Course	CSE103 Elements of Computer Science and Engineering	Semester	Monsoon Semester 2024
Faculty Name(s)	Jayendra Bhalodiya, Kuntalkumar Patel, Sanjay Chaudhary	Contact	jayendra.bhalodiya@ahduni.edu.in, kuntal.patel@ahduni.edu.in, sanjay.chaudhary@ahduni.edu.in
School	SEAS	Credits	2
GER Category:	Not Applicable	Teaching Pedagogy Enable:NO	P/NP Course: Can not be taken as P/NP

Schedule	

Section 1	08:00 am to 09:00 am	Sat	29-07-24 to 26-11-24
	09:00 am to 10:00 am	Sat	29-07-24 to 26-11-24
	02:00 pm to 03:00 pm	Wed	29-07-24 to 26-11-24
Section 2	12:00 pm to 01:00 pm	Sat	29-07-24 to 26-11-24
	01:00 pm to 02:00 pm	Sat	29-07-24 to 26-11-24
	02:00 pm to 03:00 pm	Wed	29-07-24 to 26-11-24
Section 3	02:00 pm to 03:00 pm	Wed	29-07-24 to 26-11-24
	03:00 pm to 04:00 pm	Sat	29-07-24 to 26-11-24
	04:00 pm to 05:00 pm	Sat	29-07-24 to 26-11-24

Prerequisite	Not Applicable
Antirequisite	Not Applicable
Corequisite	Not Applicable
Course Description	Elements of Computer Science and Engineering provide students with a foundational understanding of essential computer science and engineering concepts. Through interactive lectures, hands-on activities, and practical exercises, students will explore the core principles of computing, including hardware components, software systems, data representation, and algorithmic thinking. This course aims to develop critical thinking skills and problem-solving abilities with a computational context. At the end of the course, students will have gained proficiency in logical reasoning, computational thinking, basic programming concepts, and an appreciation for the interdisciplinary nature of computer science and engineering. No prior programming experience is required, making this course accessible to students from diverse academic backgrounds.

Course Objectives	The course objectives (COs) are to: CO1: Develop a foundational understanding of computer science and engineering principles, interdisciplinary areas, cutting-edge technologies and their ethical use, and various career paths CO2: Develop logical reasoning and problem-solving skills in a computational manner. CO3: Develop computational thinking and critical questioning for problem-solving using programming skills. CO4: Develop programming skills using Python
Learning Outcomes	After completing this course, a student should be able to, • Analyse interdisciplinary nature of computer science and engineering with ethical practices • Evaluate problem-solving skills by critical questioning, logical reasoning and computational thinking problems • Examine algorithmic thinking, structured program writing, and critical code debugging • Apply modern tools for problem-solving
Pedagogy	The course sessions will include classroom discussions, case studies, activity-based learning, and problem-solving during laboratory sessions.
Expectation From Students	

Assessment/Evaluation	• Mid-Semester Examination:
	  ◦ Online Exam - 30%
	• End Semester Examination:
	  ◦ Online Exam - 40%
	• Other Components:
	  ◦ Quiz - 30%

Attendance Policy	As per Ahmedabad University Policy.
Project / Assignment Details	Exams are to be conducted on LMS.

Course Material	Text Book(s) • How to solve by computer, R G Dromey, 13 Edition, Pearson India, ISBN: 9788131705629, Year: 2013, Reference Book • Structure and Interpretation of Computer Programs, Harold Abelson, Gerald Jay Sussman, Julie Sussman, 2 Edition, Universities Press, ISBN: 9788173715273, Year: 2018,
Additional Information	Students are encouraged to practice more computational thinking and logical programming questions to perform well in this course.

Session Plan

NO.	TOPIC TITLE	TOPIC & SUBTOPIC DETAILS	READINGS,CASES,ETC.	ACTIVITIES	IMPORTANT DATES
1	Introduction to Computer Science and Engineering	This session provides an overview of computer science and engineering, covering the basic concepts of hardware, software, and firmware. Overview of operating systems, distributed systems, and networking.	https://fortune.com/education/articles/computer-science-careers/		
2	Computational Thinking	Writing logical steps to solve the given problems.	Chapter 1: Introduction to Problem-Solving. Book, How to Solve it by Computer by RG Dromey.	Lab Exercise	
3	Introduction to Data Structures and Programming Languages:	Participants explore different data structures, programming languages, get to know hackathons, and online platforms for competitive programming. Introduction to High/Low level languages, which language is used where in applications and systems we use in day-to-day life. Importance, critiques of each language.			
4	Computational Thinking	Improvising logical problem-solving with sequence, loops, decision statements, and user-defined functions	Chapter 2: Fundamental Algorithms. Book, How to Solve it by Computer by RG Dromey.	Lab Exercise	
5	Problem-Solving Skills (Session 1)	Participants engage in problem-solving activities. They are expected to brainstorm the given problems and critically discuss the steps to solve the problems. They are also expected to critically discuss the correctness of their solution, its feasibility in the real world, and steps to analyse its efficiency.	Chapter 1: Introduction to Problem-Solving. Book, How to Solve it by Computer by RG Dromey.		

6	Computational Thinking	Improvising logical problem-solving by reducing steps, using data structures, and critically testing exceptions.	Chapter 2: Fundamental Algorithms. Book, How to Solve it by Computer by RG Dromey.	Lab Exercise	
7	Problem-Solving Skills (Session 2)	Participants are required to use the knowledge of combinatorics and up to class 12 mathematics to solve the given complex puzzles. Further, they are required to write a pseudocode of their solution. The solution pseudocode will be required to be converted into a program during the lab session.	Chapter 2: Fundamental Algorithms. Book, How to Solve it by Computer by RG Dromey.		
8	Logical Programming	Writing Hello World and basic programs.	Chapter 2: Fundamental Algorithms. Book, How to Solve it by Computer by RG Dromey.	Lab Exercise	
9	Problem-Solving Skills (Session 3):	Participants will be given a real world scenario to understand, brainstorm and solve. The solution will be required to be in the pseudocode form which they will be required to convert into a program during the laboratory session.	Chapter 3: Factoring Methods. Book, How to Solve it by Computer by RG Dromey.		
10	Logical Programming	Implementing problem-solution discussed in the class or write code to solve the given intermediate problems.	Chapter 3: Factoring Methods. Book, How to Solve it by Computer by RG Dromey.	Lab Exercise	
11	Introduction to Interdisciplinary Areas with Computer Science and Engineering	This session provides an overview of artificial intelligence and machine learning related areas. Overview of how mathematics, statistics, data structures and programming are being used for them.			
12	Logical Programming	Implementing problem-solution discussed in the class or write code to solve the given advanced problems.	Chapter 3: Factoring Methods. Book, How to Solve it by Computer by RG Dromey.	Lab Exercise	

13	Introduction to Statistics in Computer Science	This session will provide exposure to the students into various statistical models and how to use them in their programs.			
14	Exercise 1	Complete the code for the given searching and sorting problem (Hands-on activity)	Chapter 4: Array Techniques. Book, How to Solve it by Computer by RG Dromey.	Lab Exercise	
15	Problem-solving with mathematics and statistics (Session 2)	This session will introduce students to solve questions with linear algebra, matrix operations, and probability.	Chapter 4: Array Techniques. Book, How to Solve it by Computer by RG Dromey.		
16	Logical Programming	Write code to solve the given probability and combinatorics problems.	Chapter 6: Text Processing and Pattern Searching. Book, How to Solve it by Computer by RG Dromey.	Lab Exercise	
17	Problem-solving with mathematics and statistics (Session 2)	This session will introduce students to solve questions with linear algebra, matrix operations, and probability.	Chapter 4: Array Techniques. Book, How to Solve it by Computer by RG Dromey.		
18	Logical Programming	Write code to solve the given linear algebra and matrix operations problems.	Chapter 6: Text Processing and Pattern Searching. Book, How to Solve it by Computer by RG Dromey.	Lab Exercise	
19	Introduction to Modern Development Methodologies	This session will provide an introduction to various methodologies for DevOps, MLOps, DataOps, and LLMOps			
20	Exercise 2	Complete the given code for face recognition, object detection, optical character recognition, or segmentation. (Hands-on activity)	https://docs.opencv.org/4.x/d9/df8/tutorial_root.html	Lab Exercise	
21	Introduction to Systems	This session will provide students an exposure to Unix/Linux commands, terminal, Git and Git Hub operations for version control, Virtual Machines, and Vim editor.			

22	Exercise 3	Complete the given code to link database with your program. (Hands-on activity)	https://www.w3schools.com/python/python_mysql_getstarted.asp	Lab Exercise	
23	Problem-solving with pointers (Session 1)	This session will provide students an exposure to pointers and how they can be used in their programs	https://www.geeksforgeeks.org/c-pointers/		
24	Logical Programming	Solve the given problem using pointers.	https://www.geeksforgeeks.org/output-c-programs-set-31-pointers/	Lab Exercise	
25	Problem-solving with pointers (Session 2)	This session will provide students advanced problems to solve with pointers.	https://www.geeksforgeeks.org/swap-strings-in-c/		
26	Logical Programming	Solve the given problem using pointers.	https://www.geeksforgeeks.org/swap-strings-in-c/	Lab Exercise	
27	Reflections and Review	Problem solving using algorithms exercises			
28	Reflections and Review	Problem solving using Python and C exercises			
29	Exam	Test - Problem solving using algorithms and flowchart			
30	Exam	Test - Problem solving using Python and C			