Curriculum & Syllabus

M. Tech in IT (Courseware Engineering)

Submitted by

School of Education Technology

Jadavpur University

Kolkata

Curriculum for the 4-Semester M. Tech in IT (Courseware Engineering) programme

First Year			First Semester							
Sl. No		Code	Subject Name	Contact Periods / Week			Credit	Marks		
				L	T	P		Theory	Sessio nal	
1.	Program Core – I	PG/CWE/PC/T/111	Machine Learning Techniques for Education Technology	3			3	100	
2.	Program Core – II	PG/CWE/PC/T/112	Object Oriented Programming using Python	3			3	100	
3.	Program Elective - I	PG/MMT/PE/T/113/A	Multimedia Technology	3			3	100	
		PG/CWE/PE/T/113/B	Applied Probability & Statistics						
		PG/CWE/PE/T/113/C	Generative Artificial Intelligence						
4.	Program Elective – II	PG/MMT/PE/T/114/A	Human Computer Interaction	3			3	100	
		PG/CWE/PE/T/114/B	Augmented & Virtual Reality						
		PG/MMT/PE/T/114/C	Computer Vision						
5	Program Elective – III	PG/CWE/PE/T/115/A	Web Technology	3			3	100	
		PG/CWE/PE/T/115/B	IoT & Cloud Computing						
		PG/CWE/PE/T/115/C	Networking & Internet Technologies						
6		PG/FET/RM/T/116	Research Methodology, Ethics & IPR	2			2	100	
7	Audit Course	PG/MMT/AC/T/117	Technical Report Writing and Presentation	2			0		
8	Laboratory1	PG/CWE/P/111	AI enabled Multimedia Laboratory			4	2		100
9	Sessional	PG/CWE/P/112	Seminar			4	2		100
			Total	18		8	21	600	200

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SI. No		Code	Subject Name	Contact Periods / Week			Credit	Marks	
	First Year		**Second Semester**						
				L	T	P		Theory	Sessional
1.	Program Core – III	PG/CWE/PC/T/121	Deep Learning	3			3	100	
2.	Program Core – IV	PG/CWE/PC/T/122	Multimedia Design Principles and Authoring	3			3	100	
3.	Program Elective – IV	PG/CWE/PE/T/123/A	Educational Management and Quality Assurance	3			3	100	
		PG/CWE/PE/T/123/B	Natural Language Processing and its Applications in Education						
4.	Program Elective – V	PG/CWE/PE/T/124/A	Educational Data Mining	3			3	100	
		PG/CWE/PE/T/124/B	Soft Computing Techniques						
5	Open Elective	PG/CWE/OE/T/125	Information Security and Privacy	3			3	100	
6	Laboratory2	PG/CWE/P/121	Smart CBT Design Lab			4	2		100
7	Mini Project & Seminar	PG/CWE/P/122	Term Paper			6	4		200
			Total	**15**		**10**	**21**	**500**	**300**

SI. No	Code	Subject Name	Credit	Marks
	Second Year	**Third Semester**		
1.	PG/CWE/P/211	Dissertation/Internship-I	16	200
		Total	**16**	**200**

Second Year		Fourth Semester		
Sl. No	Code	Subject Name	Credit	Marks
1.	PG/CWE/P/221	Dissertation/Internship-II	18	400
		Total	**18**	**400**

Program Outcomes (POs)

PO1: An ability to independently carry out research /investigation and development work to solve practical problems.

PO2: An ability to write and present a substantial technical report/document.

PO3: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

Program Specific Objectives (PSOs)

At the end of the program, a student should be able to

PSO1: Incorporate modern programming frameworks, emerging technologies such as Artificial Intelligence (AI), Machine Learning (ML), into courseware systems for enhanced learning experiences.

PSO2: Develop interactive and adaptive courseware systems using multimedia technologies, Augmented Reality, Virtual Reality into courseware systems for enhanced learning experiences.

PSO3: Create scalable, technology-enhanced learning solutions, pedagogically effective digital content, assessment tools, and evaluation frameworks to meet diverse educational needs.

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Syllabus for PG Course – M. Tech in IT (Courseware Engineering)

Course code	PG/CWE/PC/T/111
Category	Program Core
Course title	MACHINE LEARNING TECHNIQUES FOR EDUCATION TECHNOLOGY
Scheme and Credits	L-T-P: 3-0-0; Credits: 3;
Pre-requisites (if any)	
Syllabus:	

Unit 1: Introduction of Education Technology: [Definition and Objectives of Education Technology(Macro level, Micro level), Individualized Instruction, Aspects of Individualization]; Model of Learning: [Six views of learning, Taxonomies of Educational Objectives-Benjamin Bloom and his collaborators like Krathwohl's model, Thomas Gilbert model with three patterns of behaviour, Piaget model based on Cognitive Development Concepts, Gagne's Hierarchical model of eight (8) principal categories of learning outcomes].

Unit 2: Modes of Teaching: [Information Processing Models, Social Interaction Models, Personal Models of Teaching, Behaviour Modification Models, Well Practiced Teaching Methods]; Knowledge, Skill and Attitude: [A Classification Schema for Skilled Performance, Domains of Performance, Reproductive/Productive scale, Distinction between factual knowledge and conceptual knowledge, Structuring of Knowledge in The Mind]; Educational Aids: [General Characteristics of Educational Aids, Training aspects of instructors, Different aspects of modern technology usage, Scientific Evaluative system]

Unit 3: Machine Learning in Education: [Motivation and Role of Machine Learning in Education Technology and Research, Paradigms of Learning (Supervised, Unsupervised, and Semi-supervised]; Introduction to Other Learning Paradigms: [Deep Learning, Transfer Learning, Reinforcement Learning, Active Learning), Problem formulations using classification and regression]

Unit 4: Classification algorithms: [Linear Classification; Linear Regression; Non-linear Transformation; Logistic Regression, Decision tree: Decision Tree Representation and Learning Algorithm (ID3), Attribute Selection using Entropy Measures and Gains, Hypotheses Space and Inductive bias, Overfitting, Generalization and Occam's Razor]; Support Vector Machine (SVM): [Decision Boundary and Support Vector: Optimization and Primal-Dual Problem]; Extension to SVM: [Soft Margin and Non-linear Decision Boundary, Kernel Functions and Radial Basis Functions]

Unit 5: Unsupervised learning: Introduction to clustering, Types of Clustering: Partitional Clustering and Hierarchical Clustering; K-means clustering; Naïve Bayes classifier; Cluster Types, Attributes and Salient Features, Density-based Clustering Algorithms. Inter and Intra Clustering Similarity, Cohesion and Separation.

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Unit 6: Quantitative Methods in Education Psychology: [Overview of Statistical Analysis, Measures of Central Tendency, Measures of Variability, Correlation, Data Collection, Hypothesis Testing, Regression, Result Presentation]; Classifier / Hypothesis Evaluation Measures: [Accuracy, Precision, Recall and F-Measures. Confusion matrix Scores, Sampling, and Bootstrapping Evaluation Measures. Hypotheses Testing and Cross-validation]

Unit 7: Instruction Design: [Levels of decision-making with instruction designing, Instruction control, Programmed learning/instruction, Prescriptive and Student Controlled Systems, IT Enabled Intelligent Systems, Knowledge and Skill-Comparison of Expositive and Experiential strategies, Tactics for knowledge teaching and strategy implementation, Strategies and tactics for skill-teaching, Other Tactics]; Organizing Courseware: General Guidelines, Subject Classification, Pedagogical analysis (Aims, Objectives, Benefits, Assumptions, Scope, Functions, Sources, Limitations, Evaluations, Management, Socio-Academic relevance];

Unit 8: Ensemble Learning: Bagging and Boosting, Adaboost and Random Forest.

Unit 9: Case Studies: Relevant to Education data and research

Reference Books:

1. Foundations of Educational Technology: Integrative Approaches and Interdisciplinary Perspectives- J. Michael Spector, Routledge Publication, 2015.
2. Learning and Teaching with Technology: Principles and Practices- Som Naidu, Routledge Publication, 2003.
3. Essentials of Educational Technology-Innovations in Teaching-Learning J.C Aggarwal, Vikas Publishing, 2014.
4. Marc Peter Deisenroth, A. Aldo Faisal, Cheng Soon Ong, Mathematics for Machine Learning, Cambridge University Press (23 April 2020)
5. Tom M. Mitchell- Machine Learning - McGraw Hill Education, International Edition
6. Aurélien Géron Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, O'Reilly Media, Inc. 2nd Edition Reference Books:
7. Ian Goodfellow, Yoshoua Bengio, and Aaron Courville Deep Learning MIT Press Ltd, Illustrated edition
8. Trevor Hastie, Robert Tibshirani, and Jerome Friedman - The Elements of Statistical Learning: Data Mining, Inference, and Prediction - Springer, 2nd edition

Resources:

https://cse.iitkgp.ac.in/~pabitra/course/ml/ml.html

https://cse.iitkgp.ac.in/~aritrah/course/theory/ML/Spring2023/

Content Delivery Method

- Classroom lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)

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• Discussion (D7)		

Course Outcomes:

After completing the course, the students will be able to

CO1	Determine the broad strategies and structure of education and explain the basic application and characteristics of Machine Learning techniques in education.
CO2	Apply various supervised learning methods to evaluate an appropriate ML model.
CO3	Create probabilistic and unsupervised learning models for handling unknown patterns.
CO4	Interpret and analyze results by reasoning about different educational datasets using various ML techniques.
CO5	Demonstrate the application of Machine Learning models in the field of education.

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1:	1	1	3	3	-	1
CO2:	1	1	3	3	-	1
CO3:	1	1	3	3	-	1
CO4:	1	1	3	3	-	1
CO5:	1	1	3	3	-	1

Course code	PG/CWE/PC/T/112
Category	Program Core
Course title	OBJECT-ORIENTED PROGRAMMING USING PYTHON
Scheme and Credits	L-T-P: 3-0-0; Credits: 3;
Pre-requisites (if any)	
Syllabus:	
Unit 1: Data types and control structures -- Operators (unary, arithmetic, etc.) -- Data types, variables, expressions, and statements -- Assignment statements -- Strings and string	

operations -- Control Structures: loops and decision

Unit 2: Modularization and Classes -- Standard modules -- Packages -- Defining Classes -- Defining functions – Functions and arguments (signature)

Unit 3: Exceptions and data structures -- Data Structures (array, List, Dictionary) -- Error processing -- Exception Raising and Handling

Unit 4: Object-oriented design -- Programming types -- Object Oriented Programming -- Object Oriented Design -- Inheritance and Polymorphism

Unit 5: Introduction to NumPy: Basics of NumPy Arrays, Computation on NumPy Arrays: Universal Functions, Aggregations. Working with NumPy: Broadcasting, Comparisons, Masks, and Boolean Logic, Fancy Indexing, Sorting Arrays, Structured Data.

Unit 6: Data Manipulation with Pandas: Introducing Pandas Objects, Data Indexing and Selection, Operating on Data in Pandas, Handling Missing Data. Working with Datasets using Pandas: Hierarchical Indexing, Combining Datasets: Concat and Append, Merge and Join, Aggregation and Grouping, Pivot Tables, Vectorized String Operations, Working with Time Series, High-Performance Pandas -eval() and query().

Unit 7: Visualization with Matplotlib: General MatplotLib, Simple Line Plots, Simple Scatter Plots, Density and Contour Plots, Histograms, Binnings, and Density, Customizing Plot Legends, Customizing Colorbars, Text and Annotation, Three-Dimensional Plotting in Matplotlib, Geographic Data with Basemap, Visualization with Seaborn.

Reference Books:

1. Python Data Science Handbook: Essential Tools for Working with Data, by Jake VanderPlas, O'reilly Media, 2017.
2. Data Science From Scratch: First Principles with Python by Joel Grus, Second Edition, 2019, O'reilly Media.
3. Python for Data Science by Mohd. Abdul Hameed, May 2021, Wiley.
4. Python for Data Science: A Crash Course for Data Science and Analysis, Python Machine Learning and Big Data by Computer Science Academy.
5. Python for Data Science: The Ultimate Step-by-Step Guide to Python Programming by Daniel, March 2021, O'Reilly.

Content Delivery Method

- Classroom lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

After completing the course, the students will be able to

CO1	Understand the programming basics (operations, control structures, data types, etc.) Readily use the Python programming language.

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CO2	Apply various data types and control structures.
CO3	Understand class inheritance and polymorphism.
CO4	Understand the object-oriented program design and development.

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1:	1	1	3	3	-	1
CO2:	1	1	3	3	-	1
CO3:	1	1	3	3	-	1
CO4:	1	1	3	3	-	1

Course code	PG/MMT/PE/T/113/A
Category	Program Elective - I
Course title	MULTIMEDIA TECHNOLOGY
Scheme and Credits	L-T-P: 3-0-0; Credits: 3;
Pre-requisites (if any)	
Syllabus:	

Unit 1: Introduction [Definition, Evolution, Multimedia presentation and production, Characteristics of a multimedia presentation, Components and Structure, Hardware and Software Specifications, Digitization concepts, Application domains]

Unit 2: Text [Introduction, Types of text, ASCII codes, Unicode standards, Font, Insertion of text, OCR, File formats]

Unit 3: Image and Graphics [Introduction, Image types, Color and color models, Scanner, Digital camera, Interface standards, Specification of digital images, Color management systems, Device independent color models, Gamma and gamma correction, Image processing steps and software, File formats, Image output on monitor and printer]

Unit 4: Audio [Introduction, Nature of sound waves, Musical sound and noise, Tone and note, Psychoacoustics and decibels, Microphone, Amplifier, Speakers, Digital audio specifications, Synthesizers, Musical Instrument Digital Interface (MIDI), Sound card, Audio processing steps and software, File formats]

Unit 5: Video: [Introduction, Video frames and frame rate, Analog video camera, Video signal formats, Television broadcasting standards, Digital video, Digital video standards, PC Video, Video processing steps and software, File formats]

Unit 6: Compression [Introduction, CODEC, Types of compression, Types of redundancies, Lossless compression techniques, Lossy compression techniques, Run length encoding, Huffman coding, Arithmetic coding, Lempel-Ziv-Welsh coding, Differential pulse code modulation, GIF standard, JPEG standard, H.261/H.263/ H.264, MPEG-1, MPEG-2, MPEG-4, MPEG-7, AMR, AAC]

Unit 7: Multimedia Databases [Introduction, Limitations of textual descriptions of media, Content based storage and retrieval (CBSR), Image color, Image texture, Image shape, Audio speech and music discrimination, Video cut detection and shot identification, "low-level" vs. "high-level" features, Design and implementation of a prototype system]

Reference Books:

1. Ranjan Parekh, "Principle of Multimedia", Tata McGraw Hill, New Delhi, 2006. ISBN: 0-07-058833-3
2. Fred Halsall, "Multimedia Communications: Applications, Networks, Protocols and Standards", Pearson Education Ltd., 2001
3. Francois Fluckiger, "Understanding Networked Multimedia: Applications and Technology", Prentice Hall, 1995
4. Prabhat K Andleigh, Kiran Thakrar, "Multimedia System Design", Prentice Hall, 1996
5. Ralf Steinmetz, Klara Nahrstedt, "Multimedia Computing, Communications and Applications", Prentice Hall, 1995
6. Nalin Sharda, "Multimedia Information Networking", Prentice Hall, 1999, ISBN: 0132587734Python for Data Science: The Ultimate Step-by-Step Guide to Python Programming by Daniel, March 2021, O'Reilly.

Content Delivery Method

- Classroom lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

After completing the course, the students will be able to

CO1	To analyze the key components of multimedia technologies including text, graphics, voice, video and animation and the broad principles associated with multimedia concepts used in computer graphics.
CO2	To apply techniques for digital image processing, including editing, compression, and enhancement, to produce high-quality visual content.
CO3	To understand the principles of audio and video processing, including recording, editing, and compression, and implement these in multimedia applications.

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CO4	To analyze and apply various data compression techniques to optimize the storage and transmission of multimedia content.
CO5	To understand and apply multimedia standards, such as MPEG, JPEG, and HTML5, in the development of multimedia applications.

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1:	2	1	3	1	3	1
CO2:	2	1	3	1	3	1
CO3:	2	1	3	1	3	1
CO4:	2	1	3	1	3	1
CO5:	2	1	3	1	3	1

Course code	PG/CWE/PE/T/113/B
Category	Program Elective – I
Course title	APPLIED PROBABILITY AND STATISTICS
Scheme and Credits	L-T-P: 3-0-0; Credits: 3;
Pre-requisites (if any)	
Syllabus:	

Unit 1: PROBABILITY AND RANDOM VARIABLES
Probability – Axioms of probability – Conditional probability – Baye's theorem - Random variables - Probability function – Moments – Moment generating functions and their properties – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions – Function of a random variable.
Unit 2: TWO DIMENSIONAL RANDOM VARIABLES
Joint distributions – Marginal and conditional distributions – Functions of two dimensional random variables – Regression curve – Correlation.
Unit 3: ESTIMATION THEORY
Unbiased estimators – Method of moments – Maximum likelihood estimation - Curve fitting by principle of least squares – Regression lines.
Unit 4: TESTING OF HYPOTHESIS

Sampling distributions – Type I and Type II errors – Small and large samples – Tests based on Normal, t, Chi square and F distributions for testing of mean, variance and proportions – Tests for independence of attributes and goodness of fit.

Unit 5: MULTIVARIATE ANALYSIS

Random vectors and matrices – Mean vectors and covariance matrices – Multivariate normal density and its properties – Principal components - Population principal components – Principal components from standardized variables

Reference Books:

1. Devore, J. L., "Probability and Statistics for Engineering and the Sciences", 8th Edition, Cengage Learning, 2014.
2. Dallas E. Johnson, "Applied Multivariate Methods for Data Analysis", Thomson and Duxbury press, 1998.
3. Gupta S.C. and Kapoor V.K.," Fundamentals of Mathematical Statistics", Sultan and Sons, New Delhi, 2001.
4. Johnson, R.A., Miller, I and Freund J., "Miller and Freund"s Probability and Statistics for Engineers ", Pearson Education, Asia, 8th Edition, 2015.
5. Richard A. Johnson and Dean W. Wichern, "Applied Multivariate Statistical Analysis", 5th Edition, Pearson Education, Asia, 2002.

Content Delivery Method

- Classroom lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

After completing the course, the students will be able to

CO1	Apply probability theory, discrete and continuous random variables to solve various problems
CO2	Understand consistency, efficiency and unbiasedness of estimators, method of maximum likelihood estimation and Central Limit Theorem.
CO3	Use statistical tests in testing hypotheses on data.
CO4	Perform exploratory analysis of multivariate data, such as multivariate normal density, calculating descriptive statistics, testing for multivariate normality.

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1:	2		3	3		

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CO2:	**2**		**3**	**3**		
CO3:	**2**		**3**	**3**		
CO4:	**2**		**3**	**3**		

Course code	PG/CWE/PE/T/113/C
Category	Program Elective - I
Course title	GENERATIVE ARTIFICIAL INTELLIGENCE
Scheme and Credits	L-T-P: 3-0-0; Credits: 3;
Pre-requisites (if any)	
Syllabus:	

Unit 1: Introduction to Generative AI: Definition and scope of Generative AI, Importance of Generative AI in various domains

Unit 2: Language Models and LLM Architectures: Introduction to language models and their role in AI, Traditional approaches to language modelling, Deep learning-based language models, Overview of popular LLM architectures: RNNs, LSTMs, and Transformers

Unit 3: Understanding GPT (Generative Pre-trained Transformer): Introduction to GPT and its significance, Pre-training and fine-tuning processes in GPT Architecture and working of GPT models, Overview of GPT variants ChatGPT: Introduction to ChatGPT and its purpose, Training data and techniques for ChatGPT, Handling user queries and generating responses

Unit 4: Simplifying Development with Language Models: Introduction to LangChain and its objectives, Overview of the LangChain framework, Streamlining application development using LangChain Examples of applications built with LangChain

Unit 5: Prompt Engineering: Understanding the concept and significance of prompt engineering, Strategies for designing effective prompts, Techniques for controlling model behaviour and output quality

Unit 6: Ethical Considerations in Generative AI: Understanding the ethical implications of generative models, Addressing bias and fairness in generative AI systems

Unit 7: Use Cases of Generative AI: Overview of various domains and industries benefiting from Generative AI, Use cases in natural language processing, content generation, and creative applications

Unit 8: Hands-on Exercise: ChatGPT Guided step-by-step exercise on prompt engineering and customization

Reference Books:
1. Tom Taulli, Generative AI, Apress, 2023
2. Ben Auffarth, Generative AI with LangChain: Build large language model (LLM) apps

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	with Python, ChatGPT, and other LLMs, Packt Publishing, 2021. 3. Joseph Babcock and Raghav Bali, Generative AI with Python and TensorFlow 2 Packt Publishing, 2021 4. Chris Fregly, Antje Barth, Shelbee Eigenbrode, Generative AI on AWS, O'Reilly Media, 1st Edition, 2023

Content Delivery Method

- Classroom lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

After completing the course, the students will be able to

CO1	Gain a comprehensive understanding of generative AI principles and techniques.
CO2	Analyse the ethical considerations and societal impacts of Generative AI, including issues related to deepfakes, intellectual property, privacy, and the potential for misuse.
CO3	Utilise generative models to create new, realistic data such as images, text, music, or other forms of content, and understand the applications of these models in various domains.
CO4	Understand the challenges of deploying generative AI models in real-world environments, including scalability, computational efficiency, and model optimisation issues.
CO5	Apply generative AI techniques across different fields, such as healthcare, entertainment, finance, and education.

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1:	2		3	3	1	1
CO2:	2		3	3	1	1
CO3:	2		3	3	1	1
CO4:	2		3	3	1	1
CO5:	2		3	3	1	1

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Course code	PG/MMT/PE/T/114/A
Category	Program Elective – I I
Course title	HUMAN COMPUTER INTERACTION
Scheme and Credits	L-T-P: 3-0-0; Credits: 3;
Pre-requisites (if any)	

Syllabus:

Unit 1: Introduction
Introduction (History) to HCI, screen design, world wide web and Interaction Design, Good and Poor Design, The Double Diamond of Design, Neilson's Heuristics, Contextual Inquiry, Users and User Experience, Accessible and Inclusive Designs, Issues with Interaction Design, Interface Metaphors & Interaction Types, Case Studies

Unit 2: Principles
Modern 2D and 3D interfaces (AR/VR), Human Considerations in Interface and Screen Design, Direct Manipulation and Invisible Interfaces, Human Abilities, Design Principles and Heuristics, Mental Models and Representations, Task Analysis, Distributed Cognition, Figma Tutorial, Case Studies

Unit 3: Methods
Ethics and Human Research, Data Gathering - Techniques and Analysis, Need finding and Requirements Gathering, Design Alternatives, Rapid Prototyping, Evaluation, HCI and Agile Development, Case studies

Unit 4: Applications
Technologies, Ideas, Domains, Project Evaluation

Unit 5: Testing
Usability Testing Methods (Fitt's Law, Heuristics etc.), User Study Designs, Quantitative and Qualitative Research Methods, Project Evaluation

Reference Books:

1. Human Computer Interaction: An Empirical Research Perspective by I. Schott Mackenzie, (Morgan Kaufmann)
2. Research Methods in Human-Computer Interaction, by Jonathan Lazar, Jinjuan Heidi Feng, Harry Hochheiser, (Wiley)
3. The essential guide to user interface design, Wilbert O Galitz, Wiley, Dream Tech
4. Human – Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, Pearson Education
5. Interaction Design: Beyond Human-Computer Interaction (4th Edition) by Jenny Preece, Helen Sharp, Yvonne Rogers (Wiley)
6. 3D User Interfaces: Theory and Practice (2nd Edition) (Usability) by Joseph J. LaViola Jr., Ernst Kruijff, Ryan P. McMahan, Doug Bowman, Ivan P. Poupyrev

Web Resources
1.   https://archive.nptel.ac.in/courses/106/106/106106177/

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2.	https://www.behance.net/gallery/48435387/Contextual-Inquiry-Surveys-Web-UI ResearchPhase?tracking_source=search_projects%7Ccontextual+inquiry+affinity+diagram

Content Delivery Method

- Classroom lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

After completing the course, the students will be able to

CO1	Comprehensive Understanding of HCI Principles and Interaction Design
CO2	Application of Modern HCI Techniques and Tools
CO3	Proficiency in Data Gathering, Prototyping, and Evaluation
CO4	Ethical Research and Project-Based Implementation

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1:	2		3	3	1	2
CO2:	2		3	3	1	2
CO3:	2		3	3	1	2
CO4:	2		3	3	1	2

Course code	PG/CWE/PE/T/114/B
Category	Program Elective – I
Course title	AUGMENTED & VIRTUAL REALITY
Scheme and Credits	L-T-P: 3-0-0; Credits: 3;
Pre-requisites (if any)	

Syllabus:

UNIT I INTRODUCTION: Introduction to Virtual Reality – Definition – Three I"s of Virtual Reality – Virtual Reality Vs 3D Computer Graphics – Benefits of Virtual Reality - Components of VR System - Input Devices – 3D Position Trackers -Performance Parameters – Types of Trackers - Navigation and Manipulation Interfaces – Gesture Interfaces – Types of Gesture Input Devices. Output Devices – Graphics Display – Human Visual System – Personal Graphics Displays – Large Volume Displays – Sound Displays – Human Auditory System.

UNIT II VR ARCHITECTURE: Computing Architectures of VR – Rendering Principle – Graphics and Haptics Rendering –PC Graphics Architecture – Graphics Accelerators – Graphics Benchmarks – Workstation Based Architectures – Sun Blade 1000 Architecture – SGI Infinite Reality Architecture – Distributed VR Architectures – Multipipeline Synchronization – Collocated Rendering Pipelines – Distributed Virtual Environments.

UNIT III VR MODELING: Modeling – Geometric Modeling – Virtual Object Shape – Object Visual Appearance – Kinematics Modeling – Transformation Matrices – Object Position – Transformation Invariants –Object Hierarchies – Viewing the 3D World – Physical Modeling – Collision Detection – Surface Deformation – Force Computation – Force Smoothing and Mapping – Behavior Modeling – Model Management.

UNIT IV VR PROGRAMMING: VR Programming – Toolkits and Scene Graphs – World ToolKit – Java 3D – Comparison of World ToolKit and Java 3D - GHOST – People Shop – Human Factors in VR – Methodology and Terminology – VR Health and Safety Issues – VR and Society.

UNIT V VR APPLICATIONS: Medical Applications of VR – Education, Arts and Entertainment – Military VR Applications – Emerging Applications of VR – VR Applications in Manufacturing – Applications of VR in Robotics – Information Visualization.

Reference Books:

1. Reinhard Klette , Concise computer vision: an introduction into theory and algorithms.
2. E.R. Davies, Computer vision: principles, algorithms, applications, learning.
3. Simon J.D. Prince, Computer vision: models, learning and inference.
4. Yeshwanth Reddy and Kishore Ayyaderava , Modern computer vision with Pytorch.
5. David A. Forsyth , Computer vision: a modern approach.
6. Scott Krig , Computer vision metrics: survey, taxonomy, and analysis.

Content Delivery Method

- Classroom lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

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Course Outcomes:						
After completing the course, the students will be able to						
CO1	Discuss the basic concepts of Virtual reality.					
CO2	Develop Virtual Reality applications in different areas.					
CO3	Design of various modelling concepts.					
CO4	Expose the concept of Virtual Reality Programming with toolkits.					

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1:	2		3	3	2	2
CO2:	2		3	3	2	2
CO3:	2		3	3	2	2
CO4:	2		3	3	2	2

Course code	PG/MMT/PE/T/114/C
Category	Program Elective – II
Course title	COMPUTER VISION
Scheme and Credits	L-T-P: 3-0-0; Credits: 3;
Pre-requisites (if any)	
Syllabus:	

Unit 1: Introduction: Basic concepts of Computer Vision - Low-level, Mid-level, High-level. Image sampling, interpolation, transformations, Image filtering techniques, Linear filters and edges, Feature extraction, Optical flow and feature tracking, Object recognition.

[5 hours]

Unit 2: Feature Extraction and Pattern Analysis: Edges - Canny, LOG, DOG; Line detectors (Hough Transform), Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF,

HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian derivative filters, Gabor Filters and DWT. Clustering: K-Means, K-Medoids, Mixture of Gaussians, Classification: Discriminant Function, Supervised, Un-supervised, Semi-supervised; Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA; Non-parametric methods.

[12 hours]

Unit 3: Segmentation and Shape Representation: Contour based representation, Region based representation, Deformable curves and surfaces, Snakes and active contours, Level set representations, Fourier and wavelet descriptors, Medial representations, Multi resolution analysis. Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation, Object detection.

[15 hours]

Unit 4: Applications of Computer Vision: Content-Based Image Retrieval, Video Data Processing, Medical image analysis, Image stitching, 3D reconstruction, Image-based rendering

[10 hours]

Reference Books:

1. Reinhard Klette , Concise computer vision: an introduction into theory and algorithms.
2. E.R. Davies, Computer vision: principles, algorithms, applications, learning.
3. Simon J.D. Prince, Computer vision: models, learning and inference.
4. Yeshwanth Reddy and Kishore Ayyaderava , Modern computer vision with Pytorch.
5. David A. Forsyth , Computer vision: a modern approach.
6. Scott Krig , Computer vision metrics: survey, taxonomy, and analysis.

Content Delivery Method

- Classroom lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

After completing the course, the students will be able to

CO1	Discuss the basic concepts, terminology, and various methods of computer vision.
CO2	Illustrate the methods of feature extraction and analyze the pattern.
CO3	Describe the different segmentation approaches and shape representations.

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	CO4	Discuss various applications of computer vision				

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1:	2		3	2	3	2
CO2:	2		3	2	3	2
CO3:	2		3	2	3	2
CO4:	2		3	2	3	2

Course code	PG/CWE/PE/T/115/A
Category	Program Elective – III
Course title	WEB TECHNOLOGY
Scheme and Credits	L-T-P: 3-0-0; Credits: 3;
Pre-requisites (if any)	
Syllabus:	

Unit I: Introduction to Internet and World-Wide-Web
Overview- What is Internet and WWW, Evolution of Internet & WWW, How Internet Works (TCP/IP Overview, IP Addressing, Packet Switching, ISPs), Web Basics: Static and Dynamic Web Pages; Client-Server Model of the Internet (Web Clients and Web Servers), Basic Working of the Web – CS Interaction, HTTP, URL, HTML, Other concepts - Proxy Servers, Search Engines, Home Pages, HTTP: Overview, Requests and Responses, HTTP Headers, Methods, Session Management - Persistent Connections, Cookies, Caching; Redirection; Conditional GET, Important Services offered on internet and related application protocols, Email: SMTP, MIME, IMAP/POP3; Domain Services-DNS; FTP

Unit II: Web Page Design using Mark-up Language HTML5 and Cascaded Stylesheets
Introduction to HTML, HTML Document Structure , Basic Tags, HTML Elements and Attributes - Headings, Paragraph, Text Formatting (styles, colours, text), Images, Links, Lists, Tables, Frames, Divisions & Spans, Forms and Form Elements, Meta tags, HTML5 tags: Embedding Audio and Video, Semantic Tags, **CSS,** Stylesheet Types – Inline, Internal, External, Selectors – Element, ID, Class, Grouping of Selectors, CSS Properties: Colors, Background, Borders, Padding and Margins – CSS Box Model, Alignment, Positioning –

Relative vs Absolute, z-index, Overflow, Pseudo Classes & Pseudo Elements, Combinators, Specificity, Responsive Web Designs, Flex/Grid, Media Queries, Introduction to Bootstrap Grid Systems, Buttons, Glyphicons, Tables, Forms, Dropdowns & Responsive Tabs, Alerts, Pagination, Progress Bar etc.

Unit III: Client-side scripting language JavaScript

Java vs JavaScript, Structure of JavaScript Program, Adding JS to HTML, Syntax - Variables and Data Types; Statements: Expression, Keyword, Block; Operators; Flow Controls, Looping, Popup/Dialog Boxes, Functions; Arrays; Objects, properties and methods; Built-in Objects (String, Date, Math, Windows, Document), Document Object Model – Dynamically creating elements/changing attributes and styles; Events and Tag attributes, Event Handling, Form Validation, Error Handling, Introduction to jQuery and JSON, Brief idea about popular JS frameworks/libraries – Angular JS, React JS, Node JS

Unit IV: XML

Introduction to XML and its Application, Syntax Rules for creating XML document, XML Elements and XML Attributes; XML Tree; XML Namespace; XML schema languages: Document Type Definition(DTD), XML Schema Definition (XSD); XSD Simple Types, XSD Attributes; XSD Complex Types; Basics of XML Style Sheets (XSLT) and XQuery

Unit V: Server-side Technology

Web servers and web hosting, types of web hosting, Server-side scripting vs Client-side Scripting, Basics of Server-Side Scripting with PHP (Primitives, Operations, Control Statements, Arrays and Functions, Form handling, Connecting to Database), Web Application Development using Python (using Flask Framework)

Reference Books:

1. James Kurose, Keith Ross, "Computer Networking: A Top-Down Approach, 6th Edition, Pearson, 2017
2. Behrouz A. Forouzan, Firouz Mosharaf, "Computer Networks: A Top-Down Approach", Special Indian Edition, McGraw Hill Publication, 2017
3. Andrew Tannenbaum, "Computer Networks", 5th Edition, Pearson, 2013
4. P.J. Dietel, H.M. Dietel, "Internet & World Wide Web How to Program", 5th Edition, Deitel.com, 2011
5. D. Flanagan, "Java Script-The Definitive Guide", 7th Edition, O'Reilly, 2020
6. M Lutz, "Learning Python", 5th Edition, O'Reilly, 2013

Content Delivery Method

- Classroom lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

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Course Outcomes:		

After completing the course, the students will be able to

CO1	Understand the basic technologies of the Internet and World-Wide-Web.
CO2	Illustrate client-side and server-side technologies and associated components involved at both client and server ends.
CO3	Apply in-demand technical skills such as HTML5/CSS for Web-design, client-side scripting language JavaScript, XML for handling Web-data and server-side scripting language PHP.
CO4	Understand the importance of frameworks in server-side scripting.

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1:	1		3	3	1	1
CO2:	1		3	3	1	1
CO3:	1		3	3	1	1
CO4:	1		3	3	1	1

Course code	PG/CWE/PE/T/115/B
Category	Program Elective – III
Course title	IOT & CLOUD COMPUTING
Scheme and Credits	L-T-P: 3-0-0; Credits: 3;
Pre-requisites (if any)	
Syllabus:	

Unit I: Introduction to IoT
Overview, conceptual framework, architecture, major components, common applications Design principles for connected devices: Modified OSI Model for IoT/M2M systems, ETSI M2M Domains and High-level capabilities, wireless communication technologies - NFC, RFID, Bluetooth BR/EDR and Bluetooth low energy, ZigBee, WiFi, RF transceiver and RF modules. Data enrichment, data consolidation & device management at the gateway.

Unit II: Introduction to Cloud Computing

Cloud Computing: Definition, roots of cloud computing, characteristics, cloud architecture, deployment models, service models. Virtualisation: Benefits & drawbacks of virtualisation, server virtualisation, virtualisation of - operating system, platform, CPU, network, application, memory and I/O devices, etc.

[10 hours]

Unit III: Cloud Service and Security

Cloud Computing Service Platforms – Compute services, storage services, database services, application services, queuing services, e-mail services, notification services, media services, content delivery services, analytics services, deployment & management services, identity & access management services and their case studies. Security in cloud computing: issues, threats, data security and information security.

[9 hours]

Unit IV: IoT Protocols

Design principles for web connectivity: web communication protocols for connected devices: constrained application protocol, CoAP Client web connectivity, client authentication, lightweight M2M communication protocol. Message communication protocols for connected devices - CoAP-SMS, CoAPMQ, MQTT, XMPP. IoT privacy, security and vulnerabilities and their solutions.

[9 hours]

Unit V: Application and Use Cases of IoT & Cloud

[4 hours]

Reference Books:

1. Chellammal Surianarayanan and Pethuru Raj Chelliah, (2019). Essentials of Cloud Computing, A Holistic Perspective, Springer Nature Switzerland AG, Switzerland.
2. Dimitrios Serpanos and Marilyn Wolf, 2018, Internet-of-Things (IoT) Systems Architecture s, Algorithms, Methodologies, Switzerland Springer, Switzerland.
3. Andrew Minteer, 2017, Analytics for the Internet of Things (IoT): Intelligent analytics for your intelligent devices, Packt Publishing.
4. Geoffrey C. Fox, Jack Dongarra, Kai Hwang, (2013), Distributed and Cloud Computing From Parallel Processing to the Internet of Things.
5. Pradeeka Seneviratne, 2015, Internet of Things with Arduino Blueprints, Packt Publishing.
6. G. Coulouris, J. Dollimore, T. Kindberg, and G. Blair, (2012), Distributed Systems: Concepts and Design, 5th Edition, Addison Wesley, USA.

Content Delivery Method

- Classroom lecture (chalk and board) (D1)
- Visual presentation (D2)

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- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

After completing the course, the students will be able to

CO1	Describe the IoT and Cloud architectures and determine the right sensors and communication protocols for a particular IoT system.
CO2	Deploy Cloud Services using different cloud technologies and Implement cloud computing elements such as virtual machines, web apps, mobile services, etc.
CO3	Establish data migration techniques from IoT devices to the cloud and Implement security features to protect data stored in the cloud.
CO4	Use visualisation techniques to show data generated from the IoT device.

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	**PO2**	**PO3**	**PSO1**	**PSO2**	**PSO3**
CO1:	1		3	3		
CO2:	1		3	3		
CO3:	1		3	3		
CO4:	1		3	3		

Course code	PG/CWE/PE/T/115/C
Category	Program Elective – III
Course title	NETWORKING & INTERNET TECHNOLOGIES
Scheme and Credits	L-T-P: 3-0-0; Credits: 3;
Pre-requisites (if any)	
Syllabus:	

Unit I: Introduction: Recap on packet switching, OSI and TCP/IP reference model, different network parameters, PAN.

[2 hours]

Unit II: Data Link Layer: Efficiency of CRC and Hamming code, ARQ protocol performance analysis, and sliding window protocol performance analysis. Example protocols: HARQ,

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Packet over SONET.

[3 hours]

Unit III: Medium Access Control: Performance measurements of MAC protocols. IEEE Standards 802.3, 802.4, 802.5, High-Speed LANs, Fast and Gigabit Ethernet, FDDI; Bridges: IEEE 802.x to IEEE 802.y Bridges, Transparent Bridge, Source Routing Bridge, Wireless systems: Wireless LANS (i.e., 802.11 standards MAC management, Framing, Architecture and services), WMAN, WPAN, IrDA technologies, Wireless Broadband-802.16

[8 hours]

Unit IV: Network Layer: Routing Algorithms: Recap on Unicast routing, Hierarchical Routing, Broadcast and Multicast Routing: Anycast routing, Congestion control: Congestion Prevention Policies, Admission control, Effect of routing on congestion. Cross-layer approaches- ECN, RED, Quality of Service: Traffic Shaping, Leaky-Bucket Algorithm, Token Bucket Algorithm, Weighted Fair Queuing, integrated services, differentiated services, Network Protocols: IPv4: class full and classless addressing, sub-netting, super-netting, address aggregation, IPv6, ICMPv6, Internet control protocols: MPLS, multicasting: IGMP, Routing Protocols: RIP, OSPF, BGP, Mobility management protocols: MIPv4, MIPv6, HMIPv6, FMIPv6 and PMIPv6.

[20 hours]

Unit V: Transport Layer: TCP, Max-min fairness, AIMD, TCP Tahoe, TCP Reno, BIC TCP, TCP Cubic, RTP, RTCP and SCTP.

[6 hours]

Unit VI: Application Layer: Secure Shell, SNMP, VoIP, streaming media, SIP, Peer-to-peer systems.

[3 hours]

Reference Books:

1. Andrew S. Tanenbaum, "Computer Networks", PHI.
2. W. Stallings, "Data and Computer Communications", 8th Edition, PHI.
3. D. E. Comer, "Internetworking with TCP/IP Vol. 1: Principles, Protocols, and Architecture", 5th Edition, PHI.
4. B. A. Forouzan, "Data Communications and Networking", 4th Edition, Tata McGraw-Hill.
5. James F. Kurose, W. Ross, "Computer Networking: A top-down approach featuring the Internet", 3rd Edition, Pearson.
6. M. Hassan, R. Jain, "High Performance TCP/IP Networking", PHI.
7. L. Garcia, I. Widjaja, "Communication Networks", 2nd Edition, TMH.
8. Jochen Schiller, "Mobile Communications" Pearson publication.
9. Theodore (Ted) S. Rappaport, "Wireless Communications", Pearson publication.

Content Delivery Method

● Classroom lecture (chalk and board) (D1)

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- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:	
After completing the course, the students will be able to	
CO1	Distinguish and demonstrate different reference models, networks, data link layer mechanisms and protocols and solve related problems.
CO2	Illustrate various medium access protocols, local area networks, and standards for wireless systems and apply them to solve problems.
CO3	Analyse and illustrate different routing and congestion control algorithms and apply different network protocols on the Internet.
CO4	Explain application and transport layer services and protocols and solve problems using them.

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1:	1		3	3		
CO2:	1		3	3		
CO3:	1		3	3		
CO4:	1		3	3		

Course code	PG/MMT/AC/T/117
Category	Audit Course
Course title	TECHNICAL REPORT WRITING AND PRESENTATION
Scheme and Credits	L-T-P: 0-0-0; Credits: 0;
Pre-requisites (if any)	
Syllabus:	

MS-Word, MS-Excel, MS-Powerpoint
Unit I: Introduction to LaTeX: Overview of LaTeX, Installing LaTeX: MiKTeX, TeX Live, and Overleaf, Basic structure of a LaTeX document: Preamble, document class, sections, Creating and compiling a simple LaTeX document, Setting up the LaTeX environment and writing a
Unit II: Document Structure and Formatting: Organizing content with sections, subsections,

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and paragraphs, Customizing fonts, text styles, and page layout, Using lists: Itemized, enumerated, and description lists, Adding comments and special characters in LaTeX, Creating a structured document with various formatting options

Unit III: Typesetting Mathematical Content: Introduction to mathematical typesetting in LaTeX, Writing equations, fractions, roots, sums, integrals, and matrices, Aligning and numbering equations

Unit IV: Including Figures and Tables: Inserting and positioning figures, Including images and diagrams; creating and formatting tables: Simple tables, multi-row, and multi-column tables; using the `graphicx` and `tabular` packages, Adding captions, labels, and references to figures and tables, Lab session: Working with figures and tables in a LaTeX document

Unit V: References and Citations: Adding bibliographic references using the `bibliography` and `biblatex` packages, Managing citations: In-text citations, bibliography styles, and reference lists, Using BibTeX for automated bibliography management

Unit VI: Advanced Document Features: Customizing headers and footers, Working with large documents: Table of contents, index, and glossaries

Unit VII: Presentations with LaTeX (Beamer): Introduction to the Beamer class for creating presentations, Structuring a Beamer presentation: Frames, slides, and overlays, Adding content: Text, bullet points, and multimedia elements, Customizing themes, colours, and slide transitions

Unit VIII: Overview of essential LaTeX packages: `amsmath`, `geometry`, `hyperref`, `xcolor` Customising LaTeX templates for articles, reports, and theses, Troubleshooting common LaTeX errors and issues, Applying packages and customisations in various document types

Reference Books:

1. LaTeX: A Document Preparation System", Leslie Lamport, Addison-Wesley, 1986.
2. The LaTeX Companion", Frank Mittelbach, Michel Goossens, Johannes Braams, David Carlisle, and Chris Rowley, Addison-Wesley Professional, 2004.
3. LaTeX Beginner's Guide", Stefan Kottwitz, Packt Publishing Ltd, 2024
4. LaTeX Cookbook", Stefan Kottwitz, Packt Publishing Ltd, 2015
5. LaTeX in 24 Hours: A Practical Guide for Scientific Writing", Dilip Datta, Springer Cham, 2017

Content Delivery Method

● Classroom lecture (chalk and board) (D1)
● Visual presentation (D2)
● Tutorial (D3)
● Discussion (D7)

Course Outcomes:

After completing the course, the students will be able to

| CO1 | Understand the fundamental concepts and syntax of LaTeX. |

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CO2	Develop skills to create well-structured documents, including articles, reports, and presentations.
CO3	Learn to include and format mathematical equations, tables, figures, and references.
CO4	Gain proficiency in using LaTeX packages to enhance document functionality.

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	**PO2**	**PO3**	**PSO1**	**PSO2**	**PSO3**
CO1:		3				
CO2:		3				
CO3:		3				
CO4:		3				

Course code	PG/CWE/P/111
Category	Laboratory 1
Course title	AI-ENABLED MULTIMEDIA LABORATORY
Scheme and Credits	L-T-P: 0-0-4; Credits: 2;
Pre-requisites (if any)	
Syllabus:	

Unit I: Image Editing [Introducing open-source image editing software (GIMP) for image manipulation and image editing, layer masks and alpha channel, cropping, resizing, transforming an image, adjustment of colour balance, applying filters, understanding various colour modes, creating an Ink Smudge Portrait, creating a Low Poly Portrait in Black and White, preparing photo collage, saving and exporting images
Unit II: Audio Editing [Introducing open-source audio editing software (Audacity) for working with multiple tracks, recording voice by setting recording levels and playback levels, recording desktop audio, editing audio using options like trimming, crossfading, mixing, panning, noise reduction, spectral analysis and saving and exporting projects
Unit III: Video Editing [Assignment-based projects involving various video editing options, multi-layer track handling, text embedding, audio and motion image synchronisation]

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Reference Books:

1. Nigel Chapman and Jenny Chapman, Digital Multimedia, Wiley, 3rd Edition, 2009
2. Jennifer Smith and Christopher Smith, Adobe Creative Cloud All-in-One For Dummies, 2nd Edition, 2018
3. Olivier Lecarme and Karine Delvare, The Book of GIMP: A Complete Guide to Nearly Everything, No Starch Press, 2013
4. Enrico Valenza, The Blender 3D Cookbook, Packt Publishing, 2015
5. Oscar Baechler and Xury Greer, Blender 3D by Example Packt Publishing, 2020

Content Delivery Method

- Classroom lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

After completing the course, the students will be able to

CO1	Design of raster images using various themes and layouts, understanding the significance of colour models and their application, composing old photos, and analysing the filters and their applications.
CO2	Create music and speech audio files using several editing options for final export.
CO3	Perform project-based video editing for final rendition and production.
CO4	Integrate multimedia components to produce cohesive digital presentations and applications.

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	**PO2**	**PO3**	**PSO1**	**PSO2**	**PSO3**
CO1:	3		1	1	3	2
CO2:	3		1	1	3	2
CO3:	3		1	1	3	2
CO4:	3		1	1	3	2

Course code	PG/CWE/P/112
Category	Seminar
Course title	SEMINAR
Scheme and Credits	L-T-P: 0-0-4; Credits: 2;
Pre-requisites (if any)	

Syllabus:

Unit I: Identification of relevant state-of-the-art topics related to Courseware Engineering through group discussion and literature search.

Unit II: Dissemination of recent technology and its application for developing executable applications identified in Unit 1 through seminar presentation and report.

Reference Books:

Resources:

https://ieeexplore.ieee.org/Xplore/home.jsp
https://link.springer.com/
https://www.sciencedirect.com/

Content Delivery Method

- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

After completing the course, the students will be able to

CO1	Conduct group discussions to identify recent research topics relevant to Courseware Engineering.
CO2	Prepare and deliver the presentation as a PowerPoint based on recent research topics, which will form the baseline for the dissertation in the third and fourth semesters.
CO3	Conduct group discussions to identify recent research topics relevant to Courseware Engineering.

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1:		3	1	1	1	1
CO2:		3	1	1	1	1

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CO3:		3	1	1	1	1

Course code	PG/CWE/PC/T/121
Category	Program Core - III
Course title	DEEP LEARNING
Scheme and Credits	L-T-P: 3-0-0; Credits: 3;
Pre-requisites (if any)	
Syllabus:	

Unit I: Introduction to Deep Learning and Neural Networks: Introduction to ML, Supervised ML, Unsupervised ML, Reinforcement Learning, Learning Concepts (PAC), Bias & Variance, Applications and History of Deep Learning

Unit II: Popular and State-of-the-art Models: Working of RBM and Implementation, AlexNet, VGG16, Inception, Xception, etc., Auto-encoders (AE), Variational AE, Generative Adversarial Networks

Unit III: Perceptron and Multi-Layer Perceptron: ANN(Multi-layer perceptron), Neurons, Weights, Connectivity and Logic Gates, Activation Function, NN Model building, Loss Function, NN Architecture, Perceptron Model and Optimization using Gradient Descent, Regularization

Unit IV: Multi-layered Neural Networks: Feed Forward and Backpropagation NN, Dense Neural Networks, Convolution Networks, Recurrent Networks, LSTMs, GRUs, Basics for Weight Initialization and Transfer Function, Batch Normalization, Gradient Checking

Unit V: Deep learning libraries: TensorFlow and Keras, PyTorch

Unit VI: Deploying Machine Learning Models on Cloud (MLOps): Introduction to MLOPS, Process of MLOPS, AZURE Machine Learning

Reference Books:

1. Ian Goodfellow, Yoshua Bengio and Aaron Courville, "Deep Learning", MIT Press, 2016.
2. François Chollet, Deep Learning with Python, Manning Publications, 2017.
3. Josh Patterson and Adam Gibson. Deep Learning: A Practitioner's Approach. First edition, O'Reilly Media, Inc., 2017.
4. Gulli, Antonio. TensorFlow, Deep Learning Cookbook: Over 90 Unique Recipes to Solve Artificial-Intelligence Driven Problems with Python. Packt Publishing, 2017.
5. Nielsen, Michael A. Neural Networks and Deep Learning. , Determination Press, 2018.

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Resource:

https://www.coursera.org/specializations/deep-learning

Content Delivery Method

- Classroom lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

After completing the course, the students will be able to

CO1	Comprehend the fundamental building blocks of neural networks.
CO2	Understand concepts in deep learning and analyse the relevant deep learning architecture in a wide range of application scenarios.
CO3	Create deep learning models and utilise alternative methods to train deep learning models.
CO4	Identify the appropriate algorithm given a practical task.

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1:	2		3	3	1	1
CO2:	2		3	3	1	1
CO3:	2		3	3	1	1
CO4:	2		3	3	1	1

Course code	PG/CWE/PC/T/122
Category	Program Core - IV
Course title	MULTIMEDIA DESIGN PRINCIPLES AND AUTHORING
Scheme and Credits	L-T-P: 3-0-0; Credits: 3;
Pre-requisites (if any)	

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Syllabus:

Unit I: Multimedia Documents & Interchange Formats [Open Document Architecture (ODA), Multimedia and Hypermedia Information Coding Expert Group (MHEG), Open Media Framework (OMF), Markup, Standard Generalized Markup Language (SGML), Hypermedia]

Unit II: Document for Multimedia Content Design[Introduction to Multimedia Presentation, Flowcharts, Simple interactive flowchart, Complex interactive flowchart, Storyboards, Advantages of Storyboarding, Interactive storyboarding, Script, Case studies]

Unit III: Multimedia Authoring Metaphors [Functions and Tasks of Authoring Metaphors, Types of Authoring Metaphors: The Slide Show Metaphor, Book Metaphor/Page metaphor, Windowing Metaphor, The Network Metaphor, Icon Metaphor, Animation and Keyframes basics, Introduction to Action Script 3.0 using Adobe Animate]

Unit IV: Learning Management System (LMS) [Introduction to LMS, Types of LMS: Proprietary, Open Source and Cloud based LMSs, Comparison among various types of LMSs, Usability and Usability Heuristics for User Interface Design, Learners and Instructors, Heuristics for Design of Learning Interfaces, LMS Administrator, SCORM and xAPI Standards, Course building process, Implementation Strategies, LMS Evaluation: Duration of evaluation, Response rate, Data analysis, Adaptive Intelligent Tutoring System (AITS)]

Unit V: MOODLE [Basics of MOODLE, Managing course content, Creating lessons, quizzes, assignments and glossaries, MOODLE Administration]

Reference Books:
1. Braunstein Roger ActionScript 3.0 Bible, 2nd Edition, Wiley Publishing Inc., 2010
2. Cole Jason, Foster Helen, Using Moodle, 2nd Edition, O'Reilly Community Press, 2008

Content Delivery Method

- Classroom lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

After completing the course, the students will be able to

CO1	Visualizing Pre-production processes for designing a presentation (CBT) through flowchart, storyboard and script
CO2	Comparing various authoring metaphors and selecting the appropriate metaphor
CO3	Implementing Action Script 3.0 in CBT construction
CO4	Explaining LMS and Course Content Management and formulating it using MOODLE

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	**PO2**	**PO3**	**PSO1**	**PSO2**	**PSO3**
CO1:	2		3		3	2
CO2:	2		3		3	2
CO3:	2		3		3	2
CO4:	2		3		3	2

Course code	PG/CSRE/PE/T/123/A
Category	Program Elective – IV
Course title	EDUCATIONAL MANAGEMENT AND QUALITY ASSURANCE
Scheme and Credits	L-T-P: 3-0-0; Credits: 3;
Pre-requisites (if any)	

Syllabus:

Unit I: Introduction [Elements of Organizational theory, Types of Educational Organization, System Concepts and Educational Organization, Defining Educational Objectives and Goals, Individual and Organizational Goals-conflict resolutions, Measuring Quality and Productivity in Educational Organization, Accreditation, Costing of Educational Services, Limitations of Organizational theories in educational perspective, Quality Circle and participatory quality Improvement, Total Quality Management (TQM)-basic principles]

Unit II: IT Enabled Distance Education[Evolution of Distance Education, Dominant Modes of Distance Education, The Basic Infrastructure for Digital Distance Education Course Re-Engineering for Digital Distance Education, Copyright Issues, Ownership of Course Material, Educational Fair Use Guidelines for Distance Learning, Accreditation and Quality Assurance for Distance Education, Managing a Distance Education Program, Economics of Distance Learning, Staffing a Distance Education Program, Help Line(for Students, for Faculty)]

Unit III: Self -Regulated Learning Approach-As Cognitive, Affective, Meta-cognition and Motivation process, SRL frameworks, Methods of Measuring SRL, facial Emotion Analysis

Reference Books:

1. Quality Management in Higher Education 1st Edition, Marmar Mukhopadhyay , Sage

Publication, 2016

2. Principles and Practices of Quality Assurance: A guide for internal and external quality assurers in the FE and Skills Sector-Ann Gravells, Learning Matter Publication, 2016
3. Total Quality Management in Education-Edward Sallis, Taylor and Francis Publication, 2015
4. Achieving your Assessment and Quality Assurance Units, Ann Gravells, 2014.
5. Quality Assurance in Higher Education Trends in Regulation, Translation and Transformation- Don F. Westerheijden, Bjorn Stensaker, Maria Joao Rosa Springer Publication, 2007
6. Educational Testing and Measurement: Classroom application and Practice (8th ed.), Kubiszyn, Tom and Gary D. Borich, NewYork: John Wiley, 2006
7. Evaluation of education: Foundation of Competency Assessment and Program Review, 3rd ed., Wolf, Richard M, Praeger Publishers, New York, 1990
8. A Practical Introduction to Measurement and Evaluation, Remmers, H.H, N.L Gage and J.F Rummel, New York: Harper and Row, 1960
9. The Management of Learning, I.K, Davis- MC Graw Hill, New York, 1971

Content Delivery Method

- Classroom lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

After completing the course, the students will be able to

CO1	Clarify the linkage between quality management principles and education, steps to be taken towards improvement of education
CO2	Analyze TQM, which could serve as a paradigm for improving every aspect of institutional functioning from fiscal administration to classroom instruction.
CO3	Develop an audio-visual method for presenting and disseminating information, including storage and retrieval. Justify the allocation and management of resources and the cost-effectiveness of media in distance education.
CO4	Evaluate the effectiveness of SRL in terms of student performance or change in behavior.

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

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	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1:	2		3			3
CO2:	2		3			3
CO3:	2		3			3
CO4:	2		3			3

Course code	PG/CWE/PE/T/123/B
Category	Program Elective – IV
Course title	NATURAL LANGUAGE PROCESSING AND ITS APPLICATION IN EDUCATION
Scheme and Credits	L-T-P: 3-0-0; Credits: 3;
Pre-requisites (if any)	
Syllabus:	

Unit I: Overview of NLP: Definition, History, and Key Concepts, Importance of NLP in the digital age, Applications of NLP in education: Personalized learning, content analysis, automated feedback, and more, Introduction to NLP tools and platforms (e.g., NLTK, SpaCy, Hugging Face Transformers), Handling noisy data in educational content, Practical session: Text preprocessing using Python libraries

Unit II: Introduction and Basic Text Processing: Word and sentence segmentation, Lemmatization, Stemming, Morphology, Representation of educational content using embeddings, Practical session: Implementing text representation techniques

Unit III: Spelling Correction and Language Modeling: n-gram models, smoothing techniques Sequence Learning Tasks and Models: Statistical Models - HMM, MEMM, CRF

Unit IV: Syntactic Parsing: Regular and Context-Free Languages, Context-Free Parsing, Dependency Parsing: Dependency Grammar, Graph-based dependency parsing, Transition-based dependency parsing, Vector-space Models: Word and Meanings, Distributional and Distributed Semantics, Lexical Semantic Analysis, GloVe, word2vec

Unit V: Introduction to sentiment analysis, Emotion detection in student feedback and educational content, applications in monitoring student engagement and well-being, Practical session: Building sentiment analysis models

Unit VI: Concepts of Named Entity Recognition (NER) and Information Extraction, Applications in Curriculum Design, Content Tagging, and Knowledge Extraction, Practical session: Implementing NER models for educational content

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Unit VII: Question Generation using BERT or T5 and Automated Assessment using NLP, developing a question generation system

Unit VIII: Techniques for text summarisation: Extractive vs. abstractive summarisation, applications in creating study guides and reading comprehension tools

Unit IX: Basics of automatic speech recognition (ASR), Applications in language learning, accessibility, and lecture transcription, Challenges in ASR for educational content, Ethical Considerations in NLP for education, Bias and fairness in educational NLP models, Case discussions on ethical dilemmas in educational NLP

Reference Books:

1. Ian Goodfellow, Yoshua Bengio and Aaron Courville, "Deep Learning", MIT Press, 2016.
2. François Chollet, Deep Learning with Python, Manning Publications, 2017.
3. Josh Patterson and Adam Gibson. Deep Learning: A Practitioner's Approach. First edition, O'Reilly Media, Inc., 2017.
4. Gulli, Antonio. TensorFlow, Deep Learning Cookbook: Over 90 Unique Recipes to Solve Artificial-Intelligence Driven Problems with Python. Packt Publishing, 2017.
5. Nielsen, Michael A. Neural Networks and Deep Learning. , Determination Press (2018).

Resource:

https://www.coursera.org/specializations/deep-learning

Content Delivery Method

- Classroom lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

After completing the course, the students will be able to

CO1	Understand various problem statements, tasks, and solution approaches in NLP.
CO2	Implement and evaluate different NLP applications using machine learning and deep learning methods.
CO3	Evaluate algorithms and approaches for specific tasks, datasets, and stages of NLP products.
CO4	Enhance educational experiences, including personalised learning, automated assessment, and content generation.

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	**PO2**	**PO3**	**PSO1**	**PSO2**	**PSO3**

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CO1:	2		3	3		3
CO2:	2		3	3		3
CO3:	2		3	3		3
CO4:	2		3	3		3

Course code	PG/CWE/PE/T/124/A
Category	Program Elective – V
Course title	EDUCATIONAL DATA MINING
Scheme and Credits	L-T-P: 3-0-0; Credits: 3;
Pre-requisites (if any)	
Syllabus:	

Unit I: Introduction to Educational Data Mining [Learning Sciences, Learning Analytics, Intelligent Tutoring Systems, Statistics, Benefit to learners, teachers and course designers]

Unit II: Data mining models and techniques [Prediction methods, Classification, Regression, Structure discovery, Social network analysis and methods for education, Clustering; Factor analysis, data preprocessing and preparation; dimensionality control, Relationship mining, Association Rule Mining, Text analytics, Prescriptive analytics]

Unit III: Visualization tools for education [Learning curves, Heatmaps]

Unit IV: Knowledge discovery tool, Factor analysis, Q-matrices, Knowledge spaces

Unit V: Bayesian modelling [Bayesian Classifiers, Bayesian networks, and Bayesian knowledge tracing, Deep learning vs. Bayesian knowledge tracing, Dempster-Shafer theory in data mining]

Unit VI: Learning content analysis using R Language: Report generation in the context of educational data mining

Reference Books:
1. Hand, Mannila, and Smyth (2001) Principles of Data Mining, MIT Press
2. Goodfellow, Bengio, Courville, and Bengio (2016) Deep Learning, MIT Press
3. Romero, Ventura, Pechenizkiy, and Baker (2010) Handbook of Educational Data Mining
4. Burkov, Andriy (2019). "The Hundred-Page Machine Learning Book".
5. Theobald, Oliver (2017). Machine Learning for Absolute Beginners: A Plain English Introduction. Second edition, The author.
6. Geron, A. (2019) Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems. 2nd Edition, O'Reilly

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Media, Inc., Sebastopol.

Content Delivery Method

- Classroom lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

After completing the course, the students will be able to

CO1	Explore and analyse educational datasets to find patterns in educational data and create predictive models using machine learning, data mining, and statistics techniques.
CO2	Generate reports to interpret the learners' performance and the knowledge discovery results.
CO3	Evaluate and visualise different forms of digital learning content to understand learning activities and improve educational practice and research.
CO4	Familiarize with various machine learning algorithms used in data mining.

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1:	2		3	3		3
CO2:	2		3	3		3
CO3:	2		3	3		3
CO4:	2		3	3		3

Course code	PG/CWE/PE/T/124/B
Category	Program Elective – V
Course title	SOFT COMPUTING TECHNIQUES
Scheme and Credits	L-T-P: 3-0-0; Credits: 3;

Pre-requisites (if any)	

Syllabus:

Unit I: Introduction to Soft Computing: Concept of computing systems, Soft computing versus Hard computing, Characteristics and applications of Soft computing

Unit II: Fuzzy Logic: Introduction to Fuzzy Logic, Fuzzy sets and membership functions, Operations on Fuzzy sets, Fuzzy relations, rules, propositions, and inferences, Defuzzification techniques, Fuzzy logic controller design, and some Fuzzy logic applications

Unit III: Genetic Algorithms: Concept of Genetics and Evolution and its application to probabilistic search techniques, Basic GA framework and different GA architectures, GA operators, Encoding, Crossover, Selection, Mutation, etc., Solving single-objective optimisation problems using GAs

Unit IV: Multi-objective Optimization Problem Solving: Concept of multi-objective optimisation problems (MOOPs) and issues of solving them, Multi-Objective Evolutionary Algorithm (MOEA), Non-Pareto approaches to solve MOOPs, Pareto-based approaches to solve MOOPs, Some applications with MOEAs.

Reference Books:
1. M.e Mitchell, An Introduction to Genetic Algorithms, MIT Press, 2000.
2. D. E. Goldberg, Genetic Algorithms In Search, Optimization and Machine Learning, Pearson Education, 2002.
3. R. L. Haupt and Sue Ellen Haupt, Practical Genetic Algorithms, John Willey & Sons, 2002.
4. S. Rajasekaran, and G. A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logis and Genetic Algorithms: Synthesis, and Applications, Prentice Hall of India, 2007.
5. D. K. Pratihar, Soft Computing, Narosa, 2008.
6. J.-S. R. Jang, C.-T. Sun, and E. Mizutani, Neuro-Fuzzy and Soft Computing, PHI Learning, 2009.

Content Delivery Method
- Classroom lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

After completing the course, the students will be able to

CO1	Implement, evaluate, and compare solutions using different soft computing techniques to find the best solutions.
CO2	Determine the suitability of a soft computing approach for a specific problem.

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CO3	Develop a methodology to solve optimisation problems using fuzzy logic, genetic algorithms, and neural networks.
CO4	Comprehend evolutionary optimisation techniques such as Particle Swarm Optimization, ant colony optimisation, and Differential Evolution.

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1:	2		3	3		1
CO2:	2		3	3		1
CO3:	2		3	3		1
CO4:	2		3	3		1

Course code	PG/CWE/OE/T/125
Category	Open Elective
Course title	INFORMATION SECURITY AND PRIVACY
Scheme and Credits	L-T-P: 3-0-0; Credits: 3;
Pre-requisites (if any)	

Syllabus:

UNIT I: Core Information Security Principles, CIA (Confidentiality, Integrity, Availability), Information Security Management Governance, Security Policies, Procedures, Standards, Guidelines and Baselines, Organization Behavior and Security Models.

UNIT II: Classical Cryptography, Modern Cryptography, A Taxonomy of Cryptography and Cryptanalysis. Symmetric and Asymmetric key algorithms.

UNIT III: Information Risk Management – Concepts like Risk Acceptance, Risk Avoidance, Risk Mitigation, Risk Handling Strategies and Risk Assessment**,** Information Classification – Guidelines, Types, Criteria for Data Classification, Data Classification procedures, and Classification Controls.

UNIT IV: Threats, Vulnerabilities, Attack vectors, and their countermeasures; Identity Management—identification, Authorization, and Access Controls—categories, Models, Challenges, Principles, Techniques, and Practices; Concept of Trust and Trustworthiness.

UNIT V: Authentication Methods, Passwords, Biometrics, Challenge response-based

authentication, Two-Factor Authentication, Single Sign-On, and Web Cookies.

UNIT VI: Software Flaws, Malware, Operating System Security Functions, Trusted Operating System, Next Generation Secure Computing Base.

Unit VII: Importance of Data privacy; privacy rules; Data Protection—organization Roles. Approaches to protect sensitive data. Personally Identifiable Information and Sensitive Data. Data Privacy And Protection Responsibilities. Consequences Of Privacy Unawareness. Overview Of Global Data Privacy Laws. The DSCI Privacy Framework for global privacy best practices and frameworks.

UNIT VIII: Ethics – Basic Concepts, Professional Code of Ethics, Common Computer Ethics Fallacies (responsible disclosure), (cross reference SP/Professional Ethics / Accountability, responsibility and liability), Hacking and Hacktivism

Reference Books:

1. David Kim, Michael G. Solomon, Jones & Bartlett Learning, Fundamentals of Information Systems Security, Jones & Bartlett Learning, 2021
2. Mark Rhodes Ousley, Information Security: The Complete Reference, McGraw Hill, 2nd Edition, 2013
3. Mark Stamp, Information Security Principles and Practice, Wiley Publication, 3rd Edition, 2021
4. C. Warren Axelrod, Jennifer L. Bayuk, Daniel Schutzer, Enterprise Information Security and Privacy, Artech House Press, 2009
5. Hossein Bidgoli, Handbook of Information Security, Threats, Vulnerabilities, Prevention, Detection, and Management, John Wiley & Sons, 2006
6. Michael E. Whitman, Herbert J. Mattord, Principles of Information Security, Course Technology Press, 4th edition, 2011
7. Andy Taylor, David Alexander, Amanda Finch, David Sutton, Information Security Management Principles, 3rd edition, BCS, The Chartered Institute for IT Publishers, 2020.
8. David Sutton, Cyber Security: A practitioner's guide, BCS, The Chartered Institute for IT Publishers, 2017

Content Delivery Method
- Classroom lecture (chalk and board) (D1)
- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

After completing the course, the students will be able to

CO1	To understand the basic principles of Information Security & Privacy management.

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CO2	To understand the basic concepts of the technical components of implementing security & privacy.
CO3	To understand that ensuring information security & privacy in a modern organisation is a problem for the management to solve and not one that technology alone can address.
CO4	To analyze the important economic and commercial consequences of devising security and privacy solutions in an enterprise or the lack thereof.

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1:	2		3	3		
CO2:	2		3	3		
CO3:	2		3	3		
CO4:	2		3	3		

Course code	PG/CWE/P/121
Category	Laboratory 2
Course title	SMART CBT DESIGN LAB
Scheme and Credits	L-T-P: 0-0-4; Credits: 2;
Pre-requisites (if any)	
Syllabus:	
Unit I: Design and Development of a Computer Based Tutorial (CBT) of 30 minutes including 20 minutes of learning and 10 minutes of Interactivity to justify appropriate knowledge drilling.	
Unit 2: It includes story writing based on a selected topic, writing sample script, building story board with proper abbreviation and preparing media management catalogue.	
Unit 3: After completion of CBT the student has to submit a detailed report which consists of Story, Scripts, flow-line, Story board with proper abbreviation and a complete media management catalogue showing details of each media component used to prepare the	

Computer based tutorial along with the developed CBT.	
Reference Books:	
Content Delivery Method ● Visual presentation (D2) ● Tutorial (D3) ● Discussion (D7)	
Course Outcomes:	
After completing the course, the students will be able to	
CO1	Design the Work Plan.
CO2	Execute the work plan and adapt the course of action as per the progress of the same.
CO3	Prepare professional-level CBT presentation describing the Objectives, Target Audience, Human Computer Interaction requirements and Hardware and Software requirements. CBT should incorporate proper image, animation, audio, video, text and interactivity where applicable using preliminary knowledge taught in 1st Semester Classes.
CO4	Analyze knowledge drilling through experiments simulation/interactivity. To develop acceptable evidences through interactivity that show learners knowledge enhancement.

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1:	3	3	3	3	3	3
CO2:	3	3	3	3	3	3
CO3:	3	3	3	3	3	3
CO4:	3	3	3	3	3	3

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Course code	PG/CWE/P/122
Category	Mini project with report and seminar
Course title	Term Paper
Scheme and Credits	L-T-P: 0-0-6; Credits: 4;
Pre-requisites (if any)	

Syllabus:

Unit I: Entail the design and development of state-of-the-art topics identified during the 1st semester.

Unit II: A report based on the design and implementation from Unit I, followed by a formal presentation of the findings.

Reference Books:

Resources:
https://ieeexplore.ieee.org/Xplore/home.jsp
https://link.springer.com/
https://www.sciencedirect.com/

Content Delivery Method

- Visual presentation (D2)
- Tutorial (D3)
- Discussion (D7)

Course Outcomes:

After completing the course, the students will be able to

CO1	Design and develop the algorithm based on the research topic identified in the 1st Semester.
CO2	Prepare a report and deliver the presentation on the research topic as a PowerPoint presentation, which will form the baseline for the dissertation in the third and fourth semesters.
CO3	
CO4	

CO-PO Mapping (3 – Strong, 2 – Moderate and 1 – Weak)

	PO1	PO2	PO3	PSO1	PSO2	PSO3
CO1:	3	3	3	X	X	X

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CO2:	3	3	3	X	X	X
CO3:						
CO4:						

'X' denotes that the mapping will be done for each Term Paper.

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