ISLAMIC UNIVERSITY OF TECHNOLOGY

Course Outline and Course Plan

Name of the Teacher	Farzana Tabassum	**Position**	Lecturer
Department	CSE	**Program**	B.Sc. Engineering in SWE
Course Code	HUM 4441	**Course Title**	Engineering Ethics
Academic Year	2022-23	**Semester**	Summer
Contact Hours	3.00	**Credit Hours**	3.00
Textbooks and Reference Books	1. Engineering Ethics 2. Engineering Ethics Concepts and Cases	**Authors of the Books**	1. Charles B. Fleddermann 2. Charles E. Harris
Prerequisites	N/A		
Course Homepage	N/A		
Teaching Methods/ Approaches	☑ Lecture ☑ Group Discussion ☐ Demonstration		☐ Problem Solving ☐ Project ☐ Others:
Teaching Aids	☑ Multimedia ☐ OHP		☑ Board and Marker ☐ Others:

Course Assessment Method						
Attendance (10%)	**Quiz/Assignment (15%) (Best 3 out of 4)**				**Mid (25%)**	**Final (50%)**
Throughout the Semester	**1st Quiz**	**2nd Quiz**	**3rd Quiz**	**4th Quiz**	**Week/Date**	**Week/Date**
	Week/ Date	**Week/ Date**	**Week/ Date**	**Week/ Date**		
	3rd Week	6th Week	10th Week	13th Week	8th Week	16th Week

Course Contents and Objectives	**Contents** Personal and Professional Ethics and the Law, Professionalism and Codes of Ethics, Understanding Ethical Problems, Ethical Problem-Solving Techniques, The Rights and Responsibilities of an Engineer, Ethical Issues in Engineering Practice, Doing the Right Thing. Ethical Use of Data-Driven Technologies, Legal and Ethical Privacy Concepts in Data-Driven Technology, Types of Bias in Data-Driven Technology, Apply Frameworks to Your Ethical Responsibilities for Data-Driven Technologies, Ethical Framework to Navigate Dilemmas in Data-Driven Technologies, Regulations and Standards for Data-Driven Business Strategy **Objectives** The objective of this course is to educate engineers on ethical principles, values, and responsibilities related to their professional practice. The course aims to develop students' moral and ethical reasoning skills, equip them with tools to address ethical dilemmas they may encounter in their work, and foster an understanding of the social and professional obligations of engineers. The goal is to prepare engineers to make ethical decisions that align with the values of the engineering profession and benefit society as a whole.
Course Outcomes	**CO1 - To develop** an understanding of the moral and ethical principles that govern the practice and decision-making of engineering. **CO2 - To examine** the social and cultural implications along with professional responsibility and accountability. **CO3 - To provide** a framework for ethical analysis and decision-making in engineering contexts. **CO4 - To analyze** the ethical implications of data-driven technologies and issues of data privacy, security, and ownership. **CO5 - To understand** the role of data-driven technologies in creating and perpetuating social biases and discrimination.

Weekly Plan for Course Content	
Weeks	**Topics**
1	Introduction
2	Professionalism and Codes of Ethics
3	Understanding Ethical Problems
4	Ethical Problem-Solving Techniques
5	The Rights and Responsibilities of an Engineer
6	Ethical Issues in Engineering Practice
7	Doing the Right Thing

8	Ethical Use of Data-Driven Technologies
9	Legal and Ethical Privacy Concepts in Data-Driven Technology
10	Types of Bias in Data-Driven Technology
11	Apply Frameworks to Your Ethical Responsibilities for Data-Driven Technologies
12	Ethical Framework to Navigate Dilemmas in Data-Driven Technologies
13	Regulations and Standards for Data-Driven Business Strategy
14	Ethics and AI

Mapping of Course Outcomes (COs) and Program Outcomes (POs) and Evaluation Method						
Assessment Method	**Marks**	**Mark Distributions (as %) on COs and POs**				
		CO1	**CO2**	**CO3**	**CO4**	**CO5**
		PO6	**PO7**	**PO8**	**PO6**	**PO7**
Attendance (Class Participation)	**10%**	10%	-	-	-	-
Quiz 1/Quiz 2/Quiz 3/Quiz 4	**15%**	3%	4%	4%	3%	1%
Mid Semester	**25%**	10%	10%	5%	-	-
Semester Final	**50%**	5%	10%	10%	15%	10%
Total	**100%**	**28%**	**24%**	**19%**	**18%**	**11%**

Mapping of COs and POs												
Course Outcomes	**Program Outcomes (POs)**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1						✓						
CO2							✓					
CO3								✓				
CO4						✓						
CO5							✓					

Program Outcomes (POs)	
Students graduating from the Bachelor of Science in Computer Science and Engineering (B. Sc. in CSE) program, upon graduation, will have the ability to:	
PO1	**Engineering Knowledge** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem Analysis** Identify, formulate, research, and analyze complex engineering problems and reach substantiated conclusions using the principles of mathematics, the natural sciences, and the engineering sciences.
PO3	**Design/Development of Solutions** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety and of cultural, societal, and environmental concerns.
PO4	**Investigation** Conduct investigations of complex problems, considering experimental design, data analysis, and interpretation, and information synthesis to provide valid conclusions.
PO5	**Modern Tool Usage** Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering activities with an understanding of their limitations.
PO6	**The Engineer and Society** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO7	**Environment and Sustainability** Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.
PO8	**Ethics** Apply ethical principles and commit to the professional ethics, responsibilities and norms of the engineering practice.
PO9	**Individual Work and Teamwork** Function effectively as an individual and as a member or leader of diverse teams and in multidisciplinary settings.
PO10	**Communication** Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.
PO11	**Project Management and Finance** Demonstrate knowledge and understanding of engineering and management principles and apply these to one's work as a team member or a leader to manage projects in multidisciplinary environments.

PO12	**Life-Long Learning** Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change.

K

Table: Knowledge Profile	
Attribute	
K1	A systematic, theory-based understanding of the natural sciences applicable to the discipline
K2	Conceptually based mathematics, numerical analysis, statistics and the formal aspects of computer and information science to support analysis and modeling applicable to the discipline
K3	A systemic, theory-based formulation of engineering fundamentals required in the engineering discipline
K4	Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline
K5	Knowledge that supports engineering design in a practice area
K6	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline
K7	Comprehension of the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the engineer's professional responsibility to public safety; the impacts of engineering activity; economic, social, cultural, environmental and sustainability
K8	Engagement with selected knowledge in the research literature of the discipline

P

Table: Range of Complex Engineering Problem Solving	
Attribute	Complex Engineering Problems have characteristic P1 and some or all of P2 to P7
Depth of knowledge required	P1: Cannot be resolved without in-depth engineering knowledge at the level of one or more of K3, K4, K5, K6, or K8 which allows a fundamentals-based, first principles analytical approach
Range of conflicting requirements	P2: Involve wide-ranging or conflicting technical, engineering and other issues
Depth of analysis required	P3: Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models
Familiarity of issues	P4: Involve infrequently encountered issues

Extent of applicable codes	P5: Are outside problems encompassed by standards and codes of practice for professional engineering
Extent of stakeholder involvement and conflicting requirements	P6: Involve diverse groups of stakeholders with widely varying needs.
Interdependence	P7: Are high-level problems including many component parts or sub-problems

A

Table: Range of Complex Engineering Activities	
Attribute	Complex activities means (engineering) activities or projects that have some or all of the following characteristics:
Range of resources	A1: Involve the use of diverse resources (and for this purpose resources include people, money, equipment, materials, information and technologies)
Level of interaction	A2: Require resolution of significant problems arising from interactions between wide-ranging or conflicting technical, engineering or other issues
Innovation	A3: Involve creative use of engineering principles and research-based knowledge in novel ways
Consequences for society and the environment	A4: Involve creative use of engineering principles and research-based knowledge in novel ways
Familiarity	A5: Can extend beyond previous experiences by applying principles-based approaches

Grading Policy		
Numeric Grade	**Letter Grade**	**Grade Point**
80% and above	A+	4.00
75% to less than 80%	A	3.75
70% to less than 75%	A-	3.50
65% to less than 70%	B+	3.25
60% to less than 65%	B	3.00
55% to less than 60%	B-	2.75
50% to less than 55%	C+	2.50
45% to less than 50%	C	2.25

40% to less than 45%	D	2.00
Less than 40%	F	0.00

Class Schedule	
Day	**Time**
Monday	02:30 p.m.
Wednesday	11:45 a.m.

Student Consulting Hour:

- Wednesday, 02:30 p.m. - 04:30 p.m.

Instruction Contact Details:

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