BS in Artificial Intelligence

Artificial Intelligence (AI) is increasingly a key driver of the Nation's research and innovation ecosystem, as it holds the potential to power discovery, innovation, and economic growth across every field of science and every sector of the economy. The term "artificial intelligence" refers to systems or machines that mimic human intelligence to perform tasks and can improve over time with use. Specifically, AI refers to a machine-based system that can, for a set of human-defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments.

AI is a branch of Computer Science (CS) that deals with enabling machines to find solutions to complex problems in a human-like manner. AI systems use data and inputs from machines and humans to:

1. Perceive real and virtual environments,
2. Abstract such perceptions into models through analysis in an automated manner, and
3. Use model inference to formulate options for information or action.

AI systems can be applied to tasks spanning diverse areas, including planning and optimization (e.g., finding the most efficient route for delivery), perception and vision (e.g., recognizing objects in an image or video feed), modeling and simulation (e.g., predicting weather phenomenon), natural language understanding (e.g., understanding spoken or written language), robotic process automation (e.g., automating repetitive tasks), recommendation (suggesting products to online shoppers), and prediction (estimating evolving scientific concepts). These tasks can be accomplished through statistical inferences extracted from training data, as is the case with Machine Learning (ML), a subset of AI that focuses on enabling machines to learn and improve from experience.

Educational Objectives

The program outcomes of the proposed BSAI are (Graduates of the program will be able to):

1. Identify how artificial intelligence can help produce a solution, given a real-world problem.
2. Apply both symbolic and numeric models.
3. Appy artificial intelligence for needs including decision making and action selection.
4. Apply artificial intelligence for multi-agent systems, distributed systems, and man-machine systems.
5. Design, analyze, implement, and use state-of-the-art AI and machine learning techniques to handle real-world data, including image, speech, and language data, and data including noise and uncertainty.
6. Apply core computer science skills, including data structure and algorithm design, programming, and computing systems integration.
7. Apply fundamental mathematical and modeling techniques, including discrete mathematics; logic; probability; statistics; and classification and regression.

Degree Plan

Required Credits: 120

Code	Title	Hours
University Core Curriculum		
Complete the University Core Curriculum requirements. (http://catalog.utep.edu/undergrad/college-of-engineering/computer-science/computer-science-bs/#university-core-curriculum)		42
Designated Core (All courses required a grade of C or better.)		
PHYS 2320 & PHYS 2120	Introductory Mechanics and Laboratory for PHYS 2320	
Required Courses:		
AI 3311	Fairness and Safety in AI	3
AI 3312	Data Integration-Processing	3
AI 4310	Human-Machine Intelligence I	3
AI 4311	Human-Machine Intelligence II	3
AI 4320	Artificial Intelligence	3
AI 4361	Machine Learning	3
AI 4362	Data Mining	3
CS 1301	Intro to Computer Science	3
CS 1101	Intro to Computer Science Lab	1
CS 2401	Elem. Data Struct./Algorithms	4
CS 2302	Data Structures	3

CS 3331	Adv. Object-Oriented Programng	3
CS 3432	Computer Organization	4
CS 3195	Junior Professionl Orientation	1
CS 4375	Operating Systems Concepts	3
EE 2369	Digital Systems Design I	3
or ECE 2303	Digital Systems Design I	
EE 2169	Laboratory for EE 2369	1
or ECE 2103	Lab for ECE 2303	
MATH 1411	Calculus I	4
MATH 1312	Calculus II	3
MATH 2300	Discrete Mathematics	3
or CS 2101 & CS 2202	Discrete Structures I and Discrete Structures II	
MATH 3323	Matrix Algebra	3
STAT 3320	Probability and Statistics	3
Prescribed Elective Courses		**12**
Choose 6 hours from the AI courses below.		
AI 4366	Deep Learning	
AI 4319	Speech/Language Processing	
AI 4363	Computer Vision	
AI 4390	Special Topics in AI	
AI 4373	AI Internship	
Sutdents can take up to six hours Computer Science courses from the following: CS 1110, CS 1120, CS 2210, CS 1190, CS 1290, CS 3000 or 4000 level course. No more than three credit hours of CS 1xxx and CS 2xxx can count for technical electives. No more than six credit hours of CS 1xxx, CS 2xxx, CS 4181, CS 4371, CS 4x73, CS 4392 and/or CS 4393 (in any combination) can count for technical electives		6
Elective Courses		**5**
Courses that may be counted towards the free elective requirement are college-level courses (not remedial) offered by the college of Liberal Arts, Business, Science, or Engineering		

University Core Curriculum (A program may recommend specific courses. All courses require a C or better.)

I. Communication (six hours)

Code	Title	Hours
Courses in this category focus on developing ideas and expressing them clearly, considering the effect of the message, fostering understanding, and building the skills needed to communicate persuasively. Courses involve the command of oral, aural, written, and visual literacy skills that enable people to exchange messages appropriate to the subject, occasion, and audience. Course objectives for this component are: Critical Thinking Skills, Communication Skills, Teamwork, and Personal Responsibility.		
Select six hours of the following:		6
For students whose secondary education was in English:		
COMM 1611	Written and Oral Communication	
ENGL 1313	Writing About Literature	
RWS 1301	Rhetoric & Composition I	
RWS 1302	Rhetoric & Composition 2	
RWS 1601	Rhetoric, Composition & Comm	
For students whose secondary education was not in English:		
ESOL 1311	Expos Engl Compos-Spkr Esl	
ESOL 1312	Res & Crit Writng Spkr Esl	
TOTAL HOURS		**6**

II. American History (six hours)

Code	Title	Hours
Courses in this category focus on the consideration of past events and ideas relative to the United States, with the option of including Texas History for a portion of this component area. Courses involve the interaction among individuals, communities, states, the nation, and the world, considering how these interactions have contributed to the development of the United States and its global role. Course objectives for this component are: Critical Thinking Skills, Communication Skills, Social Responsibility, and Personal Responsibility.		
HIST 1301	History of U.S. to 1865	3
HIST 1302	History of U.S. Since 1865	3
TOTAL HOURS		**6**

III. Language, Philosophy & Culture (three hours)

Code	Title	Hours
Courses in this category focus on how ideas, values, beliefs, and other aspects of culture express and affect human experience. Courses involve the exploration of ideas that foster aesthetic and intellectual creation in order to understand the human condition across cultures. Course objectives for this component are: Critical Thinking Skills, Communication Skills, Social Responsibility, and Personal Responsibility.		
Select one of the following:		3
ANTH 2325 Language in Culture & Society		
AFST 2300	Intro-African Amer Studies	
CHIC 2302	Latina/o Presence in the U.S.	
ENGL 2311	English Literature	
ENGL 2312	English Literature	
ENGL 2313	Intro to American Fiction	
ENGL 2314	Intro to American Drama	
ENGL 2318	Intro to American Poetry	
ENGL 2325 Language in Culture & Society		
FREN 2322	Making of the "Other" Americas	
HIST 2301	World History to 1500	
HIST 2302	World History Since 1500	
LING 2325 Language in Culture & Society		
PHIL 1301	Introduction to Philosophy	
PHIL 2306	Ethics	
RS 1301	Introduct to Religious Studies	
SPAN 2340	Seeing & Naming: Conversations	
WS 2300	Introduction to Womens Studies	
WS 2350	Global Feminisms	
TOTAL HOURS		**3**

IV. Mathematics (three hours)

Code	Title	Hours
Courses in this category focus on quantitative literacy in logic, patterns, and relationships. Courses involve the understanding of key mathematical concepts and the application of appropriate quantitative tools to everyday experience. Course objectives for this component are: Critical Thinking Skills, Communication Skills, and Empirical & Quantitative Skills.		
Select one of the following:		3
MATH 1309	College Algebra	
MATH 1310	Trigonometry and Conics	
MATH 1319	Math in the Modern World	
MATH 1320	Math for Social Sciences I	
MATH 1411	Calculus I	
MATH 1508	Precalculus	
MATH 2301	Math for Social Sciences II	
STAT 1380	Statistical Literacy	
STAT 2480	Elementary Statistical Methods	
TOTAL HOURS		**3**

V. Life & Physical Sciences (six hours)

Code	Title	Hours
Courses in this category focus on describing, explaining, and predicting natural phenomena using the scientific method. Courses involve the understanding of interactions among natural phenomena and the implications of scientific principles on the physical world and on experiences. Course objectives for this component are: Critical Thinking Skills, Communication Skills, Empirical & Quantitative Skills, and Teamwork.		
Required: Lecture/Lab Sequence plus Additional Lecture		
ASTR 1107	Astronomy Lab I	
ASTR 1307	Elem Astronomy-Solar System	
ASTR 1308	Elem Astr Stars & Galaxies	
BIOL 1103	Introductory Biology Lab	
BIOL 1104	Human Biology Laboratory	
BIOL 1107	Topics in Study of Life I	
BIOL 1108	Organismal Biology Laboratory	
BIOL 1203	Introductory Biology	
BIOL 1304	Human Biology	
BIOL 1305	General Biology	
BIOL 1306	Organismal Biology	
BIOL 2111	Human Anat/Physio Lab I	
BIOL 2113	Human Anat/Physio Lab II	
BIOL 2311	Human Anat/Physiology I	
BIOL 2313	Human Anat/Physiology II	
CHEM 1105	Laboratory for CHEM 1305	
CHEM 1106	Laboratory for CHEM 1306	
CHEM 1107	Intro General Chemistry Lab	
CHEM 1108	Intro Organic & Biochem Lab	
CHEM 1305	General Chemistry	
CHEM 1306	General Chemistry	
CHEM 1307	Intro to General Chemistry	
CHEM 1308	Intro Organic & Biochemistry	
ESCI 1101	Environmental Sci. Lab	
ESCI 1102	Non-major Lab for ESCI 1301	
ESCI 1301	Intro to Environmental Sci	
GEOG 1106	Laboratory for GEOG 1306	
GEOG 1306	Physical Geography	
GEOL 1103	Lab for GEOL 1313	
GEOL 1104	Lab for GEOL 1314	
GEOL 1111	Principles of Earth Sci - Lab	
GEOL 1112	Laboratory for Geology 1212	
GEOL 1211	Principles of Earth Sciences	
GEOL 1212	Principles of Earth Science	
GEOL 1230	The Blue Planet	
GEOL 1231	Natural Hazards	
GEOL 1313	Intro to Physical Geology	
GEOL 1314	Intro to Historical Geol	
HSCI 2302	Fundamentals of Nutrition	
HSCI 2303	Wellness Dynamics	
MICR 2330	Microorganisms and Disease	
PHYS 1403	General Physics I	
PHYS 1404	General Physics II	
PHYS 2120	Laboratory for PHYS 2320	
PHYS 2121	Laboratory for PHYS 2321	
PHYS 2320	Introductory Mechanics	

PHYS 2321	Introductory Electromagnetism	
TOTAL HOURS		**6**

VI. Political Science (six hours)

Code	Title	Hours
Courses in this category focus on consideration of the Constitution of the United States and the constitutions of the states, with special emphasis on that of Texas. Courses involve the analysis of governmental institutions, political behavior, civic engagement, and their political and philosophical foundations. Course objectives for this component are: Critical Thinking Skills, Communication Skills, Social Responsibility and Personal Responsibility.		
Required Courses:		
POLS 2310	Introduction to Politics	3
POLS 2311	American Gover & Politics	3
TOTAL HOURS		**6**

VII. Social & Behavioral Sciences (three hours)

Code	Title	Hours
Courses in this category focus on the application of empirical and scientific methods that contribute to the understanding of what makes us human. Courses involve the exploration of behavior and interactions among individuals, groups, institutions, and events, examining their impact on the individual, society, and culture. Course objectives for this component are: Critical Thinking Skills, Communication Skills, Empirical & Quantitative Skills, and Social Responsibility.		
Select one of the following:		3
ANTH 1301	Intro-Phys Anth/Archeolog	
ANTH 1302	Intro-Cultural Anthropology	
ANTH 1310	Cultural Geography	
ANTH 2320	Introduction to Human Language	
ASIA 2300	Asian American Studies	
CE 2326	Econ for Engrs & Scientists	
CHIC 2311	Intro to Chicano Studies	
COMM 2350	Interpersonal Communication	
COMM 2372	Mass Media and Society	
ECON 2303	Principles of Macroeconomics	
ECON 2304	Principles of Microeconomics	
EDPC 1301	Introduction to Ed Psychology	
EDU 1342	Action Research in Classrooms	
ENGL 2320	Introduction to Human Language	
GEOG 1310	Cultural Geography	
LEAD 2300	Leadership in Action	
LING 2320	Introduction to Human Language	
LING 2340	Lang. Inside & Out: Sel Topics	
PSYC 1301	Introduction to Psychology	
SOCI 1301	Introduction to Sociology	
SOCI 1310	Cultural Geography	
TOTAL HOURS		**3**

VIII. Creative Arts

Code	Title	Hours
Courses in this category focus on the appreciation and analysis of creative artifacts and works of the human imagination. Courses involve the synthesis and interpretation of artistic expression and enable critical, creative, and innovative communication about works of art. Course objectives for this component are: Critical Thinking Skills, Communication Skills, Teamwork, and Social Responsibility.		
Select one of the following:		3
ART 1300	Art Appreciation	
ARTH 1305	History of Art I	
ARTH 1306	History of Art II	
CHIC 1311	Chicana/o Fine Arts Appreciat	

DANC 1304	Introduction to Dance	
FILM 1390	Intro-Art of Motion Pict.	
MUSL 1324	Music Appreciation	
MUSL 1327	Jazz to Rock	
MUSL 2321	Music, Culture, and Society	
THEA 1313	Introduction to Theatre	
TOTAL HOURS		**3**

IX. Component Area Option (six hours)

Code	Title	Hours
a. A minimum of 3 SCH must meet the definition and corresponding Core Objectives specified in one of the foundational component areas. b. As an option for up to 3 semester credit hours of the Component Area Option, an institution may select course(s) that: (i) Meet(s) the definition specified for one or more of the foundational component areas; and (ii) Include(s) a minimum of three Core Objectives, including Critical Thinking Skills, Communication Skills, and one of the remaining Core Objectives of the institution's choice.		
ANTH 1312 Science & Society		
ANTH 1313 Human Variation		
BUSN 1301	Intro to Global Business	
COMM 1301	Public Speaking	
COMM 1302	Business/Profession Comm	
CS 1310	Intro-Computational Thinking	
CS 1320	Computer Programming Sci/Engr	
EL 1301	Eng Innovation and Leadership	
ENGR 1302	Engineering Design Experience	
ENGR 1303	Applied Engineering Analysis	
KIN 1301 Physical Activity for Health & Wellness		
LEAD 1300	Introduction to Leadership	
SCI 1301	Inquiry in Math & Science	
SOCI 1312 Science & Society		
SPLP 1312	Comm. Var. Across the Lifespan	
UNIV 1301	Seminar/Critical Inquiry	
TOTAL HOURS		**6**

4-Year Sample Degree Plan

BS in Artificial Intelligence with Calculus

Code	Title	Hours
1st Year		
Fall		
MATH 1411	Calculus I	4
CS 1301 & CS 1101	Intro to Computer Science and Intro to Computer Science Lab	4
CS 2101	Discrete Structures I	1
RWS 1301	Rhetoric & Composition I	3
UNIV 1301	Seminar/Critical Inquiry	3
Spring		
MATH 1312	Calculus II	3
CS 2401	Elem. Data Struct./Algorithms	4
CS 2202	Discrete Structures II	2
HIST 1301	History of U.S. to 1865	3
RWS 1302	Rhetoric & Composition 2	3
2nd Year		
Fall		
CS 2302	Data Structures	3
EE 2369	Digital Systems Design I	3

or ECE 2303	Digital Systems Design I	
EE 2169	Laboratory for EE 2369	1
or ECE 2103	Lab for ECE 2303	
MATH 3323	Matrix Algebra	3
Component Area Option *		3
HIST 1302	History of U.S. Since 1865	3
Spring		
CS 3331	Adv. Object-Oriented Programng	3
CS 3432	Computer Organization	4
PHYS 2320 & PHYS 2120	Introductory Mechanics and Laboratory for PHYS 2320	3
POLS 2310	Introduction to Politics	3
3rd Year		
Fall		
AI 3312	Data Integration-Processing	3
CS 3195	Junior Professionl Orientation	1
AI 4362	Data Mining	3
CS 4375	Operating Systems Concepts	3
STAT 3320	Probability and Statistics	3
POLS 2311	American Gover & Politics	3
Spring		
AI 3312	Data Integration-Processing	3
AI 4361	Machine Learning	3
AI 4320	Artificial Intelligence	3
Life & Physical Sciences Lecture *		3
Creative Arts *		3
4th Year		
Fall		
AI 4310	Human-Machine Intelligence I	3
AI 43XX Artificial Intelligence Elective		3
AI 43XX Artificial Intelligence Elective		3
Life & Physical Sciences *		3
Free x3xx Free Electives		3
Spring		
AI 4311	Human-Machine Intelligence II	3
CS or AI x3xx Computer Science of Artificial Intelligence Elective		3
CS or AI x3xx Computer Science of Artificial Intelligence Elective		3
Social & Behavioral Sciences *		3
Free x2xx Free Electives		2