

## Annexure – C

# Proposed Scheme of Studies for BS in Artificial Intelligence (Fall-2020 – Spring-2024)

### Proposed PLOS:

1. Skills in areas such as artificial intelligence and its applications in different fields such as robotics and computer vision for understanding and solution of relevant problems.
2. Knowledge, understanding and skills in artificial intelligence.
3. Knowledge and skills needed to become effective professionals within industries.
4. Analyze a problem and define computing requirements that are appropriate to its solution.
5. Design, implement, and evaluate a computer-based system, process, component or program to meet desired needs.
6. Knowledge of selected specialized areas of study and practice and research in artificial intelligence.
7. An ability to develop a range of transferable skills applicable to employment.
8. An ability to provide solutions to real world problems using developed skills in the field of artificial intelligence.
9. Work in a team to achieve a common goal.
10. Communicate efficiently with different audiences.

## Structure of BS (AI) Program

### *Areas Covered in BS AI program*

<b>Course Group</b>	<b>Credit hours</b>
General Education	16
University Electives	09
Mathematics & Science Foundation	12
Computing – Core	39
<b>Common courses (76 CH)</b>	
Domain (AI)	
Domain Core (AI)	24
Domain Supporting (AI)	09
Domain Electives (AI)	21
<b>Domain courses (54 CH)</b>	
<b>TOTAL</b>	<b>130</b>

- **General Education**

General Education Courses (Credit Hours: 16)				
#	Code	Course Title	Credit Hours	Proposed Semester
1	HUM-101	Islamic Studies/Ethics	2 (2 + 0)	Semester-I
2	HUM-102	Pakistan Studies	2 (2 + 0)	Semester-I
3	ENG-101	English Composition & Comprehension	3 (3 + 0)	Semester-I
4	ENG-150	Communication and Presentation Skills	3 (3 + 0)	Semester-II
5	ENG-301	Technical Writing	3 (3 + 0)	Semester-V
6	CSC-101	Introduction to Information and Communication Technology (ICT)	3 (2 + 1)	Semester-I
<b>Total</b>			<b>16</b>	

- **University Elective Courses**

University Elective Courses (Required Credit Hours: 09)		
#	Course Title	Credit Hours
1.	Principles of Management	3 (3 + 0)
2.	E-Business Management	3 (3 + 0)
3.	Technology Entrepreneurship	3 (3 + 0)
4.	<i>Professional Practices</i>	3 (3 + 0)
5.	Financial Accounting	3 (3 + 0)
6.	<i>Research Methods in Computer Science</i>	3 (3 + 0)
7.	Management Information Systems	3 (3 + 0)
8.	Organizational Behavior	3 (3 + 0)
9.	Human Resource Management	3 (3 + 0)

University Elective Courses (Required Credit Hours: 09)		
10.	Financial Accounting	3 (3 + 0)
11.	Financial Management	3 (3 + 0)
12.	Principles of Marketing	3 (3 + 0)
13.	Introduction to Economics	3 (3 + 0)
14.	Psychology	3 (3 + 0)
15.	International Relations	3 (3 + 0)
16.	Foreign/Regional Language (French, German, Sindhi, Punjabi, Urdu etc.)	3 (3 + 0)
17.	Philosophy	3 (3 + 0)
18.	System Analysis & Design	3 (3 + 0)

- **Mathematics and Science Foundation:**

Mathematics and Science Foundation Courses (Credit Hours: 12)				
#	Code	Course Title	Credit Hours	Proposed Semester
1	PHY-150	Applied Physics	3 (2 + 1)	Semester-II
2	MTS-150	Calculus and Analytic Geometry	3 (3 + 0)	Semester-II
3	MTS-250	Linear Algebra	3 (3 + 0)	Semester-IV
4	MTS-251	Probability and Statistics	3 (3 + 0)	Semester-IV
5	MTS-101	Precalculus	Non-Credit	Semester-I
<b>Total</b>			<b>12</b>	

- **Computing Core**

<b>Computing Core Courses (Credit Hours: 39)</b>				
#	Code	Course Title	Credit Hours	Proposed Semester
1	CSC-102	Programming Fundamentals	4 (3 + 1)	Semester-I
2	CSC-151	Discrete Structures	3 (3 + 0)	Semester-II
3	CSC-150	Object-Oriented Programming	4 (3 + 1)	Semester-II
4	CSC-201	Data Structures	4 (3 + 1)	Semester-III
5	SWE-201	Software Engineering	3 (3 + 0)	Semester-III
6	CSC-252	Operating Systems	4 (3 + 1)	Semester-IV
7	CSC-301	Computer Networks	4 (3 + 1)	Semester-V
8	CSC-251	Database Systems	4 (3 + 1)	Semester-IV
9	CSC-401	Information Security	3 (3 + 0)	Semester-VII
10	FYP-401	Project-I	3 (0 + 3)	Semester-VII
11	FYP-451	Project-II	3 (0 + 3)	Semester-VIII
<b>Total</b>			<b>39</b>	

- **Artificial Intelligence Core**

<b>Artificial Intelligence Core Courses (Credit Hours: 24)</b>				
#	Code	Course Title	Credit Hours	Proposed Semester
1	CSC-250	Machine Learning	3 (2 + 1)	Semester-VI
2	CSC-304	Data Mining	4 (3 + 1)	Semester-V
3	CSC-301	Deep Learning	3 (2 + 1)	Semester-VIII
4	CSC-250	Artificial Intelligence	4 (3 + 1)	Semester-IV
5	CSC-351	Design and Analysis of Algorithms	3 (3 + 0)	Semester-VI

6	CSC-352	Bigdata Analytics	3 (2 + 1)	Semester-VI
7	CSC-452	Robotics Fundamentals	3 (2 + 1)	Semester-VI
<b>Total</b>			<b>24</b>	

• **Artificial Intelligence SUPPORTING**

<b>Artificial Intelligence SUPPORTING Courses (Credit Hours: 09)</b>				
#	Code	Course Title	Credit Hours	Proposed Semester
1	MTS-201	Multivariate Calculus	3 (3 + 0)	Semester-III
2	MTS-301	Differential Equations	3 (3+ 0)	Semester-V
3	ESE-201	Digital Logic Design	4 (3 + 1)	Semester-III
<b>Total</b>			<b>09</b>	

• **Artificial Intelligence Elective**

<b>Artificial Intelligence ELECTIVE Courses (Required Credit Hours: 21)</b>		
#	Course Title	Credit Hours
1	Digital Signal Processing	3 (3 + 0)
2	Scientific Computing	3 (2 + 1)
3	Digital Image Processing	3 (3 + 0)
4	Computer Vision	3 (3 + 0)
5	Web Engineering	3 (3 + 0)
6	Recommender System	3 (3 + 0)
7	Natural Language Processing	3 (3 + 0)

<b>Artificial Intelligence ELECTIVE Courses (Required Credit Hours: 21)</b>		
#	Course Title	Credit Hours
8	Sensing Technologies	3 (3 + 0)
9	Reinforcement Learning	3 (2 + 1)
10	Emerging Trends in AI	3 (3 + 0)
11	Mobile Application Development	3 (3 + 0)
12	Case-based Reasoning	3 (3 + 0)
13	Speech Signal Processing	3 (3 + 0)
14	Stochastic Processes	3 (3 + 0)
15	Expert Systems	3 (3 + 0)
16	Social Network and AI	3 (3 + 0)
17	Fuzzy Logic	3 (3 + 0)
18	Computational Intelligence	3 (3 + 0)
19	Multi Agent System	3 (3 + 0)
20	AI for Finance	3 (3 + 0)
21	Information Retrieval	3 (3+0)
22	Computational Linguistics	3 (3+0)
23	Medical Imaging	3 (3+0)

## Semester Wise Study Plan - BS Artificial Intelligence

### Semester I (Credit Hours: 14)

#	Code	Course Name	Category	Credit Hours	Pre-Requisite
1	CSC-101	Introduction to Information and Communication Technology (ICT)	General Education 1	3(2 + 1)	-NONE-
2	CSC-102	Programming Fundamentals	Computing Core 1	4 (3 + 1)	-NONE-
3	ENG-101	English Composition and Comprehension	General Education 2	3 (3 + 0)	-NONE-
4	MTS-101	Precalculus	Maths & Science 1	Non - Credit	-NONE-
5	HUM-101	Islamic Studies/Ethics	General Education 3	2 (2 + 0)	-NONE-
6	HUM-102	Pakistan Studies	General Education 4	2 (2 + 0)	-NONE-
<b>Total Credit Hours</b>				<b>14</b>	

### Semester II (Credit Hours: 16)

#	Code	Course Name	Category	Credit Hours	Pre-Requisite
1	CSC-150	Object-Oriented Programming	Computing Core 2	4 (3 + 1)	CSC-102
2	MTS-150	Calculus and Analytic Geometry	Maths & Science 2	3 (3 + 0)	MTS-101
5	ENG-150	Communication and Presentation Skills	General Education 5	3 (3 + 0)	-NONE-
4	CSC-151	Discrete Structures	Computing Core 3	3 (3 + 0)	-NONE-
5	PHY-150	Applied Physics	Maths & Science 3	3 (2 + 1)	-NONE-
<b>Total Credit Hours</b>				<b>16</b>	



### Semester III (Credit Hours: 17)

#	Code	Course Name	Category	Credit Hours	Pre-Requisite
1	CSC-201	Data Structures	Computing Core 4	4 (3 + 1)	<b>CSC-102</b>
2	xxx-xxx	Uni – Elective - I	Uni elective 1	3 (3 + 0)	--
3	ESE-201	Digital Logic Design	AI Support 1	4 (3 + 1)	<b>-NONE-</b>
4	MTS-201	Multivariate Calculus	AI Support 2	3 (3 + 0)	MTS-150
3	SWE-201	Software Engineering	Computing Core 5	3 (3 + 0)	-NONE-
<b>Total Credit Hours</b>				<b>17</b>	

### Semester IV (Credit Hours: 18)

#	Code	Course Name	Category	Credit Hours	Pre-Requisite
1	CSC-252	Operating Systems	Computing Core 6	4 (3 + 1)	-NONE-
2	MTS-251	Probability and Statistics	Math & Science 5	3 (3 + 0)	-NONE-
3	MTS-250	Linear Algebra	Maths & Science 4	3 (3 + 0)	NONE-
4	CSC-251	Database Systems	Computing core 7	4 (3 + 1)	-NONE-
5	<b>CSC-250</b>	<b>Artificial Intelligence</b>	<b>AI Core 2</b>	<b>4 (3 + 1)</b>	<b>-NONE-</b>
<b>Total Credit Hours</b>				<b>18</b>	

### Semester V (Credit Hours: 17)

#	Code	Course Name	Category	Credit Hours	Pre-Requisite
1	MTS-301	Differential Equations	AI Support 3	3 (3 + 0)	MTS-150
2	CSC-301	Computer Networks	Computing Core 8	4 (3 + 1)	-NONE-
3	CSC-304	Data Mining	AI Core 3	4 (3 + 1)	CSC-251
4	ENG-301	Technical Writing	General Education 6	3 (3 + 0)	-NONE-
5	xxx-xxx	Uni – Elective - II	<i>Uni elective 2</i>	3 (3 + 0)	-NONE-
<b>Total Credit Hours</b>				<b>17</b>	

### Semester VI (Credit Hours: 18)

#	Code	Course Name	Category	Credit Hours	Pre-Requisite
1	CSC-350	Machine Learning	AI Core 4	3 (2 + 1)	CSC-350
2	xxx-xxx	AI – Elective I	AI Elective 1	3 (3 + 0)	-NONE-
1	CSC-353	Information Security	Computing Core 9	3 (3 + 0)	-NONE-
4	CSC-352	Big Data Analytics	AI Core 5	3 (2 + 1)	-NONE-
5	CSC-351	Design and Analysis of Algorithms	AI Core 6	3 (3 + 0)	CSC-201
6	CSC-354	Robotics Fundamentals	AI Core 8	3 (2 + 1)	-NONE-
<b>Total Credit Hours</b>				<b>18</b>	

**Semester VII (Credit Hours: 15)**

#	Code	Course Name	Category	Credit Hours	Pre-Requisite
1	xxx-xxx	AI – Elective II	AI Elective 2	3 (3 + 0)	-NONE-
2	xxx-xxx	AI-Elective-III	AI Elective 3	3 (3 + 0)	---
3	CSC-401	Deep Learning	AI Core 7	3 (2 + 1)	CSC-250
4	xxx-xxx	Uni – Elective - III	Uni Elective 3	3 (3 + 0)	-NONE-
5	FYP-401	Project-I	Computing Core 10	3 (0 + 3)	-NONE-
<b>Total Credit Hours</b>				<b>15</b>	

**Semester VIII (Credit Hours: 15)**

#	Code	Course Name	Category	Credit Hours	Pre-Requisite
1	xxx-xxx	AI-Elective-IV	AI Elective 4	3 (3 + 0)	---
2	xxx-xxx	AI-Elective-V	AI Elective 5	3 (3 + 0)	---
3	xxx-xxx	AI-Elective-VI	AI Elective 6	3 (3 + 0)	---
4	xxx-xxx	AI-Elective-VII	AI Elective 7	3 (3 + 0)	--
5	FYP-451	Project-II	Computing Core 11	3 (0 + 3)	FYP-401
<b>Total Credit Hours</b>				<b>15</b>	