

Bangalore University
University Visvesvaraya College of Engineering
K R Circle, Bengaluru -560001.

Semester: V

Artificial Intelligence and Machine Learning (CBCS-2021)

Sl. No.	Course Category	Course Code	Course Title	Teaching Dept.	Teaching Hours/ Week				Examination					Credits
					L	T	P	SS	Total Hrs/ Week	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1.	PC	21AIPC501	Game Theory											
2.	PC	21CCPC502	Computer Networks	CSE	02	02	-	-	04	03	50	50	100	03
3.	PC	21CCPC503	Database Management Systems	CSE	02	02	-	-	04	03	50	50	100	03
4.	PC	21AIPC504	Digital Image Processing	CSE	02	02	-	-	04	03	50	50	100	03
5.	PC	21AIPC505L	Digital Image Processing Laboratory	CSE	-	-	03	-	03	03	50	50	100	03
6.	PC	21CCPC506L	Database Management Systems Laboratory	CSE	-	-	03	-	03	03	50	50	100	01
7.	AE	21AIAE507	Data Analysis with Python	CSE	02	-	-	-	02	03	50	50	100	01
8.	HS	21CVHS508	Environmental Science	CIVIL	02	-	-	-	02	02	50	50	100	02
9.	IN	21CCIN509	Summer Internship- II	TPO /CSE	-	02	02	-	04	03	50	50	100	01
Total					12	08	06	-	26	26	450	450	900	20

Note: BS: Basic Science Course, PC: Professional Core Course, HS: Humanity and Social Science & Management Courses, AE: Ability Enhancement Courses, IN: Internship, CC: Common to All Branches, CI: CSE & ISE, IA: ISE & AI, CA: CSE & AI

L: Lecture, T: Tutorial, P: Practical/Drawing, S: Self Study, CIE: Continuous Internal Evaluation, SEE: Semester End Examination

Note: Internship - II to commence from vacation after 4th sem and to be evaluated in 5th sem (two weeks to four weeks internship)

Department of Computer Science and Engineering, UVCE, Bangalore University.

BANGALORE UNIVERSITY
Department of Computer Science and Engineering, UVCE, Bengaluru
Scheme and Syllabus - NEP - 2021

Course Title	GAME THEORY				
Course Code	21AIPC501				
Category	Professional Core Course				
Scheme and Credits	No. of Hours / Week				Credits
	L	T	P	SS	
	02	02	00	00	03
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 03 Hours

COURSE OBJECTIVES:

The course will enable the students to

1. Understand the Game Theory concept.
2. Apply various Game Theory strategies.
3. Analysis of pure and mixed strategies.
4. Evaluate Bargaining schemes.
5. Create techniques for profit maximization.

UNIT I:

Introduction: Introduction to Game Theory, Games and Solutions, Game Theory and the Theory of Competitive Equilibrium, Rational Behaviour, The Steady State and Deductive Interpretations, Bounded Rationality, Terminology and Notations. Strategic Games: Nash Equilibrium, Strategic Games, Nash Equilibrium Examples, Existence of a Nash Equilibrium, Strictly Competitive Games, Bayesian Games: Strategic Games with Imperfect Information. Mixed, Correlated, and Evolutionary Equilibrium: Mixed Strategy Nash Equilibrium, Interpretations of Mixed Strategy Nash Equilibrium, Correlated Equilibrium, Evolutionary Equilibrium. Rationalizability and Iterated Elimination of Dominated Actions: Rationalizability Iterated Elimination of Strictly Dominated Actions, Iterated Elimination of Weakly Dominated Actions.

10 Hours

UNIT II:

Extensive Games With Perfect Information: Extensive Games with Perfect Information, Extensive Games with Perfect Information, Subgame Perfect Equilibrium, Two Extensions of the Definition of a Game, The Interpretation of a Strategy, Two Notable Finite Horizon Games, Iterated Elimination of Weakly Dominated Strategies. Bargaining Games: Bargaining and Game Theory, A Bargaining Game of Alternating Offers Subgame Perfect Equilibrium, Variations and Extensions. Repeated Games: The Basic Idea, Infinitely Repeated Games vs. Finitely Repeated Games, Infinitely Repeated Games: Definitions, Strategies as Machines, Trigger Strategies: Nash Folk Theorems, Punishing for a Limited Length of Time: A Perfect Folk Theorem for the Limit of Means Criterion, Punishing the Punisher: A Perfect Folk Theorem for the Overtaking Criterion, Rewarding Players Who Punish: A Perfect Folk Theorem for, the Discounting Criterion The

10 Hours

Structure of Subgame Perfect Equilibria Under the Discounting Criterion, Finitely Repeated Games.

UNIT III:

Extensive Games With Imperfect Information: Extensive Games with Imperfect Information, Principles for the Equivalence of Extensive Games, Framing Effects and the Equivalence of Extensive Games, Mixed and Behavioral Strategies, Nash Equilibrium, Sequential Equilibrium: Strategies and Beliefs, Sequential Equilibrium, Games with Observable Actions: Perfect Bayesian Equilibrium, Refinements of Sequential Equilibrium, Trembling Hand Perfect Equilibrium.

10 Hours

UNIT IV:

Coalitional Games: The Core: Coalitional Games with Transferable Payoff, The Core, Non-emptiness of the Core Markets with Transferable Payoff, Coalitional Games without Transferable Payoff, Exchange Economies. Stable Sets, the Bargaining Set, and the Shapley Value: Two Approaches, The Stable Sets of Von Neumann and Morgenstern, The Bargaining Set, Kernel, and Nucleolus, The Shapley Value.

10 Hours

UNIT V:

Nash Solution: Bargaining Problems, The Nash Solution: Definition and Characterization, An Axiomatic Definition, The Nash Solution and the Bargaining Game of Alternating Offers, An Exact Implementation of the Nash Solution.

10 Hours

TEXT BOOKS:

1. Martin J. Osborne, An Introduction to Game Theory, "Oxford University Press" First Edition 2012
2. Presh Talwalkar, The Joy of Game Theory: An Introduction to Strategic Thinking Kindle Edition, 2013

REFERENCE BOOKS:

1. Ivan Pastine, Tuvana Pastine Introducing Game Theory: A Graphic Guide 2017
2. Saumitra Mukhopadhyay, Linear Programming with Game Theory, "Academic Publishers", 2017

e-BOOKS / ONLINE RESOURCES:

1. https://en.wikipedia.org/wiki/Game_theory
2. https://mathematicalolimpiads.files.wordpress.com/2012/08/martin_j-osborne-an_introduction_to_game_theory-oxford_university_press_usa2003.pdf
3. <https://www.phindia.com/Books/ShoweBooks/MTM3Mw/Game-Theory>

MOOCs:

1. <https://www.classcentral.com/tag/game-theory>
2. <https://www.youtube.com/user/gametheoryonline>
3. <https://oyc.yale.edu/economics/econ-159>
4. <https://nptel.ac.in/courses/110104063/>
5. <https://nptel.ac.in/courses/112106131/33>

COURSE OUTCOMES:

The students at the end of the course, will be able to

- CO1: Distinguish pure and mixed strategies.
 CO2: Determine the need for performance evaluation of games.
 CO3: Extrapolate extensive games.
 CO4: Validate coalition games.
 CO5: Develop techniques for Nash solution

SCHEME OF EXAMINATION:

CIE - 50 Marks			
Unit I, II & III		Unit IV & V	
Test I	AAT I	Test II	AAT II
20 Marks	05 Marks	20 Marks	05 Marks
SEE - 20 * 5 = 100 Marks (To be Scaled down to 50 Marks)			
There shall be 10 questions			
<ul style="list-style-type: none"> Two full questions to be set from each unit with internal choice. ✓ Minimum number of sub questions : 2 ✓ Maximum number of sub questions : 3 Each full question shall be for a maximum of 20 marks. Answer any Five full questions choosing at least One full question from each unit. 			

CO-GA MAPPING:

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	H			H	M							L
CO2	H			H	M							L
CO3	H				M							L
CO4		H		H	M							L
CO5	H	H			M							L

L - Low, M - Medium, H - High

BANGALORE UNIVERSITY Department of Computer Science and Engineering, UVCE, Bengaluru Scheme and Syllabus - NEP-2021

Course Title	COMPUTER NETWORKS					
Course Code	21CCPC502					
Category	Professional Core Course					
Scheme and Credits	No. of Hours / Week					
	L	T	P	SS	Credits	Semester – V CSE/ISE/AIML
	02	02	00	00	03	
CIE Marks: 50	SEE Marks: 50		Total Max. Marks: 100		Duration of SEE: 03 Hours	

COURSE OBJECTIVES:

The course will enable the students to

1. Get the idea of choosing the required functionality at each layer for a given application and trace the flow of information from one node to another node in the network.
2. Understand the division of network functionalities into layers.
3. Learn the component required to build different types of networks and identify the solution for the functionalities in each layer.
4. Learn the working and functions of various protocols of all the layers.
5. Design a basic web page.

UNIT I:

10 Hours

Physical Layer: Introduction, Uses of Computer Network, Network Hardware and Network Software, Reference Models. Physical Layer: Guided Transmission, Wireless Transmission, Digital Modulation and Multiplexing, Public Switched Telephone Network.

UNIT II:

10 Hours

Datalink Layer: Issues, Error Detection and Correction, Elementary Datalink Protocol, Sliding Window Protocol. Medium Access Control Sublayer: Channel Allocation Problem, Multiple Access Protocol, Ethernet, Datalink Layer Switching.

UNIT III:

10 Hours

Network Layer: Design Issues, Routing Algorithms, Congestion Control Algorithms, Quality of service, Internet working, Network layer in the Internet-IPv4, IPv6.

UNIT IV:

10 Hours

Transport Layer: Transport service, Elements of Transport Protocols, Congestion Control, Internet Transport Protocol- UDP, TCP.

UNIT V:

Application Layer: DNS, Electronic Mail, World Wide WEB.

10 Hours

TEXT BOOKS:

1. Computer Networks, Andrew S Tannenbaum and David J Wetherall, Pearson, 5th edition, 2014.
2. Behrouz A Forouzan, Data and Communications and Networking, Fifth Edition, McGraw Hill, Indian Edition, 2013.

REFERENCE BOOKS:

1. Larry L Peterson and Bruce S Davie, Computer Networks, fifth edition, ELSEVIER.
2. Computer Networking-A Top-Down approach, James F Kurose, Keith W Ross, 5th edition, Pearson, 2016.
3. Mayank Dave, Computer Networks, Second edition, Cengage Learning.

e-BOOKS/ONLINE RESOURCES:

1. <https://freecomputerbooks.com/networkComputerBooks.html>
2. <https://www.pdfdrive.com/computer-networking-books.html>

MOOCs:

1. <https://www.coursera.org/courses?query=computer%20network>
2. <https://www.quora.com/Which-is-the-online-course-to-learn-computer-networks>
3. <https://in.udacity.com/course/computer-networking--ud436>
4. <https://swayam.gov.in/courses/5172-computer-networks>

COURSE OUTCOMES:

The students at the end of the course, will be able to

- CO1: Analyze the need of for different protocols in data link layer and network layer of TCP/IP protocol suite.
- CO2: Design network using internetworking concepts and related protocol by analyzing the need for various routing protocols in different scenarios.
- CO3: Apply the various routing algorithms for effective communication and congestion control algorithms to manage the network traffic.
- CO4: Classify routers, IP and Routing Algorithms in network layer.
- CO5: Design a web page and acquire the knowledge of working of DNS and Email.

SCHEME OF EXAMINATION:

CIE - 50 Marks			
Unit I, II & III		Unit IV & V	
Test I	AAT I	Test II	AAT II
20 Marks	05 Marks	20 Marks	05 Marks
SEE - 20 * 5 = 100 Marks (To be Scaled down to 50 Marks)			
There shall be 10 questions			
<ul style="list-style-type: none"> • Two full questions to be set from each unit with internal choice. ✓ Minimum number of sub questions : 2 ✓ Maximum number of sub questions : 3 • Each full question shall be for a maximum of 20 marks. • Answer any Five full questions choosing at least One full question from each unit. 			

CO-GA MAPPING:

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	H	H	M	H	L	M	L	L	L	L	M	M
CO2	H	H	H	H	M	M	L	L	L	L	L	M
CO3	H	H	H	H	H	H	L	L	M	L	H	H
CO4	H	H	H	H	M	H	L	L	M	L	H	H
CO5	H	M	M	H	H	H	L	L	M	L	H	H

L – Low, M – Medium, H – High

BANGALORE UNIVERSITY
Department of Computer Science and Engineering, UVCE, Bengaluru
Scheme and Syllabus – NEP– 2021

DATABASE MANAGEMENT SYSTEMS						
Course Title	DATABASE MANAGEMENT SYSTEMS					
Course Code	21CCPC503					
Category	Professional Core Course					
Scheme and Credits	No. of Hours / Week					Semester – V CSE/ISE/AIML
	L	T	P	SS	Credits	
	02	02	00	00	03	
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 03 Hours	

COURSE OBJECTIVES:

The course will enable students to

1. Understand fundamental concepts, terminology and application of databases.
2. Discuss design concepts and creation of relational databases.
3. Acquire basic and advanced SQL commands.
4. Design overview of database programming and procedural languages.
5. Design transaction management, database recovery and security.

UNIT I:

10 Hours

Introduction: Introduction, Characteristics of Database approach, Advantages & disadvantages of using DBMS approach. Database System Concepts and Architecture: Data models, Schemas and instances, Three schema architecture and data independence, Database languages and interfaces, database system environment. Data Modelling using the Entity-Relationship(ER) model: Using High-Level conceptual Data Models for Database Design, A sample Database Application, Entity types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity-types, Refining the ER Design, ER Diagrams, Naming Conventions and Design Issues, Relationship Types of Degree Higher than Two, Database Design using ER-to Relational Mapping.

UNIT II:

10 Hours

Relational DBMS: Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions and Dealing with Constraint Violations. Relational Algebra: Unary Relational Operations, SELECT and PROJECT, Relational Algebra Operations from Set Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations.

UNIT III:

10 Hours

SQL: SQL Data Definition and Data Types specifying basic constraints in SQL, Basic retrieval queries in SQL, Insert, Delete and Update statements in SQL, Additional features of SQL, More complex SQL Queries, Specifying Constraints as Assertion and Trigger, Views.

UNIT IV:

Database Design Theory and Normalization: Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form, Multi-valued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form.

10 Hours

UNIT V:

Transaction Processing, Error Recovery, Data Storage and Indexes: Transaction processing and Error recovery - concepts of transaction processing, ACID properties, concurrency control, locking based protocols for CC, error recovery and logging, undo, redo, undo-redo logging and recovery methods. Data Storage and Indexes - file organizations, primary, secondary index structures, various index structures - hash-based, dynamic hashing techniques, multi-level indexes, B+ trees.

10 Hours

TEXT BOOKS:

1. Fundamental of Database Systems by Ramiz Elmasri and Shamkani B Navathe, Sixth Edition, Addison Wesley, 2011.
2. Database System Concepts, Sixth Edition, Abraham Silberschatz, Henry F., S. Sudarshan : Tata McGraw-Hill, 2010.

REFERENCE BOOKS:

1. An Introduction to Database Systems by C.J. Date, A. Kannan, S. Swamyathan, 8th Edition, Pearson Education, 2006.
2. Database Systems: The Complete Book, Second Edition, Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom, Pearson Education, 2001.

e-BOOKS/ONLINE RESOURCES:

1. Introduction to structured Query Language (SQL).
2. <https://cs.uwaterloo.ca/~tozsu/courses/CS338/lectures/4%20Basic%20SQL.pdf>.
3. An Introduction to Relational Database: www.cis.gsu.edu/dmcdonald/cis3730/SQL.pdf.
4. DBMS by Raghu Ramakrishnan: https://www.academia.edu/.../Ramakrishnan_Raghu.

MOOCs:

1. http://nptel.ac.in/courses/IIT-MADRAS/Intro_to_Database_Systems_Design.
2. <http://www.iitg.ernet.in/awekar/teaching/cs344fall11/>.
3. www.w3schools.com/sql/.

COURSE OUTCOMES:

- The students at the end of the course, will be able to
- CO1: Understand basic concepts of Database Management System.
 - CO2: Design ER-Diagram for real world applications using database concepts.
 - CO3: Formulate relational algebraic expressions using relational model concepts.
 - CO4: Implement SQL queries using relational model concepts.
 - CO5: Analyse and apply normalization concept for relational schema.
 - CO6: Analyse transaction processing and concurrency control techniques.

SCHEME OF EXAMINATION:

CIE - 50 Marks			
Unit I, II & III		Unit IV & V	
Test I	AAT I	Test II	AAT II
20 Marks	05 Marks	20 Marks	05 Marks
SEE - 20 * 5 = 100 Marks (To be Scaled down to 50 Marks)			
<p>There shall be 10 questions</p> <ul style="list-style-type: none"> Two full questions to be set from each unit with internal choice. Minimum number of sub questions : 2 Maximum number of sub questions : 3 Each full question shall be for a maximum of 20 marks. Answer any Five full questions choosing at least One full question from each unit. 			

CO-GA MAPPING:

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	H											
CO2	H		H								M	
CO3			H									
CO4		M	H									
CO5			H								M	

L - Low, M - Medium, H - High

BANGALORE UNIVERSITY Department of Computer Science and Engineering, UVCE, Bengaluru. Scheme and Syllabus - NEP - 2021

Course Title	DIGITAL IMAGE PROCESSING					
Course Code	21AIPC504					
Category	Professional Core Course					
Scheme and Credits	No. of Hours / Week					Semester – V AIML
	L	T	P	SS	Credits	
	02	02	00	00	03	
CIE Marks: 50	SEE Marks: 50		Total Max. Marks: 100		Duration of SEE: 03 Hours	

COURSE OBJECTIVES:

The course will enable the students to

- Define the fundamental concepts in image processing.
- Evaluate techniques followed in image enhancements in spatial domain.
- Compare spatial and frequency domain enhancement techniques.
- Illustrate image segmentation.
- Implement Image compression algorithms.

UNIT I:

10 Hours

Introduction: Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Image Sampling and Quantization, Some Basic Relationships Between Pixels, Applications of Image Processing: Medical imaging, Robot vision, Character recognition, Remote Sensing.

UNIT II:

10 Hours

Image Enhancement in The Spatial Domain: Some Basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

UNIT III:

10 Hours

Image Enhancement in Frequency Domain: Introduction to Fourier Transform and the Frequency Domain, Smoothing Frequency Domain Filters, Sharpening Frequency Domain Filters, Homomorphic Filtering.

UNIT IV:

10 Hours

Image Segmentation: Detection of Discontinuities, Edge linking and Boundary Detection, Thresholding, Region-Based Segmentation.

UNIT V:

Image Compression: Fundamentals, Image Compression Models, Elements of Information Theory, Error-Free Compression, Lossy Compression, Image Compression Standards.

Note: The concepts in all 5 units to be supported by Example Programs.

TEXT BOOKS:

1. Rafael C G., Woods R E. and Eddins S L, Digital Image Processing, Prentice Hall, 3rd edition, 2008.
2. Fundamentals of Digital Image Processing- Anil K. Jain, 2nd Edition, Prentice Hall of India.

REFERENCE BOOKS:

1. Milan Sonka, "Image Processing, Analysis and Machine Vision", Thomson Press India Ltd, 4th Edition.
2. S. Jayaraman, S Esakkirajan, T Veerakumar, Digital Image Processing, TMH, 2015.

BOOKS/ONLINE RESOURCES:

1. Digital Image Processing by Rafael C. Gonzalez & Richard E. Woods, Third Edition, Pearson Education, 2009.

MOOCs:

1. <http://www.nptelvideos.in/2012/12/digital-image-processing.html>
2. http://in.mathworks.com/discovery/digital-image-processing.html?s_tid=srchtitle

COURSE OUTCOMES:

The students at the end of the course, will be able to

- CO1: Ability to understand fundamentals of digital image processing and its applications
- CO2: Ability to apply spatial domain, frequency domain and filtering techniques for image Enhancement.
- CO3: Ability to analyze various noise models.
- CO4: Ability to conduct practical experiments on basic operations, filtering and various transformations on images.
- CO5: Ability to design and develop Image Processing system for real-world applications.

SCHEME OF EXAMINATION:

CIE - 50 Marks			
Unit I, II & III		Unit IV & V	
Test I	AAT I	Test II	AAT II
20 Marks	05 Marks	20 Marks	05 Marks
SEE - 20 * 5 = 100 Marks (To be Scaled down to 50 Marks)			
There shall be 10 questions			
• Two full questions to be set from each unit with internal choice.			
✓ Minimum number of sub questions : 2			
✓ Maximum number of sub questions : 3			
• Each full question shall be for a maximum of 20 marks.			
• Answer any Five full questions choosing at least One full question from each unit.			

CO-GA MAPPING:

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	H					M		H				
CO2				H								
CO3	M	H	M							H		
CO4	M	H				H		L				
CO5											M	

L - Low, M - Medium, H - High

BANGALORE UNIVERSITY
Department of Computer Science and Engineering, UVCE, Bengaluru.
 Scheme and Syllabus - NEP - 2021

Course Title	DIGITAL IMAGE PROCESSING LABORATORY				
Course Code	21AIPC505L				
Category	Professional Core Course				
Scheme and Credits	No. of Hours / Week				Semester – V AIMA
	L	T	P	SS	
	00	00	03	00	
CIE Marks: 50		SEE Marks: 50		Total Max. Marks: 100	Duration of SEE: 03 Hours

COURSE OBJECTIVES:

The course will enable the students to

1. Analyze solutions for multidisciplinary image process.
2. Apply the knowledge of mathematics in Digital Image Processing.
3. Design to provide fundamentals of image enhancement using various domains.
4. Implement the techniques of image segmentation and compression.
5. To exhibit professionalism, communication skills and adapt to current trends by engaging in lifelong learning.

List of Programs to Execute Using Matlab/Python Platform

1. Program to display an image as grayscale image, RED image, GREEN image, BLUE image and also display the 1D convolution & 2D convolution on an image.
2. Program to perform the basic arithmetic and logical operations on the images.
3. Execute the following Gray level transformations on the given image: Negative transformation, Log Transformation, Power law transformation and Contrast stretching.
4. Program to perform Bit plane slicing.
5. Program for image enhancement using Histogram equalization.
6. Program for smoothing an image using low pass filter and high pass filter in frequency domain.
7. Write a program to perform low pass filtering and high pass filtering on an image in spatial domain.
8. Program to observe the effect of median filter on an image corrupted by salt and pepper method.
9. Program to show image enhancement using various filters like 'SOBEL', 'PREWITT', & 'LAPLACIAN'.
10. Program to sharpen an image using 2-D Laplacian high pass filter in spatial domain.
11. Program for morphological image operations- erosion, dilation, opening and closing.
12. Program for Image segmentation.
13. Program for Image watermarking.
14. Program for Image restoration.
15. Program for Image compression using Block truncation coding.

16. Program for Edge detection.

e-BOOKS/ONLINE RESOURCES:

1. <https://www.geeksforgeeks.org/digital-image-processing-basics/?ref=llp>
2. <https://www.mygreatlearning.com/academy/learn-for-free/courses/digital-image-processing>
3. https://onlinecourses.nptel.ac.in/noc21_ec78/preview

MOOCs:

1. <https://mooc.es/course/digital-image-processing/>
2. <https://www.my-mooc.com/en/mooc/digital/>
3. <https://mooc.es/course/fundamentals-of-digital-image-and-video-processing/>

COURSE OUTCOMES

The students at the end of the course will be able to:

- CO1: Understand foundations and applications of digital image processing.
 CO2: Analyze calculations for image enhancement in various areas.
 CO3: Design using various domains and filtering techniques for image enhancement.
 CO4: Capability to develop practical trials on various operations on image process.
 CO5: Apply skills to design images of different dimensions for applications.

SCHEME OF EXAMINATION:

CIE - 50 Marks	Continuous evaluation	- 20 Marks
	Test at the end of the semester	- 20 Marks
	Viva voce	- 10 Marks
SEE - 100 Marks (To be Scaled down to 50 Marks)	Write up	- 20 Marks
	Execution & Calculation	- 60 Marks
	Viva Voce	- 20 Marks

SEE: The Candidate shall write and execute ONE complete programs.

CO-GA MAPPING:

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	H			L								L
CO2	H			L	M							
CO3	H	H										L
CO4	H	H			M							L
CO5	H	H		H	M							

L – Low, M – Medium, H – High

BANGALORE UNIVERSITY
Department of Computer Science and Engineering, UVCE, Bengaluru.
Scheme and Syllabus - NEP - 2021

Department of Computer Science & Engineering Scheme and Syllabus - 2021						
DATABASE MANAGEMENT SYSTEMS LABORATORY						
Course Title	21CCPC506L					
Course Code	Professional Core Course					
Category	No. of Hours / Week					Semester - V CSE/ISE/AIML
Scheme and Credits	L	T	P	SS	Credits	
	00	00	03	00	01	
	Duration of SEE: 03 Hours					
CIE Marks: 50	SEE Marks: 50		Total Max. Marks: 100			

COURSE OBJECTIVES:

The course will enable the students to

1. Apply the specification of Structured Query Language (SQL) for database creation and manipulation.
2. Design the ER Diagram and apply ER-mapping rules.
3. Apply the working of different concepts of DBMS.
4. Implement and test the database developed for applications.
5. Demonstrate GUI for database usage.

PART-A: SQL PROGRAMMING:

- Design, develop, and implement the specified queries for the following problems using Oracle, MySQL, PL/SQL, Postgre SQL, MS SQL Server, or any other DBMS under LINUX/Windows environment.
- Create Schema and insert at least 5 records for each table. Add appropriate database constraints.

PART-B: MINI PROJECT:

- Use Java, PHP, Python, or any other similar front-end tool.
- All applications must be demonstrated on desktop/laptop as a stand-alone or web based application (Mobile apps on Android/iOS are not permitted).

PART-A: SQL PROGRAMMING

1. Library Database:

Consider the following schema for a Library Database:

BOOK(Book_id, Title, Publisher_Name, Pub_Year)

BOOK_AUTHORS(Book_id, Author_Name)

PUBLISHER(Pub_id, Name, Address, Phone)

BOOK_COPIES(Book_id, Branch_id, No-of_Copies)

BOOK_LENDING(Book_id, Branch_id, Card_No, Date_Out, Due_Date)

LIBRARY_BRANCH(Branch_id, Branch_Name, Address)

Write SQL queries to:

1. Retrieve details of all books in the library: id, title, name of publisher, authors, number of copies in each branch, etc.
2. Get the particulars of borrowers who have borrowed more than 3 books from Jan 2019 to Jun 2019.
3. Delete a book in BOOK table and Update the contents of other tables to reflect this data manipulation operation.
4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.
5. Create a view of all books and its number of copies that are currently available in the Library.

2. Sales_Order Database

Consider the following schema for Sales_Order Database:

SALESMAN(Salesman_id, Name, City, Commission)

CUSTOMER(Customer_id, Cust_Name, City, Grade, Salesman_id)

ORDERS(Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id)

Write SQL queries to:

1. Count the customers with grades above Bangalore's average.
2. Find the name and numbers of all salesman who had more than one customer.
3. List all the salesman and indicate those who have and don't have customers in their cities (Use UNION operation.)
4. Create a view that finds the salesman who has the customer with the highest order of a day.
5. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted

3. Movie Database:

Consider the following schema for Movie Database:

ACTOR(Act_id, Act_Name, Act_Gender)

DIRECTOR(Dir_id, Dir_Name, Dir_Phone)

MOVIES(Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id)

MOVIE_CAST(Act_id, Mov_id, Role)

RATING(Mov_id, Rev_Stars)

Write SQL queries to:

1. List the titles of all movies directed by 'ABCD'.
2. Find the movie names where one or more actors acted in two or more movies.
3. List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation).

- Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title.
- Update rating of all movies directed by 'XYZ' to 5.

4. College Database

Consider the schema for College Database:

STUDENT(USN, SName, Address, Phone, Gender)

SEMSEC(SSID, Sem, Sec)

CLASS(USN, SSID)

SUBJECT(Subcode, Title, Sem, Credits)

IA-MARKS(USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)

Write SQL queries to:

- List all the student details studying in fourth semester 'C' section.
- Compute the total number of male and female students in each semester and in each section.
- Create a view of Test1 Marks of student USN '11XX1234' in all subjects.
- Calculate the FinalIA (average of best two test Marks) and update the corresponding table for all students.
- Categorize students based on the following criterion:
If FinalIA = 17 to 20 then CAT = 'Outstanding'
If FinalIA = 12 to 16 then CAT = 'Average'
If FinalIA < 12 then CAT = 'Weak'
Give these details only for 8th semester A, B, and C section students.

5. Company Database

Consider the schema for Company Database:

EMPLOYEE(SSN, Name, Address, Sex, Salary, SuperSSN, DNo)

DEPARTMENT(DNo, DName, MgrSSN, MgrStartDate)

LOCATION(DNo, DLoc)

PROJECT(PNo, PName, PLocation, DNo)

WORKS_ON(SSN, PNo, Hours)

Write SQL queries to:

- Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.
- Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise.
- Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department

- Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator).
- For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs.6,00,000.

PART B: MINI PROJECT

- For any problem selected, write the ER Diagram, apply ER-mapping rules, normalize the relations, and follow the application development process.
- Make sure that the application should have five or more tables, at least one trigger and one stored procedure, using suitable frontend tool.
- Indicative areas include; health care, education, industry, transport, supply chain, etc.

COURSE OUTCOMES:

The students at the end of the course, will be able to

- CO1: Use Structured Query Language (SQL) for database creation and manipulation.
CO2: Design the ER Diagram and apply ER-mapping rules.
CO3: Demonstrate the working of different concepts of DBMS.
CO4: Implement and test the database developed for applications.
CO5: Demonstrate GUI for database usage.

SCHEME OF EXAMINATION:

CIE - 50 Marks	Continuous evaluation	- 20 Marks
	Test at the end of the semester	- 20 Marks
	Viva voce	- 10 Marks
SEE - 100 Marks (To be Scaled down to 50 Marks)	Write up	- 20 Marks
	Execution & Calculation	- 60 Marks
	Viva Voce	- 20 Marks

SEE: The Candidate shall write and execute ONE complete program in SEE.

CO-GA MAPPING

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	H	M	L									
CO2	H	M		M	H							
CO3			H		M							L
CO4	H	H	M									L
CO5	H	H	M									L

L - Low, M - Medium, H - High

BANGALORE UNIVERSITY
Department of Computer Science and Engineering, UVCE, Bengaluru.
 Scheme and Syllabus - NEP - 2021

Course Title	DATA ANALYSIS WITH PYTHON				
Course Code	21AIAES07				
Category	Ability Enhancement Course				
Scheme and Credits	No. of Hours / Week				Semester - V AIML
	L	T	P	SS	
	02	00	00	00	02
CIE Marks: 50	SEE Marks: 50		Total Max. Marks: 100		Duration of SEE: 03 Hours

COURSE OBJECTIVES:

The course will enable the students to

1. Understand the various concepts of Python, IPython and Jupyter Notebooks.
2. Learn the NumPy basics, Arrays and vectorized computation of NumPy.
3. Familiarize with the working of Pandas
4. various Data loading, storage and file formats.
5. Learn the various Data cleaning and preparation.

UNIT I:

03 Hours

Python language basics, IPython and Jupyter Notebooks: The python interpreter, IPython basics, running the IPython shell, running the Jupyter notebook, tab completion, introspection, Python language basics, language semantics, scalar types, control flow. **Built-in data structures, functions and files:** Data structures and sequences, tuple, list, dictionary, set, built-in sequence functions, list, set and dictionary comprehensions, functions, files and the operating system.

UNIT II:

03 Hours

NumPy basics: Arrays and vectorized computation: the NumPy ndarray: A multidimensional array object, creating ndarrays, data types for ndarrays, arithmetic with NumPy arrays, basic indexing and slicing, Boolean indexing, fancy indexing, transposing arrays and swapping axes. Pseudorandom number generation, Universal functions: fast element-wise array functions, Array-oriented programming with arrays. File input and output with arrays. Linear algebra, example: Random walks, simulating many Random walks at once.

UNIT III:

03 Hours

Getting started with Pandas: Introduction to Pandas : Data structures, series, data frame, index objects, essential functionality, reindexing, dropping entries from an axis, indexing, selection, and filtering, arithmetic and data alignment, function application and mapping, sorting and ranking, axis indexes with duplicate labels, summarizing and computing descriptive statistics, correlation and covariance, unique values value counts and membership.

UNIT IV:

03 Hours

Data loading, storage and file formats: reading and writing data in text format, reading text files

in pieces, writing data to text format, working with other delimited formats, JSON data, XML and HTML: Web scraping, binary data formats, reading Microsoft excel files, using HDFS format, interacting with web APIs, interacting with databases.

UNIT V:

Data cleaning and preparation: Handling missing data, filtering out missing data, filling in missing data, data transformation, removing duplicates, transforming data using a function or mapping, replacing values, renaming axis indexes, discretization and binning, detecting and filtering outliers, permutation and random sampling, computing indicator/dummy variables, extension data types, string manipulation, python built-in string object methods, regular expressions, string functions in pandas, categorical data, background and motivation, categorical extension type in pandas, computations with categorical, categorical methods.

03 Hours

TEXT BOOKS:

1. Python for Data Analysis, Wes McKinney, 2014, O'Reilly.

REFERENCE BOOKS:

1. Swaroop C H. (2003). A Byte of Python. Python tutorial.
2. Cathy Tanimura, SQL For Data Analysis, O'Reilly.
3. Akash Tandon, Sandy ryza, Uri laserson, Sean Owen and josh wills, Advanced Analytics with Pyspark.

e-BOOKS/ONLINE RESOURCES:

1. http://en.wikipedia.org/wiki/Data_analysis
2. <http://www.inf.unibz.it/dis/teaching/DWDM/slides/dw1.pdf>
3. <https://repo.palkeo.com/algo/informationretrieval/Data%20mining%20and%20analysis.pdf>

MOOCs:

1. https://www.coursera.org/specializations/jhu-data-science?siteID=OyHlmBp2G0c-0328ZKV34mF3.yMgOBpdWA&utm_content=2&utm_medium=partners&utm_source=linkshare&utm_campaign=OyHlmBp2G0c
2. https://www.thisismetis.com/courses/introduction-to-data-science?utm_source=LDS&utm_medium=affiliate&utm_campaign=LDS2019affiliate
3. <https://www.udemy.com/python-for-data-science-and-machine-learning-bootcamp/?ranMID=39197&ranEAID=OyHlmBp2G0c&ranSiteID=OyHlmBp2G0c-wgJMi8qQiA2u1hpioHWhbQ&LSNPUBID=OyHlmBp2G0c>
4. https://www.datacamp.com/?tap_a=5644-dce66f&tap_s=97692-82206a

COURSE OUTCOMES:

- The students at the end of the course, will be able to
- CO1: Demonstrate the basic concepts of Python, IPython and Jupyter notebooks.
 - CO2: Discuss the NumPy basics: Arrays and vectorized computation and apply various techniques for Data Analysis.
 - CO3: Familiarize with the concepts of Pandas and its essential functionalities.
 - CO4: Apply Data loading, storage and file formats available to perform Data Analysis.
 - CO5: Demonstrate Data cleaning and preparation techniques and computations with categorical.

SCHEME OF EXAMINATION:

CIE - 50 Marks			
Unit I, II & III		Unit IV & V	
Test I	AAT I	Test II	AAT II
20 Marks	05 Marks	20 Marks	05 Marks
SEE - 20 * 5 = 100 Marks (To be Scaled down to 50 Marks)			
There shall be 10 questions			
<ul style="list-style-type: none"> Two full questions to be set from each unit with internal choice. ✓ Minimum number of sub questions : 2 ✓ Maximum number of sub questions : 3 Each full question shall be for a maximum of 20 marks. Answer any Five full questions choosing at least One full question from each unit. 			

CO-GA MAPPING:

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	L											
CO2	H	H										
CO3	H				M						M	
CO4	H	H	H									
CO5	H	H										

L - Low, M - Medium, H - High

BANGALORE UNIVERSITY
Department of Computer Science and Engineering, UVCE, Bengaluru.
Scheme and Syllabus - NEP - 2021

Course Title	ENVIRONMNETAL SCIENCE					
Course Code	21CVHS508					
Category	Humanity and Social Science & Management Courses					
Scheme and Credits	No. of Hours / Week					Semester – V CSE/ISE/AIIML
	L	T	P	SS	Credits	
	02	00	00	00	01	
CIE Marks: 50	SEE Marks: 50		Total Max. Marks: 100		Duration of SEE: 02 Hours	
Prerequisites (if any): NIL						

COURSE OBJECTIVES:

The Course will enable the students to

1. Gives better understanding about environment and their importance.
2. Gives information about renewable and non-renewable resources.
3. Helps in understanding the ecosystem.
4. Helps to understand the consequences of environmental pollution.
5. To understand about disaster management.

5 Hours

UNIT I:

The multidisciplinary nature of Environment studies: Definition, Scope and importance of environment, Need for public awareness.

5 Hours

UNIT II:

Natural Resources: Renewable and Non-renewable resources, Natural Resources and Associated problems

- a. Forest resources: Use and over exploitation, Deforestation, Case studies, Timber Extraction, Forest management.
- b. Water resources: Use and over utilization of surface and ground water, floods, Drought. Conflicts over water, Dams, Benefits and problems.
- c. Energy resources: Growing energy needs, renewable and non-renewable energy sources, Use of alternate energy sources. Case studies.
- d. Role of an individual in conservation of natural resources.
- e. Equitable use of resources for sustainable lifestyles.

5 Hours

UNIT III:

Fundamentals of Ecology: Introduction and Scope: Concept of an ecosystem. Structure and function of an ecosystem. -Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids.

UNIT IV:

Types Of Ecosystem: Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

5 Hours

UNIT V:

Environmental Pollution: Definition, Causes, effects, and control measures of: Air pollution, Water pollution, Soil pollution, Noise pollution. Solid waste management; Causes, effects and control measures of urban and industrial wastes, Wasteland reclamation. Role of an individual in prevention of pollution. Pollution case studies, Disaster management: floods, earthquake, cyclone, droughts, tsunami and landslides.

5 Hours

REFERENCE BOOKS:

1. J P Sharma, Environmental Studies 3rd edition. University Science Press, New Delhi, 2009
2. R. Rajagopalan - Environmental Studies 2nd edition. Oxford University Press, 2011.
3. Alok Dehi, Environmental Science and Engineering, 2nd edition, Universities Press, 2012.
4. Erach Bharucha, Environmental Studies 2nd edition, Universities Press, 2013

COURSE OUTCOMES:

The students at the end of the course, will be able to

CO1: Ability to reduce and control air, water and noise pollution.

CO2: Ability to understand individual ecosystem

CO3: Ability to manage natural disasters.

CO4: Ability to ascertain natural resources and their scarcity,

CO5: Causes, effects and control measures of urban and industrial wastes, Wasteland.

SCHEME OF EXAMINATION:

CIE - 50 Marks			
Unit I, II & III		Unit IV & V	
Test I	AAT I	Test II	AAT II
20 Marks	05 Marks	20 Marks	05 Marks
SEE - 20 * 5 = 100 Marks (To be Scaled down to 50 Marks)			
There shall be 10 questions			
<ul style="list-style-type: none"> Two full questions to be set from each unit with internal choice. Minimum number of sub questions : 2 Maximum number of sub questions : 3 Each full question shall be for a maximum of 20 marks. Answer any Five full questions choosing at least One full question from each unit. 			

Department of Computer Science and Engineering, UVCE, Bengaluru.
Scheme and Syllabus - NEP - 2021

Course Title	SUMMER INTERSHIP-II						Engineering, UVCE, Bengaluru. Syllabus - NEP - 2021
Course Code	21CCIN509						
Category	Internship						
Scheme and Credits	No. of Hours / Week						
	L	T	P	SS	Credits	Semester - V CSE/ISE/AIML	
CIE Marks: 50	00	02	02	00	03		
SEE Marks: 50		Total Max. Marks: 100			Duration of SEE: 02 Hours		
Prerequisites (if any): NIL							

COURSE OBJECTIVES:

Course will enable the student to

COURSE OBJECTIVES:

The course will enable the students:

1. To facilitate an understanding of the issues that confronts the vulnerable / marginalized sections of the society.
2. To initiate team processes with the student groups for societal change.
3. To provide students an opportunity to familiarize themselves with urban / rural community they live in.
4. To enable students to engage in the development of the community.
5. To plan activities based on the focused groups.
6. To know the ways of transforming the society through systematic programme implementation.
7. Explore career alternatives prior to graduation.
8. Integrate theory and practice.
9. Assess interests and abilities in their field of study.
10. Learn to appreciate work and its function towards future.
11. Develop work habits and attitudes necessary for job success.
12. Develop communication, interpersonal and other critical skills in the future job.
13. Build a record of work experience.
14. Acquire employment contacts leading directly to a full-time job following graduation from college.
15. Acquire additional skills required for world of work.

COURSE CONTENT**GUIDELINES:**

Internship is a programme in which during the intervening period in V semesters Innovation / Entrepreneurship/ Societal based Internship.

1. To be carried out during the vacation after the IV semester and before the commencement of the V semester for duration of 4 to 8 weeks students are permitted to take Summer

Internship-II at Central Excellences/Studies established in the same institute and / or out of the institute including companies.

2. A University examination shall be conducted during the V semester and the prescribed credit shall be included in the V semester.
3. During the intervening period of IV and V semesters, students shall be ready for industrial experience. Therefore, they shall choose to undergo Internship-II involving Innovation Entrepreneurship/Societal related activities.
4. Students may choose to work on innovation or entrepreneurial activities or both resulting in start-up or undergo internship with industry/ NGO's/ Government organizations/ Micro/ Small/ Medium enterprises to make themselves ready for the industry.
5. In case students want to undergo summer internship-II at his/her family business, he /she shall be permitted provided; a declaration by a parent is submitted directly to the principal of the institution.
6. With the consent of the internship guide and Principal of the institution, students shall be allowed to carry out the internship at their hometown (within and outside the state), provided favourable facilities are available.
7. In case, students wish to take both Innovation, and Entrepreneurship internship, they shall be permitted to take up both. Summer Internship - II period, in such cases, can extend marginally by few days, provided it will not interfere with the academic calendar of higher semester.

COURSE OUTCOMES:

The students at the end of the course, will be able to

- CO1: Apply appropriate workplace behaviors in a professional setting.
 CO2: Demonstrate content knowledge appropriate to job assignment.
 CO3: Exhibit evidence of increased content knowledge gained through practical experience.
 CO4: Describe the nature and function of the organization in which the internship experience takes place.
 CO5: Explain how the internship placement site fits into a broader career field.
 CO6: Evaluate the internship experience in terms of personal, educational and career needs.

SCHEME OF EXAMINATION

Each faculty member is to be assigned 2 to 3 batches of students each batch may have 4 or 5 students. The assessment is to be conducted for 50 marks for CIE and 100 Marks for SEE and reduced to 50 marks to be incorporated in the result. Internship Seminars has to be presented once in 15 days with the concern of the respective Guide/s, Coordinator and Chairperson about the progress of the Summer Internship -II.

For CIE the weightings shall be

Sl. No.	Particulars	Weightage	Total marks of CIE
1.	Topic of internship		50
2.	Objectives of internship	10%	
3.	Specific skills acquired	10%	
4.	Documentation	20%	
5.	Presentation	40%	
		20%	
Total		100%	

Each student is required to maintain an individual logbook, where he/she is supposed to record day to day activities. The Internship-II is assessed on an individual basis, thus allowing for individual members within groups to be assessed this way. The assessment will take into consideration the individual student's involvement in the assigned work.

Rubrics for SEE:

Sl. No.	Particulars	Weightage	Total marks of SEE
1.	Topic of internship	10%	100 To be reduced to 50
2.	Objectives of internship	10%	
3.	Specific skills acquired (Write up about in Internship)	20%	
4.	Presentation	40%	
5.	Viva-Voce	20%	
Total		100%	

CO-GA MAPPING:

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	H	H	H									H
CO2	H	H	M									M
CO3	H	H	M									M
CO4	H	H	M									H
CO5	H	H	H									H

L - Low, M - Medium, H -High