CSE400A: Capstone Project (part 1 of 3)

Credits: 0+1=1

Credit Hours & Teaching Scheme:

	Theory	Laboratory	Remarks
Credit Hours	0	1	Part 1 in the 1st semester (grade on 1 credit)
Contact Hours	0	2 Hours/Week for 13 weeks in the 1st semester	

Prerequisite: Students must complete at least 101 credits

Course Objective: Capstone is a metaphor used to describe a final achievement that builds upon previous works and encapsulates them. This project-based coursework is intended to provide a culminating experience that allows a student to demonstrate proficiency in several of the learning outcomes that are set forth by his or her degree program. The capstone project will integrate multidisciplinary subjects that will enable the students to enhance their professional skills that are difficult to impart in traditional lectured courses. This coursework will provide the students an opportunity to apply the knowledge and skills gathered through the earlier courseworks to the solution of complex engineering problems.

Course Outcomes (COs):
After completion of the first part of the course students will be able to:

CO	CO Descriptions	Learning Subdomains
CO1	**Integrate** new and previously acquired knowledge for identifying a real-life complex computer science and engineering problem as the capstone project.	Cognitive (C2, C3)
CO2	**Examine** various problem domains (literature review), **define** the problems, and **formulate** the objectives for the capstone project.	Cognitive (C4, C5, C6), Psychomotor (P2, P3, P4)

Mapping of COs to Knowledge Profile (K), Program Outcome (PO), Complex Engineering Problem (EP), and Complex Engineering Activity (EA):

CO	CO Descriptions	K	PO	EP	EA
CO1	**Integrate** new and previously acquired knowledge for identifying a real-life complex engineering problem as the capstone project	K1, K2, K3, K4	PO1	EP1, EP2, EP3, EP4, EP5, EP6, EP7	-

CO2	**Examine** various problem domains (literature review), **define** the problems, and **formulate** the objectives for the capstone project	K8	PO4	EP1, EP2, EP3, EP4, EP5, EP6, EP7	-

Teaching Learning Methodology and Assessment:

The group of students will prepare a report targeting CO1 and CO2 and finalizing a capstone project topic and its objectives. Grading will be done based on this report and the oral presentation of the students.

CSE400B: Capstone Project (part 2 of 3)

Credits: 0+2=2

Credit Hours & Teaching Scheme:

	Theory	**Laboratory**	**Remarks**
Credit Hours	0	2	Part 2 in the 2nd semester (grade on 2 credits)
Contact Hours	0	4 Hours/Week for 13 weeks in the 2nd semester	

Prerequisite: CSE400A

Course Objective: The objective of this part of the course is to enable students to select and use engineering and IT tools for analyzing and designing complex computer science and engineering problems considering various aspects of societal, health, safety, legal and cultural issues taking into account the relevant professional and engineering practices and solutions.

Course Outcomes (COs):
After completion of the second part of the course students will be able to:

CO	**CO Descriptions**	**Learning Subdomains**
CO3	**Analyze** various aspects of the objectives for designing a solution for the capstone project.	Cognitive (C2, C3, C4, C5)

CO4	**Design** and **develop** solutions for the capstone project that meet public health and safety, cultural, societal, and environmental considerations.	Cognitive (C6), Affective (A4)
CO5	**Identify** and **apply** modern engineering and IT tools for the design and development of the capstone project.	Psychomotor (P2, P3), Cognitive (C2)
CO6	**Assess** and **address** societal, health, safety, legal, and cultural aspects related to the implementation of the capstone project considering the relevant professional and engineering practices and solutions.	Affective (A4), Cognitive (C3)

Mapping of COs to Knowledge Profile (K), Program Outcome (PO), Complex Engineering Problem (EP), and Complex Engineering Activity (EA):

CO	CO Descriptions	K	PO	EP	EA
CO3	**Analyze** various aspects of the objectives for designing a solution of the capstone project	K1, K2, K3, K4	PO2	EP1, EP2, EP3, EP4, EP5, EP6, EP7	-
CO4	**Design** and **develop** solutions for the capstone project that meet public health and safety, cultural, societal, and environmental considerations	K5	PO3	EP1, EP2, EP3, EP4, EP5, EP6, EP7	-
CO5	**Identify** and **apply** modern engineering and IT tools for the design and development of the capstone project	K6	PO5	EP1, EP2, EP3, EP4, EP5, EP6, EP7	-
CO6	**Assess** and **address** societal, health, safety, legal, and cultural aspects related to the implementation of the capstone project	K7	PO6	EP1, EP2, EP3, EP4, EP5, EP6, EP7	-

	considering the relevant professional and engineering practices and solutions				

Teaching Learning Methodology and Assessment:

The group of students will prepare a report targeting CO3, CO4, CO5, and CO6 related to the design and implementation of the capstone project and its impact on societal, health, safety, legal and cultural issues. Grading will be done based on this report and the oral presentation of the students.

CSE400C: Capstone Project (part 3 of 3)

Credits: 0+3=3
Credit Hours & Teaching Scheme:

	Theory	Laboratory	Remarks
Credit Hours	0	3	Part 3 in the 3rd semester (grade on 3 credits)
Contact Hours	0	6 Hours/Week for 13 weeks in the 3rd semester	

Prerequisite: CSE400B

Course Objective: The objective of this part of the course is to enable students to solve complex computer science and engineering problems considering environment and sustainability, ethics, individual and teamwork, and project management issues as well as to communicate effectively with the heterogeneous environment and be able to learn throughout the professional life.

Course Outcomes (COs):
After completion of the third part of the course students will be able to:

CO	CO Descriptions	Learning Subdomains
CO7	**Assess** and **address** the sustainability and impact of the capstone project in societal and environmental contexts	Affective (A4), Cognitive (C5)
CO8	**Apply** professional and engineering ethical principles and practices for the implementation of the capstone project.	Affective (A4, A5) Cognitive (C5)

CO9	**Work** effectively as an individual and a team member for the successful completion of the capstone project.	Psychomotor (P4, P5), Affective (A3, A4, A5)
CO10	**Write** effective reports and design documentation, and **make** effective presentations of the outcome of the capstone project.	Psychomotor (P3, P4), Affective (A3, A4)
CO11	**Conduct** economic analysis and cost estimation, and **apply** appropriate project management processes in the development life cycle of the capstone project.	Cognitive (C2, C3), Psychomotor (P4)
CO12	**Prepare** to take part in independent and life-long learning for adapting emerging technologies for the solution of complex computer science and engineering problems.	Affective (A3), Psychomotor (P4, P5)

Mapping of COs to Knowledge Profile (K), Program Outcome (PO), Complex Engineering Problem (EP), and Complex Engineering Activity (EA):

CO	CO Descriptions	K	PO	EP	EA
CO7	**Assess** and **address** the sustainability and impact of the capstone project in societal and environmental contexts	K7	PO7	EP1, EP2, EP3, EP4, EP5, EP6, EP7	-
CO8	**Apply** professional and engineering ethical principles and practices for the implementation of the capstone project	K7	PO8	-	-
CO9	**Work** effectively as an individual and a team member for successful completion of the capstone project	-	PO9	-	-
CO10	**Write** effective reports and design documentation, and **make** effective presentations of the outcome of the capstone project	-	PO10	-	EA1, EA2, EA3, EA4, EA5
CO11	**Conduct** economic analysis and cost	-	PO11	-	-

	estimation; and **apply** appropriate project management processes in the development life cycle of the capstone project				
CO12	**Prepare** to take part in independent and life-long learning for adapting emerging technologies for the solution of the complex computer science and engineering problems	-	PO12	-	-

Teaching Learning Methodology and Assessment:

The group of students will prepare a report targeting CO7, CO8, CO9, CO10, CO11, and CO12 related to the design and implementation of the capstone project and its impact on environment and sustainability, ethics, individual and teamwork, and project management issues as well as to effective communication and life long learning. Grading will be done based on this report and the oral presentation of the students.

Final Outcomes:

1. Deliverable Product/Prototype
2. Final Capstone Project Report

Capstone Project	CO-PO Matrix		PO Descriptions	Learning Domains	Assessment Weight
CSE400A	CO1	PO1	Engineering Knowledge	Cognitive	45%
	CO2	PO4	Investigation	Cognitive, Psychomotor	45% 10%
CSE400B	CO3	PO2	Problem Analysis	Cognitive	25%
	CO4	PO3	Design/ Development of Solutions	Cognitive, Affective	45% 5%
	CO5	PO5	Modern Tool Usage	Psychomotor, Cognitive	10% 5%
	CO6	PO6	The Engineer and Society	Affective, Cognitive	5% 5%
CSE400C	CO7	PO7	Environment and Sustainability	Affective, Cognitive	5% 5%
	CO8	PO8	Ethics	Affective, Cognitive	5% 5%
	CO9	PO9	Individual Work and Teamwork	Psychomotor, Affective	10% 10%
	CO10	PO10	Communication	Psychomotor, Affective	30% 10%
	CO11	PO11	Project Management and Finance	Cognitive, Psychomotor	5% 5%
	CO12	PO12	Life-Long Learning	Affective, Psychomotor	5% 5%