Department of Computer Science and Engineering (CSE)

Outcome-Based Curriculum of B. Sc. in CSE Program

(Effective from Summer Semester 2018)

Vision Statement of CSE Department

To be internationally renowned in Computer Science and Engineering and to exalt excellence in education, research and industrial profession for sustainable transformation of the society.

Mission of CSE Department

To advance knowledge and learning of evolving challenges in Computer Science and Engineering through quality education and research towards the development of the society.

To sustain an outstanding hub dedicated to excellence in teaching, learning, and research and to become internationally recognized to meet national and international needs.

To enhance the quality of students with advanced knowledge and skills of Computer Science and Engineering to meet contemporary industrial requirements.

Program Educational Objectives (PEOs) of B. Sc. in CSE Program

Graduates of the B. Sc. in Computer Science and Engineering (CSE) program are expected to attain the following Program Educational Objectives (PEO) within few years, such as 3-5 years, of graduation.

PEO1	Graduates will establish themselves as leading computational professionals and continue to learn and address evolving challenges in Computer Science and Engineering.
PEO2	Graduates will engage in lifelong pursuit of knowledge and interdisciplinary learning for industrial, research, and academic careers.
PEO3	Graduates will contribute to sustainable development and the well-being of society through the use of Computer Science and Engineering principles, practices and tools in an ethical and responsible manner.

Program Outcomes (POs) of B. Sc. in CSE Program

Graduates of the B. Sc. in Computer Science and Engineering (CSE) program are expected to attain the following Program Outcomes (POs) by the time of graduation.

PO	Description

PO	Description
PO1: Engineering Knowledge	Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in K1 to K4 respectively to the solution of complex computer science and engineering problems (EP1 to EP7).
PO2: Problem Analysis	Identify, formulate, research literature and analyze complexcomputer science and engineering problems (EP1 to EP7) reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences. (K1 to K4)
PO3: Design/ Development of Solutions	Design solutions for complex computer science and engineering problems (EP1 to EP7) and design systems, components or processes that meet specified needs with app ropriate consideration for public health and safety, cultural, societal, and environmental considerations. (WK5)
PO4: Investigation	Conduct investigations of complex computer science and engineering problems (EP1 to EP7) using research-based knowledge (WK8) and research methods including 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 computer science and engineering problems (EP1 to EP7), with an understanding of the limitations. (WK6)
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 computer science and engineering practice and solutions to complex computer science and engineering problems (EP1 to EP7). (WK7)
PO7: Environment and Sustainability	Understand and evaluate the sustainability and impact of professional computer science and engineering work in the solution of complex computer science and engineering problems (EP1 to EP7) in societal and environmental contexts. (WK7)

PO	Description
PO8: Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of computer science and engineering practice. (WK7)
PO9: Individual Work and Teamwork	Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
PO10: Communication	Communicate effectively on complex computer science and engineering activities (EA1 to EA5) with the computer science and engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11: Project Management and Finance	Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12: Life-Long Learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Summery

Course Category	Credits
Compulsory Language and General Education Courses	9
Elective General Education Courses	9
Basic Science Courses	11
Mathematics and Statistics Courses	15
Core Computer Science and Engineering Courses	62
Capstone Project	6
Major Compulsory and Elective Computer Science and Engineering Courses	20

Non-major Elective Computer Science and Engineering Courses	8
Total	**140**

List of Courses

Course	Credits	Prerequisite
Compulsory Language and General Education Courses	**9**	
ENG101 Basic English	3	
ENG 102 Composition and Communication Skills	3	ENG101
GEN226 Emergence of Bangladesh	3	ENG102

Elective General Education Courses	**9**	
Social Science Courses (any one course)	***3***	
ECO101 Principle of Microeconomics	3	None
GEN203 Ecological System and Environment	3	None
GEN214 Development Studies	3	ENG102
SOC317 Sociology of Science and Technology	3	None
Arts and Humanities Courses (any one course)	***3***	
GEN201 Bangladesh Studies	3	ENG102
GEN204 Western Thought	3	None
GEN210 International Relation	3	ENG102
SOC211 Eastern Culture and Heritage	3	None

Course	Credits	Prerequisite
SOC217 Religion, Ethnicity, Culture and Development in South Asia	3	ENG102
Business Courses (any one course)	***3***	
ACT101 Financial Accounting	3	None
BUS321 Business for Engineering and Technology	3	ENG102
BUS231 Business Communication	3	ENG102
MGT321 Industrial Management	3	ENG102
MGT337 Production Operations Management	3	STA102
FIN101 Principle of Finance	3	STA102
MKT101 Principle of Marketing	3	None

Core Natural Science Courses	**9+2=11**	
PHY109 Engineering Physics-I (Introductory Classical Physics)	3+1=4	MAT102
PHY209 Engineering Physics-II (Introductory Quantum Physics)	3+0=3	MAT205
CHE109 Engineering Chemistry	3+1=4	

Core Mathematics and Statistics Course	**15**	
MAT101 Differential and Integral Calculus	3	
MAT102 Differential Equations and Special Functions	3	MAT101
MAT104 Coordinate Geometry and Vector Analysis	3	MAT101
MAT205 Linear Algebra and Complex Variable	3	MAT102

Course	Credits	Prerequisite
STA102 Statistics and Probability	3	

Core Computer Science and Engineering Courses	48+14=62	
CSE103 Structured Programming	3+1.5=4.5	
CSE106 Discrete Mathematics	3+0=3	CSE103
CSE110 Object Oriented Programming	3+1.5=4.5	CSE106
CSE200 Computer-Aided Engineering Drawing	0+1=1	
CSE209 Electrical Circuits	3+1=4	
CSE207 Data Structures	3+1=4	CSE110
CSE251 Electronic Circuits	3+1=4	CSE209
CSE221 Operating Systems	3+1=4	CSE207
CSE326 Algorithms	3+1.5=4.5	CSE207
CSE302 Database Systems	3+1.5=4.5	CSE106
CSE345 Digital Logic Design	3+1=4	CSE251
CSE347 Information System Analysis and Design	3+1=4	CSE302
CSE360 Computer Architecture	3+0=3	CSE221
CSE405 Computer Networks	3+1=4	CSE326
CSE407 Green Computing	3+0=3	CSE405
CSE487 Cyber Security, Ethics and Law	3+0=3	CSE405
CSE495 IT Project Management and Entrepreneurship	3+0=3	CSE347

Course	Credits	Prerequisite
Core Capstone Project	**0+6=6**	
CSE400 Capstone Project	0+6=6	Completed at least 105 credit hours
Major Requirements	**Courses from the selected major area**	
Student should select one of the four major areas for degree major requirement	Two Compulsory courses (6+2=8 credits)	Three elective courses (9+3=12 credits)
Non-Major Elective Requirements		
Minimum 8 credits (two to three courses depending on credits of the courses) from one or more major/non-major areas other than selected major area		

Four Major Areas and Courses (2 Compulsory and 3 Elective Courses)	15+5=20	

1. Intelligent Systems and Data Science	15+5=20	
Compulsory Courses	***6+2=8***	
CSE303 Statistics for Data Science	3+1=4	STA102
CSE366 Artificial Intelligence	3+1=4	CSE326
Elective Courses (Any 3 Courses)	***9+3=12***	
CSE420 Computer Graphics	3+1=4	CSE326
CSE438 Digital Image Processing	3+1=4	CSE326

Course	Credits	Prerequisite
CSE445 Computer Vision	3+1=4	CSE326
CSE452 Distributed Systems and Algorithms	3+1=4	CSE221
CSE474 Pattern Recognition	3+1=4	CSE366
CSE475 Machine Learning	3+1=4	CSE366
CSE477 Data Mining	3+1=4	CSE366
CSE481 Nature-Inspired Computing	3+1=4	CSE326
CSE486 Bioinformatics Algorithms	3+1=4	CSE326
CSE488 Big Data Analytics	3+1=4	CSE302

2. Software Engineering	**15+5=20**	
Compulsory Courses	***6+2=8***	
CSE412 Software Engineering	3+1=4	CSE347
CSE430 Software Testing and Quality Assurance	3+1=4	CSE412
Elective Courses (Any 3 Courses)	***9+3=12***	
CSE422 Simulation and Modeling	3+1=4	CSE326
CSE423 Software Architecture	3+1=4	CSE412
CSE428 Human Computer Interactions	3+1=4	CSE412
CSE452 Distributed Systems and Algorithms	3+1=4	CSE221
CSE464 Advanced Database System	3+1=4	CSE302
CSE479 Web Programming	3+1=4	CSE302

Course	Credits	Prerequisite
CSE489 Mobile Programming	3+1=4	CSE326
3. Communications and Networking	**15+5=20**	
Compulsory Courses	***6+2=8***	
CSE350 Data Communications	3+1=4	CSE251
CSE432 Digital Signal Processing	3+1=4	CSE326
Elective Courses (Any 3 Courses)	***9+3=12***	
CSE452 Distributed Systems and Algorithms	3+1=4	CSE221
CSE453 Wireless Networks	3+1=4	CSE405
CSE457 Cellular Networks	3+1=4	CSE405
CSE472 Advanced Network Services and Management	3+1=4	CSE405
CSE473 Network Security and Systems	3+1=4	CSE405
CSE489 Mobile Programming	3+1=4	CSE326

4. Hardware Engineering	**15+5=20**	
Compulsory Courses	***6+2=8***	
CSE355 Digital System Design	3+1=4	CSE345
CSE442 Microprocessors and Microcontrollers	3+1=4	CSE360
Elective Courses (Any 3 Courses)	***9+3=12***	
CSE406 Internet of Things	3+1=4	CSE405
CSE446 ASIC Design Using FPGA	3+1=4	CSE345

Course	Credits	Prerequisite
CSE491 VLSI Design	3+1=4	CSE345
CSE492 Robotics	3+1=4	CSE366
CSE494 Embedded Systems	3+1=4	CSE442
Non-Major Area: Computational Theory		
CSE225 Numerical Methods	3+1=4	CSE103
CSE313 Theory of Computations	3+0=3	CSE326
CSE460 Cryptography	3+0=3	CSE326
CSE471 Compiler Design	3+1=4	CSE326
CSE483 Graph Theory	3+0=3	CSE326
CSE484 Computational Geometry	3+0=3	CSE326

Course Flowchart

	1st Year		2nd Year		3rd Year		4th Year	
	Course (Credit)	Pre-requisite	Course	Pre-requisite	Course	Pre-requisite	Course	Pre-requisite
1st Semester	ENG101 Basic English (3)		GEN226 Emergence of Bangladesh (3)	ENG102	Elective General Education-III (3)		CSE400 Capstone Project-I (0+1=1)	
	MAT101 Differential and Integral Calculus (3)		STA102 Statistics and Probability (3)		CSE326 Algorithms (3+1.5=4.5)	CSE207	CSE407 Green Computing (3+0=3)	CSE405
	CSE103 Structured Programming (3+1.5=4.5)		CSE200 Computer-Aided Engineering Drawing (0+1=1)		CSE302 Database Systems (3+1.5=4.5)	CSE106	Elective Major-I (3+1=4)	
			CSE209 Electrical Circuits (3+1=4)				Elective Non-Major-I (3+1=4)	
2nd Semester	ENG102 Composition And Communication Skills (3)	ENG101	Elective General Education-I (3)		CSE345 Digital Logic Design (3+1=4)	CSE251	CSE400 Capstone Project-II (0+2=2)	
	MAT102 Differential Equations and Special Functions (3)	MAT101	MAT205 Linear Algebra and Complex Variables (3)	MAT102	CSE347 Information System Analysis and Design (3+1=4)	CSE302	CSE487 Cyber Security, Ethics and Law (3+0=3)	CSE405
	CSE106 Discrete Mathematics (3+0=3)	CSE103	CSE207 Data Structures (3+1=4)	CSE110	Compulsory Major-I (3+1=4)		Elective Major-II (3+1=4)	
	CHE109 Engineering Chemistry (3+1=4)		CSE251 Electronic Circuits (3+1=4)	CSE209			Elective Non-Major-II (3+1=4)	
3rd Semester	PHY109 Engineering Physics-I (3+1=4)	MAT102	Elective General Education-II (3)		CSE360 Computer Architecture (3+0=3)	CSE221	CSE400 Capstone Project-III (0+3=3)	
	MAT104 Coordinate Geometry and Vector Analysis (3)	MAT101	PHY209 Engineering Physics-II (3+0=3)	MAT205	CSE 405 Computer Networks (3+1=4)	CSE326	CSE495 IT Project Management and Entrepreneurship (3+0=3)	CSE347
	CSE110 Object Oriented Programming (3+1.5=4.5)	CSE106	CSE221 Operating Systems (3+1=4)	CSE207	Compulsory Major-II (3+1=4)		Elective Major-III (3+1=4)	
Year-Credit	35		35		35		35	