INTENDED AUDIENCE : PG Level course for Environmental Engineering and UG level for Civil Engineering

PREREQUISITES : None

INDUSTRIES SUPPORT : Synergy waste management Pvt Ltd
UPL Environmental Engineers Pvt Ltd
Green power systems
A2Z group
Timarpu-Okhla waste management pvt ltd
Ramky Enviro Engineers Limited

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Civil Engineering
Credit Points :	3
Level :	Undergraduate/Postgraduate
Start Date :	24 Jul 2023
End Date :	13 Oct 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	18 Aug 2023
Exam Date :	29 Oct 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Week 1: Evolution of Solid Waste Management
Week 2: Sources/Types and Characteristics of Solid Waste
Week 3: Generation of Solid Waste
Week 4: Waste Handling, Separation, storage, and Processing
Week 5: Collection of Solid Waste
Week 6: Transfer and Transport
Week 7: Separation and processing of Solid Waste
Week 8: Chemical Transformation (combustion/incineration)
Week 9: Biological Treatment (Composting)
Week 10: Biological Treatment (Anaerobic Digestion)
Week 11: Disposal of Solid Waste
Week 12:ISWM and legistlation

Books and references

• Christensen, H. T., Solid Waste Technology & Management, Wiley, 2010, Volume 1 & 2
• Haug, T. R., The Practical Handbook of COMPOST ENGINEERING, Lewis Publishers, 1993
• Reinhart, R. D. and Townsend, G. T., Landfill Bioreactor Design & Operation, CRC Press, 1997, 1st Edition
• Tchobanoglous, G. and Kreith, F., HANDBOOK OF SOLID WASTE MANAGEMENT, McGraw Hill, 2002, 2nd Edition
• Tchobanoglous, G., Theisen and Vigil, Integrated Solid Waste Management: Engineering Principles and Management Issues, McGraw Hill, 1993.

Instructor bio

Prof. Ajay Kalamdhad

IIT Guwahati

Dr Ajay Kalamdhad is a Professor in the Department of Civil Engineering, Indian Institute of Technology Guwahati. He received his PhD from Indian Institute of Technology Roorkee in the year of 2008 and started working as a Lecturer in Visvesvaraya National Institute of Technology from September 2008. He joined Indian Institute of Technology Guwahati in June 2009 as an Assistant Professor. His research interests include Solid waste management, Mechanical composting and vermicomposting, Anaerobic digestion, Analysis of solid wastes, Microbiology of composting, Biosorption and Water & Wastewater Treatment. He has published numerous papers in various reputed journals. He is also the head of Waste Management Research Group (WMRG), a group that focuses on the biological treatment of various wastes.

Course certifica (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

About Swayam (https://swayam.gov.in/about) | All Courses | ()

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The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).

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CRITERIA TO GET A CERTIFICATE

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Exam score = 75% of the proctored certification exam score out of 100

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- NPTEL team

Dr. Mahesh Bundele
B.E., M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

Operating System Fundamentals

By Prof. Santanu Chattopadhyay | IIT Kharagpur

Learners enrolled: 12178 | Exam registration: 3084

ABOUT THE COURSE : Operating System is a computer software that manages the hardware components. It acts as an intermediary between the users and the hardware. It is responsible for managing the system resources and providing a smooth working environment for the users. The management includes the following - process management, processor management, memory management, storage management, user management, protection and security. As a subject, it is an amalgamation of the fields like computer architecture, algorithms, data structure and so on. A course on fundamentals of operating systems is essential to equip the students for taking up the challenges in understanding and designing of computer systems. This course will address all the fundamental points, starting from the foundations to the architectural issues to correlation with existing commercial operating systems. Being primarily targeted to a one-semester course for the undergraduate students, the course will follow the current GATE syllabus, enabling the students to prepare well for

the same. It can also ... rticipants looking for an introduction to the domain of operating systems. **INTENDED AUDIENCE:** Undergraduate stude... (Computer Science), M.Sc (Computer Science, IT), MCA, MS (Computer Science) **INDUSTRY SUPPORT:** All software industries

Summary

Course Status :	Completed
Course Type :	Core
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering ◦ Systems
Credit Points :	3
Level :	Undergraduate
Start Date :	24 Jul 2023
End Date :	13 Oct 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	18 Aug 2023
Exam Date :	29 Oct 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

(/#facebook) (/#x) (/#microsoft_teams) (/#linkedin) (/#whatsapp)

(https://www.addtoany.com/share#url=https%3A%2F%2Fonlinecourses.nptel.ac.in%2Fnoc23_cs123%2Fpreview&title=Operating%20System%20Fundamentals%20-%20Course)

Course layout

Week 1: Introduction
Week 2: Processes and Threads – Part I
Week 3: Processes and Threads – Part II
Week 4: Interprocess Communication
Week 5: Concurrency and Synchronization – Part I

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Sitapura, JAIPUR

Week 6: Concurrency ion – Part II
Week 7: Deadlock
Week 8: CPU Scheduling
Week 9: Memory Management
Week 10: Virtual Memory – Part I
Week 11: Virtual Memory – Part II
Week 12: File System Processes and Threads – Part I

Books and references

NIL

Instructor bio

Prof. Santanu Chattopadhyay

IIT Kharagpur

Prof. Santanu Chattopadhyay received his BE degree in Computer Science and Technology from Calcutta University (B.E. College) in 1990. He received M.Tech in Computer and Information Technology and PhD in Computer Science and Engineering from Indian Institute of Technology Kharagpur in 1992 and 1996, respectively. He is currently a Professor in the Department of Electronics and Electrical Communication Engineering, IIT Kharagpur. Prior to this, he had been a faculty member in the IIEST Sibpur and IIT Guwahati in the departments of Computer Science and Engineering. In both these places he has taught the subject of Compiler Design several times. His research interests include Digital Design, Embedded Systems, System-on-Chip (SoC) and Network-on-Chip (NoC) Design and Test, Power- and Thermal-aware Testing of VLSI Circuits and Systems. He has published more than 150 papers in reputed international journals and conferences. He has published several text and reference books on Compiler Design, Embedded Systems and other related areas. He is a senior member of the IEEE and an Associate Editor of IET Circuits Devices and Systems journal.

Course certificate

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Date and Time of Exams: **29 October 2023** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
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Problem Solving Through Programming In C

By Prof. Anupam Basu | IIT Kharagpur

Learners enrolled: 36482 | Exam registration: 9773

Prof A Basu

ABOUT THE COURSE :

This course is aimed at enabling the students to

1. Formulate simple algorithms for arithmetic and logical problems
2. Translate the algorithms to programs (in C language)
3. Test and execute the programs and correct syntax and logical errors
4. Implement conditional branching, iteration and recursion
5. Decompose a problem into functions and synthesize a complete program using divide and conquer approach
6. Use arrays, pointers and structures to formulate algorithms and programs
7. Apply programming to solve matrix addition and multiplication problems and searching and sorting problems
8. Apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration

INTENDED AUDIENCE : BE/BTech in all disciplines BCA/MCA/M. Sc

INDUSTRY SUPPORT : All IT Industries

Summary

(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering
Credit Points :	3
Level :	Undergraduate/Postgraduate
Start Date :	24 Jul 2023
End Date :	13 Oct 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	18 Aug 2023
Exam Date :	28 Oct 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1 : Introduction to Problem Solving through programs, Flowcharts/Pseudo codes, the compilation process, Syntax and Semantic errors, Variables and Data Types
Week 2 : Arithmetic expressions, Relational Operations, Logical expressions; Introduction to Conditional Branching
Week 3 : Conditional Branching and Iterative Loops
Week 4 : Arranging things : Arrays
Week 5 : 2-D arrays, Character Arrays and Strings
Week 6 : Basic Algorithms including Numerical Algorithms
Week 7 : Functions and Parameter Passing by Value
Week 8 : Passing Arrays to Functions, Call by Reference
Week 9 : Recursion
Week 10 : Structures and Pointers
Week 11 : Self-Referential Structures and Introduction to Lists
Week 12 : Advanced Topics

Books and referenc

Textbooks:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Instructor bio

Prof. Anupam Basu

IIT Kharagpur

Anupam Basu is Professor in the Dept. of Computer Science & Engineering, IIT Kharagpur, and has been an active researcher in the areas of Cognitive and Intelligent Systems, Embedded Systems and Language Processing, Presently he is acting as the Chairman and Head of the Center for Educational Technology, IIT Kharagpur. He has developed several embedded system based tools empowering the physically challenged and has led several national projects in the area.

He has taught at the University of California, Irvine at the Center for Embedded Systems. He is an Alexander von Humboldt Fellow and a Fellow of the Indian National Academy of Engineering. The awards won by him include the State Award for the Best Contribution to the Cause of Empowerment of the Disabled (2014), Universal Design Award 2011, for contributions in design for the disabled, by National Council for Promotion of Employment of Disabled Persons, India, the National Award for the Best Technology Innovation for the Physically Disabled (2007) and the Da-Vinci Award 2004 from the Engineering Society of Detroit.

Course certificate

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The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **28 October 2023** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
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CRITERIA TO GET A CERTIFICATE

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Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

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Programming In Java

By Prof. Debasis Samanta | IIT Kharagpur

Learners enrolled: 76598 | Exam registration: 20421

Programming in Java

ABOUT THE COURSE :

With the growth of Information and Communication Technology, there is a need to develop large and complex software. Further, those software should be platform independent, Internet enabled, easy to modify, secure, and robust. To meet this requirement object-oriented paradigm has been developed and based on this paradigm the Java programming language emerges as the best

programming er ava programming language is being used for mobile programming, Internet programming, and many other appl e to distributed systems. This course aims to cover the essential topics of Java programming so that the participants can improve their skills to cope with the current demand of IT industries and solve many problems in their own filed of studies.

INTENDED AUDIENCE : The undergraduate students from the engineering disciplines namely CSE, IT, EE, ECE, etc. might be interested for this course.

PREREQUISITES : This course requires that the students are familiar with programming language such as C/C++ and data structures, algorithms.

INDUSTRY SUPPORT : All IT companies.

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering ◦ Programming
Credit Points :	3
Level :	Undergraduate
Start Date :	24 Jul 2023
End Date :	13 Oct 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	18 Aug 2023
Exam Date :	29 Oct 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

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ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

Course layout

Week 1 : Overview of Object-Oriented Programming and Java
Week 2 : Java Programming Elements
Week 3 : Input-Output Handling in Java
Week 4 : Encapsulation
Week 5 : Inheritance
Week 6 : Exception Handling
Week 7 : Multithreaded Programming
Week 8 : Java Applets and Servlets
Week 9 : Java Swing and Abstract Windowing Toolkit (AWT)
Week 10 : Networking with Java
Week 11: Java Object Database Connectivity (ODBC)
Week 12: Interface and Packages for Software Development

Books and references

1.Java: The Complete Reference Hebert Schildt, Mc Graw Hill
2. Object-Oriented Programming with C++ and Java Debasis Samanta, Prentice Hall India.

Instructor bio

Prof. Debasis Samanta

IIT Kharagpur

Debasis Samanta holds a Ph.D. in Computer Science and Engineering from Indian Institute of Technology Kharagpur. His research interests and work experience spans the areas of Computational Intelligence, Data Analytics, Human Computer Interaction, Brain

Computing and I . Dr. Samanta currently works as a faculty member at the Department of Computer Science & Engineering at II (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Course certificate

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Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

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NOTE: Please note that there will not be an unproctored programming exam for this course this term.

Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IIT Kharagpur .It will be e-verifiable at nptel.ac.in/noc (http://nptel.ac.in/noc).

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Programming In Modern C++

By Prof. Partha Pratim Das | IIT Kharagpur

Learners enrolled: 22430 | Exam registration: 4202

Programming in Modern C++: Introduction: Prof Partha Pratim Das

ABOUT THE COURSE :

There has been a continual debate on which programming language/s to learn, to use. As the latest TIOBE Programming Community Index for August 2021 indicates – C (13%), Python (12%), C++ (7%), Java (10%), and C#(5%) together control nearly half the programming activities worldwide. Further, C Programming Language Family (C, C++, C#, Objective C etc.) dominate more than 25% of activities. Hence, learning C++ is important as one learns about the entire family, about Object-Oriented Programming and gets a solid foundation to also migrate to Java and Python as needed. C++ is the mother of most general purpose of languages. It is multi-paradigm encompassing procedural, object-oriented, generic, and even functional programming. C++ has primarily been the systems language till C++03 which punches efficiency of the code with the efficacy of OOP. Then, why should I learn it if my primary focus is on applications? This is where the recent updates of C++, namely, C++11 and several later offer excellent depths and flexibility for C++ that no language can match. These extensions attempt to alleviate some of the

long-standing shortcom uding porous resource management, error-prone pointer handling, expression semantics, and better readability. The present n the knowledge of C programming and basic data structure (array, list, stack, queue etc.) to create a strong familiarity with C++98 / C++03. Besides the constructs, syntax and semantics of C++ (over C), we also focus on various idioms of C++ and attempt to go to depth with every C++ feature justifying and illustrating them with several examples and assignment problems. On the way, we illustrate various OOP concepts. The course also covers important advances in C++11 and later released features.

PRE-REQUISITE: Programming & Data Structure (mandatory), Programming in C (optional). Design and Analysis of Algorithms (optional).

INDUSTRY SUPPORT: Programming in C++ is so fundamental that all companies dealing with systems as well as application development (including web, IoT, embedded systems) have a need for the same. These include – Microsoft, Samsung, Xerox, Yahoo, Oracle, Google, IBM, TCS, Infosys, Amazon, Flipkart, etc. This course would help industry developers to be up-to-date with the advances in C++ so that they can remain at the state-of-the-art.

Summary

Course Status :	Completed
Course Type :	Core
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering
Credit Points :	3
Level :	Undergraduate/Postgraduate
Start Date :	24 Jul 2023
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Enrollment Ends :	07 Aug 2023
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ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

Course layout

Week 1: Programming in C++ is Fun.
Week 2: C++ as Better C.
Week 3: OOP in C++.
Week 4: OOP in C++.
Week 5: Inheritance.
Week 6: Polymorphism.
Week 7: Type Casting.
Week 8: Exceptions and Templates.
Week 9: Streams and STL.
Week 10: Modern C++.
Week 11: Lambda and Concurrency.
Week 12: Move, Rvalue and STL Containers.

Books and references

Online Material:

1. C++ reference - C++98 and C++03, C++11, C++14.
2. Overview of the New C++ (C++11/14) by Scott Meyers, 2015.
3. ISO C++ Standards.
4. Presentations used in the Course.

Books:

1. C++ Move Semantics - The Complete Guide by Nicolai M. Josuttis, 2020.
2. C++ Concurrency in Action, 2nd Edition by Anthony Williams, 2019.
3. C++17 - The Complete Guide by Nicolai M. Josuttis, 2020.
4. C++17 In Detail: Learn the Exciting Features of The New C++ Standard! by Bartlomiej Filipek, 2019.
5. Professional C++, 4th Edition by Marc Gregoire, 2018.
6. Functional Programming in C++ by Ivan Čukić, 2018.
7. Effective Modern C++: 42 Specific Ways to Improve Your Use of C++11 and C++14 by Scott Meyers, 2015.

Instructor bio

Prof. Partha Pratim Das
(https://swayam.gov.in/) IIT Kharagpur (https://swayam.gov.in/nc_details/NPTEL)

Prof. Partha Pratim Das received his BTech, MTech and PhD degrees in 1984, 1985 and 1988 respectively from IIT Kharagpur. He served as a faculty in Department of Computer Science and Engineering, IIT Kharagpur from 1988 to 1998. In 1998, he joined Alumnus Software Ltd as a Business Development Manager. From 2001 to 2011, he worked for Interra Systems, Inc. as a Senior Director and headed its Kolkata Center. In 2011, he joined back to Department of Computer Science and Engineering, IIT Kharagpur as Professor. Dr. Das has also served as a Visiting Professor with Institute of Radio Physics and Electronics, Calcutta University from 2003 to 2013.

Dr. Das is currently the Head of Rajendra Mishra School of Engineering Entrepreneurship, the Professor-inCharge of the upcoming Research Park of IIT Kharagpur at Rajarhat, Kolkata, and the Joint Principal Investigator of National Digital Library of India project of MHRD.

Dr. Das has taught several courses in Computer Science including Software Engineering, Object-Oriented Systems, Programming and Data Structure, Compiler Design, Design and Analysis of Algorithms, Information System Design, Database Management Systems, Computational Geometry, Principles of Programming Languages, Embedded Systems, and Image Processing. Jointly with 2 others, he has also offered a course on Introduction to Design of Algorithms under the T10KT program of NME-ICT, MHRD (https://www.facebook.com/t10kt.algorithms/) to nearly 7000 teachers. Further, Dr. Das has been offering Programming in C++ and Object-Oriented Analysis and Design in NPTEL-NOC. Both courses are regularly attended by thousands of students.

Dr. Das has published over 40 technical papers in international journals in areas of Digital Geometry, Image Processing, Parallel Computing and Knowledge-based Systems. In 2013 he has co-authored a research monograph titled Digital Geometry in Image Processing (CRC Press). His current interests include Human-Computer Interactions, Computer Analysis of Indian Classical Dance, Object-Oriented Systems Analysis and Design, Software Engineering, Compiler Technology, and Technology Enabled Learning. Dr. Das is a member of Association of Computing Machinery (ACM), The Institute of Electrical and Electronics Engineers (IEEE), and Indian Unit for Pattern Recognition and Artificial Intelligence (IUPRAI).

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **28 October 2023** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

Programming, Data Structures And Algorithms Using Python

By Prof. Madhavan Mukund | Chennai Mathematical Institute

Learners enrolled: 44747 | Exam registration: 7311

python intro

ABOUT THE COURSE :

This course is an introduction to programming and problem solving in Python. It does not assume any prior knowledge of programming. Using some motivating examples, the course quickly builds up basic concepts such as conditionals, loops, functions, lists, strings and tuples. It goes on to cover searching and sorting algorithms, dynamic programming and backtracking, as well as topics such as exception handling and using files. As far as data structures are concerned, the course covers Python dictionaries as well as classes and objects for defining user defined datatypes such as linked lists and binary search trees.

INTENDED AUDIENCE: Students in any branch of mathematics/science/engineering, 1st year

PREREQUISITES: School level mathematics.

INDUSTRY SUPPORT: This course should be of value to any company requiring programming skills.

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English

Duration :	8 weeks
Category :	◦ Computer Science and Engineering ◦ Artificial Intelligence ◦ Data Science ◦ Foundations of Computing ◦ Programming
Credit Points :	2
Level :	Undergraduate
Start Date :	24 Jul 2023
End Date :	15 Sep 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	21 Aug 2023
Exam Date :	24 Sep 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1:
Informal introduction to programmin, algorithms and data structures viagcd
Downloading and installing Python
gcd in Python: variables, operations, control flow - assignments, condition-als, loops, functions

Week 2:
Python: types, expressions, strings, lists, tuples
Python memory model: names, mutable and immutable values
List operations: slices etc
Binary search
Inductive function denitions: numerical and structural induction
Elementary inductive sorting: selection and insertion sort
In-place sorting

Week 3:
Basic algorithmic analysis: input size, asymptotic complexity, O() notation
Arrays vs lists
Merge sort
Quicksort
Stable sorting

Week 4:
Dictionaries
More on Python functions: optional arguments, default values
Passing functions as arguments
Higher order functions on lists: map, lter, list comprehension

Week 5:
Exception handling
Basic input/output
Handling files
String processing

Week 6:
Backtracking: N Queens, recording all solutions
Scope in Python: local, global, nonlocal names
Nested functions
Data structures: stack, queue
Heaps

Week 7:
Abstract datatypes
Classes and objects in Python
"Linked" lists: find, insert, delete
Binary search trees: find, insert, delete
Height-balanced binary search trees

Week 8:
Effcient evaluation of recursive definitions: memoization
Dynamic programming: examples
Other programming languages: C and manual memory management
Other programming paradigms: functional programming

Books and references

NIL

Instructor bio

Prof. Madhavan Mukund

Chennai Mathematical Institute

Madhavan Mukund studied at IIT Bombay (BTech) and Aarhus University (PhD). He has been a faculty member at Chennai Mathematical Institute since 1992, where he is presently Professor and Director. His main research area is formal verification. He has active research collaborations within and outside India and serves on international conference programme committees and editorial boards of journals.

He has served as President of both the Indian Association for Research in Computing Science (IARCS) (2011-2017) and the ACM India Council (2016-2018). He has been the National Coordinator of the Indian Computing Olympiad since 2002. He served as the Executive Director of the International Olympiad in Informatics from 2011-2014.

Soft Skill Development

By Prof. Priyadarshi Patnaik, Prof. V.N. Giri, Prof. D. Suar | IIT Kharagpur

Learners enrolled: 21105 | Exam registration: 8849

ABOUT THE COURSE:

While hard skills teach us what to do, soft skills tell us how to apply our hard skills in a social environment. The focus of the course is to develop a wide variety of soft skills starting from communication, to working in different environments, developing emotional sensitivity, learning creative and critical decision making, developing awareness of how to work with and negotiate with people and to resolve stress and conflict in ourselves and others.

The uniqueness of this course is in how a wide range of relevant issues are raised, relevant skills discussed and tips for integration provided in order to make us effective in workplace and social environments. The key areas addressed are conversation skills, group skills, persuasion skills, presentation skills, critical and creative thinking, emotional skills, positive thinking and vocational skills.

INTENDED AUDIENCE : For anyone keen to improve her soft skills, Elective Course, Open course (UG and PG), No restrictions, ideally after class XII

PREREQUISITES : Basic knowledge in communication and a good understanding of English

INDUSTRY SUPPORT : All industries where soft skills are important will recognize the relevance of this course

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	8 weeks
Category :	◦ Humanities and Social Sciences
Credit Points :	2
Level :	Undergraduate/Postgraduate
Start Date :	24 Jul 2023
End Date :	15 Sep 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	21 Aug 2023
Exam Date :	24 Sep 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

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Course layout

Week 1:
Communication skills 1: The basics

Topics to be covered:

i. Understanding the communicative environment-I
ii. Understanding the communicative environment-II
iii. What to listen for and why
iv. When to speak and how
v. Starting and sustaining a conversation

Week 2:
Communication skills 2 : Presentation and interaction

Topics to be covered:

i. What to present and how – I
ii. What to present and how – II
iii. Multimedia presentation: Understanding the basics
iv. Communication styles
v. Speaking in groups

Week 3:
Communication skills 3: Visual, nonverbal and aural communication

Topics to be covered:

i. The world of visual culture
ii. Visual perception
ii. The aural: Its relevance and impact
iv. The body and the way it communicates
v. The face, its expressions and what it says

Week 4:

Interpersonal cc dividuals, groups and cultures

i. Building Relationships
ii. Understanding Group Dynamics-I
iii. Understanding Group Dynamics- II
iv. Groups, Conflicts and their Resolution
v. Social Network, Media and Extending Our Identities

Week 5:
Interpersonal communication 2: Emotional and social skills

Week 6:
Developing key traits 1: Creativity, critical thinking and problem solving

Week 7:
Developing key traits 2: Motivation, persuasion, negotiation and leadership

i. Motivating oneself
ii.The art of persuasion-I
iii.The art of persuasion-II
iv. From persuasion to negotiation
v. Leadership and motivating others

Week 8:
Essential and vocational skills: survival strategies

i. Managing time
ii. Managing stress
iii. Resilience
iv. Work-life balance
v. Applying soft-skills to workplace

Books and references

NIL

Instructor bio

Prof. Priyadarshi Patnaik

Priyadarshi Patnaik is a Professor of English and Communication in the Department of Humanities & Social Sciences, IIT Kharagpur. He is also the Secretary, Nehru Museum of Science and Technology, IIT Kharagpur, and Rector's Nominee, Technology Students Gymkhana, IIT Kharagpur. His areas of research include Visual communication, Music and emotion, Communication and culture, Media communication, Translation, and Digital humanities. He has authored and edited more than 14 volumes of text, reference, and creative work. He has a number of research papers, translations, poems, short stories, illustrations and photographs in many national and international journals. He is currently one of the Co-PIs involved with a number of cultural and heritage projects under the MHRD Mega-Project, SandHI.

Prof. V.N. Giri

Vijay Nath Giri is a Professor and Head in the Department of Humanities & Social Sciences, IIT Kharagpur. He has been teaching subjects related to Communication Studies. He has received many awards including DAAD-Fellowship, Germany. He has published a book, a number of book chapters, and more than fifty research papers in referred journals. He has supervised eight students for Ph.D. degree. He was on the editorial board of *'Communication Theory"* published by International Communication Association, USA and member editorial board *"Encyclopaedia of Communication Theory"* published by Sage, USA. His current research interests include organizational, interpersonal and intercultural communication, communication styles, and conflict management.

Prof. D. Suar
IIT Kharagpur

Damodar Suar is a Professor in the Department of Humanities and Social Sciences, IIT Kharagpur and in the Vinod Gupta School of Management, IIT Kharagpur. He was the Head in the Department of Humanities & Social Sciences from 2007-2010. Currently, he is the President of National Academy of Psychology India and the Editor of the journal *Psychological Studies* (Springer). He teaches *Research methodology, Organisational behavior,* and *Psychology*. His research focuses on *leadership, laterality, cognition, values, post-disaster trauma, disaster preparedness,* and *pro-environmental behavior.* He has authored over 125 scientific/professional articles including book chapters. He has authored a book on *Psychological aspects of polarisation phenomenon* and co-edited three books. He has produced 25 Ph.D. students, handled more than 30 research/consultancy projects, and co-ordinated 20 training programmes.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
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CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 6 assignments out of the total 8 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IIT Kharagpur .It will be e-verifiable at nptel.ac.in/noc (http://nptel.ac.in/noc).

Only the e-certificate will be made available. Hard copies will not be dispatched.

Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

Soft Skills

By Prof. Binod Mishra | IIT Roorkee

Learners enrolled: 34222 | Exam registration: 16670

Soft Skills Promo

ABOUT THE COURSE :

Soft Skills, a buzz word today has attracted the attention of students, professionals and entrepreneurs all over the world. Employability, being the major concern today, every individual aims at getting coveted jobs. Employability today is commensurate with proving multiple skills in varied situations in a fast changing world. Hence, everyone aspiring for jobs today

has to prove o ous situations where one requires to be armed with different skills, which, collectively come under Soft Skill rnet with good competence of one's subject but one cannot compete with his peer groups unless one has the potential of performance. Performance can be ensured with the demonstration of certain abilities that can help a professional communicate, corroborate, convince, evaluate, and look into the continuing as well as the upcoming trends of the corporate world from time to time.The course aims at creating awareness among the stock holders of the corporate world in which the role of individuals as team players and also as responsible leaders materializes to a great extent. The course, with its interactive and need based modules, will address various challenges of communication as well as behavioural skills faced by individuals at workplace and organizations in bridging the gaps through effective skills of interviews, group discussions, meeting management, presentations and nuances of drafting various business documents for sustainability in today's global world.

INTENDED AUDIENCE : BE/B.Sc/B.A, ME, M.Sc./M.A, Ph.D,Open to everyone desirous of honing one's employability skills

PRE-REQUISITES : Basic knowledge of reading and writing English.

INDUSTRIES SUPPORT :Can be useful to all major companies, such L&T, BHEL, NBCC, NTPC, WIPRO, INFOSYS, and other organizations where HR has a crucial role.

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Humanities and Social Sciences
Credit Points :	3
Level :	Undergraduate/Postgraduate
Start Date :	24 Jul 2023
End Date :	13 Oct 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	18 Aug 2023
Exam Date :	29 Oct 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

Course layout

Week 1: Introduction to Soft Skills, Aspects of Soft Skills, Effective Communication Skills, Classification of Communication, Personality Development
Week 2: Positive Thinking, Telephonic Communication Skills, Communicating without Words, Paralanguage
Week 3: Proxemics, Haptics: The Language of Touch, Meta-communication, Listening Skills, Types of Listening
Week 4: Negotiation Skills, Culture as Communication, Organizational Communication
Week 5: Communication Breakdown, Advanced Writing Skills, Principles of Business Writing
Week 6: Business Letters, Business Letters: Format and Style, Types of Business Letter
Week 7: Writing Reports, Types of Report, Strategies for Report Writing, Evaluation and Organization of Data
Week 8: Structure of Report, Report Style, Group Communication Skills
Week 9: Leadership Skills, Group Discussion, Meeting Management, Adaptability & Work Ethics
Week 10: Advanced Speaking Skills, Oral Presentation, Speeches & Debates, Combating Nervousness, Patterns & Methods of Presentation, Oral Presentation: Planning & Preparation
Week 11: Making Effective Presentations, Speeches for Various Occasions, Interviews, Planning & Preparing: Effective Résumé,
Week 12: Facing Job Interviews, Emotional Intelligence & Critical Thinking, Applied Grammar

Books and references

1.Butterfield, Jeff. Soft Skills for Everyone. New Delhi: Cengage Learning. 2010.
2.Chauhan, G.S. and Sangeeta Sharma. Soft Skills. New Delhi: Wiley. 2016.
3.Goleman, Daniel. Working with Emotional Intelligence. London: Banton Books. 1998.
4.Hall, Calvin S. et al. Theories of Personality. New Delhi: Wiley. rpt. 2011.
5.Holtz, Shel. Corporate Conversations. New Delhi: PHI. 2007.
6.Kumar, Sanajy and Pushp Lata. Communication Skills. New Delhi: OUP. 2011.
7.Lucas, Stephen E. The Art of Public Speaking. McGraw-Hill Book Co. International Edition, 11th Ed. 2014.
8.Penrose, John M., et al. Business Communication for Managers. New Delhi: Thomson South Western. 2007.

Dr. Mahesh Bundele
B.E., M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

9.Sharma, R.C. . Business Correspondence and Report Writing. New Delhi: TMH. 2016.
10.Sharma, Sar Mishra. Communication Skills for Engineers and Scientists. New Delhi: PHI Learning. 2009, 6th Reprint 2015.
11.Thorpe, Edgar and Showick Thorpe. Winning at Interviews. Pearson Education. 2004.
12.Turk, Christopher. Effective Speaking. South Asia Division: Taylor & Francis. 1985.

Instructor bio

Prof. Binod Mishra

IIT Roorkee

Prof. Binod Mishra, presently a professor in the Department of HSS, IIT Roorkee, has been teaching English for more than two decades at various levels. He has to his credit 25 books and more than a hundred articles published in different reputed journals and books. Learners from all across the country have well received his MOOC courses on Soft Skills and Effective Writing. He has also addressed the participants in around a hundred invited talks at various conferences and symposiums. Besides being an engaging teacher and a competent researcher, Dr Mishra is also a passionate poet. Currently, he is the Vice Chairman of the Association for English Teachers of India, the largest body of English teachers. Before this, he had twice been the Editor-in-Chief of the Indian Journal of English Studies, one of the oldest English language and literature journals.

Course certificate

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The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **29 October 2023** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
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CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.

The Joy Of Computing Using Python

By Prof. Sudarshan Iyengar | IIT Ropar

Learners enrolled: 63924 | Exam registration: 23685

Introduction Joy of Computing

ABOUT THE COURSE :

A fun filled whirlwind tour of 30 hrs, covering everything you need to know to fall in love with the most sought after skill of the 21st century. The course brings programming to your desk with anecdotes, analogies and illustrious examples. Turning abstractions to insights and engineering to art, the course focuses primarily to inspire the learner's mind to think logically and arrive at a solution programmatically. As part of the course, you will be learning how to practice and culture the art of programming with Python as a language. At the end of the course, we introduce some of the current advances in computing to motivate the enthusiastic learner to pursue further directions.

INTENDED AUDIENCE : Any interested audience

PREREQUISITES : 10th standard/high school

INDUSTRY SUPPORT : Every[illegible]y is aware of the potential of a first course in computer science. Especially of a first course in computing, done right. (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering
Credit Points :	3
Level :	Undergraduate/Postgraduate
Start Date :	24 Jul 2023
End Date :	13 Oct 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	18 Aug 2023
Exam Date :	28 Oct 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

- Motivation for Computing
- Welcome to Programming!!
- Variables and Expressions : Design your own calculator
- Loops and Conditionals : Hopscotch once again
- Lists, Tuples and Conditionals : Lets go on a trip
- Abstraction Everywhere : Apps in your phone
- Counting Candies : Crowd to the rescue
- Birthday Paradox : Find your twin
- Google Translate : Speak in any Language

- Currency Converter : C ip expenses
- Monte Hall : 3 doors ar (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)
- Sorting : Arrange the books
- Searching : Find in seconds
- Substitution Cipher : What's the secret !!
- Sentiment Analysis : Analyse your Facebook data
- 20 questions game : I can read your mind
- Permutations : Jumbled Words
- Spot the similarities : Dobble game
- Count the words : Hundreds, Thousands or Millions.
- Rock, Paper and Scissor : Cheating not allowed !!
- Lie detector : No lies, only TRUTH
- Calculation of the Area : Don't measure.
- Six degrees of separation : Meet your favourites
- Image Processing : Fun with images
- Tic tac toe : Let's play
- Snakes and Ladders : Down the memory lane.
- Recursion : Tower of Hanoi
- Page Rank : How Google Works !!

Books and references

NIL

Instructor bio

Prof. Sudarshan Iyengar

IIT Ropar

Prof. Sudarshan Iyengar, Associate Professor at the CSE at IIT Ropar has a Ph.D. from the Indian Institute of Science (IISc). An exemplary teacher who has delivered over 350 popular science talks to students of high school and advanced graduate programmes. Dr. Sudarshan has offered more than 100 hours of online lectures with novel teaching methodologies that have reached lakhs of Students. His research interests include Data Sciences, Social Computing, Social Networks, Collective Intelligence, Crowdsourced Technologies and Secure Computation

Course certificate

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Date and Time of Exams: **28 October 2023** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.

Theory Of Computation

By Prof. Raghunath Tewari | IIT Kanpur

Learners enrolled: 6901 | Exam registration: 667

Introduction - Theory of Computation - Prof. Raghunath Tewari

ABOUT THE COURSE :

This is an introductory course on Theory of Computation intended for undergraduate students in computer science. In this course we will introduce various models of computation and study their power and limitations. We will also explore the properties of the corresponding language classes defined by these models and the relations between them. We will assume the student is comfortable in analytical reasoning and has preferably done a course on Data Structures and Algorithms.

INTENDED AUDIE (https://swayam.gov.in/) ience undergraduate students (https://swayam.gov.in/nc_details/NPTEL)

PRE-REQUISITES: It is recommended that the candidate has done a course in Data Structures and Algorithms. ()

About Swayam (https://swayam.gov.in/about) | All Courses |

INDUSTRY SUPPORT: Content will be updated soon

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	8 weeks
Category :	◦ Computer Science and Engineering ◦ Foundations of Computing
Credit Points :	2
Level :	Undergraduate
Start Date :	24 Jul 2023
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This is an AICTE approved FDP course

(/#facebook) (/#x) (/#microsoft_teams) (/#linkedin) (/#whatsapp)

(https://www.addtoany.com/share#url=https%3A%2F%2Fonlinecourses.nptel.ac.in%2Fnoc23_cs70%2Fpreview&title=Theory%20Of%20Computation%20-%20Course)

Course layout

Week 1: Finite Automata – deterministic and nondeterministic, regular operations
Week 2: Regular Expression, Equivalence of DFA, NFA and REs, closure properties
Week 3: Non regular languages and pumping lemma, DFA Minimization,
Week 4: CFGs, Chomsky Normal Form
Week 5: Non CFLs and pumping lemma for CFLs, PDAs, Equivalence of PDA and CFG
Week 6: Properties of CFLs, DCFLs, Turing Machines and its variants
Week 7: Configuration graph, closure properties of decidable languages, decidability properties of regular languages and CFLs
Week 8: Undecidability, reductions, Rice's Theorem, introduction to complexity theory

Books and references

Introduction to the Theory of Computation by Michael Sipser

Instructor bio

Prof. Raghunath Tewari

IIT Kanpur

Raghunath Tewari is an Associate Professor in the department of Computer Science and Engineering at IIT Kanpur. His research interests lie in the areas of computational complexity theory, algorithms and graph theory.

Course certificate

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Date and Time of Exams: **24 September 2023** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.

The online registr[illegible]e filled and the certification exam fee needs to be paid. More details will be made available when the exam re[illegible]p confirmed. If there are any changes it will be informed then.
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Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IIT Kanpur .It will be e-verifiable at nptel.ac.in/noc (http://nptel.ac.in/noc).

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Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

Welding Application Technology

By Prof. Pankaj Biswas | IIT Guwahati

Learners enrolled: 2421 | Exam registration: 1015

Welding Application Technology [Intro Video]

ABOUT THE COURSE:

The name of the course is Welding Application Technology. As the name implies in this course I will try to cover the fundamental overview of the traditional/ industrial welding technology especially those welding processes which are widely used in manufacturing industries. I will also try to cover the detail concepts of design and analysis of welding joints, heat treatment and weld induced residual stresses & distortions and its measurement. This will help the participants to understand and apply this knowledge of welding in practice for various industrial applications. It will also encourage academic participants to increase the research interest in the field of welding. In this present course the primary focus is on basic fundamental of welding and its importance in industries.

The brief overview of t can be stated like; this course will cover the industrial relevance of welding processes. It will give the fundamental kno important welding processes which includes three of the important fusion welding, solid state welding (i.e. Friction Welding, FSW etc.) and solid-liquid state welding (i.e. Shouldering and Brazing). It will also cover the importance and applications of all these welding techniques. This course will highlight the safety precautions to be followed in different welding techniques.

This course also will cover the basic concepts of weld induced residual stresses and distortions. In this course, the concepts of different residual stresses measurements techniques will be provided. This course also will provide the fundamental concepts of residual stresses and distortions mitigation techniques. This course also will provide the basic fundamental concept on design and analysis of welding joints. This course includes most of the important topics related to static analysis of welded joints which included 'Design and Analysis of Butt and Fillet Welds Joints, Strength Calculation of Parallel & Transverse Fillet Welds, Analysis of Eccentrically Loaded Welded Joint, Analysis of Welded Joint Subjected to Bending Moment'.

INTENDED AUDIENCE : Students (UG and PG); Participant from any manufacturing industry

PREREQUISITES : BE/BTech In Mechanical/Production/ Manufacturing Sciences/Power Plannt Engg/ Naval And Arcitucture Engg

INDUSTRY SUPPORT : Nil (But if any manufacturing industry participant want to participate then the can be allowed.)

Summary

Course Status :	Completed
Course Type :	Core
Language for course content :	English
Duration :	8 weeks
Category :	◦ Mechanical Engineering ◦ Manufacturing Processes and Technology ◦ Product Design
Credit Points :	2
Level :	Undergraduate/Postgraduate
Start Date :	24 Jul 2023
End Date :	15 Sep 2023
Enrollment Ends :	07 Aug 2023
Exam Registration Ends :	21 Aug 2023
Exam Date :	24 Sep 2023 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

Dr. Mahesh Bundele
B.E., M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

Course layout

Week-1 : Basics of welding residual stresses & distortions and its mitigation
Week-2 : Measurement & analysis of welding residual stresses and distortions
Week-3 : Measurement of welding residual stresses and distortions
Week-4 : Different type of welding methods and its details (PAW,FCAW, RSW)
Week-5 : Different type of welding methods and its details (RW, Thermit, FSW)
Week-6 : Different type of welding methods & its details (Brazing, Soldering)
Week-7 : Design & analysis of butt and fillet welds joints
Week-8 : Design & analysis of weld joints for different static loading conditions

Books and references

1. V. M. Radhakrishnan, Welding Technology and Design, New age. 2002.
2. Dr. O. P. Khanna, Welding Technology, Reprint: 2002.
3. J. A. Goldak, Computational Welding Mechanics, Springer 2005.
4. O. Grong, Metallurgical Modelling of Welding,2nd Ed. IOM publication , 1997.
5. L-E Lindgren, Computational Welding Mechanics, Woodhead Publishing Limited,2007.
6. J. F. Lancaster (Ed), The Physics of welding, Pergamon, 1986.
7. R.W. Messler, Principles of Welding, John Wiley and Sons,1999.

Instructor bio

Dr. Mahesh Bundele
B.E., M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

Prof. Pankaj Biswas
IIT Guwahati

I, Dr. Pankaj Biswas, am a Professor in the Dept. of Mechanical Engineering, IIT Guwahati. I did my B.E. in Mechanical Engineering from IIEST, Shibpur. I did my M-Tech and PhD from IIT Kharagpur. I am working in the area of different manufacturing as well as design fileds. I am working in the area of welding technology, 3-D printing and forming by line heating for the past 17 years. My areas of research are on computational weld mechanics, similar and dissimilar friction stir welding, friction stir welding of steel, hybrid welding technology, Finite Element analysis of weld induced distortion and residual stresses, Analysis of large welding structure, forming by line heating and modeling of welding processes using soft computing techniques. I guided 01 PDF, 10 PhD scholars, 40 M-Tech students and 35 B-Tech students in the area of welding, forming and 3D printing. Currently, I am guiding 02 NPDF, 08 PhD scholars in the areas of welding, 3-D printing and line heating. I already published about 105 journal articles, 95 conference proceedings, 25 book chapters and 04 patents. I worked in ten sponsored / consultancy projects. Currently, I am working in another eight sponsored / consultancy projects. I got IEI Young Engineers Award 2013- 2014' in Mechanical Engineering discipline.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **24 September 2023** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 6 assignments out of the total 8 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IIT Guwahati .It will be e-verifiable at nptel.ac.in/noc (http://nptel.ac.in/noc).

Only the e-certificate will be made available. Hard copies will not be dispatched.

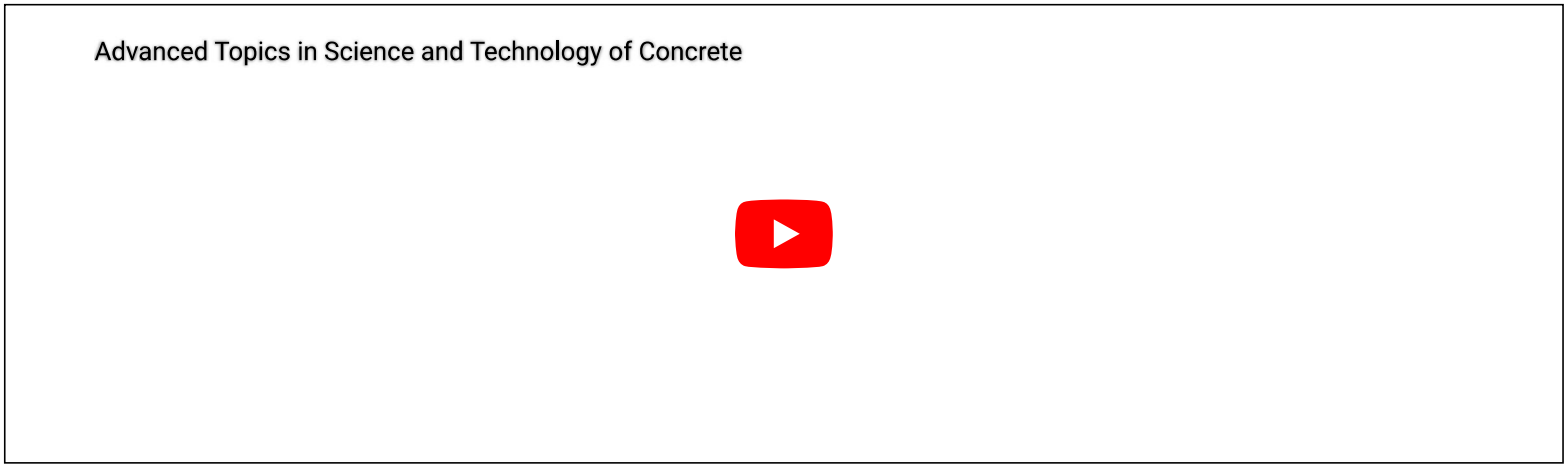
Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

Advanced Topics in Science and Technology of Concrete

By Prof. Manu Santhanam, Prof. Ravindra Gettu | IIT Madras

Learners enrolled: 3358 | Exam registration: 423



ABOUT THE COURSE:

This edition of the Advanced Topics course focuses on the use of recycled concrete as aggregate in new concrete construction. The course material was developed as part of the SPARC collaborative project between IIT Madras, University of Cape Town and University of the Witwatersrand in South Africa. The lectures in this course give a full background of the collection, processing and properties of recycled concrete aggregates. The impact of their use in terms of concrete performance and the effect on long term durability is also explored. Finally, a an understanding of the sustainability impact and the policies and practices in India and South Africa is also provided.

INTENDED AUDIENCE: Senior UG students, PG students, concrete industry professionals, Structural engineers

PREREQUISITES: An understanding of basic concrete technology

INDUSTRY SUPPORT: All concrete suppliers and construction contractors

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English

Duration :	4 weeks
Category :	(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL) ∘ Civil Engineering
Credit Points :	1
Level :	Postgraduate
Start Date :	19 Feb 2024
End Date :	15 Mar 2024
Enrollment Ends :	19 Feb 2024
Exam Registration Ends :	15 Mar 2024
Exam Date :	21 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1: Influence of aggregates on concrete properties; Sources and types of recycled aggregate; Availability, collection and processing of recycled aggregate

Week 2: Properties of recycled concrete aggregate; performance of concrete with recycled aggregate in fresh and hardened states

Week 3: Design of concrete with recycled aggregate; Utilization of recycled concrete fines; Performance approach for design of concrete structures with recycled aggregate; current standards and limitations on use of recycled aggregate

Week 4: Environmental impact and life cycle assessment; Construction supply chains and market issues for recycled aggregate; Panel discussions – experts from India and South Africa.

Books and references

The course participants will get a link to the monograph produced at IIT Madras.

Other reference books:
1. Natt Makul, Recycled Aggregate Concrete – Technology and Properties, Routledge 2023.
2. F. Pacheco-Torgal et al., Handbook of Recycled Concrete and Demolition Waste, Woodhead Publishing 2013.

Instructor bio

Prof. Manu Santhanam

IIT Madras

Prof. Manu Santhanam is a Professor at the Department of Civil Engineering at IIT Madras. His research interests are in multi-scale characterization of concrete, supplementary cementing materials, durability and non-destructive evaluation.

Prof. Ravindra Gettu

Prof. Ravindra Gettu is a chair professor of civil engineering at IIT Madras. He has coordinated the introductory course at IITM and given lectures at other institutes on civil engineering for more than 10 years. He has a wide range of experience in research, education and consultancy. His specific area of expertise is construction materials.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: 21 April 2024 Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 3 assignments out of the total 4 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IIT Madras .It will be e-verifiable at nptel.ac.in/noc (http://nptel.ac.in/noc).

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Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

Advanced topics in Wireless Communication (Hindi)

By Prof. Vivek Ashok Bohara | IIIT-Delhi

Learners enrolled: 4126 | Exam registration: 177

Advanced topics of Wireless Communication (Hindi) - Course Introduction video

ABOUT THE COURSE:

This course will provide an advanced level understanding of a wireless communication system. Starting with the overview of wireless systems and standards, the students will study the fundamental capacity limits of wireless channels along with transmission strategies to maximize the theoretical capacity The course will also cover fundamental coding techniques such as block, convolutional and trellis coding for wireless channels and will also touch upon the recent developments in concatenated, turbo and LDPC codes. The students will also learn the benefits of applying adaptive modulation and coding strategies in wireless channels to enable robust and spectrally efficient communication. This course will also introduce students to MIMO communications and space time block codes which will be followed by multiuser systems and networks. Finally, the course will share insights and possible technologies for the next generation of wireless communication systems.

INTENDED AUDIENCE: UG and PG Students

PREREQUISITES:

Mandatory:

1. Principles of Signals and Systems
2. Principles of Communication Systems
3. Fundamentals of wireless communication

Desirable:

4.Matlab Coding

INDUSTRY SUPPORT: In general, any company/ industry working with Wireless Communication and cellular/ Wi-Fi technology will recognize this course. Some examples include:

1. Cellular Operators: Jio/Airtel/ BSNL/Aircel/VI
2. CDOT
3. Cisco/ Ericsson/ Nokia / Arista Networks
4. Qualcomm / Samsung

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	8 weeks
Category :	◦ Electrical, Electronics and Communications Engineering
Credit Points :	2
Level :	Undergraduate/Postgraduate
Start Date :	19 Feb 2024
End Date :	12 Apr 2024
Enrollment Ends :	19 Feb 2024
Exam Registration Ends :	15 Mar 2024
Exam Date :	21 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1:

Overview of Wireless Communications

- History of Wireless Communications
- Evolution of Wireless Systems and Standards
- Current Wireless systems (WLAN, Cellular Satellite etc)
- Wireless Spectrum

Week 2:

Capacity of Wireless Channels

- Capacity in AWGN
- Capacity of Flat Fading Channels

1. Channel Side Information at Receiver
2. Channel Side Information at Transmitter and Receiver
3. Capacity with Receiver Diversity

- Capacity of Frequency-Selective Fading Channels

Week 3:

Coding for Wireless Channels

- Linear Block Codes
- Convolutional Codes
- Turbo Codes and LDPC

Week 4:

Adaptive Modulation and Coding

- Adaptive Techniques

1. Variable-Rate Techniques
2. Variable-Power Techniques
3. Variable-Coding Techniques
4. Hybrid Techniques

- Variable-Rate Variable-Power MQAM

Week 5:

MIMO Communications Part 1

- SIMO and MISO systems
- STBC (Alamouti codes)
- Parallel Decomposition of the MIMO Channel
- MIMO Diversity Gain: Beamforming

Week 6:

MIMO Communications Part 2

- MIMO Channel Capacity
- MIMO Receiver Detection Algorithms

1. Maximum Likelihood (ML) Detection
2. Linear Receivers: ZF and MMSE

- Diversity–Multiplexing Trade-offs

Week 7:

Multiuser Systems Multiuser Channels:

- The Uplink and Downlink
- Conventional Multiple Access (FDMA, TDMA, CDMA)
- Current and next generation Multiple Access (OFDMA, RSMA)
- Random Access (ALOHA, CSMA)
- Multiuser Diversity

Week 8:

Next generation of Communicatio (5G, 6G Networks, Technologies such as VLC, IRS, UAV, etc.)

- Fundamentals of 5G and Beyond 5G networks: Focus on technological differences with respect to prior cellular standards
- Basic of Wi-Fi

Books and references

1. Wireless Communication (Andrea Goldsmith): Cambridge University Press
2. Wireless Communications Principles and Practice (Theodore Rappaport): Pearson Education India
3. IEEE Wireless Communications Journals and Magazines

Instructor bio

Prof. Vivek Ashok Bohara

IIIT-Delhi

Prof.Vivek Ashok Bohara received the Ph.D. degree from Nanyang Technological University, Singapore, in 2011. From 2011 to 2013, he was a Postdoctoral Researcher (Marie Curie fellowship) in ESIEE Paris, University Paris-East where he was actively involved in designing and implementing critical blocks for wideband RF transmitters. Specifically, he proposed numerous green communication techniques to reduce power consumption and increase efficiency of nonlinear high power amplifiers used in RF transmitters. In 2013, he joined IIIT-Delhi, India, where he is currently Professor and Head, Department of Electronics and Communication Engineering. He has authored and coauthored over 100 publications in major IEEE/IET journals and refereed international conferences, two book chapters, and three patents. Dr. Bohara also supervises the Wirocomm Research Lab at IIIT Delhi which deals with state of the art research in wireless communication and allied area and is also the co-founding faculty member for Li-Fi Centre of excellence @ IIIT-Delhi which is supported by India-EU standardization project. His research interests are next-generation communication technologies such as Visible Light Communication (VLC), hybrid RF-VLC communication, integration of optical communication with intelligent reflective surfaces (IRS), UAV, and vehicular communication. prof.Bohara received First Prize in National Instruments ASEAN Virtual Instrumentation Applications Contest in 2007 and 2010. He was also the recipient of the Best Paper Award at the IEEE ANTS 2022 and the best poster and demo awards at IEEE Comsnets 2016 and 2023 conferences respectively.

Course certificate

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The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **21 April 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 6 assignments out of the total 8 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

Business Intelligence & Analytics

By Prof. Saji K Mathew | IIT Madras

Learners enrolled: 11228 | Exam registration: 2948

ABOUT THE COURSE:

This course equips students with necessary knowledge and skills on the thought process, modelling approaches and tools required to use data from the enterprise databases and other sources for business decisions. In turn, the course prepares participants for a career in data science, business analytics and market research. This course will introduce the context of data mining, and cover important modelling techniques such as regression, decision trees, clustering, ANN and text mining.

PREREQUISITES: A core course on Business statistics desirable

INDUSTRY SUPPORT: Analytics and data science industry, IT services industry, Manufacturing and services operations and marketing

Summary

(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering ◦ Data Science
Credit Points :	3
Level :	Postgraduate
Start Date :	22 Jan 2024
End Date :	12 Apr 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	27 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1: Introduction to Business Intelligence & Analytics (BIA), drivers of BIA, types of analytics: descriptive to prescriptive, vocabulary of business analytics, course plan and resources

Books to refer : Text 1: Han et al. (2023) Chapter 1, Introduction

Week 2: Technical architecture of BIA, case analysis of AT&T Long distance, fundamentals of data management, OnLine Transaction Processing

(OLTP), design process

Books to refer : Text 1: Han et al. (2023) Chapter 4, Data Warehouse and Online Analytical Processing (pp. 85-108)

Week 3: Relational databases, normalisation, SQL queries, ShopSense case of management questions, data warehousing, OnLine Analytical Processing (OLAP), data cube

Books to refer : Tutorial: SQL tutorial on MySQL (https://www.mysqltutorial.org (https://www.mysqltutorial.org))

Week 4: Descriptive analytics, and visualization, customer analytics, survival analysis, customer lifetime value, case study

Books to refer :

a. Knowing When to Worry: Using Survival Analysis to Understand Customers: https://learning.oreilly.com/library/view/data-mining-techniques/9780470650936/9780470650936c 10.xhtml#c10_level1_1 (https://learning.oreilly.com/library/view/data -mining-techniques/9780470650936/9780470650936c10.xhtml#c10_level1_1)

b. Customer Lifetime Value (CLV): A Critical Metric for Building Strong Customer Relationships, https://www.gartner.com/en/digital-markets/insights/what-is-customer-lifetime-value (https://www.gartner.com/en/digital-markets/insights/what-is-customer-lifetime- value)

Week 5: Data mining process, introduction to statistical learning, data pre-processing, data quality, overview of data mining techniques, case study using regression analysis

Books to refer :

a. Text 2: James et al. (2013) Chapter 1, Statistical learning, ISL

b. Text 2: James et al. (2013) Chapter 2, Linear regression, ISL

Week 6: Introduction to classification, classification techniques, scoring models, classifier performance, ROC and PR curves

Books to refer : Text 1: Han et al. (2023) Chapter 6, Classification: Basic concepts and methods

Week 7: Introduction to decision trees, tree induction, measures of purity, tree algorithms, pruning, ensemble methods

Books to refer : Text 2: James et al. (2013) Chapter 8, Tree- based models

Week 8: Tree implementation in Python: problem of targeted mailing

Books to refer :

a. https://scikit-learn.org/stable/modules/model_evaluation.html#roc-metrics (https://scikit- learn.org/stable/modules/model_evaluation.html#roc-metrics)

b. https://scikit-learn.org/stable/visualizations.html (https://scikit- learn.org/stable/visualizations.html)

Week 9: Cluster analysis, measures of distance, clustering algorithms, K-means and other techniques, cluster quality

Books to refer : Text 2: James et al. (2013) Chapter 10, Unsupervised learning (pp. 385-400)

Week 10: A store segmentation case study using clustering, implementation in Python, profiling clusters, cluster interpretation and actionable

insights, RFM sub- segm mer loyalty

Books to refer : What Is Recency, Frequency, Monetary Value (RFM) in Marketing?: https://www.investopedia.com/terms/r/rfm-recency-frequency-monetary-value.asp (https://www.investopedia.com/terms/r/rfm- recency-frequency-monetary-value.asp)

Week 11: Machine learning, Artificial Neural Networks (ANN), topology and training algorithms, back propagation, financial time series modelling using ANN, implementation in Python

Books to refer : Kaastra & Boyd (1996) Designing a neural network for forecasting financial and economic time series, JNC: https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=bcbb8ca9d6a6ce6017710ebf6143da76b6edf98b (https://citeseerx.ist.psu.edu/document?repid= rep1&type=pdf&doi=bcbb8ca9d6a6ce6017710ebf6143da76b6edf98b)

Week 12: Text mining, process, key concepts, sentiment scoring, text mining using R-the case of a movie discussion forum, summary

Books to refer : Silge and Robinson, Text Mining with R, A Tidy Approach: O'reilly: www.tidytextmining.com/index.html (http://www.tidytextmining.com/index.html)

Books and references

Text 1: Han, J., Pei, J. & Tong H. (2023). Data Mining Concepts and Techniques, 4th ed, New Delhi: Elsevier.

Text 2: James, G., Witten, D., Hastie, T. and Tibshirani,R. (2013) An Introduction to Statistical Learning with Applications in R, Springer: NY

Data sources

- "Adventure Works Cycles", SQL Server sample database
- "Retail Sense transaction data", real life data of a fashion retailer
- UCI Machine Learning Repository, http://archive.ics.uci.edu/ml/ (http://archive.ics.uci.edu/ml/)
- Financial/capital market data: Yahoo! Finance
- Text data: www.twitter.com (http://www.twitter.com)
- ISL resources: http://www-bcf.usc.edu/~gareth/isl/ (http://www-bcf.usc.edu/~gareth/isl/)
- Kaggle: www.kaggle.com (http://www.kaggle.com)

APPENDIX

Resources for Learning Python & R

Participants need to develop proficiency in statistical programming while doing this course. This course gives the flexibility to learn either one of them or both. Scripts required to solve class work will be provided in both the languages. I give below guidelines to install and get started with both the languages.

I. *Installing and Using Python and Jupyter Notebook*

You may install anaconda distribution of Python 3.7 for your machine and OS (Windows/MacOS/Linux) from Anaconda website:

https://www.anaconda.c vidual (https://www.anaconda.com/products/individual)

After installation, click on the "Anaconda Navigator" to launch Jupyter Notebook.

In Jupyter Notebook you may browse "New", "Python 3" to start a new window for writing codes.

You may separately install the following packages required for the course:

a. Graphviz: Follow the guidelines here to install Graphviz for your OS:

https://bobswift.atlassian.net/wiki/spaces/GVIZ/pages/20971549/How+to+install+Graphviz+soft

(https://bobswift.atlassian.net/wiki/spaces/GVIZ/pages/20971549/How+to+install+Graphviz+soft ware)

ware (https://bobswift.atlassian.net/wiki/spaces/GVIZ/pages/20971549/How+to+install+Graphviz+soft ware)

b. Yellowbrick: Follow guidelines here to install yellow brick in your OS:

https://www.scikit-yb.org/en/latest/quickstart.html (https://www.scikit-yb.org/en/latest/quickstart.html)

c. Category encoders: https://contrib.scikit-learn.org/category_encoders/ (https://contrib.scikit-learn.org/category_encoders/)

II. *Python learning resources*

I suggest the following resources to get started with Python programming and then data analysis using Python:

- Tutorial: https://docs.python.org/3/ (https://docs.python.org/3/)
- Wes McKinney, Python for Data Analysis, accessible at https://www.programmer-books.com/wp-content/uploads/2019/04/Python-for-Data-Analysis-2nd-Edition.pdf (https://www.programmer-books.com/wp-content/uploads/2019/04/Python-for-Data-Analysis-2nd-Edition.pdf)
- Full Stack Python (An aggregator site for Python learning resources): https://www.fullstackpython.com/best-python-resources.html (https://www.fullstackpython.com/best-python-resources.html)
- Best Python videos (An aggregator site for Python video learning resources): https://www.fullstackpython.com/best-python-videos.html (https://www.fullstackpython.com/best-python-videos.html)
- Python tutorial: https://www.w3schools.com/python/ (https://www.w3schools.com/python/)
- Machine learning in Python: https://scikit-learn.org/stable/index.html (https://scikit-learn.org/stable/index.html)
- Anaconda resources: https://www.anaconda.com/library (https://www.anaconda.com/library)
- Using Python for Research, https://online-learning.harvard.edu/course/using-python- (https://online-learning.harvard.edu/course/using-python- research?delta=0) research?delta=0
- Coursera: https://www.coursera.org/courses?query=python (https://www.coursera.org/courses?query=python)

III. *Installing and Using R*

Visit https://cran.r-project.org/doc/manuals/r-release/R-admin.html (https://cran.r-project.org/doc/manuals/r-release/R-admin.html) for guidelines to install the latest version of R for your machine and OS.

Visit https://rstudio.com/products/rstudio/download/ (https://rstudio.com/products/rstudio/download/) for guidelines to install the latest free version of RStudio for your machine and OS.

Now open RStudio and run the following command to install the packages required for the course:

install.packages("tree","rpart","rpart.plot","caret","e1071","TTR","neuralnet","tidytext", "widyr","tidyr","dplyr","ggplot2","wordcloud","reshape2","SnowballC")

If you encounter errors, try install each package separately using install.packages() command.

IV. *R learning resources*

I suggest the following r arted with R programming and then data analysis using R :

(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

1. W. N. Venables, D. M. Smith, An Introduction to R:
https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf (https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf)
2. Julia Silge and David Robinson, Text Mining with R, A Tidy Approach, O'reilly:
https://www.tidytextmining.com/index.html (https://www.tidytextmining.com/index.html)
3. David Romney, Online resources for learning R:
https://scholar.harvard.edu/dromney/online-resources-learning-r (https://scholar.harvard.edu/dromney/online-resources-learning-r)
4. Introductory Statistics with R:
https://link.springer.com/content/pdf/10.1007%2F978-0-387-79054-1.pdf (https://link.springer.com/content/pdf/10.1007%2F978-0-387-79054-1.pdf)
5. Video: https://www.youtube.com/watch?v=riONFzJdXcs&list=PLqzoL9- (https://www.youtube.com/watch?v=riONFzJdXcs&list=PLqzoL9-eJTNBDdKgJgJzaQcY6OXmsXAHU)
eJTNBDdKgJgJzaQcY6OXmsXAHU
6. Coursera: https://www.coursera.org/learn/r-programming (https://www.coursera.org/learn/r-programming)

V. *Installing and Using MySQL with Workbench*
https://dev.mysql.com/doc/workbench/en/ (https://dev.mysql.com/doc/workbench/en/)
https://www.mysqltutorial.org (https://www.mysqltutorial.org) (SQL tutorial for MySQL database)

Instructor bio

Prof. Saji K Mathew

IIT Madras

Prof.Saji K Mathew is currently a Professor at the Department of Management Studies, Indian Institute of Technology Madras, India. As a Fulbright Scholar, he did his post-doctoral research on offshore IT outsourcing at the Goizueta Business School of Emory University, Atlanta (USA). His current research focuses on behavioral cyber security, information privacy, misinformation and digital nudging. He has published research in leading IS journals while also making editorial contributions to some of them. He is a founding member of the Association for Information Systems India Chapter (INAIS) and presently serves as its Vice President.

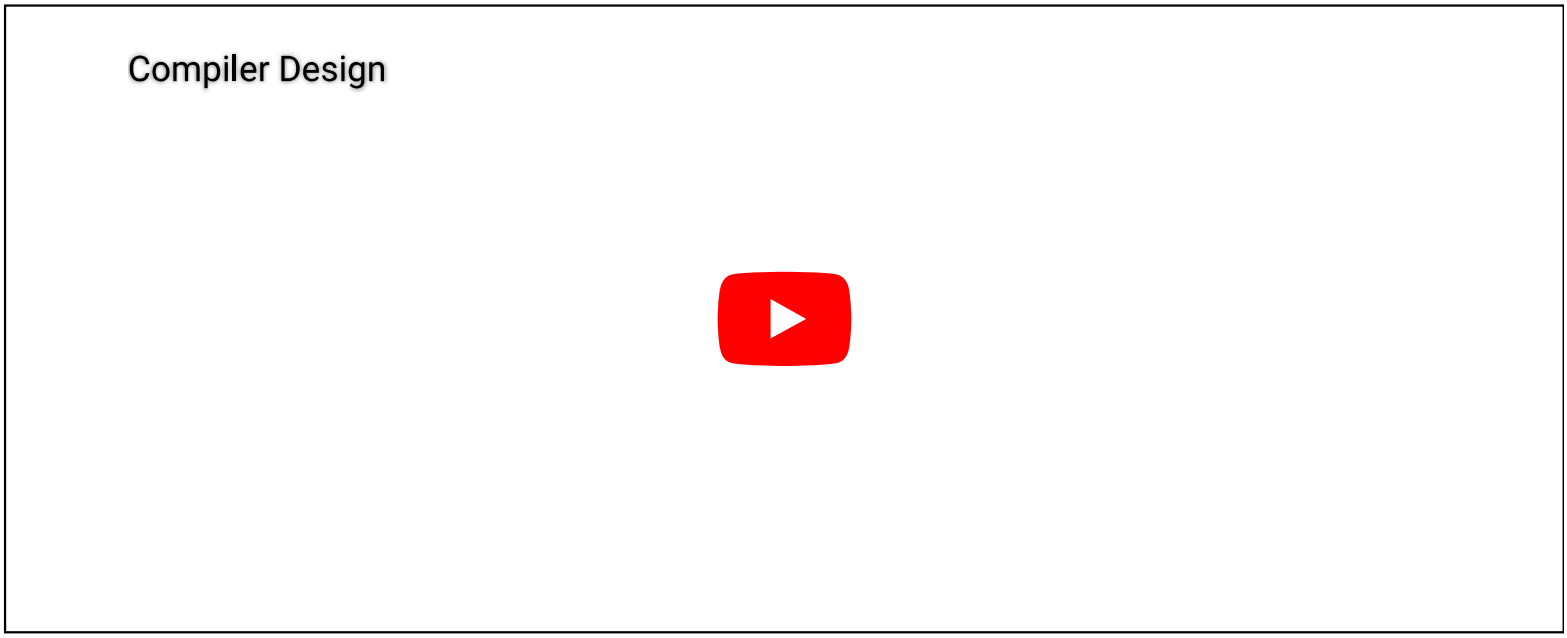
Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **27 April 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.

Compiler Design

By Prof. Santanu Chattopadhyay | IIT Kharagpur

Learners enrolled: 7746 | Exam registration: 1151



ABOUT THE COURSE :

Compilers have become part and parcel of today's computer systems. They are responsible for making the user's computing requirements, specified as a piece of program, understandable to the underlying machine. There tools work as interface between the entities of two different domains – the human being and the machine. The actual process involved in this transformation is

quite complex. [illegible] provides the base of the course on which several automated tools can be designed to be used at various phas[illegible] Advances in computer architecture, memory management and operating systems provide the compiler designer large number of options to try out for efficient code generation. This course on compiler design is to address all these issues, starting from the theoretical foundations to the architectural issues to automated tools. Being primarily targeted to a one-semester course for the undergraduate students, the course will follow the current GATE syllabus, enabling the students to prepare well for the same. It can also help all other participants looking for an introduction to the domain of compiler designs and code translators.

INTENDED AUDIENCE : Undergraduate students of CSE, IT, B.Sc (Computer Science), MCA, MS (Computer Science)
INDUSTRY SUPPORT : All software industries

Summary

Course Status :	Completed
Course Type :	Core
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering ◦ Systems
Credit Points :	3
Level :	Undergraduate
Start Date :	22 Jan 2024
End Date :	12 Apr 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	27 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

Course layout

Week 1 : Introduction
Week 2 : Lexical Analysis
Week 3 : Parsing – Part I
Week 4 : Parsing – Part II
Week 5 : Parsing – Part III
Week 6 : Syntax Directed Translation
Week 7 : Type Checking and Symbol Tables
Week 8 : Runtime Environment Management – Part I
Week 9 : Runtime Environment Management – Part II
Week 10 : Intermediate Code Generation – Part I
Week 11 : Intermediate Code Generation – Part II
Week 12 : Intermediate Code Generation – Part III

Books and references

1. Santanu Chattopadhyay, “Compiler Design”, PHI Learning Pvt. Ltd., 2015.
2. A.V. Aho, R. Sethi, J.D. Ullman, “Compilers Principles, Techniques and Tools”, Addison-Wesley, 1986.

Instructor bio

Prof. Santanu Chattopadhyay

IIT Kharagpur

Santanu Chattopadhyay received his BE degree in Computer Science and Technology from Calcutta University (B.E. College) in 1990. He received M.Tech in Computer and Information Technology and PhD in Computer Science and Engineering from Indian Institute of Technology Kharagpur in 1992 and 1996, respectively. He is currently a Professor in the Department of Electronics and Electrical Communication Engineering, IIT Kharagpur. Prior to this, he had been a faculty member in the IIEST Sibpur and IIT Guwahati in the departments of Computer Science and Engineering. In both these places he has taught the subject of Compiler

Design several t[illegible] interests include Digital Design, Embedded Systems, System-on-Chip (SoC) and Network-on-Chip (NoC) Des[illegible] and Thermal-aware Testing of VLSI Circuits and Systems. He has published more than 150 papers in reputed international journals and conferences. He has published several text and reference books on Compiler Design, Embedded Systems and other related areas. He is a senior member of the IEEE and an Associate Editor of IET Circuits Devices and Systems journal.

Course certificate

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Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IIT Kharagpur .It will be e-verifiable at nptel.ac.in/noc (http://nptel.ac.in/noc).

Only the e-certificate will be made available. Hard copies will not be dispatched.

Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

Computer Networks And Internet Protocol

By Prof. Soumya Kanti Ghosh, Prof. Sandip Chakraborty | IIT Kharagpur

Learners enrolled: 26938 | Exam registration: 11874

ABOUT THE COURSE :

The domain of Internet has grown in a rapid pace from traditional circuit switched and packet switched small scale networks to modern high-speed mobile and wireless Internet. A large number of methods, architectures and designs came up at every protocol level to cop up with the demands for developing a secure and highly dependable information technology infrastructure. The broad objective of the course is to understand - (i) the architecture and principles of today's computer networks, (ii) the protocols and their functionalities, (iii) the requirements for the future Internet and its impact on the computer network architecture. In this course, we'll broadly cover the basic TCP/IP protocol stack and touch on the next generation computer networks. We'll take a top-down approach to cover different protocols at the TCP/IP protocol stack.

INTENDED AUDIENCE : CSE, ECE, EE
INDUSTRY SUPPORT : IT industries

Summary

Course Status :	Completed
Course Type :	Core
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering ◦ Systems
Credit Points :	3
Level :	Undergraduate/Postgraduate
Start Date :	22 Jan 2024
End Date :	12 Apr 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	20 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1 : Introduction to Computer Networks – History, Circuit Switching and Packet Switching
Week 2 : TCP/IP Protocol Stack – Basic Overview
Week 3 : Application Layer Services (HTTP, FTP, Email, DNS)
Week 4 : Transport Layer Primitives – Connection Establishment and Closure
Week 5 : Flow Control and Congestion Control at the Transport Layer
Week 6 : Transmission Control Protocol – Basic Features, TCP Congestion Control
Week 7 : Network Layer Primitives – IP Addressing
Week 8 : IP Routing – Intra Domain Routing Protocols, Inter Domain Routing Protocols (BGP)
Week 9 : IP Services – SNMP, ARP
Week 10 : Data Link Layer Service Primitives – Forwarding, Flow Control, Error Control
Week 11 : Media Access Control - Channel Access Protocols, Framing
Week 12 : End to End Principles of Computer Networks

Dr. Mahesh Bundele
B.E., M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

Books and referer (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Computer Networking: A Top - Down Approach, by Ames Kurose, Keith Ross
Computer Networks - Andrew S Tanenbaum
Computer Networks: A Systems Approach Book by Bruce S. Davie and Larry L. Peterson
TCP/IP Tutorial and Technical Overview, (IBM Redbook) - Download From http://www.redbooks.ibm.com/abstracts/gg243376.html (http://www.redbooks.ibm.com/abstracts/gg243376.html)
TCP/IP Guide, Charles M. Kozierok, Available Online - http://www.tcpipguide.com/ (http://www.tcpipguide.com/)
Request for Comments (RFC) - IETF - http://www.ietf.org/rfc.html (http://www.ietf.org/rfc.html)

Journals/Transactions
IEEE/ACM Transactions on Networking IEEE Transactions on Mobile Computing ACM SIGCOMM Computer Communication Review IEEE Transactions on Communication

Instructor bio

Prof. Soumya Kanti Ghosh

IIT Kharagpur

Prof. Soumya K. Ghosh received the Ph.D. and M.Tech. degrees from Department of Computer Science and Engineering, Indian Institute of Technology (IIT), Kharagpur, India. Presently, he is a Professor with Department of Computer Science and Engineering, IIT Kharagpur. Before joining IIT Kharagpur, he worked for the Indian Space Research Organization in the area of satellite remote sensing and geographic information systems. He has more than 200 research papers in reputed journals and conference proceedings. His research interests include spatial data science, spatial web services and cloud computing.

Prof. Sandip Chakraborty

Prof. Sandip Chakraborty received the Ph.D. and M.Tech. degrees from Department of Computer Science and Engineering, Indian Institute of Technology (IIT), Guwahati, India. Presently, he is an Assistant Professor with Department of Computer Science and Engineering, IIT Kharagpur. He has around 100 research papers in reputed journals and conference proceedings. His research interests include computer systems, distributed systems and mobile computing.

Data Analytics with Python

By Prof. A Ramesh | IIT Roorkee

Learners enrolled: 54491 | Exam registration: 16049

Data Analytics with Python

ABOUT THE COURSE :

We are looking forward to sharing many exciting stories and examples of analytics with all of you using python programming language. This course includes examples of analytics in a wide variety of industries, and we hope that students will learn how you can use analytics in their career and life. One of the most important aspects of this course is that you, the student, are getting hands-on experience creating analytics models; we, the course team, urge you to participate in the discussion forums and to use all the tools available to you while you are in the course!

INTENDED AUDIENC (https://swayam.gov.in/) Industrial Engineering and Computer Science Engineering students (https://swayam.gov.in/nc_details/NPTEL)
INDUSTRY SUPPORT : Any analytics company

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering ◦ Data Science
Credit Points :	3
Level :	Undergraduate/Postgraduate
Start Date :	22 Jan 2024
End Date :	12 Apr 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	27 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1 : Introduction to data analytics and Python fundamentals

Books and references

1. McKinney, W. (2012). Python for data analysis: Data wrangling with Pandas, NumPy, and IPython. " O'Reilly Media, Inc.".
2. Swaroop, C. H. (2003). A Byte of Python. Python Tutorial.
3. Ken Black, sixth Editing. Business Statistics for Contemporary Decision Making. “John Wiley & Sons, Inc”.
4. Anderson Sweeney Williams (2011). Statistics for Business and Economics. “Cengage Learning”.
5. Douglas C. Montgomery, George C. Runger (2002). Applied Statistics & Probability for Engineering. “John Wiley & Sons, Inc”
6. Jay L. Devore (2011). Probability and Statistics for Engineering and the Sciences. “Cengage Learning”.
7. David W. Hosmer, Stanley Lemeshow (2000). Applied logistic regression (Wiley Series in probability and statistics). “Wiley-Interscience Publication”.
8. Jiawei Han and Micheline Kamber (2006). Data Mining: Concepts and Techniques. “
9. Leonard Kaufman, Peter J. Rousseeuw (1990). Finding Groups in Data: An Introduction to Cluster Analysis. “John Wiley & Sons, Inc”.

Instructor bio

Prof. A Ramesh

IIT Roorkee

Ramesh Anbanandam graduated in Production Engineering from Madras University, Chennai. He did his post-graduation from National Institute of Technology, Trichy. He later earned his Ph.D. in Supply Chain Management from Indian Institute of Technology Delhi. His professional interest includes Humanitarian Supply Chain Management, Operations Management, Operations Research, Healthcare Waste Management, Sustainable Multi-model & Freight Transportation, Transportation Asset Management and Advanced Data Analytics using Python and R- programming. He has guided Ph.D. thesis in the area of Humanitarian Supply Chain Management, Healthcare waste

management, and R e has published various research articles in reputed journals. He was also awarded Emerald Literati Award for Ex Highly Commended Research Paper in the year 2015 and 2020 in the field of Supply Chain Management.

Course certificate

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CRITERIA TO GET A CERTIFICATE

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Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

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Only the e-certificate will be made available. Hard copies will not be dispatched.

Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

Deep Learning - IIT Ropar

By Prof. Sudarshan Iyengar, Prof. Padmavati | IIT Ropar, Punjab Engineering College (Deemed to be University)

Learners enrolled: 15289 | Exam registration: 3361

Deep Learning - Course Introduction

ABOUT THE COURSE :

Deep Learning has received a lot of attention over the past few years and has been employed successfully by companies like Google, Microsoft, IBM, Facebook, Twitter etc. to solve a wide range of problems in Computer Vision and Natural Language Processing. In this course we will learn about the building blocks used in these Deep Learning based solutions. Specifically, we

will learn about l networks, convolutional neural networks, recurrent neural networks and attention mechanisms. W verious Optimization algorithms such as Gradient Descent, Nesterov Accelerated Gradient Descent, Adam, Adagrad and RMSProp which are used for training such deep neural networks. At the end of this course students would have knowledge of deep architectures used for solving various Vision and NLP tasks

INTENDED AUDIENCE: Any Interested Learners

PREREQUISITES: Working knowledge of Linear Algebra, Probability Theory. It would be beneficial if the participants have done a course on Machine Learning.

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering ◦ Artificial Intelligence ◦ Data Science ◦ Robotics
Credit Points :	3
Level :	Undergraduate/Postgraduate
Start Date :	22 Jan 2024
End Date :	12 Apr 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	28 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1 : (Partial) History of Deep Learning, Deep Learning Success Stories, McCulloch Pitts Neuron, Thresholding Logic, Perceptrons, Perceptron Learning Algorithm
Week 2 : Multilayer Perceptrons (MLPs), Representation Power of MLPs, Sigmoid Neurons, Gradient Descent, Feedforward Neural Networks, Representation Power of Feedforward Neural Networks
Week 3 : FeedForward Neural Networks, Backpropagation
Week 4 : Gradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD, AdaGrad, RMSProp, Adam, Eigenvalues and eigenvectors, Eigenvalue Decomposition, Basis
Week 5 : Principal Component Analysis and its interpretations, Singular Value Decomposition
Week 6 : Autoencoders and relation to PCA, Regularization in autoencoders, Denoising autoencoders, Sparse autoencoders, Contractive autoencoders
Week 7 : Regularization: Bias Variance Tradeoff, L2 regularization, Early stopping, Dataset augmentation, Parameter sharing and tying, Injecting noise at input, Ensemble methods, Dropout
Week 8 : Greedy Layerwise Pre-training, Better activation functions, Better weight initialization methods, Batch Normalization
Week 9 : Learning Vectorial Representations Of Words
Week 10: Convolutional Neural Networks, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet, Visualizing Convolutional Neural Networks, Guided Backpropagation, Deep Dream, Deep Art, Fooling Convolutional Neural Networks
Week 11: Recurrent Neural Networks, Backpropagation through time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, GRU, LSTMs
Week 12: Encoder Decoder Models, Attention Mechanism, Attention over images

Books and references

Deep Learning, An MIT Press book, Ian Goodfellow and Yoshua Bengio and Aaron Courville http://www.deeplearningbook.org

Instructor bio

Prof. Sudarshan Iyengar

IIT Ropar

Prof. Sudarshan Iyengar, Associate Professor at the CSE at IIT Ropar has a Ph.D. from the Indian Institute of Science (IISc). An exemplary teacher who has delivered over 350 popular science talks to students of high school and advanced graduate programmes. Dr. Sudarshan has offered more than 100 hours of online lectures with novel teaching methodologies that have reached lakhs of Students. His research interests include Data Sciences, Social Computing, Social Networks, Collective Intelligence, Crowdsourced Technologies and Secure Computation

Prof. Padmavati

Punjab Engineering College (Deemed To Be University)

Dr. Padmavati received B.E degree in Computer Science & Engineering with distinction from PDACE, Gulbarga, V.T.U, Belgaum, Karnataka, M.E. degree in Computer Science & Engineering and Ph.D from Punjab Engineering College (Deemed to be University), Chandigarh. Currently, she is working as Assistant Professor at Punjab Engineering College (Deemed to be University), Chandigarh, India. She has been teaching this course since two years for M.Tech students. She has also offered courses like Data structure, Analysis and design of algorithms, Object oriented programming, Research methodology, and Wireless sensor networks. Her research interests are in the areas of Wireless sensor networks, IoT, machine learning and deep learning. Her current research projects include “Classification of Parkinson’s disease using machine learning algorithms”, “Major depressive disorder using EEG Signal”, and “Detection of neurological disorder - Epilepsy using EEG Signals”.

Course certificate

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Date and Time of Exams: **28 April 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.

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Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

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Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

Discrete Mathematics

By Prof. Sudarshan Iyengar, Prof. Anil Shukla | IIT Ropar

Learners enrolled: 5810 | Exam registration: 747

Introduction to the Course_Discrete Mathematics

ABOUT THE COURSE :

The course will be an introduction to Discrete Mathematics which comprises of the essentials for a computer science student to go ahead and study any other topics in the subject. The emphasis will be on problem solving as well as proofs. We will be

providing motiv s and applications through out the course. The course doesn't assume any pre-requisites except for high ematics and algebra.

INTENDED AUDIENCE: Any Interested Learners

INDUSTRY SUPPORT: Every industry expects candidates to have good aptitude. This course sharpens the overall Quant skills.

Summary

Course Status :	Completed
Course Type :	Core
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering ◦ Foundations of Computing ◦ Foundations of Mathematics
Credit Points :	3
Level :	Undergraduate
Start Date :	22 Jan 2024
End Date :	12 Apr 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	28 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

Course la (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Week 1: Counting
Week 2: Set Theory
Week 3: Logic
Week 4: Relations
Week 5: Functions
Week 6: Mathematical Induction and Pegionhole Principle
Week 7: Graph Theory - 01
Week 8: Graph Theory - 02
Week 9: Graph Theory - 03 and Generating Functions
Week 10: Principle of Inclusion-Exclusion
Week 11: Recurrence relations
Week 12: Advanced Topics

Books and references

1. Discrete and Combinatorial Mathematics by Ralph P Grimaldi
2. Discrete Mathematics and its Applications by Kenneth H Rosen

Instructor bio

Prof. Sudarshan Iyengar

IIT Ropar

Prof. Sudarshan Iyengar, Associate Professor at the CSE at IIT Ropar has a Ph.D. from the Indian Institute of Science (IISc). An exemplary teacher who has delivered over 350 popular science talks to students of high school and advanced graduate programmes. Dr. Sudarshan has offered more than 100 hours of online lectures with novel teaching methodologies that have reached lakhs of Students. His research interests include Data Sciences, Social Computing, Social Networks, Collective Intelligence, Crowdsourced Technologies and Secure Computation

Prof. Anil Shukla

Prof. Anil Shukla is an Assistant Professor in the Department of Computer Science & Engineering at IIT Ropar. He completed his Ph.D from the Institute of Mathematical Sciences, Chennai, India. His research interests lie in the areas of Computational Complexity, Proof Complexity, and Graph Theory.

Course certificate

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Once again, thanks for your interest in our online courses and certification. Happy learning.

Energy Resources, Economics, and Sustainability

By Prof. Pratham Arora | IIT Roorkee

Learners enrolled: 2700 | Exam registration: 675

Promo of Course Energy Resources, Economics and Sustainability | Prof Pratham Arora | IIT Roorkee

ABOUT THE COURSE:

The course aims to explain the present global energy demand, the environmental effects of energy use, and what can be accomplished to alleviate the environmental effects of energy use and ensure an adequate energy supply. A technical and quantitative approach using simple algebra would be undertaken to explore the energy sources, usage, economics, and policy. Life cycle assessment (LCA) training would assist the students in understanding the future net-zero targets. Finally, the course would also aim to debunk misconceptions related to energy production and the environment.

INDUSTRY SUPPORT: Any industry/corporate that wants to formulate net zero or environment, social, and governance (ESG) targets.

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	8 weeks

Category : Multidisciplinary
- Energy and Environment

Credit Points : 2

Level : Undergraduate/Postgraduate

Start Date : 19 Feb 2024

End Date : 12 Apr 2024

Enrollment Ends : 19 Feb 2024

Exam Registration Ends : 15 Mar 2024

Exam Date : 20 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1: Overview of World energy scenario, primary energy demand and supply, fossil fuel reserves - estimates, an overview of India's energy scenario and its comparison with other countries, formulation of energy Sankey diagrams, trends in energy use patterns.

Week 2: Energy and development linkage, energy prices, economics and politics, energy chain, primary energy analysis, net energy analysis examples.

Week 3: Fundamental concepts of economics, decision-making process, investment appraisal methods (net present value, annual worth method, payback period, internal rate of return, profitability index)

Week 4: Financial analysis of renewable energy projects, government incentives and disincentives, project financing for energy projects, case studies: wind energy, green hydrogen, electric vehicles.

Week 5: Environmental effects of energy production and utilization, recent successes in abatement of acid rains, lead emissions, and ozone depletion, uniqueness of climate change problem.

Week 6: The Kyoto protocol, the Paris agreement, the Kigali agreement, myths and realities related to global climate change, nuclear waste, thermal pollution, energy-water nexus.

Week 7: Introduction to Life cycle assessment (LCA) and its relation with environmental decision support, LCA framework methods, and standards.

Week 8: LCA: mass flow, data estimation, multi-functionality, impact categories, mid-point and end-point indicators, interpretation: consistency and sensitivity. Case studies in LCA of energy systems.

Books and references

1. Energy, the Environment, and Sustainability, Efstathios E. Michaelides, CRC Press, 2018.
2. The Age of Sustainable Development, Jeffrey D. Sachs, Ki-moon Ban, Columbia University Press, 2015.
3. Life Cycle Assessment Handbook: A Guide for Environmentally Sustainable Products, Mary Ann Curran, Wiley, 2012.
4. Energy Economics, Subhes C. Bhattacharyya, Springer London, 2011.

Instructor bio

Prof. Pratham Arora

IIT Roorkee

Prof. Pratham Arora is currently an Assistant Professor, Department of Hydro and Renewable Energy, IIT Roorkee. At IIT Roorkee, his research is focused on comparative life cycle assessment, process optimization and techno-enviro-economic analysis of different energy and environmental systems. Prior to joining IIT Roorkee, he was a Post-doctoral fellow at the Georgia Tech., Atlanta in the Industrial and Systems Engineering Department. Prof. Arora has completed his doctorate from IITB-Monash Research Academy – a joint venture between IIT-Bombay, India and, Monash University, Australia. He has been working in collaboration with highly innovative sustainability-focused companies such as Algenol biofuels, Lanzatech, Pontoka, Orica Mining and Global Thermostat.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **20 April 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 6 assignments out of the total 8 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IIT Roorkee .It will be e-verifiable at nptel.ac.in/noc (http://nptel.ac.in/noc).

Only the e-certificate will be made available. Hard copies will not be dispatched.

Enhancing Soft Skills and Personality

By Prof. T. Ravichandran | IIT Kanpur

Learners enrolled: 59107 | Exam registration: 19859

noc19-hs22-Enhancing Soft Skills and Personality

ABOUT THE COURSE:

The course aims to cause an enhanced awareness about the significance of soft skills in professional and inter-personal communications and facilitate an all-round development of personality. Hard or technical skills help securing a basic position in one's life and career. But only soft skills can ensure a person retain it, climb further, reach a pinnacle, achieve excellence, and derive fulfilment and supreme joy. Soft skills comprise pleasant and appealing personality traits as self-confidence, positive attitude, emotional intelligence, social grace, flexibility, friendliness and effective communication skills. The focus of this course is on interpersonal and management skills. It has been approved for "Faculty Development Programme (https://nptel.ac.in/AICTE_FDP/)" by AICTE.

INTENDED AUDIENCE : Students, Teachers, Professionals, Trainers, Leaders, Employers

PREREQUISITES : No prere[...] Background knowledge of MOOC Course on "Developing Soft Skills and Personality" is preferred. "Developing Soft Skills and [...]se was also recognized as FDP during Aug-Oct'18 Period.

INDUSTRY SUPPORT : All industry/companies/organisations will recognize and value this course and recommend this for their employees and trainee programs

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	8 weeks
Category :	◦ Humanities and Social Sciences
Credit Points :	2
Level :	Undergraduate/Postgraduate
Start Date :	19 Feb 2024
End Date :	12 Apr 2024
Enrollment Ends :	19 Feb 2024
Exam Registration Ends :	15 Mar 2024
Exam Date :	20 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

(/#facebook) (/#x) (/#microsoft_teams) (/#linkedin) (/#whatsapp)

(https://www.addtoany.com/share#url=https%3A%2F%2Fonlinecourses.nptel.ac.in%2Fnoc24_hs26%2Fpreview&title=Enhancing%20Soft%20Skills%20and%20Personality%20-%20Course)

Course layout

Week 1 :

- Highlights of Developing Soft Skills and Personality Course-1-24
- Highlights of Developing Soft Skills and Personality Course-25-48
- Definitions and Types of Mindset
- Learning Mindsets

Dr. Mahesh Bundele
B.E., M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

- Secrets of Developing

Week 2 :

- Importance of Time and Understanding Perceptions of Time
- Using Time Efficiently
- Understanding Procrastination
- Overcoming Procrastination
- Don't Say "Yes" to Make Others Happy!

Week 3 :

- Types of People
- How to Say "No"
- Controlling Anger
- Gaining Power from Positive Thinking-1
- Gaining Power from Positive Thinking-2

Week 4 :

- What Makes Others Dislike You?
- What Makes Others Like You?-1
- What Makes Others Like You?-2
- Being Attractive-1
- Being Attractive-2

Week 5 :

- Common Errors-1
- Common Errors-2
- Common Errors-3
- Common Errors-4
- Common Errors-5

Week 6 :

- Humour in Communication
- Humour in the Workplace
- Function of Humour in the Workplace
- Money and Personality
- Managing Money

Week 7 :

- Health and Personality
- Managing Health-1: Importance of Exercise
- Managing Health-2: Diet and Sleep
- Love and Personality
- Managing Love

Week 8 :

- Ethics and Etiquette
- Business Etiquette
- Managing Mind and Memory
- Improving Memory
- Care for Environment
- Highlights of the Course

Books and refere

- Dorch, Patricia. What Are Soft Skills? New York:Execu Dress Publisher, 2013.
- Kamin, Maxine. Soft Skills Revolution: A Guide for Connecting with Compassion for Trainers,Teams, and Leaders. Washington, DC: Pfeiffer &Company, 2013.
- Klaus, Peggy, Jane Rohman & Molly Hamaker.The Hard Truth about Soft Skills. London:HarperCollins E-books, 2007.
- Petes S. J., Francis. Soft Skills and ProfessionalCommunication. New Delhi: Tata McGraw-HillEducation, 2011.
- Stein, Steven J. & Howard E. Book. The EQ Edge: Emotional Intelligence and Your Success.Canada: Wiley & Sons, 2006.

Instructor bio

Prof. T. Ravichandran

IIT Kanpur

Dr. T. RAVICHANDRAN is presently a Professor of English in the Department of Humanities and Social Sciences at the Indian Institute of Technology Kanpur, Uttar Pradesh, India. He has written about fifty research articles/book chapters, supervised six doctoral theses, edited a special issue on Cyberpunk Literature for the Creative Forum Journal, and published a book on Postmodern Identity. He is a recipient of the Fulbright-Nehru Academic and Professional Excellence Fellowship (2014-15) for his research/teaching at Duke University, North Carolina, USA. He is honored with Champa Devi Gangwal Chair Professorship at IIT Kanpur. In his distinguished twenty-five years of teaching career, he has taught various courses in English Language and Literature. His NPTEL Video and Web courses on Communication Skills are well-acclaimed nationally and internationally. His NPTEL MOOC on Developing Soft Skills and Personality became hugely popular and well-received by about fifteen thousand participants from India and abroad.

Course certificate

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Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

APPRECIATIONS AND COMMENTS BY THE CURRENT AND PREVIOUS BATCH STUDENTS:

I wish to convey a heartfelt thank you for the wonderful course on enhancing soft skills and personality. It is a blessing especially to people who are about to start their careers. They could be saved from committing many mistakes that could actually ruin their lives. I greatly appreciate the tremendous and sincere efforts that have been put in to design this course and make it available for all. Sir, you are very gentle in your speech and I have been looking forward each day to learning something new from you. I admire the way you explain with so many examples and quotes. It was a great learning experience for me. Thank you so much!- **Manali Mehta**

The entire course was well organized and was tailored to effectively deliver the intended objective of enhancing soft skills. You actually did justice to the course in every way- content, the distribution of modules over the week for them to co relate and be effective at each juncture that they were placed, overall delivery to the last bit of providing timely solutions to queries. I must congratulate you and your team for doing fantastic work in structuring this course and on its very successful completion. I look forward to the next! - **Dr. Vineeta Saluja, Principal - Mata Gujri Mahila Mahavidyalaya, Jabalpur (12-05-2019)**

Dear Sir, I am writing this mail to thank you. You just made my day. I went through your course on personality development on YouTube and it charged me. I am so relieved after watching your lecture on TECHNOLOGY AND COMMUNICATION: MOBILE PERSONALITY that I cannot express it in words. Sir, your video has saved my life. It is life changing. I request you to bless me so that I can move on the path shown by you. Once again thank you so much for providing such a beneficial video on very important issue of life.- **P. K. Rai (10-04-2019)**

Thank You sir for this Awesome Course. This course really was a great work of you. I now understand how much practice and hard work you been undergone to deliver such awesome and easy to understand lectures. My more thanks to you sir for lecture on habits [Week 3]. Concepts in lectures are difficult to understand and I don't think I could understood those without your guidance. - **Siddharth Bhusari**

I would like to thank you for providing this wonderful course with lots of subject information, examples and life examples . . . . Looking forward to more courses like this from NPTEL. My special thanks to the Professor for guiding and explaining elaborately and neatly about the subject. Also eagerly waiting to enroll for the next Enhancing course. - **Ranjani**

This course helped me a lot. I can experience the change in my life style. I am suggesting others at least to watch the videos. Thank you very much for the wonderful course. - **Indugu Rushiraj (M. Tech (Digital Systems and Instrumentation-ETC) IIEST, Shibpur Howrah-711103)**

The course is an enriching one. This course has helped me understand myself and develop in many ways. I appreciate the way you have designed this course uch! I look forward to doing the next level. - **Pankaj Haryan, pankajharyan8@gmail.com**

This course is really helped me a lot. This type of thing I was searching since 12 years But I never found stuff that I needed. This is the course which provides me quality learning skills. Big Thanks to you sir . . . I'm blessed that I get chance to learn from you . . . Thank you..!! - **Durga Charan (M.Tech Student PEC, Chandigarh), dcharan44@gmail.com**

I am very excited and happy to convey my sincere feelings to you. This course not just only helped me in my teaching but also it helped to develop my personality in terms of my attitude. Sir, as you said in the presentations that it is not just to learn or get certificate but we should be in a position to implement and follow in our day to day life then only it will become life changing course. That's true Sir. Once again my best warm wishes to you sir for your wonderful efforts. - **A. Praveen**

Dear Sir, I am very blessed to have you as my guru. Sir, you have motivated and inspired me to become the human being with the essence of sensitiveness and mindfulness that everyone must possess. I promise you that I will imbibe all the necessary skills with regular practice. With all the valuable motivational tips and suggestions I learned in this course, had bought many essential changes in my thinking pattern. - **Dilip Kumar**

This was the perfect course which I sought one year back. The way you delivered the lectures were lucid. Lot of examples, new technical words were adding credits to it. This course brought Awareness on Communication Skill, Conflict Resolution methods, Non-verbal communication, Self-Actualisation, Interview Skill and Group Discussion. Apart from exam perspective I am satisfied in following this course for 8 weeks successfully bringing awareness around me. Thank you sir. – **Gowtham**

I have completed the course today. Today I feel equally proud as well as happy to have been a part of such a wonderful course. You and your supporting team is great. Thank you for putting this great course for us people. I am looking forward to the advance course in this series. Thank you sir. - **Rahul Parwal (B.Tech, 2016, JIET Jodhpur)**

I am feeling sentimental about end of this course! Two months have passed in no time, I became happy! Everyday in the evening after coming from office I used to watch your videos religiously. Sir I am from technical background, and have never learnt soft skill. Before this course I was knowing that Personality means simply the outlook/dress up/makeup, etc., of a person. After doing this course, I have change a lot and now I have forgotten the term “Anger”. Now I am able to understand the term “Humans and Humanity”. All the short stories used in the lecture were simple but highly effective. Your Etiquette session was superb! And the last week lecture was splendid! The most interesting was the summary in single slide. Keep sharing such thoughts so that humans behave like humans. The whole world has become selfish and inhuman. Most people have removed the word called humanity from their dictionary. I promise you sir I will apply these thoughts in the life. Thank you once again for the splendid course and reminding us that we are HUMANS. – **Vinod Kumar**

Dear Prof. T. Ravichandran, This is the first ever course I have pursued from NPTEL and my journey has been a fruitful one. The content and the structure of the course was well designed. Your short stories throughout the course were amazing. Your questions during the course were thought provoking. My intent of undergoing this course is full-filled and I am immensely grateful to you. - **Richa Baid 29 October 2018**

Respected Prof. Ravichandran, Thanks for your valuable lectures and interesting presentation. I had an excellent journey through the course, learnt so much about myself and my peers. I could map all my activities with the course contents. Thanks for this wonderful opportunity, will never forget this course in my lifetime. It became part and parcel of life & hand in hand in my routine . . . . – **sandanalakshmi@pec.edu**

Respected Sir, At first, whe not think this course would help me. But, today after the exam, I did realize the wonderfulness of the learning through the cours ures have definitely made me change into a better version of myself. I would really appreciate the team of students and teachers who have been consistent and working around the clock to answer the queried in the forum and also to conduct those 2 live sessions. So with a big Thank you. I will be definitely registering for Enhancing Soft Skills and Personality. Thank you Sir, - **Yours Sincerely, Sanjith P Hemagiri**

Statistics of Developing Soft Skills and Personality Course:

Timeline	Course Enrollment	Exam Registration
Jul-Sep 2016	14644	2537
Jul-Sep 2017	18054	2237
Aug-Oct 2018	38959	13102
Aug-Oct 2019	50380	17958
Sep-Nov 2020	35163	11265
Aug-Oct 2021	39324	14204
Jul-Dec 2022	41910	16810
Jul-Sep 2023	39307	13482

Statistics of Enhancing Soft Skills and Personality Course:

Timeline	Course Enrollment	Exam Registration
Feb-Apr 2017	18559	2867
Feb-Mar 2018	16525	3053
Feb-Apr 2019	38562	11126
Feb-Apr 2020	53027	4172
Feb-Apr 2021	44708	12227

Feb-Apr 2022	44034	14085
Jan-Apr 2023	54175	18235

Introduction to Database Systems

By Prof. Sreenivasa Kumar | IIT Madras

Learners enrolled: 16436 | Exam registration: 5094

Introduction to Database Systems - Course Introduction

ABOUT THE COURSE :

Databases are the backbone of almost all the digital services and e-governance solutions. Modern businesses and financial systems heavily depend on databases systems and transaction processing for their successful operation. This course introduces the students to the various theoretical and practical principles involved in the design and use of databases systems with the help of database management systems (DBMS) and the SQL Standard

INTENDED AUDIENCE : Any Interested Learners

PREREQUISITES : Studying B Tech (computer science) 3rd year, Discrete Mathematics and Data Structures

(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Summary

Course Status :	Completed
Course Type :	Core
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering ◦ Programming ◦ Systems
Credit Points :	3
Level :	Undergraduate
Start Date :	22 Jan 2024
End Date :	12 Apr 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	21 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

Course layout

Week 1 : Introduction and part of E/R Model Module
Week 2 : ER Model Module
Week 3 : Relational Model Module
Week 4 : Relational Model Module
Week 5 : TRC Module and part of SQL Module
Week 6 : SQL Module

Books and references

Database Systems by Ramez Elmasri and Shamkanth Navathe, Pearson Publications

Instructor bio

Prof. Sreenivasa Kumar

IIT Madras

The instructor Dr P Sreenivasa Kumar has been a member of the faculty of the CSE Dept for the past two decades. His research interests are: databases, semi-structured data and XML, theory and applications of ontologies. He completed his Masters and PhD from the Department of Computer Science and Automation of Indian Institute of Science, Bangalore.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **21 April 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
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CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

Introduction To Industry 4.0 And Industrial Internet Of Things

By Prof. Sudip Misra | IIT Kharagpur

Learners enrolled: 22180 | Exam registration: 12221

Introduction to Industry 4 0 and Industrial Internet of Things

ABOUT THE COURSE :

Industry 4.0 concerns the transformation of industrial processes through the integration of modern technologies such as sensors, communication, and computational processing. Technologies such as Cyber Physical Systems (CPS), Internet of Things (IoT), Cloud Computing, Machine Learning, and Data Analytics are considered to be the different drivers necessary for the transformation. Industrial Internet of Things (IIoT) is an application of IoT in industries to modify the various existing industrial systems. IIoT links the automation system with enterprise, planning and product lifecycle.This course has been organized into the following modules:

INTENDED AUDIENCE : CSE, IT, ECE, EE, Instrumentation Engg, Industrial Engineering, Industry Professionals
PRE-REQUISITES : Basic knowledge of computer and internet
INDUSTRY SUPPORT : All Industrial Sectors

Summary

Course Status :	Completed
Course Type :	Core
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering
Credit Points :	3

Level :	Postgraduate
Start Date :	22 Jan 2024
End Date :	12 Apr 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	21 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1 : Introduction: Sensing & actuation, Communication-Part I, Part II, Networking-Part I, Part II
Week 2 : Industry 4.0: Globalization and Emerging Issues, The Fourth Revolution, LEAN Production Systems, Smart and Connected Business Perspective, Smart Factories
Week 3 : Industry 4.0: Cyber Physical Systems and Next Generation Sensors, Collaborative Platform and Product Lifecycle Management, Augmented Reality and Virtual Reality, Artifical Intelligence, Big Data and Advanced Analysis
Week 4 : Cybersecurity in Industry 4.0, Basics of Industrial IoT: Industrial Processes-Part I, Part II, Industrial Sensing & Actuation, Industrial Internet Systems.
Week 5 : IIoT-Introduction, Industrial IoT: Business Model and Referece Architerture: IIoT-Business Models-Part I, Part II, IIoT Reference Architecture-Part I, Part II.
Week 6 : Industrial IoT- Layers: IIoT Sensing-Part I, Part II, IIoT Processing-Part I, Part II, IIoT Communication-Part I.
Week 7 : Industrial IoT- Layers: IIoT Communication-Part II, Part III, IIoT Networking-Part I, Part II, Part III.
Week 8 : Industrial IoT: Big Data Analytics and Software Defined Networks: IIoT Analytics - Introduction, Machine Learning and Data Science - Part I, Part II, R and Julia Programming, Data Management with Hadoop.
Week 9 : Industrial IoT: Big Data Analytics and Software Defined Networks: SDN in IIoT-Part I, Part II, Data Center Networks, Industrial IoT: Security and Fog Computing: Cloud Computing in IIoT-Part I, Part II.
Week 10 : Industrial IoT: Security and Fog Computing - Fog Computing in IIoT, Security in IIoT-Part I, Part II, Industrial IoT- Application Domains: Factories and Assembly Line, Food Industry.
Week 11 : Industrial IoT- Application Domains: Healthcare, Power Plants, Inventory Management & Quality Control, Plant Safety and Security (Including AR and VR safety applications), Facility Management.
Week 12 : Industrial IoT- Application Domains: Oil, chemical and pharmaceutical industry, Applications of UAVs in Industries, Real case studies :
Case study - I : Milk Processing and Packaging Industries
Case study - II: Manufacturing Industries - Part I
Case study - III : Manufacturing Industries - Part II
Case study - IV : Student Projects - Part I
Case study - V : Student Projects - Part II
Case study - VI : Virtual Reality Lab
Case study - VII : Steel Technology Lab

Books and references

1) S. Misra, A. Mukherjee, and A. Roy, 2020. *Introduction to IoT*. Cambridge University Press.
Availability: https://www.amazon.in/Introduction-IoT-Sudip-Misra/dp/1108959741/ref=sr_1_1?dchild=1&keywords=sudip+misra&qid=1627359928&sr=8-1 (https://www.amazon.in/Introduction-IoT-Sudip-Misra/dp/1108959741/ref=sr_1_1?dchild=1&keywords=sudip+misra&qid=1627359928&sr=8-1)
2) S. Misra, C. Roy, and A. Mukherjee, 2020. *Introduction to Industrial Internet of Things and Industry 4.0.* CRC Press.

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Director
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Availability: https://www.amazon.in/dp/10 _3?dchild=1&keywords=sudip+misra&qid=1627359971&sr=8-3 (https://www.amazon.in/dp/1032146753/ref=sr_1_3?dchild=1&keywords=sudip+misra&qid=162 (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)
3) Research Papers

Instructor bio

Prof. Sudip Misra

IIT Kharagpur

Dr. Sudip Misra is a Professor in the Department of Computer Science and Engineering at the Indian Institute of Technology Kharagpur. Prior to this he was associated with Cornell University (USA), Yale University (USA), Nortel Networks (Canada) and the Government of Ontario (Canada). He received his Ph.D. degree in Computer Science from Carleton University, in Ottawa, Canada. He has several years of experience working in the academia, government, and the private sectors in research, teaching, consulting, project management, architecture, software design and product engineering roles.His current research interests include Wireless Ad Hoc and Sensor Networks, Internet of Things (IoT), Computer Networks, Learning Systems, and algorithm design for emerging communication networks. Dr. Misra is the author of over 260 scholarly research papers, including 140+ reputed journal papers. He has won seven research paper awards in different conferences. Recently, he and his students won Samsung Innovation Award and the IEEE ComSoc Student Competition. He was awarded the fellow of NASI. He was also awarded the IEEE ComSoc Asia Pacific Outstanding Young Researcher Award at IEEE GLOBECOM 2012, Anaheim, California, USA. He was also the recipient of several academic awards and fellowships such as the Young Scientist Award (National Academy of Sciences, India), Young Systems Scientist Award (Systems Society of India), Young Engineers Award (Institution of Engineers, India), (Canadian) Governor General's Academic Gold Medal at Carleton University, the University Outstanding Graduate Student Award in the Doctoral level at Carleton University and the National Academy of Sciences, India - Swarna Jayanti Puraskar (Golden Jubilee Award).Dr. Misra was also awarded the Canadian Government's prestigious NSERC Post-Doctoral Fellowship and the Humboldt Research Fellowship in Germany. Dr. Misra has been serving the editorial boards of distinguished journals such as the Transactions on Vehicular Technology, Transactions on Mobile Computing, International Journal of Communication Systems (Wiley) and the IET Wireless Sensor Systems (UK). In the past, he served as the Associate Editor/Editorial Board Member of the Telecommunication Systems Journal (Springer), Security and Communication Networks Journal (Wiley), and the EURASIP Journal of Wireless Communications and Networking, IET Communications Journal, and the Computers and Electrical Engineering Journal (Elsevier).Dr. Misra has published 10 books in the areas of wireless ad hoc networks, wireless sensor networks, wireless mesh networks, communication networks and distributed systems, network reliability and fault tolerance, and information and coding theory, published by reputed publishers such as Cambridge University Press, Springer, Wiley, and World Scientific.

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Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IIT Kharagpur .It will be e-verifiable at nptel.ac.in/noc (http://nptel.ac.in/noc).

Dr. Mahesh Bundele
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Introduction To Internet Of Things

By Prof. Sudip Misra | IIT Kharagpur

Learners enrolled: 67527 | Exam registration: 36244

Prof Sudip Misra

ABOUT THE COURSE :

Internet of Things (IoT) is presently a hot technology worldwide. Government, academia, and industry are involved in different aspects of research, implementation, and business with IoT. IoT cuts across different application domain verticals ranging from civilian to defence sectors. These domains include agriculture, space, healthcare, manufacturing, construction, water, and mining, which are presently transitioning their legacy infrastructure to support IoT. Today it is possible to envision pervasive connectivity, storage, and computation, which, in turn, gives rise to building different IoT solutions. IoT-based applications such as innovative shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT based systems. Therefore, it is very important to learn the fundamentals of this emerging technology.

INTENDED AUDIENCE : CSE, IT, ECE, EE, Instrumentation Engg, Industrial Engineering

PREREQUISITES : Basic vledge

(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Summary

About Swayam (https://swayam.gov.in/about) | All Courses | ()

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering ◦ Programming ◦ Systems
Credit Points :	3
Level :	Undergraduate
Start Date :	22 Jan 2024
End Date :	12 Apr 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	21 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1: Introduction to IoT: Part I, Part II, Sensing, Actuation, Basics of Networking: Part-I
Week 2: Basics of Networking: Part-II, Part III, Part IV, Communication Protocols: Part I, Part II
Week 3: Communication Protocols: Part III, Part IV, Part V, Sensor Networks: Part I, Part II

Week 4: Sensor Networks, Part V, Part VI, Machine-to-Machine Communications
Week 5: Interoperability in IoT, Introduction to Arduino Programming, Part I, Part II, Integration of Sensors and Actuators with Arduino: Part I, Part II
Week 6: Introduction to Python programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi
Week 7: Implementation of IoT with Raspberry Pi (contd), Introduction to SDN, SDN for IoT
Week 8: SDN for IoT (contd), Data Handling and Analytics, Cloud Computing
Week 9: Cloud Computing(contd), Sensor-Cloud
Week 10: Fog Computing, Smart Cities and Smart Homes
Week 11: Connected Vehicles, Smart Grid, Industrial IoT
Week 12: Industrial IoT (contd), Case Study: Agriculture, Healthcare, Activity Monitoring

Books and references

1) S. Misra, A. Mukherjee, and A. Roy, 2020. *Introduction to IoT*. Cambridge University Press.
Availability: https://www.amazon.in/Introduction-IoT-Sudip-Misra/dp/1108959741/ref=sr_1_1?dchild=1&keywords=sudip+misra&qid=1627359928&sr=8-1 (https://www.amazon.in/Introduction-IoT-Sudip-Misra/dp/1108959741/ref=sr_1_1?dchild=1&keywords=sudip+misra&qid=1627359928&sr=8-1)
2) S. Misra, C. Roy, and A. Mukherjee, 2020. *Introduction to Industrial Internet of Things and Industry 4.0.* CRC Press.
Availability: https://www.amazon.in/dp/1032146753/ref=sr_1_3?dchild=1&keywords=sudip+misra&qid=1627359971&sr=8-3 (https://www.amazon.in/dp/1032146753/ref=sr_1_3?dchild=1&keywords=sudip+misra&qid=1627359971&sr=8-3)
3) Research Papers

Instructor bio

Prof. Sudip Misra

IIT Kharagpur

Dr. Sudip Misra is a Professor in the Department of Computer Science and Engineering at the Indian Institute of Technology Kharagpur. Prior to this he was associated with Cornell University (USA), Yale University (USA), Nortel Networks (Canada) and the Government of Ontario (Canada). He received his Ph.D. degree in Computer Science from Carleton University, in Ottawa, Canada. He has several years of experience working in the academia, government, and the private sectors in research, teaching, consulting, project management, architecture, software design and product engineering roles.His current research interests include Wireless Ad Hoc and Sensor Networks, Internet of Things (IoT), Computer Networks, Learning Systems, and algorithm design for emerging communication networks. Dr. Misra is the author of over 260 scholarly research papers, including 140+ reputed journal papers. He has won seven research paper awards in different conferences. Recently, he and his students won Samsung Innovation Award and the IEEE ComSoc Student Competition. He was awarded the fellow of NASI. He was also awarded the IEEE ComSoc Asia Pacific Outstanding Young Researcher Award at IEEE GLOBECOM 2012, Anaheim, California, USA. He was also the recipient of several academic awards and fellowships such as the Young Scientist Award (National Academy of Sciences, India), Young Systems Scientist Award (Systems Society of India), Young Engineers Award (Institution of Engineers, India), (Canadian) Governor General's Academic Gold Medal at Carleton University, the University Outstanding Graduate Student Award in the Doctoral level at Carleton University and the National Academy of Sciences, India - Swarna Jayanti Puraskar (Golden Jubilee Award).Dr. Misra was also awarded the Canadian Government's prestigious NSERC

Post-Doctoral Fellowship Research Fellowship in Germany. Dr. Misra has been serving the editorial boards of distinguished journals such as the Transactions on Emerging Telecommunications Technology, Transactions on Mobile Computing, International Journal of Communication Systems (Wiley) and the IET Wireless Sensor Systems (UK). In the past, he served as the Associate Editor/Editorial Board Member of the Telecommunication Systems Journal (Springer), Security and Communication Networks Journal (Wiley), and the EURASIP Journal of Wireless Communications and Networking, IET Communications Journal, and the Computers and Electrical Engineering Journal (Elsevier).Dr. Misra has published 10 books in the areas of wireless ad hoc networks, wireless sensor networks, wireless mesh networks, communication networks and distributed systems, network reliability and fault tolerance, and information and coding theory, published by reputed publishers such as Cambridge University Press, Springer, Wiley, and World Scientific.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **21 April 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IIT Kharagpur .It will be e-verifiable at nptel.ac.in/noc (http://nptel.ac.in/noc).

Only the e-certificate will be made available. Hard copies will not be dispatched.

Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

Introduction to Machine Learning

By Prof. Balaraman Ravindran | IIT Madras

Learners enrolled: 40964 | Exam registration: 8308

Introduction to Machine Learning

ABOUT THE COURSE :

With the increased availability of data from varied sources there has been increasing attention paid to the various data driven disciplines such as analytics and machine learning. In this course we intend to introduce some of the basic concepts of machine learning from a mathematically well motivated perspective. We will cover the different learning paradigms and some of the more popular algorithms and architectures used in each of these paradigms.

INTENDED AUDIENCE : This is an elective course. Intended for senior UG/PG students. BE/ME/MS/PhD

PREREQUISITES : We w e students know programming for some of the assignments.If the students have done introductory courses on probability (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL) o weeks as well.
INDUSTRY SUPPORT : Any company in the data analytics/data science/big data domain would value this course.

About Swayam (https://swayam.gov.in/about) | All Courses | ()

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering ◦ Artificial Intelligence ◦ Data Science ◦ Programming ◦ Robotics
Credit Points :	3
Level :	Undergraduate/Postgraduate
Start Date :	22 Jan 2024
End Date :	12 Apr 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	21 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Week 0: Probability Theory, Linear Algebra, Convex Optimization - (Recap)
Week 1: Introduction: Statistical Decision Theory - Regression, Classification, Bias Variance
Week 2: Linear Regression, Multivariate Regression, Subset Selection, Shrinkage Methods, Principal Component Regression, Partial Least squares
Week 3: Linear Classification, Logistic Regression, Linear Discriminant Analysis
Week 4: Perceptron, Support Vector Machines
Week 5: Neural Networks - Introduction, Early Models, Perceptron Learning, Backpropagation, Initialization, Training & Validation, Parameter Estimation - MLE, MAP, Bayesian Estimation
Week 6: Decision Trees, Regression Trees, Stopping Criterion & Pruning loss functions, Categorical Attributes, Multiway Splits, Missing Values, Decision Trees - Instability Evaluation Measures
Week 7: Bootstrapping & Cross Validation, Class Evaluation Measures, ROC curve, MDL, Ensemble Methods - Bagging, Committee Machines and Stacking, Boosting
Week 8: Gradient Boosting, Random Forests, Multi-class Classification, Naive Bayes, Bayesian Networks
Week 9: Undirected Graphical Models, HMM, Variable Elimination, Belief Propagation
Week 10: Partitional Clustering, Hierarchical Clustering, Birch Algorithm, CURE Algorithm, Density-based Clustering
Week 11: Gaussian Mixture Models, Expectation Maximization
Week 12: Learning Theory, Introduction to Reinforcement Learning, Optional videos (RL framework, TD learning, Solution Methods, Applications)

Books and references

1. The Elements of Statistical Learning, by Trevor Hastie, Robert Tibshirani, Jerome H. Friedman (freely available online)
2. Pattern Recognition and Machine Learning, by Christopher Bishop (optional)

Instructor bio

Prof. Balaraman Ravindran

IIT Madras

Prof. Balaraman Ravindran is currently an Professor in Computer Science at IIT Madras and Mindtree Faculty Fellow . He has nearly two decades of research experience in machine learning and specifically reinforcement learning. Currently his research interests are centered on learning from and through interactions and span the areas of data mining, social network analysis, and reinforcement learning.

Course certific (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.

The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).

Date and Time of Exams: **21 April 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.

Registration url: Announcements will be made when the registration form is open for registrations.

The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.

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CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.

Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IIT Madras .It will be e-verifiable at nptel.ac.in/noc (http://nptel.ac.in/noc).

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Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

Dr. Mahesh Bundele
B.E., M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

Laboratory Practices in Earth Sciences: Landscape Mapping

By Prof. Javed N. Malik | IIT Kanpur

Learners enrolled: 767 | Exam registration: 128

Laboratory Practices in Earth Sciences: Landscape Mapping - Intro

ABOUT THE COURSE:

Laboratory Practices in Earth Sciences: Landscape Mapping is a thorough and practical course that explores remote sensing, fieldwork, and laboratory studies to better understand the surface and subsurface geological and geomorphological structures. The fundamental principles, techniques, and methodologies that have been used to investigate, analyze, and map landscapes across the world will be covered in this course. It is a comprehensive educational experience that incorporates theoretical ideas, real-world applications, and ethical problems. This course offers a strong basis for your career choice, irrespective of whether you want to pursue a career in the Earth Sciences or want to learn more about landform mapping techniques.

INDUSTRY SUPPORT: Any company involved in infrastructure development

Summary

Course Status :	Completed
Course Type :	Core
Language for course content :	English
Duration :	8 weeks
Category :	◦ Civil Engineering
Credit Points :	2

Level :	Undergraduate/Postgraduate
Start Date :	19 Feb 2024
End Date :	12 Apr 2024
Enrollment Ends :	19 Feb 2024
Exam Registration Ends :	15 Mar 2024
Exam Date :	28 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1: Geospatial technologies, such as Geographic Information Systems (GIS), remote sensing is used to acquire skills in satellite data analysis, processing, and visualization using specialized software such as QGIS, Global Mapper and ENVI, generate thematic maps that convey valuable information about landscapes. It will includes knowing and understanding landforms using Cartosat-1, CORONA and SRTM data.

Week 2: Georeferencing, mosaicking of these satellite data and preparation of Anaglyph and DEM from the Cartosat-1 data using ENVI software. Tectonic landform identification and interpretation using Anaglyph and DEM, preparation of Tectono-Geomorphic maps.

Week 3: Understand contour lines, elevation, and how to represent three-dimensional landscapes on two-dimensional maps. Morphometric analysis and estimation of morphometric indices to understand the landscapes evolution. Preparation of Geological cross-section – folded terrain and faulted terrain.

Week 4: Mapping of landforms such as rivers terraces, alluvial fan surfaces, topographic profiles of fault scarps, river offsets etc. through Total Station (TS) and Real Time Kinematics (RTK). TS and RTK are used to generate detailed topographic maps by measuring coordinates (x, y, and z) of points on the landscape. The combination of these instruments allows for extremely accurate data collection, crucial for precise landform mapping.

Week 5: Mapping of sub-surface utility/lithological variations using Ground Penetrating Radar survey (GPR). It used to study the soil and sediments stratigraphy. It can detect buried objects, layers, and its anomalies.

Week 6: Mapping of surface landforms using Unmanned Aerial Vehicle (UAV) which provide high resolution aerial imagery to generate orthophotos and DEM of the landscapes. Mapping of sub-surface lithology through Resistivity Survey.

Week 7: Sate of the art knowledge of Optically Stimulated Dating techniques, it is a valuable method to date fluvial landforms. It utilizes trapped electrons in minerals to estimate the time since the last exposure of the sediment grains to sunlight or heat. Fluvial sediments deposited by rivers and streams are often important archives of past climatic changes or tectonic activity. Dating of coarse and fine grain Quartz and Feldspar minerals. Sample Preparation: Chemical Processing, Sieving of samples to acquire the suitable grain size, Magnetic separation to separate the quartz from heavy minerals.

Week 8: OSL Lab: Sensitivity Corrections, Preheat Plateau test to estimate the preheat temperature, Recycling and Recuperation test, Single Aliquot Regenerative (SAR) Protocol, Age Models (Central Age Model, Minimum Age Model and Common Age Model), Moisture Calculation, Dose Rate estimation, Paleodose Calculation and Age Calculation.

Books and references

• Monroe, J. S., Wicander, R., and Hazlett, R. (2007). Physical Geology: Exploring the Earth. Sixth Edition. Page 690.
• Strahler, A. Introduction to Physical Geology. Pub. John Wiley & Sons, Inc. page 632.
• Keller, E. D. (2012). Introduction to Environmental Geology. Printice Hall. Page 801.
• Understanding Earth, by Grotzinger, Jordan, Press and Siever, Freeman and Company
• J. Uren, W. F. Price (auth.) - Surveying for Engineers-Macmillan Education UK (1994)
• Ravi P. Gupta (auth.)- Remote Sensing Geology-Springer-Verlag Berlin Heidelberg (2018)
• Richard J. Lisle - Geological Structures and Maps_ A Practical Guide-Butterworth-Heinemann (2020)
• Lillesand Thomas M, Kiefer, Ralph W, Chipman, Jonathan. Remote sensing and image interpretation, John Wiley & Sons (2015)v

Instructor bio

Prof. Javed N. Malik

IIT Kanpur

- The instructor finished his Ph. D in 1998 from M. S. University Baroda, Vadodara. Gujarat (Geology), did Post-Doctrate (Japan Society for Promotion of Science) from (1999-2001) Hiroshima University, JAPAN.
- Joined IIT Kanpur in 2001.

Area of Specialization: Active Tectonics, Paleoseismology and Paleo-tsunami

Current Areas of Research:
• Active fault mapping and Paleoseismological studies along NW Himalaya and Kachchh
• Paleo-Tsunami studies in Andaman & Nicobar Islands
• Collaboration with Japan, US and France – related to earthquake and tsunami studies

Research Projects:
• Active tectonic investigation along northwestern Himalayan foothill zone, sponsored by DST
• Active fault mapping and paleoseismic investigations in Kachchh region. Gujarat, by OYO International Japan.
• Active Tectonic investigations around South-Middle Andaman and Car Nicobar Islands, A&N Islands, sponsored by INCOIS, Hyderabad, MoES.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **28 Apr 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 6 assignments out of the total 8 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

Machine Learning for Engineering and science applications

By Prof. Balaji Srinivasan, Prof. Ganapathy Krishnamurthi | IIT Madras

Learners enrolled: 10503 | Exam registration: 1348

Machine Learning for Engineering and Science Applications - Intro Video

ABOUT THE COURSE:

Recent applications of machine learning have exploded due to cheaply available computational resources as well as wide availability of data. Machine Learning (ML) techniques provides a set of tools that can automatically detect patterns in data which can then be utilized for predictions and for developing models. Developments in ML algorithms and computational capabilities have now made it possible to scale engineering analysis, decision making and design rapidly. This, however, requires an engineer to understand the limits and applicability of the appropriate ML algorithms. This course aims to provide a broad overview of modern algorithms in ML, so that engineers may apply these judiciously. Towards this end, the course will focus on broad heuristics governing basic ML algorithms in the context of specific engineering applications. Matlab will be used in this course but students will also be trained to implement these methods utilizing open source packages such as TensorFlow.

INTENDED AUDIENCE: Postgraduate students in all engineering and science disciplines. Mature senior undergraduate students may also attempt the course.
PREREQUISITES: Familiarity with Multivariable Calculus, Linear Algebra, Probability, Statistics. Comfortable with basic programming.
INDUSTRY SUPPORT: Should be of interest to companies trying to employ engineers familiar with Machine Learning

Thanks to the support from Math Works, enrolled students have access to MATLAB for the duration of the course.

Summary

Course Status :	Completed
Course Type :	Elective

Language for course content :	English
Duration :	12 weeks
Category :	Computer Science and Engineering
Credit Points :	3
Level :	Undergraduate
Start Date :	22 Jan 2024
End Date :	12 Apr 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	20 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1: Mathematical Basics 1 – Introduction to Machine Learning, Linear Algebra
Week 2: Mathematical Basics 2 - Probability
Week 3: Computational Basics – Numerical computation and optimization, Introduction to Machine learning packages
Week 4: Linear and Logistic Regression – Bias/Variance Tradeoff, Regularization, Variants of Gradient Descent, MLE, MAP, Applications
Week 5: Neural Networks – Multilayer Perceptron, Backpropagation, Applications
Week 6: Convolutional Neural Networks 1 – CNN Operations, CNN architectures
Week 7: Convolutional Neural Networks 2 – Training, Transfer Learning, Applications
Week 8: Recurrent Neural Networks RNN, LSTM, GRU, Applications
Week 9: Classical Techniques 1 – Bayesian Regression, Binary Trees, Random Forests, SVM, Naïve Bayes, Applications
Week 10: Classical Techniques 2 – k-Means, kNN, GMM, Expectation Maximization, Applications
Week 11: Advanced Techniques 1 – Structured Probabilistic Models, Monte Carlo Methods
Week 12: Advanced Techniques 2 – Autoencoders, Generative Adversarial Network

Thanks to the support from MathWorks, enrolled students have access to MATLAB for the duration of the course.

Books and references

Deep Learning, Goodfellow et al, MIT Press, 20172.
Pattern Recognition and Machine Learning, Christopher Bishop, Springer, 20093.
References to research papers will be provided through the course.

Instructor bio

Prof. Balaji Srinivasan

IIT Madras

Prof. Balaji Srinivasan is a faculty member in the Mechanical Engineering Department at IIT-Madras. His areas of research interest include Numerical Analysis, Computational Fluid Dynamics and applications of Machine Learning.

Prof. Ganapathy Krishnamurthi

Prof. Ganapathy Krishnamurthi is now an Professor in the Department of Engineering Design at IIT-Madras. His research work is primarily in the area of medical image analysis and image reconstruction.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **20 April 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
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- NPTEL team

Microprocessors and Microcontrollers

By Prof. Santanu Chattopadhyay | IIT Kharagpur

Learners enrolled: 8739 | Exam registration: 2185

Prof Santanu Chattopadhyay

ABOUT THE COURSE:

Microprocessors are used extensively in the design of any computing facility. It contains units to carry out arithmetic and logic calculations, fast storage in terms of registers and associated control logic to get instructions from memory and execute them. A number of devices can be interfaced with them to develop a complete system application. On the other hand, microcontrollers are single chip computers, integrating processor, memory and other peripheral modules into a single System-on-Chip (SoC). Apart from input-output ports, the peripherals often include timers, data converters, communication modules, and so on. The single chip solution makes the footprint of the computational element small in the overall system package, eliminating the necessity of additional chips on board. However, there exists a large range of such products. While the simpler microcontrollers are cheap, their capabilities (in terms of program size and analog and digital peripherals) are also limited. Such processors may be suitable for small applications. Microcontrollers like 8051, PIC belong to this categ[illegible]. On the [illegible]er hand,

advanced microcontroll ı more powerful, comparable to the very advanced microprocessors. The AVR and ARM processors are of this category.

This course will start with a discussion on a simple microprocessor, 8085. Understanding this architecture is the basis to follow any other complex CPU architecture. It will be followed by a complete overview of a range of microcontrollers covering 8051, PIC, AVR and ARM. The hardware intricacies of these processors and their programming will be covered. Different system design examples built around these processors will also be elaborated.

INTENDED AUDIENCE : CSE, ECE, EE
PRE-REQUISITES : Digital Design, Digital Logic
INDUSTRY SUPPORT : Companies involved in development of microprocessor and microcontroller based products

Summary

Course Status :	Completed
Course Type :	Core
Language for course content :	English
Duration :	12 weeks
Category :	◦ Electrical, Electronics and Communications Engineering ◦ Control and Instrumentation ◦ VLSI design ◦ Robotics
Credit Points :	3
Level :	Undergraduate
Start Date :	22 Jan 2024
End Date :	12 Apr 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	21 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

Course layout

Week 1: Introduction: General processor architecture, Microprocessors, Microcontrollers

Week 2: 8085 – Part I

Week 3: 8085 – Part II

Week 4: 8085 – Part III

Week 5: 8085 – Part IV

Week 6: 8051 – Part I

Week 7: 8051 – Part II

Week 8: PIC, AVR

Week 9: ARM – Part I

Week 10:ARM – Part II

Week 11: Interfacing examples – Part I

Week 12: Interfacing examples – Part II

Books and references

1. R. Gaonkar, “Microprocessor Architecture, Programming and Applications with the 8085”, Prentice Hall, 2014.
2. M.A. Mazidi, R.D. McKinlay, J.G. Mazidi, “The 8051 Microcontroller: A Systems Approach”, Pearson, 2013.
3. M.Bates, “PIC Microcontrollers”, Newnes, 2011.
4. M.A. Mazidi, S. Naimi, S. Naimi, “The AVR Microcontroller and Embedded Systems: Using Assembly and C”, Prentice Hall, 2011.
5. W.A. Smith, “ARM Microcontroller Interfacing: Hardware and Software, Eketor, 2010.

Instructor bio

Prof. Santanu Chattopadhyay
IIT Kharagpur

Santanu Chattopadhyay received his BE degree in Computer Science and Technology from Calcutta University (B.E. College) in 1990. He received M.Tech in Computer and Information Technology and PhD in Computer Science and Engineering from Indian Institute of Technology Kharagpur in 1992 and 1996, respectively. He is currently a Professor in the Department of Electronics and Electrical Communication Engineering, IIT Kharagpur. Prior to this, he had been a faculty member in the IIEST Sibpur and IIT Guwahati in the departments of Computer Science and Engineering. In both these places he has taught the subject of Compiler Design several times. His research interests include Digital Design, Embedded Systems, System-on-Chip (SoC) and Network-on-Chip (NoC) Design and Test, Power- and Thermal-aware Testing of VLSI Circuits and Systems. He has published more than 150 papers in reputed international journals and conferences. He has published several text and reference books on Compiler Design, Embedded Systems and other related areas. He is a senior member of the IEEE and an Associate Editor of IET Circuits Devices and Systems journal.

Course certificate

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Date and Time of Exams: **21 April 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
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Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

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Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IIT Kharagpur .It will be e-verifiable at nptel.ac.in/noc (http://nptel.ac.in/noc).

Only the e-certificate will be made available. Hard copies will not be dispatched.

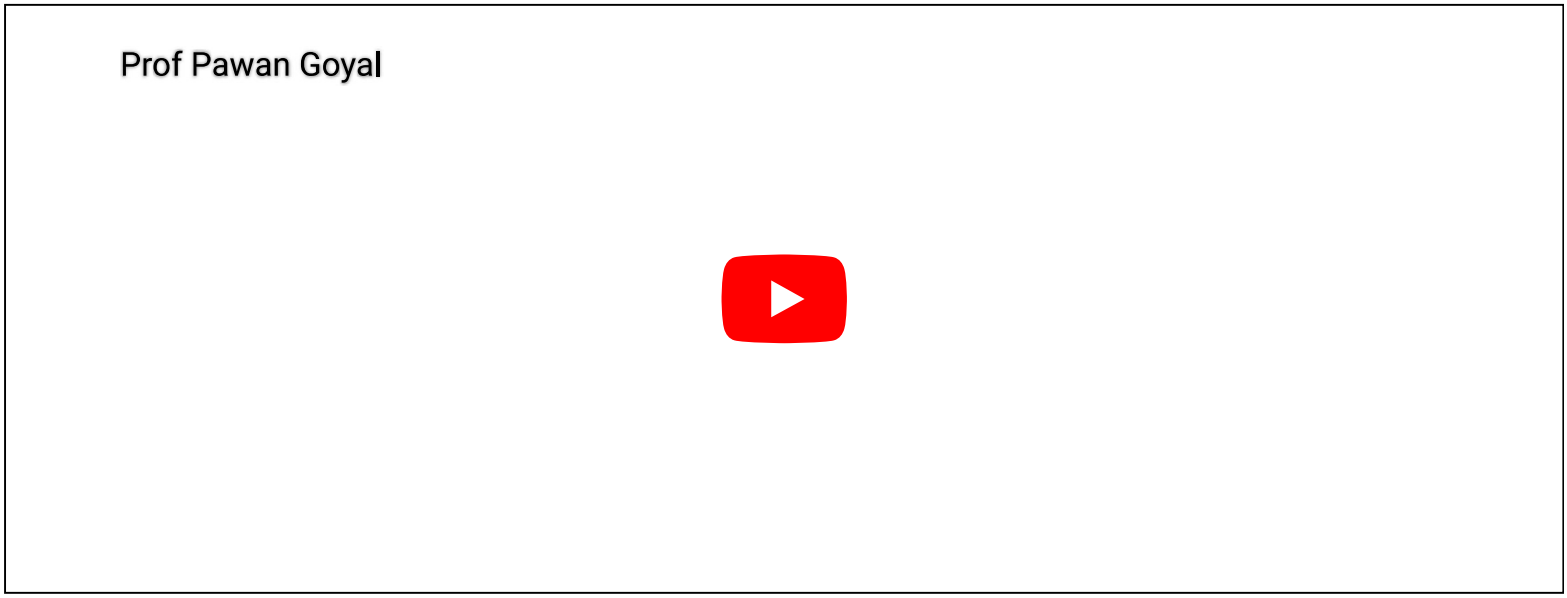
Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

Natural Language Processing

By Prof. Pawan Goyal | IIT Kharagpur

Learners enrolled: 14004 | Exam registration: 3622



ABOUT THE COURSE :

This course starts with the basics of text processing including basic pre-processing, spelling correction, language modeling, Part-of-Speech tagging, Constituency and Dependency Parsing, Lexical Semantics, distributional Semantics and topic models. Finally, the course also covers some of the most interesting applications of text mining such as entity linking, relation extraction, text summarization, text classification, sentiment analysis and opinion mining.

PREREQUISITES : Basic knowledge of probabilities for the lectures and python for programming assignment

INDUSTRY SUPPOR arch, Google, Adobe, Xerox, Flipkart, Amazon

(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Summary

About Swayam (https://swayam.gov.in/about) | All Courses | ()

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering ◦ Artificial Intelligence ◦ Data Science
Credit Points :	3
Level :	Undergraduate/Postgraduate
Start Date :	22 Jan 2024
End Date :	12 Apr 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	28 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Dr. Mahesh Bundele
B.E., M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

Course layou (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Week 1: Introduction and Basic Text Processing
Week 2: Spelling Correction, Language Modeling
Week 3: Advanced smoothing for language modeling, POS tagging
Week 4: Models for Sequential tagging – MaxEnt, CRF
Week 5: Syntax – Constituency Parsing
Week 6: Dependency Parsing
Week 7: Distributional Semantics
Week 8: Lexical Semantics
Week 9: Topic Models
Week 10: Entity Linking, Information Extraction
Week 11: Text Summarization, Text Classification
Week 12: Sentiment Analysis and Opinion Mining

Books and references

1. Dan Jurafsky and James Martin. Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition. Prentice Hall, Second Edition, 2009.
Some draft chapters of the third edition are available online: https://web.stanford.edu/~jurafsky/slp3/ (https://web.stanford.edu/~jurafsky/slp3/.)
2. Chris Manning and Hinrich Schütze. Foundations of Statistical Natural Language Processing. MIT Press, Cambridge, MA: May 1999.

Instructor bio

Prof. Pawan Goyal

IIT Kharagpur

Prof. Pawan Goyal is an Assistant Professor at the Department of Computer Science and Engineering, IIT Kharagpur. His research interests include Natural Language Processing, Text Mining, Information Retrieval and Sanskrit Computational Linguistics. He has published around 75 research papers in international conferences and journals. He has published in various top-tier conferences and journals including ACL, NAACL, EMNLP, SIGIR, KDD, CIKM, JCDL, ICWSM, CSCW, Coling, IEEE and ACM transactions. Prior to joining IIT Kharagpur, he received his B. Tech. degree in Electrical Engineering from IIT Kanpur in 2007 and his Ph.D. degree in the faculty of Computing and Engineering from University of Ulster, UK in 2011. He was then a Post Doctoral Fellow at INRIA Paris Rocquencourt.

Course certi (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.

The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).

Date and Time of Exams: **28 April 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.

Registration url: Announcements will be made when the registration form is open for registrations.

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CRITERIA TO GET A CERTIFICATE

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- NPTEL team

Operations Management

By Prof. Inderdeep Singh | IIT Roorkee

Learners enrolled: 2868 | Exam registration: 768

Operations Management

ABOUT THE COURSE :

The current competitive business environment is forcing the organizations to adopt the latest tools, techniques and strategies for managing their resources in the most effective and efficient manner. The topics of the course deals with the management of resources and activities that lead to production of goods of right quality, in right quantity, at right time and place in the most cost-effective manner. The course focuses on the basic concepts, issues, and techniques adopted worldwide for efficient and effective

operations. The erations strategy, product design and development, forecasting, facility planning and layout, aggregate produ acity planning, project management, production control, material management, inventory and quality management, JIT and Kanban System.

INTENDED AUDIENCE : Interested students

PREREQUISITES : No-prerequisite, any student enrolled for a UG/PG degree in any discipline of Mechanical Engineering, Production Engineering, BBA, BBM, MBA.

INDUSTRY SUPPORT : All industries that efficiently produce and deliver goods and services to the customers.

Summary

Course Status :	Completed
Course Type :	Core
Language for course content :	English
Duration :	12 weeks
Category :	◦ Mechanical Engineering ◦ Manufacturing Processes and Technology
Credit Points :	3
Level :	Undergraduate/Postgraduate
Start Date :	22 Jan 2024
End Date :	12 Apr 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	21 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Dr. Mahesh Bundele
B.E., M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

Course layout

Week 1: Introduction to Course, Operations Management: Objectives, Operations Management: Functions and Scope,Types of Production Systems, Operations Strategy.
Week 2: Product Life – Cycle, Value Engineering Concepts, Design for X (DFX), Ergonomics in Product Design, Rapid Prototyping: Concept, Advantages.
Week 3: Sales Forecasting, Forecasting System, Qualitative Methods of Forecasting, Quantitative Methods - I, Quantitative Methods – I.
Week 4: Facility Planning, Factors Affecting Plant Location, Plant Location: Case Study on Uttarakhand, Location Evaluation Methods-I, Location Evaluation Methods-II.
Week 5: Facility Layout and Planning-I, Facility Layout and Planning-II, Factors Influencing Plant Layout, Material Flow Patterns, Tools and Techniques used for Plant Layout Planning.
Week 6: Production Planning and Control, Process Planning, Aggregate Production Planning, Capacity Planning: Introduction, Capacity Planning: Examples.
Week 7: Project Scheduling, Network Diagrams, Critical Path Method (CPM), Critical Path Method: Problems, Critical Path Method: Problems.
Week 8: Program Evaluation and Review Technique (PERT), PERT Problems, PERT Problems, Time Cost Trade Off (Crashing), Project Network: Crashing Problems.
Week 9: Production Control, Sequencing, Sequencing Problems-I, Sequencing Problems-II, Master Production Scheduling (MPS).
Week 10: Concept of Quality, Total Quality Management (TQM), Total Productive Maintenance (TPM), Statistical Quality Control (SQC), Six Sigma.
Week 11: Materials Management, Inventory Control, Economic Order Quantity (EOQ) Models, Economic Order Quantity (EOQ): Problems, Production Quantity Model.
Week 12: Just in Time (JIT), Kanban System, Materials Requirement Planning (MRP)-I, Materials Requirement Planning (MRP)-II, Enterprise Resource Planning (ERP).

Books and references

1.Operation Management: K. N. Dervitsiotis, McGraw-Hill International Company.
2.Operations Management: R.S. Russell, and B.W. Taylor, Pearson Education
3.Industrial Engineering and Production Management: M. Telsang, S. Chand & Company Ltd.

Instructor bio

Prof. Inderdeep Singh

IIT Roorkee

Dr. Inderdeep Singh is currently working as Associate Professor in Department of Mechanical and Industrial Engineering at Indian Institute of Technology Roorkee. He has taught among others, the industrial engineering courses such as Production Planning and Control, Product Design and Development, Work System Design, Industrial Management and Quality Management. He has been actively involved in the National Mission Project on Education Through ICT (NME-ICT) of Government of India. He has completed three video and one web course under the National Programme on Technology Enhanced Learning (NPTEL). He has developed suitable pedagogical methods for two under-graduate courses of Mechanical Engineering.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **21 April 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
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B.E., M.E., Ph.D.
Director
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Problem Solving Through Programming In C

By Prof. Anupam Basu | IIT Kharagpur

Learners enrolled: 35182 | Exam registration: 9934

Prof A Basu

ABOUT THE COURSE :

This course is aimed at enabling the students to

1. Formulate simple algorithms for arithmetic and logical problems
2. Translate the algorithms to programs (in C language)
3. Test and execute the programs and correct syntax and logical errors
4. Implement conditional branching, iteration and recursion
5. Decompose a problem into functions and synthesize a complete program using divide and conquer approach
6. Use arrays, pointers and structures to formulate algorithms and programs
7. Apply programming to solve matrix addition and multiplication problems and searching and sorting problems
8. Apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration

INTENDED AUDIENCE : BE/BTech in all disciplines BCA/MCA/M. Sc

INDUSTRY SUPPORT : All IT Industries

Summary

(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering
Credit Points :	3
Level :	Undergraduate/Postgraduate
Start Date :	22 Jan 2024
End Date :	12 Apr 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	21 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1 : Introduction to Problem Solving through programs, Flowcharts/Pseudo codes, the compilation process, Syntax and Semantic errors, Variables and Data Types
Week 2 : Arithmetic expressions, Relational Operations, Logical expressions; Introduction to Conditional Branching
Week 3 : Conditional Branching and Iterative Loops
Week 4 : Arranging things : Arrays
Week 5 : 2-D arrays, Character Arrays and Strings
Week 6 : Basic Algorithms including Numerical Algorithms
Week 7 : Functions and Parameter Passing by Value
Week 8 : Passing Arrays to Functions, Call by Reference
Week 9 : Recursion
Week 10 : Structures and Pointers

Week 11 : Self-Referential Stru ction to Lists
Week 12 : Advanced Topics (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

About Swayam (https://swayam.gov.in/about) | All Courses | ()

Books and references

Textbooks:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Instructor bio

Prof. Anupam Basu

IIT Kharagpur

Anupam Basu is Professor in the Dept. of Computer Science & Engineering, IIT Kharagpur, and has been an active researcher in the areas of Cognitive and Intelligent Systems, Embedded Systems and Language Processing, Presently he is acting as the Chairman and Head of the Center for Educational Technology, IIT Kharagpur. He has developed several embedded system based tools empowering the physically challenged and has led several national projects in the area.

He has taught at the University of California, Irvine at the Center for Embedded Systems. He is an Alexander von Humboldt Fellow and a Fellow of the Indian National Academy of Engineering. The awards won by him include the State Award for the Best Contribution to the Cause of Empowerment of the Disabled (2014), Universal Design Award 2011, for contributions in design for the disabled, by National Council for Promotion of Employment of Disabled Persons, India, the National Award for the Best Technology Innovation for the Physically Disabled (2007) and the Da-Vinci Award 2004 from the Engineering Society of Detroit.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **21 April 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
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CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Programming In Java

By Prof. Debasis Samanta | IIT Kharagpur

Learners enrolled: 84287 | Exam registration: 26925

Programming in Java

ABOUT THE COURSE :

With the growth of Information and Communication Technology, there is a need to develop large and complex software. Further, those software should be platform independent, Internet enabled, easy to modify, secure, and robust. To meet this requirement object-oriented paradigm has been developed and based on this paradigm the Java programming language emerges as the best

programming er ava programming language is being used for mobile programming, Internet programming, and many other appl e to distributed systems. This course aims to cover the essential topics of Java programming so that the participants can improve their skills to cope with the current demand of IT industries and solve many problems in their own filed of studies.

INTENDED AUDIENCE : The undergraduate students from the engineering disciplines namely CSE, IT, EE, ECE, etc. might be interested for this course.

PREREQUISITES : This course requires that the students are familiar with programming language such as C/C++ and data structures, algorithms.

INDUSTRY SUPPORT : All IT companies.

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering ◦ Programming
Credit Points :	3
Level :	Undergraduate
Start Date :	22 Jan 2024
End Date :	12 Apr 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	27 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1 : Overview of Object-Oriented Programming and Java
Week 2 : Java Programming Elements
Week 3 : Input-Output Handling in Java
Week 4 : Encapsulation
Week 5 : Inheritance
Week 6 : Exception Handling
Week 7 : Multithreaded Programming
Week 8 : Java Applets and Servlets
Week 9 : Java Swing and Abstract Windowing Toolkit (AWT)
Week 10 : Networking with Java
Week 11: Java Object Database Connectivity (ODBC)
Week 12: Interface and Packages for Software Development

Books and references

1.Java: The Complete Reference Hebert Schildt, Mc Graw Hill
2. Object-Oriented Programming with C++ and Java Debasis Samanta, Prentice Hall India.

Instructor bio

Prof. Debasis Samanta

IIT Kharagpur

Debasis Samanta holds a Ph.D. in Computer Science and Engineering from Indian Institute of Technology Kharagpur. His research interests and work experience spans the areas of Computational Intelligence, Data Analytics, Human Computer Interaction, Brain

Computing and I . Dr. Samanta currently works as a faculty member at the Department of Computer Science & Engineering at II (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **27 April 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
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CRITERIA TO GET A CERTIFICATE

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Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

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NOTE: Please note that there will not be an unproctored programming exam for this course this term.

Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IIT Kharagpur .It will be e-verifiable at nptel.ac.in/noc (http://nptel.ac.in/noc).

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Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

Programming in Modern C++

By Prof. Partha Pratim Das | IIT Kharagpur

Learners enrolled: 24215 | Exam registration: 4412

Programming in Modern C++: Introduction: Prof Partha Pratim Das

ABOUT THE COURSE :

There has been a continual debate on which programming language/s to learn, to use. As the latest TIOBE Programming Community Index for August 2021 indicates – C (13%), Python (12%), C++ (7%), Java (10%), and C#(5%) together control nearly half the programming activities worldwide. Further, C Programming Language Family (C, C++, C#, Objective C etc.) dominate more than 25% of activities. Hence, learning C++ is important as one learns about the entire family, about Object-Oriented Programming and gets a solid foundation to also migrate to Java and Python as needed. C++ is the mother of most general purpose of languages. It is multi-paradigm encompassing procedural, object-oriented, generic, and even functional programming. C++ has primarily been the systems language till C++03 which punches efficiency of the code with the efficacy of OOP. Then, why should I learn it if my primary focus is on applications? This is where the recent updates of C++, namely, C++11 and several later offer excellent depths and flexibility for C++ that no language can match. These extensions attempt to alleviate some of the

long-standing shortcom uding porous resource management, error-prone pointer handling, expression semantics, and better readability. The present (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL) the knowledge of C programming including basic data structure (array, list, stack, queue etc.) to create a strong familiarity with C++98 / C++03. Besides the constructs, syntax and semantics of C++ (over C), we also focus on various idioms of C++ and attempt to go to depth with every C++ feature justifying and illustrating them with several examples and assignment problems. On the way, we illustrate various OOP concepts. The course also covers important advances in C++11 and later released features.

About Swayam (https://swayam.gov.in/about) | All Courses | ()

PRE-REQUISITE: Programming & Data Structure (mandatory), Programming in C (optional). Design and Analysis of Algorithms (optional).

INDUSTRY SUPPORT: Programming in C++ is so fundamental that all companies dealing with systems as well as application development (including web, IoT, embedded systems) have a need for the same. These include – Microsoft, Samsung, Xerox, Yahoo, Oracle, Google, IBM, TCS, Infosys, Amazon, Flipkart, etc. This course would help industry developers to be up-to-date with the advances in C++ so that they can remain at the state-of-the-art.

Summary

Course Status :	Completed
Course Type :	Core
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering
Credit Points :	3
Level :	Undergraduate/Postgraduate
Start Date :	22 Jan 2024
End Date :	12 Apr 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	28 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1: Programming in C++ is Fun.
Week 2: C++ as Better C.
Week 3: OOP in C++.
Week 4: OOP in C++.
Week 5: Inheritance.
Week 6: Polymorphism.
Week 7: Type Casting.
Week 8: Exceptions and Templates.
Week 9: Streams and STL.
Week 10: Modern C++.
Week 11: Lambda and Concurrency.
Week 12: Move, Rvalue and STL Containers.

Books and references

Online Material:

1. C++ reference - C++98 and C++03, C++11, C++14.
2. Overview of the New C++ (C++11/14) by Scott Meyers, 2015.
3. ISO C++ Standards.
4. Presentations used in the Course.

Books:

1. C++ Move Semantics - The Complete Guide by Nicolai M. Josuttis, 2020.
2. C++ Concurrency in Action, 2nd Edition by Anthony Williams, 2019.
3. C++17 - The Complete Guide by Nicolai M. Josuttis, 2020.
4. C++17 In Detail: Learn the Exciting Features of The New C++ Standard! by Bartlomiej Filipek, 2019.
5. Professional C++, 4th Edition by Marc Gregoire, 2018.
6. Functional Programming in C++ by Ivan Čukić, 2018.
7. Effective Modern C++: 42 Specific Ways to Improve Your Use of C++11 and C++14 by Scott Meyers, 2015.

Instructor bio

Prof. Partha Pratim Das
(https://swayam.gov.in/) IIT Kharagpur (https://swayam.gov.in/nc_details/NPTEL)

Prof. Partha Pratim Das received his BTech, MTech and PhD degrees in 1984, 1985 and 1988 respectively from IIT Kharagpur. He served as a faculty in Department of Computer Science and Engineering, IIT Kharagpur from 1988 to 1998. In 1998, he joined Alumnus Software Ltd as a Business Development Manager. From 2001 to 2011, he worked for Interra Systems, Inc. as a Senior Director and headed its Kolkata Center. In 2011, he joined back to Department of Computer Science and Engineering, IIT Kharagpur as Professor. Dr. Das has also served as a Visiting Professor with Institute of Radio Physics and Electronics, Calcutta University from 2003 to 2013.

Dr. Das is currently the Head of Rajendra Mishra School of Engineering Entrepreneurship, the Professor-inCharge of the upcoming Research Park of IIT Kharagpur at Rajarhat, Kolkata, and the Joint Principal Investigator of National Digital Library of India project of MHRD.

Dr. Das has taught several courses in Computer Science including Software Engineering, Object-Oriented Systems, Programming and Data Structure, Compiler Design, Design and Analysis of Algorithms, Information System Design, Database Management Systems, Computational Geometry, Principles of Programming Languages, Embedded Systems, and Image Processing. Jointly with 2 others, he has also offered a course on Introduction to Design of Algorithms under the T10KT program of NME-ICT, MHRD (https://www.facebook.com/t10kt.algorithms/) to nearly 7000 teachers. Further, Dr. Das has been offering Programming in C++ and Object-Oriented Analysis and Design in NPTEL-NOC. Both courses are regularly attended by thousands of students.

Dr. Das has published over 40 technical papers in international journals in areas of Digital Geometry, Image Processing, Parallel Computing and Knowledge-based Systems. In 2013 he has co-authored a research monograph titled Digital Geometry in Image Processing (CRC Press). His current interests include Human-Computer Interactions, Computer Analysis of Indian Classical Dance, Object-Oriented Systems Analysis and Design, Software Engineering, Compiler Technology, and Technology Enabled Learning. Dr. Das is a member of Association of Computing Machinery (ACM), The Institute of Electrical and Electronics Engineers (IEEE), and Indian Unit for Pattern Recognition and Artificial Intelligence (IUPRAI).

Course certificate

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Date and Time of Exams: **28 April 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
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Sensors and Actuators

By Prof. Hardik Jeetendra Pandya | IISc Bangalore

Learners enrolled: 6350 | Exam registration: 2218

Sensors and Actuators intro

ABOUT THE COURSE:

This course is designed with an aim of educating students in microtechnology and its use to fabricate sensors and systems. The students will have an exposure to sensors and its importance in the real world. The students will also able to understand how to fabricate some of those sensors. Students will have an exposure towards how to fabricate the sensors and its application in real world. The students will provide an understanding on modern day microsensors and micro actuators. The student will have an

idea about how t f those sensors and characterise before fabricating it. Below are some of the course objectives. The first objectiv to understand dynics of sensors, actuators and their operating principle. The second objective is to educate the students on different types of microfabrication techniques for designing and developing sensors (Several applications from Electronics to Biomedical will be covered). The third objective is to explain working of various types of electrochemical sensors and actuators. Fourth objective is to provide information about interfacing of sensors and signal conditioning circuits to establish any control system or monitoring system. Fifth objective is to provide knowledge about simulation and characterization of different sensors. The final objective is to provide an understanding on characteristic parameters to evaluate sensor performance. **INTENDED AUDIENCE:** Engineering Students, Faculty from Engineering Colleges **PREREQUISITES:** Basic Electronics

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Electrical, Electronics and Communications Engineering ◦ Control and Instrumentation ◦ Robotics
Credit Points :	3
Level :	Undergraduate/Postgraduate
Start Date :	22 Jan 2024
End Date :	12 Apr 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	27 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

%20Course)

Course layout

Week 1: Basics of Energy Transformation: Transducers, Sensors and Actuators **Week 2:** Understanding of thin film physics: Application in MOSFET and its variants **Week 3:** Thin Film Deposition Techniques: Chemical Vapor Deposition (APCVD, LPCVD, UHVCVD, PECVD, ALCVD, HPCVD, MOCVD) **Week 4:** Thin Film Deposition Techniques: Physical Vapor Deposition (Thermal Deposition, E-beam Evaporation, Sputtering, Pulsed Laser Deposition) **Week 5:** Basics understanding of Photolithography for pattering layer. Detailed overview of Etching methods. **Week 6:** Understanding various gas sensors: Optical gas sensor, Metal oxide semiconductor gas sensor, Field effect transistor gas sensor, Piezoelectric gas sensor, Polymer gas sensor, Nano-structured based gas sensors **Week 7:** Design and fabrication process of Microsensors: Force Sensors, Pressure Sensors, Strain gauges and practical applications **Week 8:** Explain working principles of Actuators. Piezoelectric and Piezoresistive actuators, micropumps and micro actuators with practical applications **Week 9:** Understanding basics of microfluidics to assist Photomask design using Clewin Software, pattern transfer techniques, PDMS moulding and degassing, device bonding techniques. **Week 10:** Simulation, Optimization and characterization of various sensors using COMSOL Multiphysics **Week 11:** Understanding of Sensor Interfacing with Microprocessor to build electronic system **Week 12:** Static and Dynamic Characteristic Parameters for Sensors and Actuators, Calibration of Sensor based electronics systems.

Books and references

1. Lecture notes on some topics will be provided by the instructor Pallás-Areny Ramón, and John G. Webster. 2. Sensors and Signal Conditioning Wiley-Blackwell, 2008 Jacob Fraden, Handbook of modern sensors, Springer, Stefan Johann Rupitsch. 3. Piezoelectric Sensors and Actuators: Fundamentals and Applications, Springer, 2018 Senturia S. D. 4. Microsystem Design, Kluwer Academic Publisher, 2001 J.D. Plummer, M.D. Deal, P.G. Griffin 5. Silicon VLSI Technology, Pearson Education, 2001 S.M. Sze (Ed) 6. VLSI Technology, 2 Edition, McGraw Hill, 1988 Madou 7. M Fundamentals of Microfabrication, CRC Press, 1997.

Instructor bio

Prof. Hardik Jeetendra Pandya
IISc Bangalore

Biodata (Self Introduction): Dr. Hardik J. Pandya is an assistant professor in the Department of Electronic Systems Engineering, Division of Electrical Sciences, IISc Bangalore where he is developing Advanced Microsystems and Biomedical Devices Facility for Clinical Research and Biomedical and Electronic (10-6-10-9) Engineering Systems Laboratory to carry out cutting-edge research on novel devices to solve unmet problems in biology and medicine. He is recipient of prestigious Early Career Research Award from Science and Engineering Research Board, Government of India as well as a start-up grant of 228 Lacs from IISc. He has taught Design for Analog Circuits, Analog Integrated Circuits, VLSI technology, and Semiconductor Devices to undergraduate and graduate students from Electronic Engineering, Instrumentation Engineering, and Applied Physics. He seek to understand and exploit novel ways of fabricating microengineering devices using glass, silicon, polymers and integrate with unusual classes of micro/nanomaterials. His research interests include integrating biology/medicine with micro- and nanotechnology to develop innovative tools to solve unmet clinical problems. His current research focuses on flexible sensors for smart catheters, microsensors, microfluidic devices, and microelectromechanical systems, all lately with an emphasis on cancer diagnosis, therapeutics, e-nose, and biomedical device technologies. Before joining IISc, he worked as a postdoctoral scientist in the Department of Mechanical Engineering, Maryland Robotics Center, University of Maryland, College Park and in the Department of Medicine, Brigham and Women's Hospital–Harvard Medical School affiliated with Harvard-MIT Health Science and Technology. His work has resulted in several patents and publications. His work has been highlighted as "Breaking Research News" by The Physicians Committee for Responsible Medicine and has been featured on IEEE Transactions on Biomedical Engineering July 2016 issue cover image as well as IEEE TBME July 2016 feature article for the website and monthly highlights. The work on portable cancer diagnosis tool was also featured on Science Translational Medicine as an Editorial Choice, Breast Cancer Diagnosis, March 2016 and has been highlighted on CapeRay blog as "Biochips and Diagnostic tools" in April 2016. His work has been published in high-quality journals including Lab on a Chip, IEEE Transactions on Biomedical Engineering, IEEE Journal of Microelectromechanical Systems, Sensors and Actuators B, Biosensors and Bioelectronics, Nanoscience and Nanotechnology Letters, Sensors and Transducers, and Journal of Micromechanics and Micromachining.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **27 April 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

The Joy of Computing using Python

By Prof. Sudarshan Iyengar | IIT Ropar

Learners enrolled: 60289 | Exam registration: 24330

Introduction Joy of Computing

ABOUT THE COURSE :

A fun filled whirlwind tour of 30 hrs, covering everything you need to know to fall in love with the most sought after skill of the 21st century. The course brings programming to your desk with anecdotes, analogies and illustrious examples. Turning abstractions to insights and engineering to art, the course focuses primarily to inspire the learner's mind to think logically and arrive at a solution programmatically. As part of the course, you will be learning how to practice and culture the art of programming with Python as a language. At the end of the course, we introduce some of the current advances in computing to motivate the enthusiastic learner to pursue further directions.

INTENDED AUDIENCE : Any interested audience

PREREQUISITES : 10th standard/high school

INDUSTRY SUPPORT : Everybody is aware of the potential of a first course in computer science. Especially of a first course in computing, done right.

(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Summary

About Swayam (https://swayam.gov.in/about) | All Courses | ()

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	12 weeks
Category :	◦ Computer Science and Engineering
Credit Points :	3
Level :	Undergraduate/Postgraduate
Start Date :	22 Jan 2024
End Date :	12 Apr 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	21 Apr 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

- Motivation for Computing
- Welcome to Programming!!
- Variables and Expressions : Design your own calculator
- Loops and Conditionals : Hopscotch once again
- Lists, Tuples and Conditionals : Lets go on a trip
- Abstraction Everywhere : Apps in your phone
- Counting Candies : Crowd to the rescue
- Birthday Paradox : Find your twin

- Google Translate : Spe e
- Currency Converter : C rip expenses
- Monte Hall : 3 doors and a twist
- Sorting : Arrange the books
- Searching : Find in seconds
- Substitution Cipher : What's the secret !!
- Sentiment Analysis : Analyse your Facebook data
- 20 questions game : I can read your mind
- Permutations : Jumbled Words
- Spot the similarities : Dobble game
- Count the words : Hundreds, Thousands or Millions.
- Rock, Paper and Scissor : Cheating not allowed !!
- Lie detector : No lies, only TRUTH
- Calculation of the Area : Don't measure.
- Six degrees of separation : Meet your favourites
- Image Processing : Fun with images
- Tic tac toe : Let's play
- Snakes and Ladders : Down the memory lane.
- Recursion : Tower of Hanoi
- Page Rank : How Google Works !!

Instructor bio

Prof. Sudarshan Iyengar

IIT Ropar

Prof. Sudarshan Iyengar, Associate Professor at the CSE at IIT Ropar has a Ph.D. from the Indian Institute of Science (IISc). An exemplary teacher who has delivered over 350 popular science talks to students of high school and advanced graduate programmes. Dr. Sudarshan has offered more than 100 hours of online lectures with novel teaching methodologies that have reached lakhs of Students. His research interests include Data Sciences, Social Computing, Social Networks, Collective Intelligence, Crowdsourced Technologies and Secure Computation

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **21 April 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

Dr. Mahesh Bundele
B.E., M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

Cloud Computing and Distributed Systems

By Prof. Rajiv Misra | IIT Patna

Learners enrolled: 14381 | Exam registration: 4177

Introduction - Cloud Computing and Distributed Systems - Prof Rajeev Misra

ABOUT THE COURSE :

Cloud computing is the on-demand delivery of computations, storage, applications, and other IT resources through a cloud services platform over the internet with pay-as-you-go business model. Today's Cloud computing systems are built using fundamental principles and models of distributed systems. This course provides an in-depth understanding of distributed computing “concepts”, distributed algorithms, and the techniques, that underlie today's cloud computing technologies. The cloud computing and distributed systems concepts and models covered in course includes: virtualization, cloud storage: key-value/NoSQL stores, cloud networking,fault-tolerance cloud using PAXOS, peer-to-peer systems, classical distributed algorithms such as leader election, time, ordering in distributed systems, distributed mutual exclusion, distributed algorithms for failures and recovery approaches, emerging areas of big data and many more. And while discussing the concepts and techniques, we will also look at aspects of industry systems such as Apache Spark, Google's Chubby, Apache Zookeeper, HBase, MapReduce, Apache Cassandra, Google's B4, Microsoft's Swan and many others. Upon completing this course, students will have intimate knowledge about the internals of cloud computing and how the distributed systems concepts work inside clouds.

PREREQUISITES : **Minimum**: d Algorithms
Ideal: Com , Basic OS and Networking concepts
INDUSTRY SUPPORT : Companies like Amazon, Microsoft, Google, IBM, Facebook and start-ups working on this field.

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	8 weeks
Category :	◦ Computer Science and Engineering
Credit Points :	2
Level :	Undergraduate/Postgraduate
Start Date :	22 Jan 2024
End Date :	15 Mar 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	23 Mar 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1: Introduction to Clouds, Virtualization and Virtual Machine

1. Introduction to Cloud Computing: Why Clouds, What is a Cloud,Whats new in todays Clouds, Cloud computing vs. Distributed computing, Utility computing, Features of today's Clouds: Massive scale, AAS Classification: HaaS, IaaS, PaaS, SaaS, Data-intensive Computing, New Cloud Paradigms, Categories of Clouds: Private clouds, Public clouds
2. Virtualization: What's virtualization, Benefits of Virtualization, Virtualization Models: Bare metal, Hosted hypervisor
3. Types of Virtualization: Processor virtualization, Memory virtualization, Full virtualization, Para virtualization, Device virtualization
4. Hotspot Mitigation for Virtual Machine Migration: Enterprise Data Centers, Data Center Workloads, Provisioning methods, Sandipiper Architecture, Resource provisioning, Black-box approach, Gray-box approach, Live VM Migration Stages, Hotspot Mitigation

Week 2: **Network Virtualization and Geo distributed Clouds**

1. Server Virtualization: Methods of virtualization: Using Docker,Using Linux containers, Approaches for Networking of VMs: Hardware approach: Single-root I/O virtualization (SR-IOV), Software approach: Open vSwitch, Mininet and its applications
2. Software Defined Network: Key ideas of SDN, Evolution of SDN,SDN challenges, Multi-tenant Data Centers: The challenges, Network virtualization, Case Study: VL2, NVP
3. Geo-distributed Cloud Data Centers: Inter-Data Center Networking, Data center interconnection techniques: MPLS, Google's B4 and Microsoft's Swan

Week 3: **Leader Election in Cloud, Distributed Systems and Industry Systems**

1. Leader Election in Rings (Classical Distributed Algorithms): LeLann-Chang-Roberts (LCR) algorithm, The Hirschberg and Sinclair (HS) algorithm
2. Leader Election (Ring LE & Bully LE Algorithm): Leader Election Problem, Ring based leader election, Bully based leader election, Leader Election in Industry Systems: Google's Chubby and Apache Zookeeper
3. Design of Zookeeper: Race condition, Deadlock, Coordination, Zookeeper design goals, Data model, Zookeeper architecture, Sessions, States, Usecases, Operations, Access Control List (ACL), Zookeeper applications: Katta, Yahoo! Message Broker

Week 4: **Classical Distributed Algorithms and the Industry Systems**

1. Time and Clock Synchronization in Cloud Data Centers: Synchronization in the cloud, Key challenges, Clock Skew, Clock Drift, External and Internal clock synchronization, Christians algorithm, Error bounds, Network time protocol (NTP), Berkley's algorithm, Datacenter time protocol (DTP), Logical (or Lamport) ordering, Lamport timestamps, Vector timestamps
2. Global State and Snapshot Recording Algorithms: Global state, Issues in Recording a Global State, Model of Communication, Snapshot algorithm: Chandy-Lamport Algorithm
3. Distributed Mutual Exclusion: Mutual Exclusion in Cloud, Central algorithm, Ring-based Mutual Exclusion, Lamport's algorithm, Ricart-Agrawala's algorithm, Quorum-based Mutual Exclusion, Maekawa's algorithm, Problem of Deadlocks, Handling Deadlocks, Industry Mutual Exclusion : Chubby

Week 5: **Consensus, Paxos and Recovery in Clouds**

1. Consensus in Cloud Computing and Paxos: Issues in consensus, Consensus in synchronous and asynchronous system, Paxos Algorithm
2. Byzantine Agreement: Agreement, Faults, Tolerance, Measuring Reliability and Performance, SLIs, SLOs, SLAs, TLAs, Byzantine failure, Byzantine Generals Problem, Lamport-Shostak-Pease Algorithm, Fischer-Lynch-Paterson (FLP) Impossibility
3. Failures & Recovery Approaches in Distributed Systems: Local checkpoint, Consistent states, Interaction with outside world, Messages, Domino effect, Problem of Livelock, Rollback recovery schemes, Checkpointing and Recovery Algorithms: Koo-Toueg Coordinated Checkpointing Algorithm

Week 6: **Cloud Storage: Key-value stores/NoSQL**

1. Design of Key-Value Stores: Key-value Abstraction, Key-value/NoSQL Data Model, Design of Apache Cassandra, Data Placement Strategies, Snitches, Writes, Bloom Filter, Compaction, Deletes, Read, Membership, CAP Theorem, Eventual Consistency, Consistency levels in Cassandra, Consistency Solutions
2. Design of HBase: What is HBase, HBase Architecture, Components, Data model, Storage Hierarchy, Cross-Datacenter Replication, Auto Sharding and Distribution, Bloom Filter, Fold, Store, and Shift

Week 7: **P2P Systems and their use in Industry Systems**

1. Peer to Peer Systems in Cloud Computing: Napster, Gnutella, FastTrack, BitTorrent, DHT, Chord, Pastry and Kelips.

Week 8: **Cloud Applications: MapReduce, Spark and Apache Kafka**

1. MapReduce: Paradigm, Programming Model, Applications, Scheduling, Fault-Tolerance, Implementation Overview, Examples
2. Introduction to Spark: Resilient Distributed Datasets (RDDs), RDD Operations, Spark applications: Page Rank Algorithm, GraphX, GraphX API, GraphX working
3.Introduction to Kafka: What is Kafka, Use cases for Kafka, Data model, Architecture, Types of messaging systems, Importance of brokers

Books and referen

Text Books:

1. Distributed and Cloud Computing From Parallel Processing to the Internet of Things- Kai Hwang, Jack Dongarra, Geoffrey Fox
2. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011
3. Distributed Computing: Principles, Algorithms, and Systems- Ajay D. Kshemkalyani and Mukesh Singhal
4. Distributed Computing: Fundamentals, Simulations and Advanced Topics-Hagit Attiya and Jennifer Welch

Reference Book:

1.Distributed Algorithms-Nancy Lynch
2.Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
3.Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012

Instructor bio

Prof. Rajiv Misra

IIT Patna

Dr. Rajiv Misra is working in Department of Computer Science and Engineering at Indian Institute of Technology Patna, India. He obtained his Ph.D degree from IIT Kharagpur, M.Tech degree in Computer Science and Engineering from the Indian Institute of Technology (IIT) Bombay, and Bachelor's of engineering degree in Computer Science from MNIT Allahabad. His research interests spanned a design of distributed algorithms for Mobile, Adhoc and Sensor Networks, Cloud Computing and Wireless Networks. He has contributed significantly to these areas and published more than 70 papers in high quality journals and conferences, and 2 book chapters. His h-index is 10 with more than 590 citations. He has authored papers in IEEE Transactions on Mobile Computing, IEEE Transaction on Parallel and Distributed Systems, IEEE Systems Journal, Adhoc Networks, Computer Network, Journal of Parallel and Distributed Computing. He has edited a book titled as “Smart Techniques for a Smarter Planet: Towards Smarter Algorithms” for the "Studies in Fuzziness and Soft Computing" book series, Springer (2018). He has supervised four Phd students and currently four Phd students working under his supervision in the area of big data, cloud computing, distributed computing, and sensor networks. He is a senior member of the IEEE and fellow of IETE. He has completed as the Principal Investigator of R&D Project Sponsored by DeiTY entitled as “Vehicular Sensor and Mesh Networks based Future ITS”. He has mentored the online courses on Cloud Computing, Advanced Graph Theory and Distributed Systems in the platform of NPTEL.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **23 March 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

Data Base Management System

By Prof. Partha Pratim Das, Prof. Samiran Chattopadhyay | IIT Kharagpur

Learners enrolled: 44644 | Exam registration: 11544

Prof P P Das

ABOUT THE COURSE :

Databases form the backbone of all major applications today – tightly or loosely coupled, intranet or internet based, financial, social, administrative, and so on. Structured Database Management Systems (DBMS) based on relational and other models have long formed the basis for such databases. Consequently, Oracle, Microsoft SQL Server, Sybase etc. have emerged as leading commercial systems while MySQL, PostgreSQL etc. lead in open source and free domain.

While DBMS's differ in the details, they share a common set of models, design paradigms and a Structured Query Language (SQL). In this background the course examines data structures, file organizations, concepts and principles of DBMS's, data analysis, database design, data

modeling, database m query optimization, and database implementation. More specifically, the course introduces relational data models; entity-rel g, SQL, data normalization, and database design. Learners will also learn query coding practices using MySQL (or any other open system) through various assignments. Design of simple multi-tier client / server architectures based and Web-based database applications is also introduced.

INTENDED AUDIENCE : Students from all disciplines can enroll for this course.

PRE-REQUISTES :1. Procedural and / or Object-Oriented Programming (C / C++ / Java / Python)
2. Data Structures
3. Algorithms

INDUSTRY SUPPORT : DBMS is so fundamental that all companies dealing with systems as well as application development (including web, IoT, embedded systems, data mining, machine learning) have a need for the same. These include – Microsoft, Samsung, Xerox, Yahoo, Google, IBM, TCS, Infosys, Amazon, Flipkart, etc.

Summary

Course Status :	Completed
Course Type :	Core
Language for course content :	English
Duration :	8 weeks
Category :	◦ Computer Science and Engineering ◦ Programming
Credit Points :	2
Level :	Undergraduate/Postgraduate
Start Date :	22 Jan 2024
End Date :	15 Mar 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	24 Mar 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Week 1: Course Overview. Introduction to RDBMS
Week 2: Structured Query Language (SQL)
Week 3: Relational Algebra. Entity-Relationship Model
Week 4: Relational Database Design
Week 5: Application Development. Case Studies. Storage and File Structure
Week 6: Indexing and Hashing. Query Processing
Week 7: Query Optimization. Transactions (Serializability and Recoverability)
Week 8: Concurrency Control. Recovery Systems. Course Summarization.

Books and references

Text Books / Basic Material

1. Database System Concepts by Abraham Silberschatz, Henry F. Korth, and S. Sudarshan, 6th Edition, McGraw-Hill Education, 2010.
2. Presentations used in the Course

Reference (Advanced) Material

This is a first level course. So the textbook would be the primary resource also for the advanced chapters. In addition, some references will be specified for every topic during the course.

Instructor bio

Prof. Partha Pratim Das

IIT Kharagpur

Prof. Partha Pratim Das received his BTech, MTech and PhD degrees in 1984, 1985 and 1988 respectively from IIT Kharagpur. He served as a faculty in Department of Computer Science and Engineering, IIT Kharagpur from 1988 to 1998. In 1998, he joined Alumnus Software Ltd as a Business Development Manager. From 2001 to 2011, he worked for Interra Systems, Inc. as a Senior Director and headed its Kolkata Center. In 2011, he joined back to Department of Computer Science and Engineering, IIT Kharagpur as Professor. Dr. Das has also served as a Visiting Professor with Institute of Radio Physics and Electronics, Calcutta University from 2003 to 2013.

Dr. Das is currently the Head of Rajendra Mishra School of Engineering Entrepreneurship, the Professor-inCharge of the upcoming Research Park of IIT Kharagpur at Rajarhat, Kolkata, and the Joint Principal Investigator of National Digital Library of India project of MHRD.

Dr. Das has taught several courses in Computer Science including Software Engineering, Object-Oriented Systems, Programming and Data

Structure, Compiler De nalysis of Algorithms, Information System Design, Database Management Systems, Computational Geometry, Principles o guages, Embedded Systems, and Image Processing. Jointly with 2 others, he has also offered a course on Introduction to Design of Algorithms under the T10KT program of NME-ICT, MHRD (https://www.facebook.com/t10kt.algorithms/) to nearly 7000 teachers. Further, Dr. Das has been offering Programming in C++ and Object-Oriented Analysis and Design in NPTEL-NOC. Both courses are regularly attended by thousands of students.

Dr. Das has published over 40 technical papers in international journals in areas of Digital Geometry, Image Processing, Parallel Computing and Knowledge-based Systems. In 2013 he has co-authored a research monograph titled Digital Geometry in Image Processing (CRC Press). His current interests include Human-Computer Interactions, Computer Analysis of Indian Classical Dance, Object-Oriented Systems Analysis and Design, Software Engineering, Compiler Technology, and Technology Enabled Learning. Dr. Das is a member of Association of Computing Machinery (ACM), The Institute of Electrical and Electronics Engineers (IEEE), and Indian Unit for Pattern Recognition and Artificial Intelligence (IUPRAI).

Prof. Samiran Chattopadhyay

Samiran Chattopadhyay obtained his B Tech and M Tech degree in 1987 and 1989 respectively from IIT Kharagpur. He obtained his PhD degree from Jadavpur University in 1993. He served as a faculty in the Department of Computer Science and Engineering, Jadavpur University from 1989 to 1993. In 1993, he moved to industry and joined back the same department in Jadavpur University as an Associate Professor in 1997. Since 2001, he is a Professor of Information Technology in Jadavpur University.

Dr. Chattopadhyay is also a visiting fellow of the University of Northumbria, Newcastle upn Tyne UK. He was an adjunct faculty at IIT Kharagpur for the Distributed Systems course and a visiting faculty member for the MTech course by IIT Kharagpur which was offered in distance learning mode.
Dr. Chattopadhyay has more than two decades of experience of serving reputed Industry houses including Mindware, Computer Associates TCG Software, Interra Systems India Ltd. He is also a project consultant of the prestigious National Digital Library Mission of Government of India.

Dr. Chattopadhyay has taught several courses in Computer Science including Software Engineering, Object-Oriented Systems, Programming and Data Structure, Compiler Design, Design and Analysis of Algorithms, Information System Design, Database Management Systems, Ad hoc Wireless Networks, Cloud Computing. Dr. Chattopadhyay has been a co-faculty in Database Management Systems in NPTEL-NOC.

Dr. Chattopadhyay has published over 60 technical papers in international journals in the areas of Wireless Networks, Network Security, Machine learning applications. He has co- authored a research monograph titled 'Digital Geometry in Image Processing', a textbook titled 'Data Structures through C' and 'Big Data in e-Healthcare'. His current research interests include Network Security, Machine learning, Wireless network and Pervasive computing..

Course certific (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.

The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).

Date and Time of Exams: **24 March 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.

Registration url: Announcements will be made when the registration form is open for registrations.

The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.

Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 6 assignments out of the total 8 assignments given in the course.

Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IIT Kharagpur .It will be e-verifiable at nptel.ac.in/noc (http://nptel.ac.in/noc).

Only the e-certificate will be made available. Hard copies will not be dispatched.

Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

Data Science for Engineers

By Prof. Ragunathan Rengasamy, Prof. Shankar Narasimhan | IIT Madras

Learners enrolled: 22728 | Exam registration: 4209

Data Science for Engineers - Introduction

ABOUT THE COURSE :

Learning Objectives :

1. Introduce R as a programming language
2. Introduce the mathematical foundations required for data science
3. Introduce the first level data science algorithms
4. Introduce a data analytics problem solving framework
5. Introduce a practical capstone case study

Learning Outcomes:

1. Describe a flow (https://swayam.gov.in/) data science problems (Remembering) (https://swayam.gov.in/nc_details/NPTEL)
2. Classify data science problems into standard typology (Comprehension)
3. Develop R codes for data science solutions (Application)

4. Correlate results to the solution approach followed (Analysis)
5. Assess the solution approach (Evaluation)
6. Construct use cases to validate approach and identify modifications required (Creating)

INTENDED AUDIENCE: Any interested learner

PREREQUISITES: 10 hrs of pre-course material will be provided, learners need to practise this to be ready to take the course.

INDUSTRY SUPPORT: HONEYWELL, ABB, FORD, GYAN DATA PVT. LTD.

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	8 weeks
Category :	◦ Computer Science and Engineering ◦ Data Science ◦ Programming
Credit Points :	2
Level :	Undergraduate/Postgraduate
Start Date :	22 Jan 2024
End Date :	15 Mar 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	24 Mar 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1: Course philosophy and introduction to R

Week 2: Linear algebra for data science

1. Algebraic view - vectors, matrices, product of matrix & vector, rank, null space, solution of over-determined set of equations and pseudo-inverse)

2. Geometric view - vectors, distance, projections, eigenvalue decomposition

Week 3: Statistics (descriptive statistics, notion of probability, distributions, mean, variance, covariance, covariance matrix, understanding univariate and multivariate normal distributions, introduction to hypothesis testing, confidence interval for estimates)

Week 4: Optimization

Week 5: 1. Optimization

2. Typology of data science problems and a solution framework

Week 6: 1. Simple linear regression and verifying assumptions used in linear regression

2. Multivariate linear regression, model assessment, assessing importance of different variables, subset selection

Week 7: Classification using logistic regression

Week 8: Classification using kNN and k-means clustering

Books and references

1. INTRODUCTION TO LINEAR ALGEBRA - BY GILBERT STRANG
2. APPLIED STATISTICS AND PROBABILITY FOR ENGINEERS – BY DOUGLAS MONTGOMERY

Instructor bio

Prof. Ragunathan Rengasamy

IIT Madras

Prior to joining IIT M or, Prof.Rengaswamy was a professor of Chemical Engineering and Co-Director of the Process Control and Optimiz t Texas Tech University, Lubbock, USA. He was also professor and associate professor at Clarkson University, USA and an assistant professor at IIT Bombay. His major research interests are in the areas of fault detection and diagnosis and development of data science algorithms for manufacturing industries.

Prof. Shankar Narasimhan

Prof.Shankar Narasimhan is currently a professor in the department of Chemical Engineering at IIT Madras. His major research interests are in the areas of data mining, process design and optimization, fault detection and diagnosis and fault tolerant control. He has co-authored several important papers and a book titled Data Reconciliation and Gross Error Detection: An Intelligent Use of Process Data which has received critical appreciation in India and abroad.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **24 March 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
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CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 6 assignments out of the total 8 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

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Dr. Mahesh Bundele
B.E., M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

Design and analysis of algorithms

By Prof. Madhavan Mukund | Chennai Mathematical Institute

Learners enrolled: 15136 | Exam registration: 2179

Course Introduction

ABOUT THE COURSE :

This course will cover basic concepts in the design and analysis of algorithms.

- Asymptotic complexity, O() notation
- Sorting and search
- Algorithms on graphs: exploration, connectivity, shortest paths, directed acyclic graphs, spanning trees
- Design techniques: divide and conquer, greedy, dynamic programming
- Data structures: heaps, union of disjoint sets, search trees
- Intractability

INTENDED AUDIENCE: Students in BE/BTech Computer Science, 2nd/3rd year.

PRE-REQUISITES: Exposu (https://swayam.gov.in/) courses on programming and data structures (https://swayam.gov.in/nc_details/NPTEL)

INDUSTRY SUPPORT: This course should be of value to any company working in the area of software services and products.

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	8 weeks
Category :	◦ Computer Science and Engineering ◦ Foundations of Computing
Credit Points :	2
Level :	Undergraduate
Start Date :	22 Jan 2024
End Date :	15 Mar 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	24 Mar 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1

Module 1: Introduction

Module 2: Examples and motivation

Module 3: Examples and
Module 4: Asymptotic co concepts
Module 5: Asymptotic complexity: formal notation
Module 6: Asymptotic complexity: examples
Assignments MCQ/Fill in blanks (unique answer)

Week 2

Module 1: Searching in list: binary search
Module 2: Sorting: insertion sort
Module 3: Sorting: selection sort
Module 4: Sorting: merge sort
Module 5: Sorting: quicksort
Module 6: Sorting: stability and other issues
Assignments MCQ/Fill in blanks, programming assignment

Week 3

Module 1: Graphs: Motivation
Module 2: Graph exploration: BFS
Module 3: Graph exploration: DFS
Module 4: DFS numbering and applications
Module 5: Directed acyclic graphs
Module 6: Directed acyclic graphs
Assignments MCQ/Fill in blanks, programming assignment

Week 4

Module 1: Shortest paths: unweighted and weighted
Module 2: Single source shortest paths: Dijkstra
Module 3: Single source shortest paths: Dijkstra
Module 4: Minimum cost spanning trees: Prim's algorithm
Module 5: Minimum cost spanning trees: Kruskal's Algorithm
Module 6: Union-Find data structure
Assignments MCQ/Fill in blanks, programming assignment

Week 5

Module 1: Divide and conquer: counting inversions
Module 2: Divide and conquer: nearest pair of points
Module 3: Priority queues, heaps
Module 4: Priority queues, heaps
Module 5: Dijstra/Prims revisited using heaps
Module 6: Search Trees: Introduction
Assignments MCQ/Fill in blanks, programming assignment

Week 6

Module 1: Search Trees: Traversals, insertions, deletions
Module 2: Search Trees: Balancing
Module 3: Greedy : Interval scheduling
Module 4: Greedy : Proof strategies

Module 5: Greedy : Huffn
Module 6: Dynamic Prog[illegible] Interval scheduling
Assignments MCQ/Fill in blanks, programming assignment

Week 7
Module 1: Dynamic Programming: memoization
Module 2: Dynamic Programming: edit distance
Module 3: Dynamic Programming: longest ascending subsequence
Module 4: Dynamic Programming: matrix multiplication
Module 5: Dynamic Programming: shortest paths: Bellman Ford
Module 6: Dynamic Programming: shortest paths: Floyd Warshall
Assignments MCQ/Fill in blanks, programming assignment

Week 8
Module 1: Intractability: NP completeness
Module 2: Intractability: reductions
Module 3: Intractability: examples
Module 4: Intractability: more examples
Module 5: Misc topics
Module 6: Misc topics
Assignments MCQ/Fill in blanks

Instructor bio

Prof. Madhavan Mukund

Chennai Mathematical Institute

Madhavan Mukund studied at IIT Bombay (BTech) and Aarhus University (PhD). He has been a faculty member at Chennai Mathematical Institute since 1992, where he is presently Professor and Director. His main research area is formal verification. He has active research collaborations within and outside India and serves on international conference programme committees and editorial boards of journals.

He has served as President of both the Indian Association for Research in Computing Science (IARCS) (2011-2017) and the ACM India Council (2016-2018). He has been the National Coordinator of the Indian Computing Olympiad since 2002. He served as the Executive Director of the International Olympiad in Informatics from 2011-2014.

In addition to the NPTEL MOOC programme, he has been involved in organizing IARCS Instructional Courses for college teachers. He is a member of ACM India's Education Committee. He has contributed lectures on algorithms to the Massively Empowered Classroom (MEC) project of Microsoft Research and the QEEE programme of MHRD.

Course certifica (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

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- NPTEL team

Dr. Mahesh Bundele
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Director
Poornima College of Engineering
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Sitapura, JAIPUR

Economic Growth And Development

By Prof. Rajshree Bedamatta | IIT Guwahati

Learners enrolled: 2267 | Exam registration: 569

Economic Growth and Development [Introduction Video]

This course engages the student with the much debated theories of growth versus development. The decades following liberalization and globalization have been a period of very high levels of economic inequality. With the focus on issues surrounding inequality, this course will introduce students to the major ideas and theories surrounding the often used and misused concepts of economic growth and economic development. With the help of major concepts used in growth and development economics, a student taking this course will be able to participate in the debate and understand the nuances surrounding the issue of economic development.

INTENDED AUDIENCE : UG and PG students of Humanities and Social Sciences, Sciences and Engineering
PREREQUISITES :NIL
INDUSTRY SUPPORT : NIL

Summary

(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	8 weeks
Category :	◦ Humanities and Social Sciences ◦ Economics
Credit Points :	2
Level :	Undergraduate/Postgraduate
Start Date :	22 Jan 2024
End Date :	15 Mar 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	23 Mar 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1: Concepts of economic growth & development; The Global North & Global South Divide
Week 2: Indices of economic development and contemporary controversies
Week 3: Strategies of economic development-I
Week 4: Strategies of economic development-II
Week 5: Growth and Inequality
Week 6: Introduction to Human Development

Week 7 :Human Develop
Week 8: MDGs, SDGs & (
(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

About Swayam (https://swayam.gov.in/about) | All Courses | ()

Books and references

Adelman, Irma (1961), Theories of Economic Growth and Development, Stanford University Press.
Behrman, J. R., Chenery, Hollis, and T.N. Srinivasan (1995), Handbook of Development Economics, Vol 1 to 3, North Holland.
Ray, Debraj (2009), Development Economics, Oxford University Press, New Delhi.
Todaro, Michael and S. Smith (2009), Economic Development, Pearson.
UNDP (1990), Human Development Report 1990.
UNDP (1995), Human Development Report 1995.
Sen, Amartya (1977), Growth Economics, Selected Readings, Penguin.
Fukudda-Parr, Sakiko and Shiva, Kumar (eds.) (2007), Readings in Human Development, Oxford University Press, New Delhi.
Fukudda-Parr, Sakiko (2003), The Human Development Paradigm: Operationalising Sen's Ideas on Capabilities, in Feminist Economics, Volume 9 (2-3).
Harris-White, Barbara and J. Heyer (2010), The Comparative Political Economy of Development: Africa and South Asia, Routledge.
Shariff, Abusaleh and M. Krishnaraj (2007), State, Markets and Inequalities, Orient Longman.

Instructor bio

Prof. Rajshree Bedamatta

IIT Guwahati

Rajshree Bedamatta is Associate Professor of Economics at the Department of Humanities and Social Sciences at Indian Institute of Technology Guwahati, India. Her university training is in the discipline of Economics with specialization in Development Economics. She teaches and researches in the broad domains on Development Economics and Public Economics at IIT Guwahati. Her research is on agrarian markets with focus in the domains of food and nutrition, health and education.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **23 March 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
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Introduction to Civil Engineering Profession

By Prof. Ravindra Gettu, Prof. Subhadeep Banerjee | IIT Madras

Learners enrolled: 5029 | Exam registration: 2198

Introduction to Civil Engineering Profession _ Introductory video

ABOUT THE COURSE : The course introduces the civil engineering profession and the degree programme to first year students and prospective students. The different disciplines of civil engineering are briefly explained, along with the pre-requisites, scope and opportunities. Career prospects and novel/emerging areas are also presented. This should be a compulsory first course in civil engineering to present the perspective for the undergraduate students.

INTENDED AUDIENCE : 1st year civil engineering students

PREREQUISITES : High school education

Summary

Course Status :	Completed
Course Type :	Core

Language for course content English
(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)
Duration : 8 weeks
Category : About Swayam (https://swayam.gov.in/about) | All Courses (https://swayam.gov.in/explorer) | Civil Engineering ()

Credit Points :	2
Level :	Undergraduate
Start Date :	22 Jan 2024
End Date :	15 Mar 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	23 Mar 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

Course layout

Week 1: What is Civil Engineering? Different disciplines of civil engineering. Scope and prospects. Heritage structures, architecture **Week 2:** Environmental Engineering. Prevention of environmental impact. Pollution, waste and water treatment **Week 3:** Geotechnical Engineering. Soil mechanics and foundations. Hydraulics and water resources **Week 4:** Construction Materials and Methods. Infrastructure Engineering. Sustainability. **Week 5:** Structural Engineering. Analysis, design and modelling **Week 6:** Highway Engineering. Traffic Engineering and Planning **Week 7:** Automation and Robotics in Construction. Water Security. **Week 8:** Novel areas. Career Prospects

Instructor bio

Prof. Ravindra Gettu

IIT Madras

Prof. Ravindra Gettu is a chair professor of civil engineering at IIT Madras. He has coordinated the introductory course at IITM and given lectures at other institutes on civil engineering for more than 10 years. He has a wide range of experience in research, education and consultancy. His specific area of

expertise is construction mat

Prof. Subhadeep Banerjee

Prof. Subhadeep Banerjee is an associate professor of civil engineering at IIT Madras. He received his PhD in Civil Engineering from National University of Singapore in 2010. Since 2012, he is involved in teaching various civil engineering core courses, such as Geology & Soil Mechanics, and Advanced Foundation Engineering for UG and PG students. His expertise includes seismic soil-foundation interactions, cyclic behaviour of geomaterials and finite element analysis of complex dynamic problems.

Course certificate

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CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 6 assignments out of the total 8 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

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Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

Introduction to programming in C

By Prof. Satyadev Nandakumar | IIT Kanpur

Learners enrolled: 46490 | Exam registration: 8138

Introduction

ABOUT THE COURSE :

This is a course in programming in C. No prior programming experience is assumed; however, mathematical maturity at the level of a second year science or engineering undergraduate is assumed.

We emphasize solving problems using the language, and introduce standard programming techniques like alternation, iteration and recursion. We will briefly glimpse the basics of software engineering practices like modularization, commenting, and naming conventions which help in collaborating and programming in teams.

Given a problem, we pay attention to the following questions:

1. What is an algorithmic solution to the problem?
2. How do we translate the algorithm into C code?
3. How efficient is the code?

4. How maintainable i

It is expected that by the [illegible] students will be comfortable in):-

- Attempting algorithmic solutions to problems
- Designing and coding moderate sized programs running to the order of a few hundred lines of code, and
- Reading, understanding and modifying code written by others.

INTENDED AUDIENCE : Any interested learners.

PREREQUISITES : No prior programming required; mathematical maturity of a second level UG student in science or engineering.

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	8 weeks
Category :	◦ Computer Science and Engineering
Credit Points :	2
Level :	Undergraduate/Postgraduate
Start Date :	22 Jan 2024
End Date :	15 Mar 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	23 Mar 2024 IST

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This is an AICTE approved FDP course

Course layout

(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Week 1 : Introduction. Straight-Line Code. Variables, Operators, Expressions and Conditionals.
Week 2 : Loops
Week 3 : Functions
Week 4 : One-Dimensional Arrays and Pointers
Week 5 : Recursion
Week 6 : Multi-dimensional Arrays, Linked Lists.
Week 7 : Operating on Files
Week 8 : Organizing C projects, working with multiple source directories, makefiles.

Instructor bio

Prof. Satyadev Nandakumar

IIT Kanpur

Dr. Satyadev Nandakumar is an Assistant Professor from the Department of Computer Science and Engineering IIT Kanpur who specialises in Computable Analysis, Algorithmic Information Theory, Symbolic Dynamics. His research interests includes Theoretical Computer Science, Algorithmic Information Theory, Computible Analysis.

Course certificate

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CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 6 assignments out of the total 8 assignments given in the course.
(All assignments in a particular week will be counted towards final scoring - quizzes and programming assignments).
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

Introduction To Soft Computing

By Prof. Debasis Samanta | IIT Kharagpur

Learners enrolled: 6051 | Exam registration: 2094

Prof Debasis Samanta

ABOUT THE COURSE :

Soft computing is an emerging approach to computing which parallel the remarkable ability of the human mind to reason and learn in an environment of uncertainty and imprecision. Soft computing is based on some biological inspired methodologies such as genetics, evolution, ant's behaviors, particles swarming, human nervous systems, etc. Now, soft computing is the only solution when we don't have any mathematical modeling of problem solving (i.e., algorithm), need a solution to a complex problem in real time, easy to adapt with changed scenario and can be implemented with parallel computing. It has enormous applications in many application areas such as medical diagnosis, computer vision, hand written character recondition, pattern recognition, machine intelligence, weather forecasting, network optimization, VLSI design, etc.

INTENDED AUDIENCE (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

- The course is of interdisciplinary nature and students from
- CSE
- IT
- EE
- ECE
- CE
- ME, etc. can take this course.

INDUSTRY SUPPORT :All IT companies, in general.

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	8 weeks
Category :	◦ Computer Science and Engineering
Credit Points :	2
Level :	Undergraduate/Postgraduate
Start Date :	22 Jan 2024
End Date :	15 Mar 2024
Enrollment Ends :	05 Feb 2024
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This is an AICTE approved FDP course

Course layout (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Week 1: Introduction to Soft Computing, Introduction to Fuzzy logic,Fuzzy membership functions,Operations on Fuzzy sets

Week 2: Fuzzy relations, Fuzzy propositions, Fuzzy implications, Fuzzy inferences

Week 3: Defuzzyfication Techniques-I, Defuzzyfication Techniques-II, Fuzzy logic controller-I, Fuzzy logic controller-II

Week 4: Solving optimization problems, Concept of GA, GA Operators: Encoding,GA Operators: Selection-I

Week 5: GA Operators: Selection-II, GA Operators: Crossover-I, GA Operators: Crossover-II, GA Operators: Mutation

Week 6: Introduction to EC-I, Introduction to EC-II, MOEA Approaches: Non-Pareto, MOEA Approaches: Pareto-I

Week 7: MOEA Approaches: Pareto-II, Introduction to ANN, ANN Architecture

Week 8: ANN Training-I, ANN Training-II, ANN Training-III, Applications of ANN

Books and references

1. An Introduction to Genetic Algorithm Melanic Mitchell (MIT Press)
2. Evolutionary Algorithm for Solving Multi-objective, Optimization Problems (2nd Edition), Collelo, Lament, Veldhnizer (Springer)

3. Fuzzy Logic with Engineering Applications Timothy J. Ross (Wiley)

4. Neural Networks and Learning Machines Simon Haykin (PHI)

Instructor bio

Prof. Debasis Samanta

IIT Kharagpur

Debasis Samanta holds a Ph.D. in Computer Science and Engineering from Indian Institute of Technology Kharagpur. His research interests and work experience spans the areas of Computational Intelligence, Data Analytics, Human Computer Interaction, Brain Computing and Biometric Systems. Dr. Samanta currently works as a faculty member at the Department of Computer Science & Engineering at IIT Kharagpur.

Course certifi (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

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- NPTEL team

Dr. Mahesh Bundele
B.E., M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

Machine Learning, ML

By Prof. Carl Gustaf Jansson | KTH, The Royal Institute of Technology

Learners enrolled: 12346 | Exam registration: 1892

Machine Learning Course Introduction

ABOUT THE COURSE ;

The scientific discipline of Machine Learning focuses on developing algorithms to find patterns or make predictions from empirical data. It is a classical sub-discipline within Artificial Intelligence (AI). The discipline is increasingly used by many professions and industries to optimize processes and implement adaptive systems. The course places machine learning in its context within AI and gives an introduction to the most important core techniques such as decision tree based inductive learning, inductive logic programming, reinforcement learning and deep learning through decision trees.

INTENDED AUDIEN Undefined

PREREQUISITES : Relevant applied math and statistics, core computer science

INDUSTRY SUPPORT : Broad industrial interest at present i.e. for autonomous vehicles, robots, intelligent assistants and general datamining

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	8 weeks
Category :	◦ Computer Science and Engineering ◦ Robotics
Credit Points :	2
Level :	Postgraduate
Start Date :	22 Jan 2024
End Date :	15 Mar 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	24 Mar 2024 IST

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This is an AICTE approved FDP course

Course layo (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Week 1 : Introduction to the Machine Learning course
Week 2 : Characterization of Learning Problems
Week 3 : Forms of Representation
Week 4 : Inductive Learning based on Symbolic Representations and Weak Theories
Week 5 : Learning enabled by Prior Theories
Week 6 : Machine Learning based Artificial Neural Networks
Week 7 : Tools and Resources + Cognitive Science influences
Week 8 : Examples, demos and exam preparations

Books and references

Own course notes, copy of ppts. Machine Learning textbooks as optional background material.

Instructor bio

Prof. Carl Gustaf Jansson

KTH, The Royal Institute Of Technology

Carl Gustaf Jansson is tenured Professor in Artificial Intelligence at the School of Electrical Engineering and Computer Science, KTH Royal Institute of Technology, Stockholm, Sweden. His research contributions are mostly in artificial intelligence, in particular Knowledge Representation and Machine Learning. Particular research interests are intelligent interfaces and ubiquitous computing.Henrik Boström is tenured professor in computer science and data science at the School of Electrical Engineering and Computer Science, KTH Royal Institute of Technology, Stockholm. His research focuses on machine learning algorithms and applications, in particular ensemble learning and interpretable models, including decision trees and rules, and conformal predictio. He is also a senior researcher at the Swedish institute RISE SICS.Fredrik Kilander is Associate Professor in Computer Science at the School of Electrical Engineering and Computer Science, KTH Royal Institute of Technology, Stockholm. His PhD was in Machine Learning in particular Conceptual Clustering. A particular research interest is ubiquitous computing. Dr Kilander has a broad experience from teaching in Computer Science in particular Programming Methodology.

Course cert (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

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The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).

Date and Time of Exams: **24 March 2024** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.

Registration url: Announcements will be made when the registration form is open for registrations.

The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.

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CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 6 assignments out of the total 8 assignments given in the course.

Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IIT Madras .It will be e-verifiable at nptel.ac.in/noc (http://nptel.ac.in/noc).

Only the e-certificate will be made available. Hard copies will not be dispatched.

Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team

Dr. Mahesh Bundele
B.E., M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

Plastic Waste Management

By Prof. Brajesh Kumar Dubey | IIT Kharagpur

Learners enrolled: 9052 | Exam registration: 3664

ABOUT THE COURSE:

This course will focus on:1. Introduction of Plastic pollution as a global problem today.2. What is Plastic Waste? The Magnitude of the problem on global scale and in Indian context. Plastic in Ocean and impact on sea life and economy.3. What is the nature and complexity of this problem and what could be the best way to manage the plastic waste and how to mitigate the risk from plastic waste.4. Plastic Waste Management Rules 2016, Recent Plastic Bans and the use of Extended Producer Responsibilities (EPR) concepts in managing Plastic waste in India.5. Best Practices of Managing Plastic Waste from around the World including use of

Plastic waste in ro[illegible]n Indian context and other countries)6. Way forward – how to manage this waste stream applying state of the art tech[illegible]

INTENDED AUDIENCE : Civil and Chemical Engineering BTech programs, Environmental Engineering and Environmental Science Masters and Doctoral Programs

PREREQUISITES : Basic Environmental Science, Basic Differential Equations, Basic Chemistry

INDUSTRY SUPPORT : AECOM, Ramky, Environmental Resource Management (ERM),SENES/ARCADIS. Waste Management related companies, Govt. Agencies

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	8 weeks
Category :	◦ Civil Engineering ◦ Environment
Credit Points :	2
Level :	Postgraduate
Start Date :	22 Jan 2024
End Date :	15 Mar 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	24 Mar 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1 : Plastics – What it is? Types, Uses and Global Statistics
Week 2 : Plastic Waste – Sources, Production, Global and Indian Context
Week 3 : Plastic Waste Management Rules 2016 (India) and Global Rules and Regulations
Week 4 : Plastic Bans including China Sword Policy implication on global plastic waste management
Week 5 : Impact of Plastics on Marine Life, Effect on Wildlife, Human Health and Environment
Week 6 : Plastic Waste Management Practices – Use of Plastic waste in roads, issues and challenges
Week 7 : Possible Alternate Materials to Plastics –Greener Alternatives
Week 8 : Plastics Resource Recovery and Circular Economy.

Books and references

Journal articles, Technical Reports will be collated from the web and made available to course participants.

Instructor bio

Prof. Brajesh Kumar Dubey

IIT Kharagpur

Professor Brajesh Kr. Dubey has his bachelors degree in Civil Engineering (Hons) from Indian Institute of Technology (IIT) Kharagpur, India and PhD in Environmental Engineering Sciences, University of Florida, Gainesville, Florida, USA. He is presently Associate Professor (Integrated Waste Management and Sustainable Engineering) in the Division of Environmental Engineering and Management at Indian Institute of Technology (IIT), Kharagpur, India. Dr. Dubey has more than 17 years of research, teaching, training and industrial outreach experience in the areas of Integrated Solid and Hazardous Waste Management, and Sustainable Engineering and Application of Life Cycle Assessment techniques. He also works in the area of Life Cycle Analysis and Sustainable Engineering. He has been teaching courses in the area of Solid Waste Management, Hazardous Waste Management, Life Cycle Analysis and Environmental Risk Assessment among other courses for nearly a decade. He has taught at several universities in USA, Canada, New Zealand, China andIndia. He has also conducted training programs in the Integrated Waste Management areas including that for Electronics Waste. Dr. Dubey has authored/co- authored more than 200 publications in his area of expertise and have presented at several national and international conferences. He has worked as Waste Management Expert for UN agencies and World Bank.

Course certi (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

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Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

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Programming, Data Structures And Algorithms Using Python

By Prof. Madhavan Mukund | Chennai Mathematical Institute

Learners enrolled: 44520 | Exam registration: 9442

python intro

ABOUT THE COURSE :

This course is an introduction to programming and problem solving in Python. It does not assume any prior knowledge of programming. Using some motivating examples, the course quickly builds up basic concepts such as conditionals, loops, functions, lists, strings and tuples. It goes on to cover searching and sorting algorithms, dynamic programming and backtracking, as well as topics such as exception handling and using files. As far as data structures are concerned, the course covers Python dictionaries as well as classes and objects for defining user defined datatypes such as linked lists and binary search trees.

INTENDED AUDIENCE: Students in any branch of mathematics/science/engineering, 1st year

PREREQUISITES: School level mathematics.

INDUSTRY SUPPORT: This course should be of value to any company requiring programming skills.

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English

Duration :	8 weeks
Category :	◦ Computer Science and Engineering ◦ Artificial Intelligence ◦ Data Science ◦ Foundations of Computing ◦ Programming
Credit Points :	2
Level :	Undergraduate
Start Date :	22 Jan 2024
End Date :	15 Mar 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	24 Mar 2024 IST

Note: This exam date is subject to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1:
Informal introduction to programmin, algorithms and data structures viagcd
Downloading and installing Python
gcd in Python: variables, operations, control flow - assignments, condition-als, loops, functions

Week 2:
Python: types, expressions, strings, lists, tuples
Python memory model: names, mutable and immutable values
List operations: slices etc
Binary search
Inductive function denitions: numerical and structural induction
Elementary inductive sorting: selection and insertion sort
In-place sorting

Week 3:
Basic algorithmic analysis: input size, asymptotic complexity, O() notation
Arrays vs lists
Merge sort
Quicksort
Stable sorting

Week 4:
Dictionaries
More on Python functions: optional arguments, default values
Passing functions as arguments
Higher order functions on lists: map, lter, list comprehension

Week 5:
Exception handling
Basic input/output
Handling files
String processing

Week 6:
Backtracking: N Queens, recording all solutions
Scope in Python: local, global, nonlocal names
Nested functions
Data structures: stack, queue
Heaps

Week 7:
Abstract datatypes
Classes and objects in Python
"Linked" lists: find, insert, delete
Binary search trees: find, insert, delete
Height-balanced binary search trees

Week 8:
Effcient evaluation of recursive definitions: memoization
Dynamic programming: examples
Other programming languages: C and manual memory management
Other programming paradigms: functional programming

Instructor bio

Prof. Madhavan Mukund

Chennai Mathematical Institute

Madhavan Mukund studied at IIT Bombay (BTech) and Aarhus University (PhD). He has been a faculty member at Chennai Mathematical Institute since 1992, where he is presently Professor and Director. His main research area is formal verification. He has active research collaborations within and outside India and serves on international conference programme committees and editorial boards of journals.

He has served as President of both the Indian Association for Research in Computing Science (IARCS) (2011-2017) and the ACM India Council (2016-2018). He has been the National Coordinator of the Indian Computing Olympiad since 2002. He served as the Executive Director of the International Olympiad in Informatics from 2011-2014.

In addition to the NPTEL MOOC programme, he has been involved in organizing IARCS Instructional Courses for college teachers. He is a member of ACM India's Education Committee. He has contributed lectures on algorithms to the Massively Empowered Classroom (MEC) project of Microsoft Research and the QEEE programme of MHRD.

Python for Data Science

By Prof. Ragunathan Rengasamy | IIT Madras

Learners enrolled: 61057 | Exam registration: 15701

Introduction

ABOUT THE COURSE :

The course aims at equipping participants to be able to use python programming for solving data science problems.

INTENDED AUDIENCE : Final Year Undergraduates

PRE-REQUISITES : Knowledge of basic data science algorithms

Summary

(https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

About Swayam (https://swayam.gov.in/about) | All Courses | ()

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	4 weeks
Category :	◦ Computer Science and Engineering ◦ Artificial Intelligence ◦ Data Science
Credit Points :	1
Level :	Undergraduate
Start Date :	22 Jan 2024
End Date :	16 Feb 2024
Enrollment Ends :	05 Feb 2024
Exam Registration Ends :	16 Feb 2024
Exam Date :	24 Mar 2024 IST

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This is an AICTE approved FDP course

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(https://www.addtoany.com/share#url=https%3A%2F%2Fonlinecourses.nptel.ac.in%2Fnoc24_cs54%2Fpreview&title=Python%20for%20Data%20Science%20-%20Course)

Course layout

Week 1:

BASICS OF PYTHON SPYDER (TOOL)

- Introduction Spyd
- Setting working D
- Creating and savi
- File execution, clearing console, removing variables from environment, clearing environment
- Commenting script files
- Variable creation
- Arithmetic and logical operators
- Data types and associated operations

Week 2:

Sequence data types and associated operations

- Strings
- Lists
- Arrays
- Tuples
- Dictionary
- Sets
- Range

NumPy

- ndArray

Week 3:

Pandas dataframe and dataframe related operations on Toyota Corolla dataset

1. Reading files
2. Exploratory data analysis
3. Data preparation and preprocessing

Data visualization on Toyoto Corolla dataset using matplotlib and seaborn libraries

1. Scatter plot
2. Line plot
3. Bar plot
4. Histogram
5. Box plot
6. Pair plot

Control structures using Toyota Corolla dataset

1. if-else family
2. for loop
3. for loop with if break
4. while loop

Functions

Week 4: CASE STUDY

Systems and Usable Security

By Prof. Neminath Hubballi | IIT Indore

Learners enrolled: 3763 | Exam registration: 995

Systems and Usable Security Introduction video

ABOUT THE COURSE :

This course will give an understanding of the principles of systems security from application viewpoint. Student will obtain hands-on experience on security threats and counter-measures. Goal is to study various types of threats, operating systems security, advanced topics on network security, web security and usable security. After the completion of the course, the student will have understanding of practical aspects of security and will be able to analyze and design the secure systems.

PRE-REQUISITE :Computer Networks, Operating Systems, Discrete Mathematics

INDUSTRY SUPPORT s an important aspect for every organization currently. Having knowledge about the threats and possible countermea ly especially organization in today's world.

INTENDED AUDIENCE final year undergraduate students of Computer Science and Engineering discipline.

Summary

Course Status :	Completed
Course Type :	Elective
Language for course content :	English
Duration :	4 weeks
Category :	◦ Computer Science and Engineering
Credit Points :	1
Level :	Undergraduate/Postgraduate
Start Date :	22 Jan 2024
End Date :	16 Feb 2024
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Course layout

Week 1: Introduction: Computer security concepts, threats, attacks; Malicious Software: Types of Malicious Software (Malware), Vulnerability, Exploits, Social Engineering–SPAM E-mail, Zombie, Bots, Keyloggers, Phishing, Spyware.

Week 2: Operating System Security Planning, Application Security, Linux/Unix Security, Windows Security, Virtualization Security

Week 3: Web Security: Secure E-mail and S/MIME, Domain Keys Identified Mail, Secure Sockets Layer (SSL) and Transport Layer Security (TLS), HTTPS, IPv4 and IPv6 Security, Public Key Infrastructure and Federated Identity Management.

Week 4: Usable Security: Introduction to Privacy, Trust and Semantic Security, Visualizing Privacy, Web Browser Security and Privacy, Authentication and Text Passwords, Biometrics and Graphical Passwords.

Books and references

1. W. Stallings and L. Brown, Computer Security: Principles and Practice (2nd Edition), Prentice Hall, 2011.
2. M. Goodrich and R. Tamassia, Introduction to Computer Security, Addison-Wesley, 2010.
3. L. F. Cranor and S. Garfinkel Security and Usability Designing Secure Systems that People Can Use, 1st Edition, O'Reilly 2005

Instructor bio

Prof. Neminath Hubballi

IIT Indore

Neminath Hubballi received the Ph.D. degree from the Department of Computer Science and Engineering, IIT Guwahati, India. He is currently an Associate Professor in the Discipline of Computer Science, IIT Indore, India. Prior to the current role, he was with corporate research and development centers of Samsung, Infosys Lab. He has also worked with Hewlett-Packard. He has several publications in the areas of security. His areas of interests include networks and system security. He has served as a TPC member and the chair of several conferences. He is a regular reviewer of many security journals and conferences.

Course certificate

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