

Course Code : CSE-4805

Course Title : Social, Professional and Ethical Issues in Computing

Credit Hours: 2

Contact Hours: 2 per week

Year/Semester: Four/Eight

Type: Optional

[Prerequisite courses: None]

Rationale:

The purpose of this course is to introduce the concept of engineering ethics and impact on society.

Course Objectives:

The main objectives of this course are:

1. Identify areas of society where information technology has had a substantial impact and where its effects may be of concern.
2. Appreciate how different perspectives can contribute to making choices about the development and use of computing technology.
3. Appreciate the legal and social issues associated with the use of computers in organizations and computer crime.
4. Critically assess the concepts, theories and issues in recent public debates about technology and society and develop a personal position.

Course Outcomes (COs):

After completion of this course students will be able to:

CO 1	Understand, identify, and apply different ethical philosophies, frameworks, and methodologies. The goal is for students to be able to address ethical dilemmas with reasoned arguments, grounded in a combination of these ethical theories.
CO 2	Identify and interpret the codes of professional conduct relating to the disciplines of computer science and software engineering such as ACM Code of Ethics. We will also learn how we can use these in our daily practice.
CO 3	Analyze the local and global impact of computing on individuals, organizations, and society. Students will be able to discuss key concepts in a digital society including issues of copyright, privacy, personal freedom, computer crimes and new legal issues as well as advances in medicine, telecommunications and education.
CO 4	Understand and apply the concepts and principles of moral thinking to problems relating to computing and digital technologies.

Course Content

Section-A (Mid-term: 30 Marks)

1. Introduction: History of computer hardware, software, networking; Overview of Technological Change; Impact of information technology on some sectors (Education, Industry, Business, Health/ Medicine).
2. Privacy and personal information: Definition of privacy. How does computer technology effect privacy? To what moral problems does this lead? Ethical and legal basis for privacy protection; Privacy implications of database systems; Technological strategies for privacy protection;

3. Cyber Laws: UNCITRAL model law, ICT Act 2006 in Bangladesh, Pornography Control Act 2012, Freedom of expression in cyberspace, Offensive speech and censorship in cyberspace Anonymity, Spam etc.

Section-B (Final Exam: 50 Marks) Group-A (20 Marks)

4. Computer & Software Reliability: How liability is determined when computer hardware and software fails? Responsibility vs. Liability vs. Accountability; Some historical examples of software risks (such as the Therac-25 case)
5. Intellectual Property: What is intellectual property? Copyrights, patents, and trade secrets; Software piracy; Software patents; Free software, What is fair use?

Group-B (30 Marks)

6. Computer Crime: History and examples of computer crime; “Cracking” (“hacking”) and its effects; Viruses, worms, and Trojan horses; Online scams, Identity theft; moral issues related to these crimes.
7. Computer and Work: Impact of employment, work environment, Employee monitoring, Health issues
8. Professional Ethics and responsibilities: What is Ethics? What is Computer ethics, Some ethical guidelines for computer professionals, Examine and discuss professional codes of ethics, conduct, and practice (IEEE, ACM, SE, AITP, and so forth).

Recommended Books:

1. Sara Baase: A gift of fire, 2/e, Pearson Education Inc., 2003.
2. Michael A Gallo & Robert B. Nenno: Computer and society 2/e, McGraw-Hill, 1997.

Teaching Strategy:

Text Book, Presentation Slides, Case study, Problem Solving.

Assessment Strategy:

	Items	%
1	Class attendance and class participation	10%
2	Presentation	10%
3	Midterm exam	30%
4	Final exam	50%
	Total	100%

Course Code: URBS-4802		Course Title: Bangladesh Studies	
Credits: 2 CH		Contacts: 2 CH	
Course Assessments	CIE: Continuous Internal Evaluation	Attendance	10 Marks
		Class test/ Assignment/ Quizzes	10 Marks
		Mid-term	30Marks
	SEE: Semester End Examination		50 Marks

Rationale of the Course: This course is designed to help the students obtaining comprehensive knowledge about the history and heritage, Geography and environment, people and society, politics and constitutional Development of Bangladesh. This course also will make students understandings on foreign policy and international relations, economics and natural resources, education and literature, philosophy and religion, art and culture of Bangladesh and such other conceptions and ideas that are significantly related to the people and society of Bangladesh.

This course will deepen students understanding of complex interconnection of historical events that lead to the formation of Bangladesh, current trend in political and economic development thereby improving critical thinking along with their written and oral communication skills, quantitative skills and technical literacy. It will also enhance their understanding of current phenomena in the light of history that will make them responsible global citizen.

SL	Course Learning Outcomes (CLOs) : Upon the successful completion of the course, students will be able to :	Corresponding IIUCMS	Bloom's taxonomy domain/level
CLO1	Understand basic geographical characteristics of Bangladesh and its impact on the life and society, ethnology of its people and population distribution.	IIUCMS-1&3	Cognitive/ Analyze
CLO2	Identify specific stages of Bangladesh's political history, through the ancient, medieval, colonial and post-colonial periods and critically analyzesocio-cultural plurality in Bangladesh.	IIUCMS-1&3	Cognitive/ Undrrstand
CLO3	Have a comprehensive concept about the historical developments of Bengali nation until the emergence of Bangladesh as an independent country in 1971.	IIUCMS-2&3	Cognitive/ Evaluate
CLO4	Critically analyze and present cogent argument on why tensions and contestations between and among social groups may emerge within and among states both in written and oral forms.	IIUCMS-1&2	Cognitive/ Analyze
CLO5	Critically analyze how different constitutional bodies and socio-political institutions operate and how their behavior influences political governance.	IIUCMS-1,2&3	Cognitive/ Apply

SL.NO	CONTENT OF COURSE (as Summary)	Hrs.	CLOs
01.	Outline study of Bangladesh Geography: Location, Area, Boundary, Physiographic features, River System, Forest, Climate and Environmental Challenges of Bangladesh. Geographical Impact on the People and Society.	06	CLO1

02.	The People of Bangladesh: Ethnology of the People, Tribal Communities, Population Growth, Composition and Distribution, Population Challenges and Prospects for Bangladesh.	03	CLO1
03.	History and Society of Ancient Bengal: Early settlement and territorial identity, Sasanka (The first independent king), Matsyanyayam and its comparison with the present situation, Pala and Sena dynasty.	06	CLO2 CLO3
04.	History and Society of Bengal under Muslim Rule (1204-1757): Advent of Islam in Bengal and Its Impact, Composition of Muslim Society in Bengal, Role of Sufism, Foundation of Bengali Nationalism, Educational and Literary Development, Evaluation of the Impact of Muslim Rule on Bengal Society and Civilization.	06	CLO2 CLO3
05.	History and Society of Bengal under British Rule (1757-1947): Introduction of British Colonial Rule in Bengal, British Policy towards Economy and Education, Socio-Religious Reform Movements and the Struggles for Freedom from British Colonialism, Intellectual Movements, Partition of Bengal, Role of Congress and Muslim League, Rising of Nationalism Movements and the Emergence of Pakistan, Impact of British Administrative Policy on the Society of Bengal.	06	CLO4 CLO5
06.	History and Society of Bangladesh during Pakistan Rule (1947-1971): National disintegration between East and West Pakistan, political mobilization and successive national movements leading to the independence of Bangladesh.	03	CLO3 CLO5
07.	Political Development in Modern Bangladesh: Formation and Role of Major Political Parties, Regime Analysis of Modern Bangladesh, Issues of Bangladesh Politics, and Challenges of Democracy.	03	CLO6 CLO7
08.	Constitutional and Administrative Development of Bangladesh: The Constitution of Bangladesh, its historical background, characteristics, contents, constitutional organizations, amendments and administrative structure.	03	CLO6 CLO7
09.	Foreign Policy and International Relations of Bangladesh: Principles of Foreign Policy, International Relations of Bangladesh, Role of Bangladesh in International Organizations such as the UN, OIC, SAARC, ASEAN, BIMSTEC etc.	03	CLO6 CLO7
10.	Concept of Development and Sector wise Development in Bangladesh: Definitions of Development, The Birth of the Human Development Index, MDGs, SDGs, Sector wise development scenario in Bangladesh (Education, Economy, Health, Agriculture, Women Empowerment, Environment) Minerals and Resources, Socio-economic and cultural problems and prospects of Bangladesh.	06	CLO7 CLO8

Text Book:

- Sirajul Islam (ed.), *Banglapedia: National Encyclopedia of Bangladesh*, Vol. 1-14, (Dhaka: Asiatic Society of Bangladesh, 2014).
- Md. Thowhidul Islam and others, *Bangladesh Studies*. (Dhaka: Bangladesh Institute of Islamic Thought-BIIT, 2017).
- Dr. M.A. Rahim, and others, *Bangladesher Itihash*, (Dhaka: Nowroz Kitabistan, 1994).
- Muhammad Shamsul Huq, *Bangladesh in International Politics*, (Dhaka: The University Press Limited, 1995).

Reference Books:

- Harun Er Rashid, *Geography of Bangladesh*, (Dhaka: University Press Limited, 1991).
- Mosharraf Hossain, *Graphoman World Atlas*, 7th edition, (Dhaka: Graphosman, 2012).
- Sir Jadu-Nath Sarkar, *The History of Bengal*, Vol – 1-3, (Dhaka: The University of Dhaka, 1972).
- Mohar Ali, *History of the Muslims of Bengal*. Vol – 1-3, (Dhaka: Islamic Foundation Bangladesh, 2003).

- Abdul Karim, *Social History of the Muslims of Bengal*, (Chittagong: Baitush Sharaf Islamic Research Institute, 1985).
- Dr. Enamul Huq, *A History of Sufism in Bengal*, (Dhaka: Bangla Academy, 1975).
- Board of Researchers, *Islam in Bangladesh through Ages*, Dhaka: Islamic Foundation Bangladesh, 1995).
- Sufia Ahmed, *Muslim Community in Bengal (1884-1912)*, (Dhaka: Oxford University Press, 1974).
- Dr. M.A. Rahim, *The Muslim Society and Politics in Bengal*, (Dhaka: University of Dhaka, 1978).
- Dr. M.A. Rahim, *Social and Cultural History of Bengal*, Vol – 1-2, (Dhaka: Bangla Academy, 1982).
- Prof. Dr. Muinuddin Ahmed Khan, *Islamic Revivalism*, (Dhaka: Bangladesh Institute of Islamic Thought, 2010).
- Dr. Muinuddin Ahmed Khan, *Muslim Struggle for freedom in Bengal*, (Dhaka: Islamic Foundation Bangladesh, 1983).
- Dr. Muhammad Inamul Huq, *Varoter Musalman O Shwadinota Andolan*, (Dhaka: Bangla Academy, 1995).
- Azizur Rahman Mallick, *British Policy and the Muslims in Bengal*, (Dhaka: Asiatic Society of Pakistan, 1961).
- Muhammad Habibur Rahman, *Gangariddhi Theke Bangladesh*, (Dhaka: Bangla Academy, 1985).
- Sirajul Islam, *History of Bangladesh*, Vol – 1-3, (Dhaka: Asiatic Society of Bangladesh, 2008).
- Oli Ahad, *Jatiyo Rajniti 1945-1975*, (Dhaka: Bangladesh Co-operative Book Society, 2004).
- Abul Mansur Ahmad, *Amar Dekha Rajniteer Poncash Bochor*, (Dhaka: Srijon Prokashoni Ltd., 1988).
- Kamruddin Ahmed, *Social History of East Pakistan*, (Dhaka: Crescent Book Center, 1967).
- Shaikh Maqsum Ali, *From East Bengal to Bangladesh: Dynamics and Perspectives*, (Dhaka: The University Press Ltd., 2009).
- Maidul Hasan, *Muldhara 71*, (Dhaka: The University Press Ltd., 1986).
- Moudud Ahmed, *Bangladesh: Constitutional Quest for Autonomy*, (Dhaka: The University Press Ltd., 2003).
- Rounaq Jahan, *Pakistan: Failure in National Integration*, (Dhaka: University Press Limited, 1977).
- Akbar Ali Khan, *Discovery of Bangladesh*, (Dhaka: The University Press Ltd., 2009).
- Talukdar Maniruzzaman, *Bangladesh Revolution and its Aftermath*, (Dhaka: The University Press Ltd., 1992).
- Shamsul I. Khan, *Political Culture, Political Parties and the Democratic Transition in Bangladesh*, (Dhaka: The University Press Ltd., 2008).
- Dr. Md. Emran Zahan & Dr. Md. Siddiqur Rahman Khan, *Bangladesher Itihas 1972-2014*, (Dhaka: Abosar Prokashana Sangstha, 2018).
- *The Constitution of the People's Republic of Bangladesh*, (Dhaka: Ministry of Law, Justice and Parliamentary Affairs)
- Md. Abdul Halim, *Constitution, Constitutional Law and Politics: Bangladesh Perspective*, (Dhaka: BCC Foundation, 1998).

Useful web links:

- <http://www.bangladesh.gov.bd>
- <http://www.bangladesh.com>

- <http://www.banglapedia.org>
- <http://www.bbs.gov.bd>

Course Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50marks)
Cognitive learning	Affective Learning	Mid-term: (30)	Assignment/ Class Test: (10)	Attendance Marks (:10)	Written Exam: (50)
Remember	-	-	-	-	5
Understand	-	5	5	-	5
Apply	-	5	-	-	10
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	10
Create	-	5	-	-	10
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester.				

Note: CIE=Continuous Internal Evaluation, SEE= Semester End Examination.

Delivery methods & activities: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

Assessment tools: Class Attendance, Class test, Quizzes/ Assignment. Mid-Term & Final Exam. Project evaluation & Viva.

ISCED Code:	Course Code: CSE-4877
Course Title: Machine Learning and Data Mining	
Credit Hours: 3	Contact Hours: 3
Type: Optional	Semester: 8th
Prerequisite: CSE-3635	
Co-requisite: CSE-4878 (Machine Learning and Data Mining Lab)	

Course Rationale:

This course provides a broad introduction to machine learning and data mining techniques. The primary focus of the course will be on understanding the underlying algorithms used in various learning systems. Class lectures will discuss general issues as well as present algorithms. Topics include: supervised learning (Classifications, neural networks, support vector machines); unsupervised learning (clustering, dimensionality reduction). Basic concepts of database, linear algebra, probability theory, computer algorithms are prerequisites for this course.

Course Learning Outcomes (CLOs):

Upon successful completion of this course, students will be able to:

CL O	CLO Statement	Weightage (%)
1	Remembering statistical data analysis techniques.	10
2	Understanding and preprocessing the data	20
3	Apply Machine learning algorithms for classification and clustering of objects.	35
4	Analysis different ML and DM algorithms.	35

Course Learning Outcomes (CLOs) and Mapping:

C L O	CLO Statement	PL O	DL	KP	EP	EA	Delivery methods and activities	Assessment Tools
1	Remembering statistical data analysis techniques.	1	C2	2,3			Lecture, Class discussion, Assignment, Notes	Assignment, Exam, Quiz
2	Understanding and preprocessing the data	1,2	C2	2,3			Lecture, Class discussion, Assignment, Notes	Assignment, Exam, Quiz
3	Apply Machine learning algorithms	3	C3	5			Lecture, Class	Assignment, Exam, Quiz

	for classification and clustering of objects.						discussion, Assignment, Notes	
4	Analysis different ML and DM algorithms.	4	C4	8			Lecture, Class discussion, Assignment, Notes	Assignment, Exam, Quiz
Note: DL: Domain/level of learning taxonomy, KP: Knowledge Profile, EP: Attribute of Complex Engineering Problems, EA: Attribute of Complex Engineering Activities Learning Domains (C: Cognitive, A: Affective, P: Psychomotor)								

Course Content:

Segment	Contents	Duration	CLOs
Section-A (Midterm Exam: 30 Marks)			
1	Introduction: Data mining functionality, Classification of data mining systems, Top-10 most popular data mining algorithms, Major issues in data mining	02	CLO1
2	Introduction to Data: Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity	06	CLO2
3	Data Preprocessing: Data Quality, Major Tasks in Data Preprocessing, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization, Frequent Itemset Mining Methods, which Patterns Are Interesting? Pattern Evaluation Methods.	04	CLO2
Section-B (SEE: 50 Marks)			
4	Data Warehouse Modeling: Data Cube and OLAP, Data Warehouse Design and Usage	04	CLO2
5	Classification: Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Model Evaluation and Selection.	06	CLO3
6	Classification Advanced Topics: Techniques to Improve, classification Accuracy: Ensemble Methods, Bayesian Belief Networks, Classification by Backpropagation, Support Vector Machines, Lazy Learners (or Learning from Your Neighbors), Other Classification Methods	02	CLO4
7	Cluster Analysis: Basic Concepts, Partitioning Methods, Hierarchical Methods, Density-Based Methods deletion.	04	CLO3

8	Outliers Detection and Analysis: Outliers Detection Methods, Mining Contextual and Collective	02	CLO4
		30	

Student Learning Time

A. Face to Face Instructions	Allocated Hours = 45
A.1 Instructor-Oriented	
Lecture	35
A.2 Student-Oriented	
Active learning	10
B. Independent Learning	Estimated Hours = 71
B.1 Reading and revision	
Learning hours for comprehension of lecture topics	45
B.2 Estimated hours for preparation of assessments	
Quizzes	6
Assignment	4
Midterm Examination	6
Final Examination	10
C. Assessment Outside Instruction Hours	Allocated Hours = 4
Midterm Examination	1.5
Final Examination	2.5
Total SLT	120

Books:

Text Book :
1. Jiawei Han, Micheline Kamber, Jian Pei, Data Mining Concepts and Techniques, 3 rd Edition.
Reference Books :
1. An Introduction to Statistical Learning by Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani.
2. Fundamentals of Machine Learning for Predictive Data Analytics by John D. Kelleher, Brian Mac Namee, and Aoife D'Arcy

Course Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember					
Understand		5			5

Apply		10	5		15
Analyze		15	5		30
Evaluation					
Create					
x	Responding	x	x	10	

Note: **CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

Delivery methods & activities: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

Assessment tools: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam.

ISCED Code:	Course Code: CSE-4878
Course Title: Machine Learning and Data Mining Lab	
Credit Hours: 1	Contact Hours: 2
Type: Optional	Semester: 8th
Prerequisite: CSE-3636	
Co-requisite: CSE-4878 (Machine Learning and Data Mining)	

Course Rationale:

After successful completion of this course, the students should be able to:

- Develop the concepts of and the techniques in key machine learning algorithms
- Provide hands-on experience with data mining using tools
- Encourage innovative and useful applications of data mining tasks
- Gain basic knowledge about some advanced topics of ML, DL, etc.
- Implement algorithms in python, debug and run programs.
- Develop algorithms to solve a wide range of common machine learning problems.

Course Learning Outcomes (CLOs):

Upon successful completion of this course, students will be able to:

CL O	CLO Statement	Weightage (%)
1	Demonstrating statistical data analysis techniques.	10
2	Understanding and preprocessing the data	20
3	Apply Machine learning algorithms for classification and clustering of objects.	35
4	Analysis different ML and DM algorithms.	35

Course Learning Outcomes (CLOs) and Mapping:

CL O	CLO Statement	PL O	DL	KP	EP	EA	Delivery methods and activities	Assessment Tools
1	Demonstrating statistical data analysis techniques and modern tools.	1,5	C2	2,3,6			Lecture, Class discussion, Assignment, Lab work, Note	Assignment, Exam, Lab performance

2	Understanding and preprocessing the data	2	C2	2,3			Lecture, Class discussion, Assignment, Lab work, Note	Assignment, Exam, Lab performance
3	Apply Machine learning algorithms for classification and clustering of objects.	3	C3	5			Lecture, Class discussion, Assignment, Lab work, Note	Assignment, Exam, Lab performance
4	Analysis different ML and DM algorithms.	4	C4	8			Lecture, Class discussion, Assignment, Lab work, Note	Assignment, Exam, Lab performance
Note: DL: Domain/level of learning taxonomy, KP: Knowledge Profile, EP: Attribute of Complex Engineering Problems, EA: Attribute of Complex Engineering Activities Learning Domains (C: Cognitive, A: Affective, P: Psychomotor)								

List of Lab experiments

Week	Activities	Topics	CLOs
1	Lecture, Problem solving	Introduction to Python, NumPy, Pandas, SciPy, Matplotlib.	CLO1
2	Lecture, Problem solving	Data visualization, Basic Statistical Descriptions of Data	CLO1
3	Lecture, Problem solving	Simple Regression, Multiple Regression	CLO3
4	Lecture, Problem solving	Logistic Regression, Lasso, Ridge	CLO3
5	Lecture, Problem solving	Data Preprocessing, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization	CLO1 CLO2
6	Lecture, Problem solving	Frequent Itemset Mining Methods, Apriori Algorithm, FP Growth Algorithm	CLO3
7	Midterm		
8	Lecture, Problem solving	Classification: Basic Concepts, Decision Tree Induction	CLO3

Week	Activities	Topics	CLOs
9	Lecture, Problem solving	Bayes Classification Methods, Rule-Based Classification	CLO3
10	Lecture, Problem solving	Model Evaluation and Selection, Techniques to Improve Classification Accuracy: Ensemble Methods	CLO2
11	Lecture, Problem solving	Bayesian Belief Networks, Classification by Backpropagation	CLO4
12	Lecture, Problem solving	Support Vector Machines, Lazy Learners (or Learning from Your Neighbors), Other Classification Methods	CLO4
13	Lecture, Problem solving	Cluster Analysis: Basic Concepts, Partitioning Methods, Hierarchical Methods, Density-Based Methods	CLO4
14	Lecture, Problem solving	Outliers Detection and Analysis, Outliers Detection Methods, Mining Contextual and Collective Outliers	CLO4
15	Presentation on Submitted Project		

Books:

Text Book :
1. Jiawei Han, Micheline Kamber, Jian Pei, Data Mining Concepts and Techniques, 3 rd Edition.
Reference Books :
1. An Introduction to Statistical Learning by Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani.
2. Fundamentals of Machine Learning for Predictive Data Analytics by John D. Kelleher, Brian Mac Namee, and Aoife D'Arcy

Course Code: 4871

Course Title: Neural Networks and Fuzzy Systems

Mid Term: 30 Marks

1. Introductory Concept:

Neural network, human brain, biological inspiration of neural network, synapses and their weights, biasing input, characteristics of neural network, benefits of neural networks, limitation of neural network, application of neural network.

2. Fundamental concept of ANN: Basic models of artificial neuron, mathematical models of an artificial neuron, network architecture, neural network viewed as directed graph, activation functions, importance of nonlinearity in activation function, derivatives of activation functions.

3. Perceptrons: Overview of perceptrons, single layer of perceptrons, mathematical model of single layer perceptrons, mathematical model of multilayer perceptron (MLP), delta learning rule, supervised and unsupervised learning.

Final Term: 50 Marks

4. Training Neural Network: Quantifying different loss functions (Step, MSE, MAE, hinge loss, binary cross-entropy or log loss, categorical cross-entropy), loss optimization, weight initialization, gradient descent algorithms, computing gradients : back propagation learning algorithm, setting the learning rate, adaptive learning rate algorithms, gradient algorithm with mini-batch, stochastic gradient descent,

5.

6. Recurrent Neural Network: Why sequence models, Examples of sequence data, RNN architectures, training RNN, Vanishing gradients with RNNs, GRU, LSTM, language modeling with RNN, bidirectional RNN, Deep Belief Networks (DBNs).

7. Convolutional Neural Network: Concept of deep learning, Convolutional neural network (CNN) for computer vision, types of layer in a convolutional network (convolution , Pooling , Fully Connected layer), softmax classification, different convolution network examples, some classic CNNs, transfer learning, fine tuning, data augmentation.

8. Fuzzy system: Introduction to Fuzzy system, Fuzzy relations, fuzzy numbers, Linguistic description and their analytical form, fuzzy control.

9. Defuzzification: Defuzzification Methods, Centroid Method, Center of Sum Method, Mean of Maxima Defuzzification, Applications

Course code : CSE-4872

Course title : Neural Network and Fuzzy System sessional

Credit Hours: 1.5

Contact Hours: 3 per week

Laboratory works based on CSE-4811

1. MATLAB and ANN Toolbox
2. Problem related perceptron (Logical AND, OR, NOT Problem)
3. Problem based on Backpropagation Network (XOR problem)
4. **Pattern Recognition:** Classification of Digits 0-9
5. Problems based on Hopfield Model
6. Boltzmann Machine problem: Traveling Salesman Problem
7. Problem related to Self-Organizing Map
8. Problems on Adaptive Resonance Theory
9. Problem on Fuzzy system
10. To perform also other experiments relevant to this course.

Course Code : MGT-3601

Course Title :Industrial Management

Credit Hours: 2

Contact Hours: 2 per week

Year/Semester: Three/Six

Type: Interdisciplinary

Prerequisite courses: NONE

Instructor: A.B.M. YASIR ARAFAT

Office Location: Room # C 204, CSE Building

Email: abmya89@yahoo.com

Class Hours: Refer to the Departmental Class Schedule

CourseObjectives:

- Understand the basic principles of management and four functions of managers.
- Being familiar with the principles of organizing and manpower development.
- Interpret financial statements and other financial reports of industrial companies.
- Design different combinations of systems for management control in an organization.
- Introducing different industrial laws relating to employee rights and work environment.
- Understanding the industrial production system and quality control.
- Understanding the basic principles of marketing management.

Course Outcomes (COs):

Upon successful completion of this course, students will be able to:

	CO Description	Weight (%)
CO1	Explain the theories and principles of modern management and apply the concepts to the management of organizations in private and public sector..	50%
CO2	Understand how managers can effectively plan in today's dynamic environment,	20%
CO3	Identify what strategies organizations might use to become more innovative and explain how the industrial company markets and price it's products and also how the company deal with it's environment.	30%

Mapping of CO-PO:

	CO Description	POs	Bloom's Taxonomy Domain/Level	Delivery Methods and activities	Assessment Tools
CO1	Explain the theories and principles of modern management and apply the concepts to the management of organizations in private and public sector..	PO11	Cognitive- <i>C1 - Recall data,</i>	Lecture, Class discussion, Case study	Exam, Assignment, Case presentation
CO2	Understand how managers can effectively plan in today's dynamic environment,	PO11	Cognitive- <i>C2 - Understand</i>	Lecture, Class discussion, Case study	Exam, Assignment, Case presentation
CO3	Identify what strategies organizations might use to become more innovative and explain how the industrial company markets and price its products and also how the company deal with its environment.	PO11	Cognitive- <i>C3 – Apply</i> <i>C5 - Synthesize</i>	Lecture, Class discussion, Case study	Exam, Assignment, Case presentation

(Recall:

2. Domains and Levels of Bloom's Taxonomy

☐ "Cognitive" Domain (C): C1 - Recall data, C2 - Understand, C3 - Apply, C4 - Analysis, C5 - Synthesize, and C6 - Evaluate.

☐ "Affective" Domain (A): A1 - Receive, A2 - Respond, A3 - Value, A4 - Organize personal value system, and A5 - Internalize value system.

☐ "Psychomotor" Domain (P): P1 - Imitation, P2 - Manipulation, P3 - Develop precision, P4 - Articulation, and P5 - Naturalization.)

Mapping of COs to POs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1											X	
CO2											X	
CO3											X	

Distribution among Assessment Tools:

Assessment Tools	Weight (%)
Class Attendance	10
Class Tests and Assignments	10
Midterm examination	30
Final Examinations	50

Grading Policy:

As per IIUC grading policy

Course Content

Section-A (Mid-term: 30 Marks)

- 1. Preliminaries:** Definition, Importance of management, Evolution, Functions of management, Introduction to Industry & organizational management. (2 Lectures)
- 2. Organization and it's Environment:** Environmental context of the Organization. (3 Lectures)
- 3. Organizing & staffing:** Theory & structure, Co-ordination, Span of control, Authority delegation, Formal & Informal Groups, Committee and task force, Manpower planning & Development. (6 Lectures)

Section-B (Final Exam: 50 Marks)

Group-A (20 Marks)

- 4. Cost & Financial Management:** Investment analysis, benefit-cost analysis & it's implications in decision making. Cost planning & Price Control, budget & budgetary control, development planning process. (5 Lectures)
- 5. Marketing management:** Concepts, strategy, sales promotion, Transportation & Storage. Technology management: Management of innovation & changes, technology lifecycle. (4 Lectures)

Group-B (30 Marks)

6. Production Management: Designing operations system in production and service-oriented industry. Product layout, process layout, & fixed position layout. Organizational technologies: automation, computer-assisted manufacturing, flexible manufacturing system, and robotics. TQM, bench marking, ISO 9000, SQC. (3 Lectures)

7. Industrial law: Law of contract, sale of goods, Hire and purchase, Negotiable instrument Act, patent right and validity. Factories act, Industrial relations ordinance, workmen's compensation act. (3 Lectures)

8. Professional Practice: Tender documentation, General conditions of tender, Tech. Specification, Purchase & procurement rules-2004, Technical evaluation, Copyright, Intellectual property right. (2 Lectures)

Recommended Books:

- | | |
|-----------------------------------|--|
| 1. Ricky W. Griffin | : "Management" |
| 2. Heinz Weihrich & Harold Koontz | : Management A Global Perspective", |
| 3. W.J. Stevenson | : Management Science |
| 4. Terry & Frankin | : Principle of Management |
| 5. Edwin B. Flippo | : Personnel Management. |
| 6. Arun Monappa | : Industrial Relations. |
| 7. Naceur Jabnoun | : Islam & Management. |
| 8. F.R. Faridi | : Islamic Principles of Business Organization and Management |
| 9. Leon G. Schiffman & L.L. Kanuk | : Consumer Behavior. |
| 10. W.J. Stevenson | : Management Science |
| 11. Harold Koontz | : Management |
| 12. Terry & Frankin | : Principle of Management |

1. **Course code : CSE-4876**
2. **Course title : Pattern Recognition and Image processing sessional**
3. **Credit Hours: 1.5**
4. **Contact Hours: 3 per week**
5. **Types: Optional, Engineering**
6. **Prerequisite: Laboratory works based on CSE-4875**
7. **Rationale:**
8. **Objectives:**

The main objectives of this course are:

- To introduce the student with fundamental concepts of images and to analyze and manipulate the different types of images.
- To introduce students with the different algorithms of image processing and pattern recognition.
- To help the student to enhance their analysing skills and use the same for writing program in MATLAB/Python.

9. Course Outcomes (COs):

After completion of this course students will be able to:

CO1	Knowledge and understanding: Describe and explain the fundamentals concepts of two-dimensional image acquisition, image enhancement algorithms such as histogram modification, contrast manipulation, and edge detection. Understanding the Image Restoration, Compression, Segmentation, Representation and Description and Pattern Recognition,
CO2	Use an integrated programming environment to write and execute algorithms of image processing as well as apply debugging techniques to locate and resolve errors.
CO3	Compare and apply the appropriate image processing and pattern recognition algorithms to solve real world problems.
CO4	Apply appropriate algorithms for segmentation, feature extraction and pattern recognition to solve real world problems.

10. Mapping of CO-PO:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	X											
CO2	X	X	X									
CO3	X	X	X	X								
CO4		X	X	X	X							

11. Resources:

Text/Reference Books:

Text /Reference Books :

#	Name of	Title of Book	Edition	Publisher's	Year	ISBN
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	Autors			Name		
1.	R. C. Gonzalez, R. E. Woods	Digital Image Processing using Matlab	2th			

12. Weightage Distribution among Assessment Tools:

Assessment Tools	Weightage (%)
Class Attendance	10
Continuous Assessment	40
Midterm Examination	20
Final Examinations	30

13. Grading Policy:

As per IIUC grading policy

14. Weekly Activity Plan and List of Experiments:

Week	Experiment Name
1.	Image files format and read using MATLAB/Python.
2.	Image enhancement: Binary Image, gray level image, negative, brightness, darkness, thresholding (single, dual, contrast stretching).
3.	Filtering: Smoothing, Sharpening.
4.	Image Histogram: Calculate the histogram of an image, equalize the image.
5.	Temporal and geometric processing: Implement various temporal and geometric processing algorithms.
6.	Lab Test
7.	Compression: Implement various image compression algorithms.
8.	Morphological Processing: Implement different morphological image processing methods.
9.	Segmentation: Implement different segmentation methods.
10.	Implement different feature extraction methods.
11.	Object Recognition: Pattern recognition using different approaches.
12.	Perform other experiments relevant to this course.
13.	Overview
14.	Lab Test

1. **Course Code:** CSE-4875
2. **Course Title:** Pattern Recognition and Image Processing
3. **Credit Hours:** 3
4. **Contact Hours:** 3 lecture hours per week
5. **Type:** Core, Engineering
6. **Prerequisite:** CSE-4703
7. **Co-requisite:** CSE-4876 (Pattern Recognition and Image Processing Lab)
8. **Course Rationale / Summary:**
9. The course objectives include: overview of digital image processing field; understand the fundamental DIP algorithms and implementation; gain experience in applying image processing algorithms to real problems, understanding basic concept of pattern recognition.

10. Course Objective:

After completing this course the students will learn

- The basic concepts of two-dimensional image acquisition, sampling, and quantization.
- Spatial filtering techniques, including linear and non-linear methods.
- The fundamental image enhancement algorithms such as histogram modification, contrast manipulation, and edge detection.
- Programming techniques in digital image processing related problems.
- Understand segmentation and feature extraction process of pattern recognition.
- To develop a complete pattern recognition system to classify the patterns from images.
- Demonstrated teamwork and communication skills through course projects

11. Course Outcomes (COs):

Upon successful completion of this course, students will be able to:

#	CO Description	Weightage (%)
1.	Explain basic image processing techniques for solving real problems	10%
2.	Apply and demonstrate image processing techniques for solving problems in computer science	60%
3.	Evaluate algorithms for higher level image processing.	20%
4.	Develop an application using existing image processing algorithms with modern techniques.	10%

12. Mapping of CO-PO:

Sl. No.	COs	POs	Bloom's taxonomy domain/level	Delivery methods and activities	Assessment tools

Sl. No.	COs	POs	Bloom's taxonomy domain/level	Delivery methods and activities	Assessment tools
CO1	Explain basic image processing techniques for solving real problems	PO1 PO2	Cognitive/Understand	Lecture, Class discussion, Assignment, Note	Exam, Quiz, Assignment
CO2	Apply and demonstrate image processing techniques for solving problems in computer science	PO2 PO4	Cognitive/Apply	Lecture, Class discussion, Assignment, Note	Exam, Quiz, Assignment
CO3	Evaluate algorithms for higher level image processing.	PO4	Cognitive/Apply	Lecture, Class discussion, Assignment, Note,	Exam, Quiz, Assignment,
CO4	Develop an application using existing image processing algorithms with modern techniques.	PO3	Cognitive/Apply	Lecture, Class discussion, Assignment, Note,	Exam, Quiz, Assignment,

13. Resources:

Text Books:

#	Name of Authors	Title of Book	Edition	Publisher's Name	Year	ISBN
1.	R. C. Gonzalez, R. E. Woods	Digital Image Processing	3rd Edition	McGraw-Hill	2015	0-07-014590-3

Reference Books:

1. R. C. Gonzalez, R. E. Woods :Digital Image Processing .
2. Earl Gose :Pattern Recognition and Image Analysis.
3. Related Papers from Journals and Conferences
4. I.T. Young, J.J. Gerbrands, L.J. van Vliet :Image Processing Fundamentals
5. Russ, J.C. :The Image Processing Handbook.

14. Weightage Distribution among Assessment Tools:

Assessment Tools	Weightage (%)
Class Attendance	10
Class Tests and Assignments	10
Midterm examination	30
Final Examinations	50

15. Grading Policy:

As per IIUC grading policy available in-

<https://library.iiuc.ac.bd/assets/notice/2019/180Notice-Grading-system-GPA-CGPA-cancellation-of-admission.pdf>

16. Weekly Activities

1. Weekly Activity Plan and List of Experiments:

Lectures	Topics
Lec 1-3	1. Introduction: Introduction of Digital Image Processing and Pattern Recognition, Application areas, Fundamental steps of Digital Image Processing, Components of Digital Image Processing, Image & Video, Image & Human eyes, Color TV scheme.
Lec 4-6	2. Analog and Digital Image: Analog and Digital Image, Image Acquisition and acquisition devices, Spatial and amplitude quantization, Pixels, Resolution, Aspect Ratio, Gray levels, Relationship color and gray levels.
Lec 7-15	3. Image Enhancement: Different types of Image Enhancement operations, Spatial domain and frequency domain processing, Different types of filtering.
Lec 16-18	Class Test 1 & Review class
	Mid Term Exam
Lec 19-24	4. Image Compression: Fundamental concepts of Image Compression and Data Compression, Data Redundancy, Image Compression models, Error free and Lossy compression, Image Compression Standards.
Lec 25-28	5. Morphological processing: Morphological Image Processing, Dilation, Erosion, Opening, Closing, Hit and Miss etc.
Lec 29-32	6. Segmentation: Image Segmentation, Different types of Segmentation, Edge linking and boundary detection, Thresholding, Region oriented segmentation,
Lec 33	Class Test 2
Lec 34-37	7. Image Representation: Object representation and description algorithms, Run Code, Chain Code, Signature, Skeleton, Boundary detection, Feature Extraction few case studies.
Lec 38-41	8. Pattern Recognition: Fundamental concepts of Pattern Recognition, Pattern, Pattern Classes, Types of Pattern Recognition, Decision Theoretic methods, Structural method, Statistical method, Neural Network, Few case studies like speech recognition, fingerprint recognition, character recognition etc.
Lec 42-45	Class Test 3 & Review Class

Course code : CSE-4845

Course Title : Distributed Database

Credit Hours: 3

Contact Hours: 3 per week

[Pre requisite: CSE-2407]

Course Objectives: The course has dual objectives. The first is an in-depth study of the classical distributed database management issues such as distribution design, distributed query processing and optimization, and distributed transaction management. The second objective is to study more current distributed database management topics such as pervasive computing, Web data management, different distribution models (push versus pull), interoperability and componentization, and data mining on the web.

Section-A (Mid-term: 30 Marks)

1. **Introduction:** Introduction to Distributed Databases, Distributed DBMS (DDBMS), Distributed DBMS Architecture, Data Independence, Functional goals of distributed databases, Characteristics of DDBMS, Advantages and Disadvantages of DDBMS.
2. **Data Integration:** Virtual vs Materialized integration, Views, View Integration, Conflict analysis, Schema Integration, Data Integration in the Multidatabase, Global query processing, Source Schema Reverse engineering, GAV (global as view), LAV (local as view), Mapping, Wrappers.
3. **Distributed Database Design:** Design problem of distributed systems, Design Strategies, Fragmentation, Correctness Rules of Fragmentation, Horizontal Fragmentation, Vertical Fragmentation, Correctness of Vertical Fragmentation, Mixed Fragmentation, Replication and Allocation.

Section-B (Final Exam: 50 Marks)

Group-A (20 Marks)

4. **Overview of Query Processing:** Query Processing, Query Optimization, Distributed Query Processing Steps, Query Decomposition, Normalization, Analysis, Elimination of Redundancy, Rewriting, Data Localization.
5. **Transaction Management:** Definition, Formalization of a Transaction, Properties of Transactions, Atomicity, Consistency, Isolation, Durability Classification of Transactions, Transaction Processing Issues.

Group-B (30 Marks)

6. **Concurrency Control:** Concurrency, Conflicts, Schedules, Serializability, Concurrency Control Algorithms, Locking Based Algorithms, Two-Phase Locking (2PL), 2PL for DDBMS, Timestamp Ordering, Deadlock Management, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection.
7. **Distributed DBMS Reliability:** Definitions and Basic Concepts, Local Recovery Management, In-Place Update, Out-of-Place Update, Distributed Reliability Protocols, Commit Protocols, Centralized Two Phase Commit Protocol (2PC), Linear 2PC Protocol, Distributed 2PC Protocol, 2PC Protocol and Site Failures, Three Phase Commit Protocol (3PC).
8. **Data Warehouses:** Definition, Architecture for a data warehouse, Dimensional Fact Model, Dimensions and hierarchies, OLAP OPERATIONS, Data cube in SQL (ROLAP), Data Warehouse Design, Conceptual Design, Logical Design.

Recommended Textbooks:

1. M. Tamer Oezsu, Patrick Valduriez ``Principles of Distributed Database Systems, Second Edition" Prentice Hall.
2. Distributed Systems: Concept and Design. Coulouris, Dollimore, and Kindberg. AW.
3. Distributed Database Principles and Systems. Ceri and Pelagatti. McGraw Hill.
4. Recovery Mechanisms in Database Systems. Kumar and Hsu, Prentice Hall.
5. Concurrency Control and Recovery in Database Systems. Bernstein, Hadzilacos and Goodman, AW.

Course code : CSE-4846

Course title : Distributed Database sessional

Credit Hours: 1.5

Contact Hours: 3 per week

Objectives: This course investigates the architecture, design, and implementation of massive-scale data systems. The course discusses foundational concepts of distributed database theory including design and architecture, security, integrity, query processing and optimization, transaction management, concurrency control, and fault tolerance. It then applies these concepts to both large-scale data warehouse and cloud computing systems. The course blends theory with practice, with each student developing both distributed database and cloud computing projects.

- **Integration:** View-based data integration (Relational data model), Data integration (homogeneous and heterogeneous data sources), Identification of the sources data models, Reverse engineering (conceptual models), Identification and resolution of conflicts, Conceptual models integration, Choice of the target data model (for global conceptual schema translation), Source schemata translation to the target data model (by means of adapters), Conceptual model translation, Definition of data views (mappings), Exam Simulation.
- **Data Warehouse:** SQL Recall, Data warehousing conceptual design, Facts definition, For each fact: attribute tree definition, attribute tree editing, dimensions definition, measures definition, hierarchies definition, fact schemata creation, glossary definition, Data warehousing logical design, ROLAP model: star schema, snowflake schema

Lab Requirements

Hardware: PC.

Software: Windows, Internet Browser, MySQL, Xampp, Oracle 11g,

Laboratory works based on CSE-4845. To perform also other experiments relevant to this course.

Recommended Textbooks:

1. M. Tamer Oezsu, Patrick Valduriez ``Principles of Distributed Database Systems, Second Edition" Prentice Hall.
2. Distributed Systems: Concept and Design. Coulouris, Dollimore, and Kindberg. AW.
3. Distributed Database Principles and Systems. Ceri and Pelagatti. McGraw Hill.
4. Recovery Mechanisms in Database Systems. Kumar and Hsu, Prentice Hall.
5. Concurrency Control and Recovery in Database Systems. Bernstein, Hadzilacos and Goodman, AW.

Week	List of Experiments
1-2	Integration part 1: View-based data integration (Relational data model), Data integration (homogeneous and heterogeneous data sources), Identification of the sources data models
3-4	Integration part 2: Reverse engineering (conceptual models), Identification and resolution of conflicts, Conceptual models integration, Choice of the target data model (for global conceptual schema translation),
5-6	Integration part 3: Source schemata translation to the target data model (by means of adapters), Conceptual model translation, Definition of data views (mappings), Exam Simulation.
7-8	Data Warehouse part 1: SQL Recall, Data warehousing conceptual design, Facts definition, For each fact: attribute tree definition,
9-10	Data Warehouse part 2: Attribute tree editing, dimensions definition, measures definition, hierarchies definition,
11-12	Data Warehouse part 3: Fact schemata creation, glossary definition, Data warehousing logical design,
13-14	Data Warehouse part 4: ROLAP model: star schema, snowflake schema