Green University of Bangladesh
Department of Computer Science and Engineering

Course Outline

1 General Information

Faculty	Faculty of Science and Engineering (FSE)
Department	Department of Computer Science and Engineering (CSE)
Programme	Bachelor of Science in Computer Science and Engineering
Semester	**Spring 2023**
Course Title	*Computational Thinking and Problem Solving*
Course Code	CSE 100
Course Credit	1.5 units
Contact Hours	2.5/week
Course Status	Core Course
Prerequisite Course	None

2 Course Instructors

Section	Name	Office	Email
231 DA	Sagufta Sabah Nakshi	PC	sagufta@cse.green.edu.bd
231 D3	Md. Rafiqul Islam	C605	rafiqul@cse.green.edu.bd
231 D2	Rabea Khatun	C605	rabea@cse.green.edu.bd
231-B	Md. Saimul Haque Shanto	PC	saimul@cse.green.edu.bd
231 D1	Mr. Saurav Chandra Das	C605	saurav@cse.green.edu.bd
231 EA	Mr. Saurav Chandra Das	C605	saurav@cse.green.edu.bd

3 Laboratory and Counseling Hours

Section	Room	Laboratory Weekday	Laboratory Time	Counseling Weekday	Counseling Time
231 DA	PC502	Saturday	1:15 PM - 03:45 PM	Friday	02:45 PM - 04:00 PM
231 D3	D801	Tuesday	04:00 PM - 06:30 PM	Wednesday	10:30 AM - 11:45 AM
231 D2	C601	Tuesday	04:00 PM - 06:30 PM	Tuesday	01:30 PM - 02:45 PM
231-B	PC409B	Saturday	2:30 PM - 5:00 PM	Thursday	10:30 AM - 11:45 AM
231 D1	C603	Tuesday	04:00 PM - 06:30 PM	Monday	11:45 AM - 01:00 PM
231 EA	B1005	Friday	08:00 AM - 10:30 AM	Friday	11:45 AM - 01:00 PM

4 Course Rationale

Computational thinking is the systematic approach to a problem and the creation and expression of a solution that can be carried out by a computer. Many quantitative and data-centric issues can be solved using computational thinking, and understanding computational thinking will provide students with a foundation for solving real-world, social problems. This course will introduce students to solving problems using computational thinking. They will interact with a unique community of analytical thinkers and be encouraged to consider how computational thinking can have a positive social impact.

5 Course Description

In this course, students will learn about the pillars of computational thinking, how computer scientists develop and analyze algorithms, and how solutions can be realized on a computer using the Structure programming language . By the end of the course, students will be able to create an algorithm and flowchart and express it to a computer using a simple C program. Additionally, they will be able to apply the acquired programming knowledge for creating a project using "SCRATCH".

6 Teaching Methods

Lecture, Laboratory experiments, Project developments.

7 Course Outcomes

CO	CO Description	PO	Domain (LoBT)	Weight	WK	WP	EA	Assessment Methods
CO1	Apply the knowledge regarding four pillars of Computational thinking process to identify a real-life problem [Cognitive]	PO1	Cognitive (C3)	65%	WK3			Please refer to Section 8.
CO2	Demonstrate a problem-solving technique for creating and expressing a solution that can be carried out by a computer[Cognitive]	PO1	Cognitive (C3)	25%	WK4			
CO3	Demonstrate the acquired programming knowledge for developing a simple project using "SCRATCH" [Psychomotor]	PO5	Psychomotor (P6)	10%	WK6			

Legend:

CO: *Course Outcome*
PO: *Program Outcome* (Appendix: A)
WK: *Knowledge Profile* (Appendix: B)
WP: *Complex Problem Solving* (Appendix: C)
EA: *Complex Engineering Activities* (Appendix: D)
LoBT: *Level of Bloom's Taxonomy* (Appendix: E)

8 Assessment Methods of COs

Assessment Method	CO1	CO2	CO3	Total
Continuous Lab Performance	15%	10%		25%
Lab Report	10%	5%		15%
Capstone Project Presentation & Viva	10%	10%	10%	30%
Lab Final	30%			30%
Total	65%	25%	10%	100%

9 Lab Activity Outline

Class	Experiment Title	COs	Reference	Activities
1	Socialization and Introduction to the course Overview	1		
2-3	Introduction to Computational Thinking	1	Lab Manual 1	Lab Experiment
4	Algorithm Design	1	Lab Manual 2	Lab Experiment
5	Problem Solving and Flowchart Design	1	Lab Manual 3	Lab Experiment
6-7	Overview of Scratch	1	Lab Manual 4	Lab Experiment
8	Familiarization with the different programming languages, compiler, interpreter, assembler, IDE and Coding Environments	1	Lab Manual 5	Lab Experiment
9	First Program: Basic program and syntax, Braces, Output, Input, Format specifiers, Variables and Data types, Variable Naming, Keywords, Token, Operators	1	Lab Manual 6	Lab Experiment
10	Conditional Statements if / else Nested if / else if / else if / else Switch Case	2	Lab Manual 7	Lab Experiment
11-12	Loops For loop While loop Do-while loop Nested loops Infinite loops	2	Lab Manual 8,9	Lab Experiment
13	Debugging and Tracing	1	Lab Manual 10	Lab Experiment
14	Project presentation	3		Presentation,Viva
15	**Final Examination**	1, 2, 3		Exam, Viva

10 Text and Reference Materials

T Textbook:

- *Schildt, H,* **The Complete Reference C**, 4th Edition, McGraw-Hill, 2000.

R References:

- Computational Thinking and Programming.
- Computational Thinking and Problem Solving Course (Coursera).
- Problem Solving and Programming Course.

11 Grading Policy

Marks Obtained	Letter Grade	Numerical Evaluation	Definition
80% and above	A+	4.00	Excellent
75% <80%	A	3.75	Excellent
70% <75%	A-	3.50	Very Good
65% <70%	B+	3.25	Good
60% <65%	B	3.00	Good
55% <60%	B-	2.75	Good
50% <55%	C+	2.50	Average

45% <50%	C	2.25	Average
40% <45%	D	2.00	Below Average
below 40%	F	0.00	Failing

12 Additional Course Policies

1. **Equipment and Aids**: Bring your own materials such as a calculator, notebook, and pen to participate effectively in classroom activities. You are NOT allowed to borrow from others inside the classroom which may potentially create distractions for your classmates.
2. **Assignments**: There will be a number of assignments for formative assessment purposes. The average of the assignment marks will be used for computing the final grade. Late submission of homework will carry a zero mark.
3. **Class Tests**: There will be at least three Class Tests taken during the semester and the best two will be counted for final grading. A class test can be taken with/without prior announcement.
4. **Examinations**: The midterm and final examinations will be a closed book, closed notes. Mobile phones are strictly prohibited in the exam hall. Please bring your own watch (non-smart) and synchronize at the beginning of the examination.
5. **Test Policy**: In case of missing a test without prior notice to the respected faculty member, a zero mark will be given. No makeup tests will be taken as the best two test scores will be considered for grading out of three tests.
6. **Mobile Devices Policy**: Empirical evidence of using multitasking devices such as laptops and smartphones in the classroom hinders the learning experience. Thus, the use of multitasking devices is strictly discouraged. Switch off your laptop/mobile devices during class activities.

13 Additional Information

Please click or scan:

Academic Calendar Spring, 2023 :

Academic Information and Policies:

Proctorial Rules:

Grading and Performance Evaluation:

Sagufta Sabah Nakshi
Course Coordinator, CSE 100
September 17, 2023

Chairman, Department of CSE
September 17, 2023

Appendix A : Program Outcomes

POs	Category	Program Outcomes
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 the literature and analyze complex engineering problems and reach substantiated conclusions using first 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 as well as cultural, societal and environmental concerns.
PO4	Investigations	Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information 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 the 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 professional ethics, responsibilities and the norms of the engineering practice.
PO9	Individual work and teamwork	Function effectively as an individual and as a member or leader of diverse teams as well as 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 the engineering and management principles and apply these to one's own work as a member or a leader of a team 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.

Appendix B : Knowledge Profile

Knowledge Profile	Attribute
WK1	A systematic, theory-based understanding of the natural sciences applicable to the discipline
WK2	Conceptually based mathematics, numerical analysis, statistics and the formal aspects of computer and information science to support analysis and modeling applicable to the discipline
WK3	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline
WK4	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
WK5	Knowledge that supports engineering design in a practice area
WK6	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline
WK7	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

WK8	Engagement with selected knowledge in the research literature of the discipline

Appendix C : Range of Complex Engineering Problem Solving

Attribute	Identity	Complex Engineering Problem Description
Depth of knowledge required	WP1	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	WP2	Involve wide-ranging or conflicting technical, engineering and other issues
Depth of analysis required	WP3	Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models
Familiarity of issues	WP4	Involve infrequently encountered issues
Extent of applicable codes	WP5	Are outside problems encompassed by standards and codes of practice for professional engineering
Extent of stakeholder involvement and conflicting requirements	WP6	Involve diverse groups of stakeholders with widely varying needs
Interdependence	WP7	Are high-level problems including many component parts or sub-problems

Note: Complex Engineering Problems have identity P1 and some or all of P2 to P7.

Appendix D : Range of Complex Engineering Activities

Attribute	Identity	Activity Description
Range of resources	EA1	Involve the use of diverse resources (and for this purpose resources include people, money, equipment, materials, information and technologies)
Level of interaction	EA2	Require resolution of significant problems arising from interactions between wide-ranging or conflicting technical, engineering or other issues
Innovation	EA3	Involve creative use of engineering principles and researchbased knowledge in novel ways
Consequences for society and the environment	EA4	Have significant consequences in a range of contexts, characterized by difficulty of prediction and mitigation
Familiarity	EA5	Can extend beyond previous experiences by applying principles-based approaches

Note: Complex activities means (engineering) activities or projects that have some or all of the above activities.

Appendix E : Domain and Level of Bloom's Taxonomy

Cognitive Domain		Psychomotor Domain		Affective Domain	
C1	Remembering	P1	Perception	A1	Receive
C2	Understanding	P2	Set	A2	Respond
C3	Applying	P3	Guided Response	A3	Value
C4	Analyzing	P4	Mechanism	A4	Organize
C5	Evaluating	P5	Complex Overt Response	A5	Internalize
C6	Creating/ Designing	P6	Adaption		
		P7	Origination		