



BRAINWARE UNIVERSITY
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Bachelor of Technology in Computer Science & Engineering

Mandatory Induction Program (Duration: 3 weeks)

- Physical activity
- Creative Arts
- Universal Human Values
- Literary
- Proficiency Modules
- Lectures by Eminent People
- Visits to local Areas
- Familiarization to Dept./Branch & Innovations

Different components of Mandatory Induction Program will be implemented as per the guidelines of AICTE.

SEMESTER – VIII

Course Code	Course Name	L - T - P	Credits	Total Marks
PEC801	Elective VI A. Security and Privacy of Data B. Modelling Internet Attack	3 - 0 - 0	3	100
OEC-801	Open Elective III A. Research Methodology B. Control System C. MOOC Courses	3 - 0 - 0	3	100
OEC-802	Open Elective IV A. Fiber optic Communication B. Satellite Communication C. Organizational Behavior	3 - 0 - 0	3	100
PROJ-CS881	Project II	0 - 0 - 8	4	100
CS882	Grand Viva	0 - 0 - 0	3	100
	Total		16	500



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Course Name: Security and Privacy of Data

Course Code: PEC801A

Contact: 3L

Credits: 3

No. of Lectures: 36

Module 1 **[6L]**

Secure Isolation of Physical & Logical Infrastructure: Objectives, Isolation, Readings Compute, Network and Storage, Common attack vectors and threats, Secure Isolation Strategies

Module 2 **[5L]**

Multitenancy, Virtualization strategies: Inter-tenant network segmentation strategies, Storage isolation strategies

Module 3 **[7L]**

Data Protection for Cloud Infrastructure and Services: Cloud based Information Life Cycle, Data protection for Confidentiality and Integrity, Common attack vectors and threats, Encryption, Data Redaction, Tokenization, Obfuscation, PKI and Key Management, Assuring data deletion, Data retention, deletion and archiving procedures for tenant data, Data Protection Strategies

Module 4 **[9L]**

Enforcing Access Control for Cloud Infrastructure based Services: Access control requirements for Cloud infrastructure, Common attack vectors and threats, Enforcing Access Control Strategies Compute, Network and Storage, Authentication and Authorization, Roles-based Access Control, Multi-factor authentication, Host, storage and network access control options, OS Hardening and minimization, securing remote access, Verified and measured boot Readings, Firewalls, IDS, IPS and honeypots

Module 5 **[9L]**

Monitoring, Auditing and Management: Proactive activity monitoring, Incident Response, Monitoring for unauthorized access, malicious traffic, abuse of system privileges, intrusion detection, events and alerts, Auditing – Record generation, Reporting and Management, Tamper-proofing audit logs, Quality of Services, Secure Management, User management, Identity management, Security Information and Event Management

Text Books

1. John R. Vacca, "Cloud Computing Security", CRC Press 2016.
2. Shahed Latif, Subra Kumaraswamy, Tim Mather, "Cloud Security and Privacy" O'Reilly 2009

Reference Books

1. Pearson, Siani, Yee, George (Eds.) "Privacy and Security for Cloud Computing" Springer 2013
- 2., "Cloud Management and Security" Wiley



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Course Name: Modeling Internet Attack

Course Code: PEC801B

Contact: 3L

Credits: 3

No. of Lectures: 36

Module 1 **[7L]**

Introduction: Network Security Model, Types of Attack, Overview of Most Common Security Issues, Linux Security Overview, Password Attack, Dictionary Attack - Thwarting dictionary attack, IP Tables, Using iptables to thwart dictionary attack, Password Cracking -

Module 2 **[5L]**

Hashing: Overview, Lookup tables, Introduction to Rainbow Table, Modern Linux Password Hashing Scheme

Module 3 **[6L]**

Malware: Virus Infection Techniques, Anatomy of a Virus, Virus Propagation, Classification of Viruses based on Infection Techniques, Memory Strategies etc., Defense Against Viruses, Worms, (Case Study Morris Worm & Conficker worm), Malware analysis, Static and Dynamic Malware analysis

Module 4 **[9L]**

Application Vulnerabilities: Smashing the Stack for Fun and Profit, Format string attack, SQL Injection, XSS, Authentication- Overview of Authentication, Need for Key Distribution Centers, Authentication & Key Distribution Protocols - Needham Schroeder, Kerberos, Random Number Generation - Pseudo and True random number generators, Cryptographically Secure PRNGs – The Blum BlumShub Generator, PRNG – Linear Congruential Generators, Entropy - software and hardware, Message Authentication Codes

Module 5 **[9L]**

TCP/IP Vulnerabilities: TCP Overview - Connection Setup/Teardown, Packet Sniffing, Detecting Sniffers on your network, IP Spoofing, ARP Poisoning, UDP Hijacking, Fragmentation Attack- Ping of Death, Evasion & Denial of Service, UDP Hijacking, TCP Spoofing, TCP Hijacking - Mitnick attack, Joncheray attack, SYN Flood Attack, Denial of Service Attack, Port Scanning Techniques DNS – DNS Zones, Zone Transfer, BIND, DNS Spoofing, DNS Cache Poisoning, IPSec – Introduction, Tunnel & Transfer Modes, IPSec Authentication Header, Encapsulating Security Header and Payload, IPSec Key Exchange

Text Books

1. Charlie Kaufman, Radia Perlman and Mike Speciner, Network Security: PRIVATE Communication in a PUBLIC World, Second Edition, Prentice Hall, 2002.
2. Eric Rescoria, "SSL and TLS : Designing and Building Secure Systems", Addison-Wesley Professional, 2000.

Reference Books

1. Stephen Kent, Charles Lynn, Joanne Mikkelsen, and Karen Seo, Secure Border Gateway Protocol (S-BGP)-Real World Performance and Deployment Issues, NDSS, 2000.
2. Proctor Paul, The Practical Intrusion Detection Handbook, Third Edition, Prentice-Hall, Englewood Cliffs



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Course Name: Research Methodology

Course Code: OEC 801A

Contact: 3L

Credits: 3

Allotted Hours: 40

Objective:

At the end of this course, the students should be able to:

- Understand some basic concepts of research and its methodologies and Identify appropriate research topics
- Select and define appropriate research problem and parameters
- Prepare a project proposal (to undertake a project)
- Organize and conduct research (advanced project) in a more appropriate manner
- Write a research report and thesis with a research proposal (grants)

Module - I: Foundations of Research

[6L]

Meaning, Objectives, Motivation, Utility. Concept of theory, empiricism, deductive and inductive theory. Characteristics of scientific method Understanding the language of research Concept, Construct, Definition, Variable Research Process

Module - II: Problem foundation

[6L]

Problem definition and foundation Research question, investigation Question, Measurement Issues, Hypothesis, Qualities of a good Hypothesis, Null Hypothesis & Alternative Hypothesis. Hypothesis Testing Logic & Importance.

Module - III: Research design

[6L]

Concept and Importance in Research – Features of a good research design, Exploratory Research Design – concept, types and uses, Descriptive Research Designs – concept, types and uses. Experimental Design: Concept of Independent & Dependent variables.

Module- IV: Qualitative and Quantitative Research

[4L]

Qualitative research – Quantitative research – Concept of measurement, causality, generalization, replication. Merging the two approaches.

Module – V: Sampling

6L]

Concepts of Statistical Population, Sample, Sampling Frame, Sampling Error, Sample Size, Non Response. Characteristics of a good sample. Probability Sample – Simple Random Sample, Systematic Sample, Stratified Random Sample & Multi-stage sampling. Determining size of the sample Practical considerations in sampling and sample size.

Module - VI: Paper writing methodology

[6L]

Layout of a Research Paper, Journals in Computer Science, Impact factor of Journals, When and where to publish? Ethical issues related to publishing, Plagiarism and Self-Plagiarism, Use of Encyclopedias, Research Guides, Handbook etc., Academic Databases for Computer Science Discipline.

Module - VII: IT software tools in research

[2L]

Methods to search required information effectively, Reference Management Software like Zotero/Mendeley, Software for paper formatting like LaTeX/MS Office, Software for detection of Plagiarism

Suggested books:

1. Business Research Methods – Alan Bryman & Emma Bell, Oxford University Press.
2. Business Research Methods – Donald Cooper & Pamela Schindler, TMGH, 9th edition
3. Research Methodology – C.R.Kothari, New Age International.



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Name of the Course: Control System

Course Code: OEC801B

Credit: 3

Contact: 3L

Hours: 40

Module 1: Introduction

[8]

Concept of feedback and Automatic Control, Electrical analogy of physical system. Transfer Function, Block diagram representation of Control Systems, Block Diagram Algebra, Signal Flow Graph, Mason's gain formula.

Module 2: Control system components

[10]

Error sensing devices, potentiometer, synchros, D.C. and A.C. tachometers, servomotors, modulators and demodulators. Transient analysis of closed loop systems. Transient errors and their minimization, steady state error and their minimization, error coefficients, P, PI and P-I-D type controllers.

Module 3: Stability of Control Systems

[10]

R-H criteria, Nyquist criteria, Bode Plots. Polar Plots, Nichols chart, measures of relative stability. Construction of Root Loci for simple system, effects of the movement of poles and zeros.

Module 4:

[8]

Improvement of system performance through compensation. Case studies on control voltage, current, frequency, position and speed. Control of liquid level, density, flow & temperature.

Texts & References:

1. Kuo B.C. :Automatic Control System, PHI.
2. Das Gupta S : Control System Theory ; Khanna Pub.
3. Nagrath I J & Gopal M : Control Systems Engineering, New Age International Pub.
4. Ogata K : Modern Control Engg. PHI
5. Dorf R C & Bishop R.H.: Modern Control System ; Addison Wesley
6. Bolton: Industrial Control & Instrumentation, Orient Longman
7. Nakra: Theory & Applications of Automatic Control, New Age International
8. Gopal: Modern Control System Theory, New Age International
9. Gopal: Digital Control Engineering, New Age International
10. Sinha: Control Systems, New Age International



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Course Name: Fiber Optic Communications

Course Code: OEC-802A

Contact: 3L

Credits: 3

Number of Lectures: 36

Module I: [12L]

Introduction: Introduction to vector nature of light, propagation of light, propagation of light in a cylindrical dielectric rod, Ray model, wave model, Different types of optical fibers, Modal analysis of a step index fiber, Signal degradation on optical fiber due to dispersion and attenuation. Fabrication of fibers and measurement techniques like OTDR

Module II: [8L]

Optical sources:- LEDs and Lasers, Photo-detectors - pin-diodes, APDs, detector responsivity, noise, optical receivers, Optical link design - BER calculation, quantum limit, power penalties

Module III: [2L]

Optical switches: coupled mode analysis of directional couplers, electro-optic switches

Module IV: [2L]

Optical amplifiers: EDFA, Raman amplifier

Module V: [8L]

Optical Network: WDM and DWDM systems, Principles of WDM networks, Nonlinear effects in fiber optic links, Concept of self-phase modulation, group velocity dispersion and soliton based communication

Module VI: [4L]

Holey Fiber, Photonic Crystal Fiber and Fiber Bragg Grating: Construction and applications

Text/Reference Books:

1. J. Keiser, Fibre Optic communication, McGraw-Hill, 5th Ed. 2013 (Indian Edition)
2. T. Tamir, Integrated optics, (Topics in Applied Physics Vol.7), Springer-Verlag, 1975
3. J. Gower, Optical communication systems, Prentice Hall India, 1987
4. S.E. Miller and A.G. Chynoweth, eds., Optical fibres telecommunications, Academic Press, 1979
5. G. Agrawal, Nonlinear fibre optics, Academic Press, 2nd Ed. 1994
6. G. Agrawal, Fiber optic Communication Systems, John Wiley and sons, New York, 1997
7. F.C. Allard, Fiber Optics Handbook for engineers and scientists, McGraw Hill, New York (1990)



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Course Name: Satellite Communication

Course Code: OEC-802B

Contact: 3L

Credits: 3

Number of Lectures: 36

Module I

[4L]

Introduction to Satellite Communication: Principles and architecture of satellite Communication, Brief history of Satellite systems, advantages, disadvantages, applications and frequency bands used for satellite communication

Module II

[4L]

Orbital Mechanics: Orbital equations, Kepler's laws, Apogee and Perigee for an elliptical orbit, evaluation of velocity, orbital period, angular velocity etc. of a satellite, concepts of Solar day and Sidereal day

Module III

[4L]

Satellite sub-systems: Study of Architecture and Roles of various sub-systems of a satellite system such as Telemetry, tracking, command and monitoring (TTC & M), Attitude and orbit control system (AOCS), Communication sub-system, power sub-systems etc

Module IV

[10L]

Typical Phenomena in Satellite Communication: Solar Eclipse on satellite, its effects, remedies for Eclipse, Sun Transit Outage phenomena, its effects and remedies, Doppler frequency shift phenomena and expression for Doppler shift. Satellite link budget, Flux density and received signal power equations, Calculation of System noise temperature for satellite receiver, noise power calculation, Drafting of satellite link budget and C/N ratio calculations in clear air and rainy conditions. Modulation and Multiple Access Schemes: Various modulation schemes used in satellite communication, Meaning of Multiple Access, Multiple access schemes based on time, frequency, and code sharing namely TDMA, FDMA and CDMA

Module V

[4L]

Subsystems and satellite link design: AOCS, TT&C, power system, spacecraft antenna, transponder, Friis transmission equation, G/T ratio of earth station.

Module VI

[10L]

Remote Sensing: Basic of remote sensing, Electromagnetic Radiation principles, Atmospheric window, Indian satellite sensing satellite system, Active, Passive, ground based and space based remote sensing, Spatial, spectral, Radiometric and temporal resolution, satellite sensors, detectors and scanning technique, FOV and error sources, Image analysis and Interpretation weather RADAR, LIDAR, acoustic sounding systems, TRMM, AURA-MLS, Megha Tropiques Altimeter, Scatterometer, Radiometer. 3. Ground based and radio occultation techniques, spectral response of water, Sea surface temperature, wind speed, colour monitor, clouds and aerosols, water vapor, convective system, Trace gases.

Text /Reference Books:

1. Timothy Pratt Charles W. Bostian, Jeremy E. Allnutt: Satellite Communications: Wiley India. 2nd edition 2002
2. Tri T. Ha: Digital Satellite Communications: Tata McGraw Hill, 2009
3. Dennis Roddy: Satellite Communication: 4th Edition, McGraw Hill, 2009



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Course Name: ORGANIZATIONAL BEHAVIOUR

Course Code: OEC-802C

Contact: 3L

Credits: 3

Allotted Hrs:30

Unit I: Forms of Business Ownership

[5L]

Basic forms of Business Ownership; Special forms of ownership: Franchising, Licensing, Leasing; Choosing a form of Business ownership; Corporate Expansion: mergers and acquisitions, diversification, forward and backward integration, joint ventures, Strategic alliance.

Unit II: School of Management Thought

[5L]

Classification of School of Management Thought, Classical School of Management, Neo – Classical School of Management, Modern School of Management

Unit III: Overview of Planning

[5L]

Overview of Planning: Types of Plans & The planning process; Decision making Process, Types and Techniques. Control: Function, Process and types of Control; Principles of organizing: Common organizational structures; Delegation & Decentralization: Factors affecting the extent of decentralization, Process and Principles of delegation.

Unit IV: Importance of Organizational Behavior

[5L]

Importance of Organizational Behavior. Perception and Attribution: Concept, Nature, Process, Personality: Personality: Learning: Concept and Theories of Learning, reinforcement

Unit V: Theory of Motivation

[5L]

Human Factors in Managing Motivation, McGregor's Theory X and Theory Y, Maslow's Hierarchy of Need Theory, Herzberg's Hygiene Theory, McClelland's Need Theory

Unit VI: Groups & Teams

[5L]

Groups and Teams: Definition, Difference between Groups and teams; Stages of Group Development, Group Cohesiveness, Types of teams. Analysis of Interpersonal Relationship: Transactional Analysis, Johari Window

Unit VII: Organizational Power & Politics

[6L]

Nature of organisational politics. Conflict: Concept, Sources, Types, Stages of conflict, Management of conflict, Organisational Change: Concept, Resistance to change, Managing resistance to change, Implementing Change, Kurt Lewin Theory of Change. Managing Stress: Insights from Indian ethos

Suggested Readings:

1. Greenberg Jerald and Baron Robert A.: Behaviour in Organisations: Understanding and Managing The Human Side of Work, Prentice Hall of India.
2. Kaul Vijay Kumar, Business Organisation & Management - Text and Cases, Pearson.
3. Kaul, Vijay Kumar, Management- Text & Cases, Vikas Publication.
4. Kavita Singh: Organisational Behaviour, Vikas Publication.
5. Koontz & Heinz Weihrich: Essential of Management, McGraw Hill.
6. Luthans Fred: Organisational Behaviour, Tata McGraw Hill.
7. Mc Shane L. Steven, Glinow Mary Ann Von & Sharma Radha R. – Organisational Behaviour; Tata McGraw Hill.
8. Newstrom John W.: Organisational Behaviour, Tata McGraw Hill.



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9. Richard L. Daft: Principles of Management, Cengage Learning India.
10. Robbins Stephen P: Organisational Behaviour, Pearson.
11. Stephen P. Robbins & Mary Coulter: Management, Pearson.
12. Stoner & Wankel: Management, Prentice Hall of India.
13. Y.K. Bhushan: Fundamentals of Business Organisation & Management, Sultan Chand & Sons.

N. B. A student will be eligible to get Under Graduate degree with Honours or additional Minor Engineering, if he/she completes an additional 20 credits. These could be acquired through MOOCs.

The said course is however optional and the student is entitled to acquire such credits during the entire period of study.