



DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Scheme of Instruction

and

Syllabi of

B.E. VII & VIII- SEMESTERS

2018-2019



UNIVERSITY COLLEGE OF ENGINEERING

(AUTONOMOUS)

OSMANIA UNIVERSITY

HYDERABAD – 500 007, TELANGANA

SCHEME OF INSTRUCTION
BE (COMPUTER SCIENCE & ENGINEERING)
SEMESTER – VIII

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/Wk	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
Theory									
1.	PE-IV	Professional Elective-IV	3	1	0	4	30	70	3
1.	PE-V	Professional Elective-V	3	1	0	4	30	70	3
2.	OE-III	Open Elective-III	3	1	0	4	30	70	3
Practicals									
3.	PW861CS	Project Work –II	0	0	4	4	50	100	8
4.	MC901EG	Mandatory Course	0	0	3	3	50	-	3Units
Total			09	03	07	19	190	310	17

Open Elective-III	
OE 801 MT	**Statistical Applications in Engineering
OE801BM	**Human Machine Interaction
OE802BM	Instrumentation Engineering
OE801CE	Road Safety Engineering
OE802CE	Green Building Technologies
OE801CS	*Data Science Using R
OE801EC	Global and Regional Satellite Navigation Systems
OE801EE	Illumination and Electric Traction
OE801ME	Composite Materials
OE802 ME	Industrial and Financial Management
OE803ME	3D Printing Technology

Professional Elective-IV	
PE801CS	Data Mining
PE802CS	Information Retrieval Systems
PE803CS	Machine learning
PE804CS	Natural Language Processing
PE805CS	Data Science using R

Professional Elective-V	
PE 806 CS	Multi Core & Gpu Programming
PE 807 CS	Cloud Computing
PE 808 CS	Human Computer Interaction

Mandatory Course	
MC901EG	Gender Sensitization

*CS Electives offered for BME/CE/EC/EE/ME branches only

** Electives offered for CE/EC/EE branches only

**MACHINE LEARNING
(PROFESSIONAL ELECTIVE-IV)**

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	70 Marks
Sessionals	30 Marks
Credits	3

Course objectives:

- To introduce the basic concepts of machine learning and range of problems that can be handled by machine learning
- To introduce the concepts of instance based learning and decision tree induction
- To introduce the concepts of linear separability , Perceptron and SVM
- To learn the concepts of probabilistic inference, graphical models and evolutionary learning
- To learn the concepts of ensemble learning, dimensionality reduction and clustering

Course Outcomes:

Student will be able to :

- Explain the strengths and weaknesses of many popular machine learning approaches
- Recognize and implement various ways of selecting suitable model parameters for different machine learning techniques
- Design and implement various machine learning algorithms in a range of real-world applications

UNIT-I

Introduction: Learning, Types of Machine Learning.

Concept learning: Introduction, Version Spaces and the Candidate Elimination Algorithm. **Learning with Trees:** Constructing Decision Trees, CART, Classification Example

UNIT-II

Linear Discriminants: The Perceptron, Linear Separability, Linear Regression

Multilayer Perceptron (MLP): Going Forwards, Backwards, MLP in practice, Deriving back

Propagation SUPPORT Vector Machines: Optimal Separation, Kernels

UNIT-III

Some Basic Statistics: Averages, Variance and Covariance, The Gaussian, The Bias-Variance Tradeoff Bayesian learning: Introduction, Bayes theorem. Bayes Optimal Classifier, Naive Bayes Classifier.

Graphical Models: Bayesian networks, Approximate Inference, Making Bayesian Networks, Hidden Markov Models, The Forward Algorithm.

UNIT-IV

Evolutionary Learning: Genetic Algorithms, Genetic Operators, Genetic Programming **Ensemble learning:** Boosting, Bagging

Dimensionality Reduction: Linear Discriminant Analysis, Principal Component Analysis

UNIT-V

Clustering: Introduction, Similarity and Distance Measures, Outliers, Hierarchical Methods, Partitional Algorithms, Clustering Large Databases, Clustering with Categorical Attributes, Comparison

Suggested Readings:

1. Tom M. Mitchell, *Machine Learning*, Mc Graw Hill, 1997
2. Stephen Marsland, *Machine Learning - An Algorithmic Perspective*, CRC Press, 2009
3. Margaret H Dunham, *Data Mining*, Pearson Edition., 2003.
4. Galit Shmueli, Nitin R Patel, Peter C Bruce, *Data Mining for Business Intelligence*, Wiley India Edition, 2007
5. Rajjan Shinghal, *Pattern Recognition*, Oxford University Press, 2006.

**CLOUD COMPUTING
(PROFESSIONAL ELECTIVE-V)**

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	70 Marks
Sessonals	30 Marks
Credits	3

Course Objectives:

- To introduce basic concepts cloud computing and enabling technologies
- To learn about Auto-Scaling, capacity planning and load balancing in cloud
- To introduce security, privacy and compliance issues in clouds
- To introduce cloud management standards and programming models

Course Outcomes:

Student will be able to :

- Understand the architecture and concept of different cloud models: IaaS, PaaS, SaaS
- Create virtual machine images and deploy them on cloud
- Identify security and compliance issues in clouds.

UNIT- I

Introduction, Benefits and challenges, Cloud computing services, Resource Virtualization, Resource pooling sharing and provisioning

UNIT -II

Scaling in the Cloud, Capacity Planning , Load Balancing, File System and Storage,

UNIT-III

Multi-tenant Software, Data in Cloud , Database Technology, Content Delivery Network, Security Reference Model , Security Issues, Privacy and Compliance Issues

UNIT-IV

Portability and Interoperability Issues, Cloud Management and a Programming Model Case Study, Popular Cloud Services

UNIT- V

Enterprise architecture and SOA, Enterprise Software , Enterprise Custom Applications, Workflow and Business Processes, Enterprise Analytics and Search, Enterprise Cloud Computing Ecosystem.

Suggested Readings:

1. Cloud Computing - Sandeep Bhowmik, Cambridge University Press, 2017.
2. Enterprise Cloud Computing - Technology, Architecture, Applications by Gautam Shroff, Cambridge University Press, 2016.
3. Kai Hwang, Geoffrey C.Fox, Jack J.Dongarra, "*Distributed and Cloud Computing From Parallel Processing to the Internet of Things*", Elsevier, 2012.

STATISTICAL APPLICATIONS IN ENGINEERING
(Open Elective-III For EEE, MECH, CIVIL)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	70 Marks
Sessionals	30 Marks
Credits	3

Course Objectives :

- To Introduce the basics of Probability
- To provide the knowledge of various distributions like Normal Weibull, Log normal etc
- To provide the knowledge of tests of significance like F-test, t-test and Chi-square test

Course Outcomes:

Students will be able to :

- Explain what is meant by a statistic and its sampling distribution
- Apply various probability distributions to solve practical problems
- Estimate unknown parameters of populations and apply the tests of hypothesis
- Judge the independence of attributes of given data.

UNIT I : Basic Probability: Introduction- Random experiments and events, Mutually exclusive events, Probability of an event, Addition law of Probability, Conditional Probability, Independent events and Independent experiments, Baye's theorem .

Random Variables-One dimensional Random Variable, Discrete Random Variable, Continuous Random Variable.

UNIT II : Basic Statistics : Measures of Central tendency (Mean, Median, Mode), Moments, Skewness, Kurtosis.

Probability distributions, Binomial, Poisson-Evaluation of statistical parameters for these two distributions.

UNIT III : Continuous Distributions: Exponential, Gamma, Normal distribution, Wei-bull distribution, χ^2 - distribution, t-distribution, F-distribution, Lognormal distribution , Evaluation of statistical parameters for these distributions.

UNIT IV : Applied Statistics: Sampling, Standard Error, Test of significance for large samples, Null hypothesis, Alternate hypothesis, Critical region, Critical values, Level of significance, Confidence interval, Test of significance, Large sample test for single proportion, Difference of proportions, Single mean, Difference of means, Difference of standard deviations.

UNIT V : Test of Significance for Small samples : Tests of Significane for small samples Test for single mean, Difference of means, Test for ratio of variances (F- test, t-test), Chi-square test for goodness of fit and independence of attributes.

Suggested Readings:

1. R.K.Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.
2. S. Ross," A First Course in Probability" , Pearson Education India, 2002.
3. S.C. Gupta and V.K.Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand& Sons, 2014.
4. Peter V. O' Neil., Advanced Engineering Mathematics 7th Edition, Cengage Learning.
5. Kanti B. Dutta., Mathematical Methods of Science and Engineering Cengage Learning.
6. N.P . Bali and M. Goyal, " A text book of Engineering Mathematics", Laxmi Publications, 2010.
7. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons ,9th Edition, 2012.
8. P.N. Arora,Sumeet Arora, S. Arora, Comprehensive Statistical Methods, S.Chand & Company Ltd, 2008.

INDUSTRIAL AND FINANCIAL MANAGEMENT
(Open Elective-III)

Instruction	3 Periods per week
Duration of University Examination	3 Hours
Semester Examination	70 Marks
Sessionals	30 Marks
Credits	3

Course Objectives:

- To understand various types of organizational structures, manufacturing processes and importance of plant layout and the role of scheduling function in optimizing the utilization of resources
- To understand the importance of quality, inventory control and concepts like MRP I and MRP II
- To understand the nature of financial management and concepts like breakeven analysis, depreciation and replacement analysis

Course Outcomes:

Student will be able to :

- Understand the different phases of product life cycle, types of manufacturing systems, plant layout optimization problems and role of scheduling function in better utilization of resources
- Understand the Fundamental concepts of quality control, process control, material control and appreciate the importance of MRP-I and MRP –II.
- Know the different terminology used in financial management and understand the different techniques of capital budgeting and various types of costs involved in running an industrial organisation.

UNIT-I

Types of organizations, organizational structures. Designing Products, Services and Processes: New product design and development. Product life cycle: phasing multiple products. Manufacturing process Technology: Product, job shop, batch, assembly line and continuous process technology; flexible manufacturing systems. Design of Services, service process technology operations capacity; capacity planning decisions, measuring capacity; estimating future capacity needs.

UNIT-II

Locating production and services facilities, effects of location and costs and revenues, factor rating, simple median model (linear programming) Layout planning; process layout; product layout — Assembly lines; line balancing manufacturing cellular layout. Scheduling systems and aggregate planning for production and services; loading assignment algorithm; priority sequencing and other criteria.

UNIT-III

Quality planning and Control: basic concepts, definitions and history of quality control. Quality function and concept of quality cycle. Quality policy and objectives. Economics of quality and measurement of the cost of quality. Quality considerations in design.

Process control: machine and process capability analysis. Use of control charts and process engineering techniques for implementing the quality plan. Acceptance sampling: single, double and multiple sampling, operating characteristic Curve - calculation of producers risk and consumers risk.

UNIT-IV

Inventory control: deterministic and stochastic inventory models; variable demand; lead time, specific service level, perishable products and service.

Inventory control in application; concepts for the practitioners; saving money in inventory systems; ABC classifications. Inventory control procedures; Quantity - reorders versus periodic inventory systems; material requirement planning (MRP); MRP as a scheduling and ordering system; MRP system components; MRP computational procedure; Detailed capacity planning; MRP - limitation and advantages; Manufacturing Resources Planning (MRP-II).

UNIT-V

Elements of cost, overheads, breakeven analysis, depreciation, replacement analysis. Nature of financial management-time value of money, techniques of capital budgeting and method, cost of capital, financial leverage.

Suggested Readings:

1. Buifa and Sarin, "Production and operations management" - Wiley Publications.
2. I.M. Pandey, "Elements of Financial Management" Vikas Publications, New Delhi, 1994.
3. James C. Van Home & John, M. Wachowicz, Jr., "Fundamentals of Financial Management", Pearson Education Asia, 11th ed. 2001.

3D PRINTING TECHNOLOGY**(Open Elective-III)**

Instruction	3 Periods per week
Duration of University Examination	3 Hours
Semester Examination	70 Marks
Sessionals	30 Marks
Credits	3

Course Objectives:

- To understand the fundamental concepts of 3D Printing, its advantages and limitations.
- To classify various types of 3D Printing Processes and know their working principle, advantages, limitations etc.
- To have a holistic view of various applications of these technologies in relevant fields such as Mechanical, Bio-medical, Aerospace, electronics etc.

Course Outcomes:

Student will be able to :

- Understand the significance of 3D Printing and compare it with conventional manufacturing process.
- Classify various types of 3D PRINTING processes, rapid tooling and understand the working principle and applications of them with case studies.
- Know the various types of errors that creep up while saving the .STL file format and also will be able to appreciate the features of various types of software's used in 3D Printing.
- Appreciate the diversified applications of 3D PRINTING in various fields like biomedical, aerospace, automobile, defence, architecture etc.

UNIT-I

Introduction: Prototyping fund3D Printingentals, Historical development, Fund3D Printingentals of 3D PRINTING, Advantages and Limitations of 3D PRINTING , Commonly used Terms, Classification of 3D PRINTING process, 3D PRINTING Process Chain: Fund3D Printingental Automated Processes, Process Chain.

UNIT-II

Liquid-based 3D Printing Systems: Stereo lithography Apparatus (SLA): Models and specifications, Process, working principle, photopolymers, photo polymerization, Layering technology, laser and laser scanning, Applications, Advantages and Disadvantages, Case studies. Solid ground curing (SGC): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies

Solid-based 3D Printing Systems: L3D Printinginated Object Manufacturing (LOM): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies. Fused Deposition Modeling (FDM): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies.

UNIT-III

Powder Based 3D Printing Systems: Selective laser sintering (SLS): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies. Three dimensional Printing (3DP): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies. Laser Engineered Net Shaping (LENS), Electron Beam 3D Printing Melting.

UNIT-IV

3D Printing Data Formats: STL Format, STL File Problems, Consequence of Building Valid and Invalid Tessellated Models, STL file Repairs: Generic Solution, Other Translators, Newly Proposed Formats. Rapid Prototyping Software's: Features of various RP software's like Magics, Mimics, Solid View, View Expert, 3 D View, Velocity 2, Rhino, STL View 3 Data Expert and 3 D doctor.

UNIT-V

Applications of 3D Printing : Application in Design, Application in Engineering, Analysis and Planning, Aerospace Industry, Automotive Industry, Jewellery Industry, Coin Industry, GIS application, Arts and Architecture. RP Medical and Bioengineering Applications: Planning and simulation of complex surgery, Customized Implants & Prostheses, Design and Production of Medical Devices, Forensic Science and Anthropology, Visualization of Biomolecules. Printed electronics, Biopolymers, Packaging

Suggested Readings:

1. Chua C.K., Leong K.F. and LIM C.S, Rapid prototyping; Principles and Applications, World Scientific Publications , Third Edition, 2010.
2. D.T. Pham, 3D Printing and S.S. Dimov, Rapid Manufacturing, Springer, 2001.
3. Terry Wohlers, Wohlers Report 2000, Wohlers Associates, 2000.
4. Paul F. Jacobs, Rapid Prototyping & Manufacturing ASME Press, 1996

PROJECT WORK – II

Instruction	3 Periods per week
Duration of University Examination	Viva Voce
University Examination	100 Marks
Sessionals	50 Marks
Credits	8

Course Objectives :

- To enhance practical and professional skills.
- To familiarize tools and techniques of systematic Literature survey and documentation
- To expose the students to industry practices and team work.
- To encourage students to work with innovative and entrepreneurial ideas

Course Outcomes :

Student will able to :

- Demonstrate the ability to synthesize and apply the knowledge and skills acquired in the academic program to real-world problems
- Evaluate different solutions based on economic and technical feasibility
- Effectively plan a project and confidently perform all aspects of project management
- Demonstrate effective written and oral communication skills

The aim of Project work -II is to implement and evaluate the proposal made as part of Project Work - I. Students can also be encouraged to do full time internship as part of project work-II based on the common guidelines for all the departments . The students placed in internships need to write the new proposal in consultation with industry coordinator and project guide within two weeks from the commencement of instruction.

The department will appoint a project coordinator who will coordinate the following:

Re-grouping of students - deletion of inters hip candidates from groups made as part of project work-I

Re-Allotment of internship students to project guides

Project monitoring at regular intervals

All re-grouping/re-allotment has to be completed by the 1st week of VIIIth semester so that students get sufficient time for completion of the project.

All projects(internship and departmental) will be monitored at least twice in a semester through student presentation for the award of sessional marks. Sessional marks are awarded by a monitoring committee comprising of faculty members as well as by the supervisor. The first review of projects for

25 marks can be conducted after completion of five weeks. The second review for another 25 marks can be conducted after 12 weeks of instruction.

Common norms will be established for the final documentation of the project report by the respective departments. The students are required to submit draft copies of their project report within one week after completion of instruction.

Note: Three periods of contact load will be assigned to each project guide.

GENDER SENSITIZATION**(Mandatory Course)**

Instruction	3 Periods per week
Sessionals	50 Marks
Credits	3

Course Objectives:

- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women

Course Outcomes:

Students will :

- Be able to develop a better understanding of important issues related to gender in contemporary India.
- Be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender through discussion of materials derived from research, facts, everyday life, literature and film.
- Get a finer grasp of how gender discrimination works in our society and how to counter it.
- Develop a sense of appreciation of women in all walks of life.

UNIT-I

UNDERSTANDING GENDER: Why Should We Study It? Socialization: Making Women, Making Men: Introduction-Preparing for Womanhood-Growing up male-First lessons in casteDifferent Masculinities; Just Relationships: Being Together as Equals: Mary Kom and OnlerLove and acid just do not mix-Love Letters-Mothers and Fathers-Further reading: Rosa Parks-The brave heart.

UNIT-II

GENDER AND BIOLOGY: Missing Women: Sex selection and Its Consequences – Declining sex ratio. Demographic Consequences; Gender Spectrum: Beyond the Binary – Two or many – Struggles with discrimination; Our Bodies, Our Health.

UNIT-III

GENDER AND LABOUR: Housework: the Invisible Labour: “My mother doesn’t work”- Share the Load”; Women's Work; Its Politics and Economics: Fact and fiction-Unrecognized and unaccounted work- Wages and conditions of work.

UNIT-IV

ISSUES OF VIOLENCE: Sexual Harassment: Say No! : Sexual harassment – not eve-teasingCoping with everyday harassment-“Chupulu”; Domestic Violence: Speaking Out: Is home a safe place? When women unite-Rebuilding lives-New forums for justice; Thinking about Sexual Violence: Blaming the victim – “I fought for my life”. The caste face of violence.

UNIT – V

GENDER STUDIES: Knowledge - Through the Lens of Gender - Point of view - Gender and the structure of knowledge – Unacknowledged women artists of Telangana: Whose History? Questions for Historians and Others: Reclaiming a past-Writing other histories-Missing pages from modern Telangana history.

Suggested Readings:

1. A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu, “Towards a World of Equals: A Bilingual Text book on Gender” Telugu Akademi, Hyderabad, 1st Edition, 2015.
2. [www.halftthesky.cgg.gov.in](http://www.halfthesky.cgg.gov.in).