BS Artificial Intelligence

The Department of Computer Science offers a 4-year BS Artificial Intelligence (BSAI) program designed to provide students with a comprehensive foundation in artificial intelligence, equipping them with the skills to tackle complex real-world challenges. The program adheres to the latest HEC and NCEAC-approved curriculum, offering students both theoretical knowledge and practical experience necessary to excel as AI professionals. The BS (AI) program focuses on transforming large, complex data and scenarios into actionable decisions. Students gain in-depth knowledge on how advanced inputs — such as knowledge, vision, language, and large databases — can be leveraged to make decisions that enhance human capabilities. The curriculum covers a wide range of topics, including computing, mathematics, automated reasoning, statistics, computational modeling, artificial neural networks, machine learning, natural language processing, vision, symbolic computation, and classical AI languages.

In addition to core AI subjects, students are encouraged to take courses in ethics and social responsibility. The program emphasizes long-term projects that allow students to apply AI to solve pressing global issues in fields such as agriculture, defense, healthcare, governance, transportation, e-commerce, finance, and education. Practical experience is a core component of the curriculum, with students gaining hands-on exposure to real-world AI applications through internships. BSAI graduates are well-prepared for roles such as machine learning engineers, data scientists, AI researchers, computer vision specialists, and natural language processing (NLP) experts.

The department has already applied for the Zero Visit of the BS AI program and expects to receive approval soon.

Program Mission for BS Artificial Intelligence

The mission of the Bachelor of Artificial Intelligence (AI) program is to provide a **quality education** that equips students with both **technical expertise and essential transferable skills.** The program aims to cultivate graduates who are proficient in Artificial Intelligence, demonstrate **social and ethical responsibility**, and are committed to ongoing **professional development and career advancement**.

Program Educational Objectives (PEOs) for BSAI

Program Educational Objectives (PEOs) are the attributes and abilities that the graduates are expected to demonstrate within a few years after graduation. The PEOs are a direct translation of program mission and are derived involving all stakeholders aligned with University and Institute missions. Department of Computer Science has defined and established its PEOs keeping in view the desirable attributes of our graduates.

The Program Educational Objectives (PEOs) are focused on to produce BS Artificial Intelligence graduates who are:

PEO 1: Produce graduates with a strong foundation in artificial intelligence concepts, algorithms, and techniques, who can apply advanced problem-solving and analytical skills to develop innovative and ethical AI solutions across diverse domains.

PEO 2: Develop graduates with strong communication, teamwork, and ethical reasoning abilities to collaborate effectively in AI-driven projects and address societal implications.

PEO 3: Foster graduates who are lifelong learners, capable of adapting to the rapidly evolving AI landscape through continuous learning and research, and contribute to the advancement of AI technology.

Graduate Attributes (GAs) for BSAI

The Graduate Attributes (GA) are statements that describe the set of skills, knowledge, and attitude that university expects from its graduates. The GAs broadly describes the knowledge, skills, and behaviors the students acquire in their program of study that is intended to foster the achievement of Program Educational Objectives (PEOs). The following GAs for undergraduate computing programs has been adopted from the Seol Accord as recommended by the National Computing Education Accreditation Council (NCEAC). By the time of graduation, the program enables students to:

1. **Academic Education:** Completion of an accredited program of study designed to prepare graduates as artificial intelligence professionals.
2. **Knowledge for Solving Computing Problems:** Apply knowledge of artificial intelligence fundamentals, machine learning, deep learning, and relevant domain knowledge to real-world AI challenges and requirements.
3. **Problem Analysis:** Identify, formulate, research, and solve complex AI problems reaching substantiated conclusions using fundamental principles of mathematics, statistics, and AI sciences.
4. **Design/Development of Solutions:** Design and evaluate solutions for complex AI problems, and design and evaluate AI systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
5. **Modern Tool Usage:** Create, select, adapt, and apply appropriate AI techniques, resources, and modern AI tools to complex AI activities, with an understanding of the limitations.
6. **Individual and Team Work:** Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary AI settings.
7. **Communication:** Communicate effectively with the AI community and with society at large about complex AI activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.
8. **Computing Professionalism and Society:** Understand and assess societal, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional AI practice.
9. **Ethics:** Understand and commit to professional ethics, responsibilities, and norms of professional AI practice.
10. **Lifelong Learning:** Recognize the need, and have the ability, to engage in independent learning for continual development as an AI professional.

Mapping of PEOs to GAs

S.No.	Graduate Attributes (GAs)	Program Education Objectives (PEOs)		
		PEO-1	PEO-2	PEO-3
1.	Academic Education	✓		
2.	Knowledge for Solving Computing Problems	✓		
3.	Problem Analysis	✓		
4.	Design/ development of Solutions	✓		
5.	Modern Tool Usage	✓		
6.	Individual and Team Work		✓	
7.	Communication		✓	
8.	Computing Professionalism and Society		✓	
9.	Ethics		✓	
10.	Life-long Learning			✓

Eligibility Criteria, Duration of the Program and Award of Degree

- The minimum requirements for admission in BS Artificial Intelligence is F.Sc Pre-Engineering OR Equivalent, F.Sc. Pre-Medical, FCS/F.Sc Computer Science, Diploma of Associate Engineering (DAE) with at least 50% marks.
- The students who have not studied Mathematics at intermediate level have to pass deficiency courses of Mathematics (06 credits) in first two semesters.
- At minimum 130 credit hours are required for award of BS degrees in any computing
- discipline mentioned in this document.
- The minimum duration for completion of BS Computing degrees is four years. The HEC allows maximum period of seven years to complete BS degree requirements.
- A minimum 2.0 CGPA (Cumulative Grade Point Average) on a scale of 4.0 is required for award of BS Computing Degree.
- The students after successful completion of 04 semesters in BS Computing Programs may exit with Associate Degree in Computing subject to completion of all requirements for the award of associate degree, i.e., Credit Hours, CGPA, and compulsory courses.

Curriculum Model for BS Artificial Intelligence

The generic structure for the computing degree program given before is mapped with the BSAI program in the following tables.

Program Generic Structure

		NCEAC/HEC Proposed		ICP BS AI Program	
Categories (Cat)	Cat Code	No. of Courses	Credit Hours	No. of Courses	Credit Hours
Computing Core (CC)	1	14	46	14	46
Domain Core (DC)	2	6	18	6	18
Domain Elective (DE)	3	7	21	7	21
General Education Requirements (GER)	4	15	34	15	34
Mathematics & Supporting Courses (MSC) or Interdisciplinary Courses	5	4	12	4	12
Elective Supporting Courses (ESC)	6	1	3	1	3
Field Experience/Internship	7	01	03	01	03
Total		48	137	48	137

Proposed Semester/Study Plan for BS Artificial Intelligence (AI)

4-Year Program (8 Regular Semesters of 16 weeks each)

Semester 1 (18 Credit Hours)				
Course Code	**Course Title**	**Cr.Hr**	**Domain**	**Pre-Requisite**
CSC-140	Application of Information and Communication Technologies	3 (2-1)	GER	
CSC-110	Programming Fundamentals (PF)	4 (3-1)	CC	
	Islamic Studies	2 (2-0)	GER	
	Natural Sciences Elective (Applied Physics)	3 (3-0)	GER	
	Functional English (FE)	3 (3-0)	GER	
	Pakistan Studies	2 (2-0)	GER	
	Understanding of Holy Quran-I	1 (1-0)	GER	
	*Pre-Calculus-I	Non-Credit		
	Semester Total	**18 (16-2)**		
* Non-Credit course. Students with pre-medical, have to pass deficiency courses of Mathematics of 6 credit hours; preferably within first year of enrolment in the program.				

Semester 2 (18 Credit Hours)				
Course Code	**Course Title**	**Cr.Hr**	**Domain**	**Pre-Requisite**
CSC-143	Discrete Structures	3 (3-0)	GER	
	Expository Writing (EW)	3 (3-0)	GER	FE
CSC-111	Object Oriented Programming (OOP)	4 (3-1)	CC	PF
	Ideology and Constitution of Pakistan	2 (2-0)	GER	
CSC-113	Digital Logic Design	3 (3-0)	CC	

	Social Science Elective (Introduction to Psychology)	2 (2-0)	GER	
	Understanding of Holy Quran-II	1 (1-0)	GER	
	* Pre-Calculus-II	Non-Credit		
	Semester Total	**18 (17-1)**		

Semester 3 (18 Credit Hours)				
Course Code	**Course Title**	**Cr.Hr**	**Domain**	**Pre-Requisite**
CSC-218	Software Engineering	3 (3-0)	CC	
CSC-214	Data Structures	4 (3-1)	CC	OOP
CSC-212	Database Systems (DB)	4 (3-1)	CC	
	Calculus and Analytic Geometry (CAG)	3 (3-0)	GER	
CSC-249	Arts & Humanities (Professional Practices)	2 (2-0)	GER	
CSC-2410	Civics and Community Engagement	2 (2-0)	GER	
	Semester Total	**18 (16-2)**		

Semester 4 (18 Credit Hours)				
Course Code	**Course Title**	**Cr.Hr**	**Domain**	**Pre-Requisite**
CSC-217	Computer Networks	3 (2-1)	CC	
CSC-219	Computer Organization & Assembly Language (COAL)	3 (2-1)	CC	DLD
CSC-2111	Analysis of Algorithms	3 (3-0)	CC	DS
	Linear Algebra	3 (3-0)	MSC	CAG
CSC-216	Artificial Intelligence	3 (2-1)	CC	
	Probability & Statistics	3 (3-0)	MSC	
	Semester Total	**18 (15-3)**		

Semester 5 (17 Credit Hours)				
Course Code	**Course Title**	**Cr.Hr**	**Domain**	**Pre-Requisite**
	Multivariable Calculus	3 (3-0)	MSC	CAG
AI-320	Programming for AI	3 (2-1)	DC	AI
AI-321	Machine Learning (ML)	3 (2-1)	DC	AI
CSC-3110	Operating Systems (OS)	3 (2-1)	CC	
	Domain Elective 1	3 (2-1)	DE1	
CSC-3411	Entrepreneurship	2 (2-0)	GER	
	Semester Total	**17 (13-4)**		

Semester 6 (18 Credit Hours)				
Course Code	**Course Title**	**Cr.Hr**	**Domain**	**Pre-Requisite**
	Domain Elective 2	3 (2-1)	DE2	
AI-322	Artificial Neural Networks & Deep Learning	3 (2-1)	DC	ML
AI-323	Knowledge Representation & Reasoning	3 (2-1)	DC	AI
	Domain Elective 3	3 (2-1)	DE3	
CSC-315	Information Security	3 (3-0)	CC	
CSC-353	Technical and Business Writing	3 (3-0)	MSC	EW
	Semester Total	**18 (14-4)**		

Semester 7 (15 Credit Hours)				
Course Code	**Course Title**	**Cr.Hr**	**Domain**	**Pre-Requisite**
AI-424	Computer Vision	3 (2-1)	DC	
	Domain Elective 4	3 (3-0)	DE4	
	Domain Elective 5	3 (3-0)	DE5	
CSC-464	Digital Marketing	3 (3-0)	ESC	
CSC-4112	Final Year Project-1	3 (0-3)	CC	
	Semester Total	**15 (11-4)**		

Semester 8 (12 Credit Hours)				
Course Code	**Course Title**	**Cr.Hr**	**Domain**	**Pre-Requisite**
CSC-425	Parallel and Distributed Computing	3 (2-1)	DC	OS
	Domain Elective 6	3 (2-1)	DE6	
	Domain Elective 7	3 (2-1)	DE7	
CSC-4113	Final Year Project-II	3 (0-3)	CC	FYP-I
	Seerat Un Nabi	Non-Credit		
	Semester Total	**12 (6-6)**		

Summary of Total Credit Hours for BS (AI) Program

Semesters	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**	**Total**
Credit Hours	18	18	18	18	17	18	15	12	137