جامعة الفيصل
Alfaisal University

# BS in Artificial Intelligence Program

Alfaisal University, College of Engineering & Advanced Computing

*Effective: Fall 2025*

*Approved: April 2025*

## Curriculum Structure and Study Plan

The Artificial Intelligence program curriculum is composed of **133** Credit Hours (CRHs) divided as follows:

**I. General Education Requirements (30 CRHs)**
1. Mathematics & Statistics (12 CRHs)
2. Basic Sciences (4 CRHs)
3. Humanities (14 CRHs)

**II. Core Requirements (103 CRHs)**
1. Software Engineering Courses (87 CRHs)
2. College of Engineering & Advanced Computing Courses (4 CRHs)
3. Technical Electives (12 CRHs)
4. Summer Internship (0 CRHs)

### I. General Education Requirements (30 CRHs)

#### 1. Mathematics & Statistics (12 CRHs)

| Course Code | Course-Title | Credit Hours (CRHs) | | | | Pre-Requisite Course Code | Co-Requisite Course Code |
|---|---|---|---|---|---|---|---|
| | | Total-CRHs | Lect. | Lab | Tut | | |
| MAT 101 | Calculus I | 3 | 3 | 0 | 1 | | |
| MAT 112 | Calculus II | 3 | 3 | 0 | 0 | MAT 101 | |
| MAT 211 | Calculus III | 3 | 3 | 0 | 0 | MAT 112 | |
| MAT 212 | Linear Algebra | 3 | 3 | 0 | 0 | MAT 112 | |

## 2. Basic Sciences (4 CRHs)

| Course Code | Course-Title | Credit Hours (CRHs) | | | | Pre-Requisite Course Code | Co-Requisite Course Code |
|---|---|---|---|---|---|---|---|
| | | Total-CRHs | Lect | Lab | Tut | | |
| PHU 103 | Mechanics and Waves for Engineers | 3 | 3 | 0 | 1 | | MAT 101, PHU 103L |
| PHU 103 L | Mechanics and Waves for Engineers Lab | 1 | 0 | 2 | 0 | | PHU 103 |

## 3. Humanities (14 CRHs)

| Course Code | Course-Title | Credit Hours (CRHs) | | | | Pre-Requisite Course Code | Co-Requisite Course Code |
|---|---|---|---|---|---|---|---|
| | | Total-CRHs | Lect | Lab | Tut | | |
| ENG 101 | University Writing | 3 | 3 | 0 | 0 | | |
| ENG 222 | Technical Writing | 3 | 3 | 0 | 0 | ENG 101 | |
| ISL 101 | Islamic Studies I | 2 | 2 | 0 | 0 | | |
| ARB 101 | Arabic Language and Literature I | 2 | 2 | 0 | 0 | | |
| GE _ _ _ | General Education Elective I | 2 | 2 | 0 | 0 | | |
| GE _ _ _ | General Education Elective II | 2 | 2 | 0 | 0 | | |

## II. Core Requirements (103 CRHs)

### 1. Software Engineering Courses (87 CRHs)

| Course Code | Course-Title | Credit Hours (CRHs) | | | | Pre-Requisite Course Code | Co-Requisite Course Code |
|---|---|---|---|---|---|---|---|
| | | Total-CRHs | Lect | Lab | Tut | | |
| SE 100 | Programming for Engineers | 3 | 3 | 0 | 0 | | SE 100L |
| SE 100 L | Programming for Engineers Lab | 1 | 0 | 2 | 0 | | SE 100 |
| SE 120 | Object-Oriented Programming I | 3 | 3 | 0 | 0 | SE 100 | SE 120L |
| SE 120 L | Object-Oriented Programming I Lab | 1 | 0 | 2 | 0 | | SE 120 |
| SE 151 | Discrete Mathematics | 3 | 3 | 0 | 0 | SE 100 | |
| DSE 200 | Introduction to Data Science | 3 | 3 | 0 | 0 | SE 120 | DSE 212 |
| SE 201 | Introduction to Software Engineering | 3 | 3 | 0 | 0 | SE 120 | |
| DSE 201 | Data Visualization | 3 | 3 | 0 | 0 | DSE 200 | |
| DSE 212 | Probability and Statistics for Engineers | 3 | 3 | 0 | 0 | MAT 112 | |
| AI 213 | Introduction to Artificial Intelligence | 3 | 3 | 0 | 0 | SE 215 | |
| SE 215 | Data Structures | 3 | 3 | 0 | 0 | SE 120 | SE 215L |
| SE 215 L | Data Structures Lab | 1 | 0 | 2 | 0 | | SE 215 |
| SE 239 | Computer Networks | 3 | 3 | 0 | 0 | EE 210 | |
| SE 252 | Database Management Systems | 3 | 3 | 0 | 0 | SE 215 | SE 252L |
| SE 252 L | Database Management Systems Lab | 1 | 0 | 2 | 0 | | SE 252 |
| SE 254 | Operating Systems | 3 | 3 | 0 | 0 | SE 215 | SE 254L |
| SE 254 L | Operating Systems Lab | 1 | 0 | 2 | 0 | | SE 254 |
| SE 301 | Analysis of Algorithms | 3 | 3 | 0 | 0 | SE 215 | |
| SE 316 | Application Development | 3 | 3 | 0 | 0 | SE 215 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| AI 317 | Computer Vision | 3 | 3 | 0 | 0 | SE 215 | |
| AI 320 | Data Mining | 3 | 3 | 0 | 0 | SE 215, DSE 201 | |
| CSE 330 | Introduction to Cybersecurity | 3 | 3 | 0 | 0 | SE 239 | SE 254 |
| AI 346 | Introduction to Big Data | 3 | 3 | 0 | 0 | SE 252, SE 254 | |
| AI 347 | Introduction to Machine Learning | 3 | 3 | 0 | 0 | SE 252, SE 254 | |
| AI 360 | Agent Based Systems | 3 | 3 | 0 | 0 | SE 215, SE 239 | |
| AI 361 | Human Centered AI | 3 | 3 | 0 | 0 | AI 213 | |
| SE 400 | Theory of Computation | 3 | 3 | 0 | 0 | SE 151, AI 347 | |
| AI 455 | Generative AI | 3 | 3 | 0 | 0 | AI 347 | |
| AI 475 | Game Theory | 3 | 3 | 0 | 0 | SE 301 | |
| AI 480 | Natural Language Processing | 3 | 3 | 0 | 0 | SE 400 | |
| SE 481 | Ethical and Professional Development | 1 | 1 | 0 | 0 | AI 495 | |
| AI 495 | Capstone Project I | 3 | 0 | 6 | 0 | AI 346, AI 347, AI 360, AI 361 | |
| AI 496 | Capstone Project II | 3 | 0 | 6 | 0 | AI 495 | |

## 2. College of Engineering & Advanced Computing Courses (4 CRHs)

| Course Code | Course-Title | Credit Hours (CRHs) | | | | Pre-Requisite Course Code | Co-Requisite Course Code |
|---|---|---|---|---|---|---|---|
| | | Total-CRHs | Lect | Lab | Tut | | |
| EE 210 | Digital Logic Design | 3 | 0 | 0 | 0 | PHU 103 | EE 210L |
| EE 210 L | Digital Logic Design Lab | 1 | 0 | 2 | 0 | | EE 210 |

**3. Technical Electives (12 CRHs)**

Select from the following courses:

| Course Code | Course-Title | Credit Hours (CRHs) | | | | Pre-Requisite Course Code | Co-Requisite Course Code |
|---|---|---|---|---|---|---|---|
| | | Total-CRHs | Lect | Lab | Tut | | |
| AI 362 | Technical Elective 1 (Product Management for AI) | 3 | 3 | 0 | 0 | AI 213 | |
| AI 471 | Technical Elective 2 (Deep and Reinforcement Learning) | 3 | 3 | 0 | 0 | AI 347 | |
| AI 472 | Technical Elective 3 (Expert Systems) | 3 | 3 | 0 | 0 | AI 213 | |
| AI 483 | Technical Elective 4 (AI in Robotics) | 3 | 3 | 0 | 0 | AI 213 | |

**4. Summer Internship (0 CRHs)**

| Course Code | Course-Title | Credit Hours (CRHs) | Pre-Requisite Course Code | Co-Requisite Course Code |
|---|---|---|---|---|
| AI 390 | Software Engineering Summer Internship | 0 | Department approval | |

# Typical Study Plan- Artificial Intelligence Program

**4-Year Curriculum:** ***133 Credit Hours Total***

Each course below follows the following format:
Course code, Course Title, and Course Credit Hours (Lecture contact hours – Lab contact hours – Tutorial contact hours)

| ***1st Year*** | | | |
|---|---|---|---|
| Fall | Course Code | Course-Title | CRHs |
| | **SE 100** | **Programming for Engineers** | **3 (3-0-0)** |
| | **SE 100 L** | **Programming for Engineers Lab** | **1 (0-2-0)** |
| | **MAT 101** | **Calculus I** | **3 (3-0-2)** |
| | **PHU 103** | **Mechanics and Waves for Engineers** | **3 (3-0-1)** |
| | **PHU 103 L** | **Mechanics and Waves for Engineers Lab** | **1 (0-2-0)** |
| | **ENG 101** | **University Writing** | **3 (3-0-0)** |
| | **ISL 101** | **Islamic Studies I** | **2 (2-0-0)** |
| | **GE _ _ _** | **General Education Elective I** | **2 (2-0-0)** |
| | | **Total** | **18** |
| Spring | Course Code | Course-Title | CRHs |
| | **SE 120** | **Object-Oriented Programming I** | **3 (3-0-0)** |
| | **SE 120 L** | **Object-Oriented Programming I Lab** | **1 (0-2-0)** |
| | **SE 151** | **Discrete Mathematics** | **3 (3-0-0)** |
| | **MAT 112** | **Calculus II** | **3 (3-0-2)** |
| | **EE 210** | **Digital Logic Design** | **3 (3-0-0)** |
| | **EE 210 L** | **Digital Logic Design Lab** | **1 (0-2-0)** |
| | **ENG 222** | **Technical Writing** | **3 (3-0-0)** |
| | | **Total** | **17** |

| ***2nd Year*** | | | |
|---|---|---|---|
| Fall | Course Code | Course-Title | CRHs |
| | **DSE 200** | **Introduction to Data Science** | **3 (3-0-0)** |
| | **DSE 212** | **Probability and Statistics for Engineers** | **3 (3-0-0)** |
| | **SE 215** | **Data Structures** | **3 (3-0-0)** |
| | **SE 215 L** | **Data Structures Lab** | **1 (0-2-0)** |
| | **SE 239** | **Computer Networks** | **3 (3-0-0)** |
| | **MAT 211** | **Calculus III** | **3 (3-0-0)** |
| | **MAT 212** | **Linear Algebra** | **3 (3-0-0)** |
| | | **Total** | **19** |
| Spring | Course Code | Course-Title | CRHs |
| | **SE 252** | **Database Management Systems** | **3 (3-0-0)** |
| | **SE 252 L** | **Database Management Systems Lab** | **1 (0-2-0)** |
| | **SE 254** | **Operating Systems** | **3 (3-0-0)** |
| | **SE 254 L** | **Operating Systems Lab** | **1 (0-2-0)** |
| | **DSE 201** | **Data Visualization** | **3 (3-0-0)** |
| | **AI 213** | **Introduction to Artificial Intelligence** | **3 (3-0-0)** |
| | **CSE 330** | **Introduction to Cybersecurity** | **3 (3-0-0)** |
| | | **Total** | **17** |

| *3rd Year* | | | |
|---|---|---|---|
| Fall | Course Code | Course-Title | CRHs |
| | **SE 201** | **Introduction to Software Engineering** | **3 (3-0-0)** |
| | **SE 301** | **Analysis of Algorithms** | **3 (3-0-0)** |
| | **SE 316** | **Application Development** | **3 (3-0-0)** |
| | **AI 317** | **Computer Vision** | **3 (3-0-0)** |
| | **AI 320** | **Data Mining** | **3 (3-0-0)** |
| | **ARB 101** | **Arabic Language and Literature I** | **2 (2-0-0)** |
| | | **Total** | **17** |
| Spring | Course Code | Course-Title | CRHs |
| | **AI 346** | **Introduction to Big Data** | **3 (3-0-0)** |
| | **AI 347** | **Introduction to Machine Learning** | **3 (3-0-0)** |
| | **AI 360** | **Agent Based Systems** | **3 (3-0-0)** |
| | **AI 361** | **Human Centered AI** | **3 (3-0-0)** |
| | **AI _ _ _** | **Technical Elective 1** | **3 (3-0-0)** |
| | | | **15** |

| **Summer** | Course Code | Course-Title | CRHs |
|---|---|---|---|
| | **AI 390** | **Internship** | **0** |
| | | **Total** | **0** |

| *4th Year* | | | |
|---|---|---|---|
| Fall | Course Code | Course-Title | CRHs |
| | **SE 400** | **Theory of Computation** | **3 (3-0-0)** |
| | **AI 455** | **Generative AI** | **3 (3-0-0)** |
| | **AI 475** | **Game Theory** | **3 (3-0-0)** |
| | **AI _ _ _** | **Technical Elective 2** | **3 (3-0-0)** |
| | **AI 495** | **Software Engineering Capstone Project I** | **3 (0-6-0)** |
| | | **Total** | **15** |
| Spring | Course Code | Course-Title | CRHs |
| | **AI 480** | **Natural Language Processing** | **3 (3-0-0)** |
| | **SE 481** | **Ethics and Professional Development** | **1 (3-0-0)** |
| | **AI _ _ _** | **Technical Elective 3** | **3 (3-0-0)** |
| | **AI _ _ _** | **Technical Elective 4** | **3 (3-0-0)** |
| | **AI 496** | **Software Engineering Capstone Project II** | **3 (0-6-0)** |
| | **GE _ _ _** | **General Education Elective II** | **2 (2-0-0)** |
| | | **Total** | **15** |

# Course Descriptions

In this section, we give brief descriptions of courses in the Artificial Intelligence program. Each course below follows the following format:

**Course code: Course Title Course credit hours (Lecture contact hours – Lab contact hours – Tutorial contact hours)**

Course Description

Prerequisite(s)

Co-requisites

**Core Courses**

**SE 100: Programming for Engineers 3 (3-0-0)**

The course introduces the students to basic notions of computers and computing and then introduces them to programming starting from abstract ways like flowcharts and pseudocode and finally using a typical programming language. The students will be introduced to the basic concepts of data types and structures, operators, and the different ways of data storage, manipulation, and representation.
Emphasis is on problem-solving and structured program design methodologies.
Prerequisite(s): None
Co-requisites: SE 100L

**SE 100 L: Programming for Engineers Lab 1 (0-2-0)**

This course constitutes the lab component of the Programming for Engineer course (SE 100). The purpose of this lab is to provide hands-on training on programming concepts, technologies and techniques introduced during lectures.
Prerequisite(s): None
Co-requisites: SE 100

**SE 120: Object-Oriented Programming I 3 (3-0-0)**

After completing this course, students will be equipped with the necessary skills and tools to write programs in Java based on a procedural and object-oriented approach. Topics of focus will include basic Java programming, conditional statements, strings, iteration, methods, arrays, creating classes, encapsulation, inheritance and polymorphism, abstract classes, packages, principles of object-oriented design, as well as exceptions and interfaces.
Prerequisite(s): SE 100
Co-requisites: SE 120L

**SE 120 L: Object-Oriented Programming I Lab 1 (0-2-0)**

This course constitutes the lab component of the Object-Oriented Programming I course (SE 120). The purpose of this lab is to provide hands-on training on the basics of Java and advanced object-oriented programming. Topics covered include data types and operators, logical expressions, control structures, methods, arrays, inheritance; polymorphism; abstract classes and interfaces. be covered.
Prerequisite(s): None
Co-requisites: SE 120

**SE 151: Discrete Structures for Software Engineers** **3 (3-0-0)**
This course covers the mathematical elements of computer science including formal logic, propositional logic, predicate logic, logic in mathematics, sets, functions and relations, recursive thinking, mathematical induction, counting, combinatorics, algorithms, matrices, graphs, trees, and Boolean logic. Students will learn to recognize and express mathematical ideas graphically, numerically, symbolically, and in writing.
Prerequisite(s): SE 100

**DSE 200: Introduction to Data Science** **3 (3-0-0)**
This course covers the mathematical elements of computer science including formal logic, propositional logic, predicate logic, logic in mathematics, sets, functions and relations, recursive thinking, mathematical induction, counting, combinatorics, algorithms, matrices, graphs, trees, and Boolean logic. Students will learn to recognize and express mathematical ideas graphically, numerically, symbolically, and in writing.
Prerequisite(s): SE 120
Co-requisites: DSE 212

**DSE 201: Data Visualization** **3 (3-0-0)**
This course covers the mathematical elements of computer science including formal logic, propositional logic, predicate logic, logic in mathematics, sets, functions and relations, recursive thinking, mathematical induction, counting, combinatorics, algorithms, matrices, graphs, trees, and Boolean logic. Students will learn to recognize and express mathematical ideas graphically, numerically, symbolically, and in writing.
Prerequisite(s): DSE 200

**SE 201: Introduction to Software Engineering** **3 (3-0-0)**
This course is designed to present students with several principles relevant to Software Engineering. Students will gain insights into various software process models throughout the course. The curriculum strongly emphasizes the agile software development approach, highlighting the importance of adaptability and collaborative teamwork. Students will acquire knowledge and skills in requirements engineering. The course covers systems modeling and project management strategies. It addresses the value of software reuse and introduces students to human computer interaction and software testing. The final segment of the course focuses on configuration management.
Prerequisite(s): SE 120

**DSE 212: Probability and Statistics for Engineers** **3 (3-0-0)**
The course is designed to teach students the basics of probability and statistics as used in engineering and the sciences. The course covers introduction to probability theory, random variables, statistics, and regression.
Prerequisite(s): MAT 112

**AI 213: Introduction to Artificial Intelligence** **3 (3-0-0)**
This course introduces students to the fundamental concepts, techniques, and tools used in artificial intelligence (AI). Topics include perception, reasoning, learning, and search algorithms (informed and uninformed). Students will gain skills in applying AI techniques to real-world problems.
Prerequisite(s): SE 215

**SE 215: Algorithms and Data Structures** **3 (3-0-0)**
The course involves the study of important data structures and sorting methods commonly encountered in object-oriented software engineering. It covers the design, performance analysis, and implementation of the related algorithms, stressing their practical use and performance.
Prerequisite(s): SE 120
Co-requisites: SE 215L

**SE 215 L: Algorithms and Data Structures Lab** **1 (0-2-0)**
Survey of important computer algorithms and related data structures used in object-oriented software engineering. Design, performance analysis and implementation of such algorithms, stressing their practical use and performance certification of large software applications. Understand how to "seal" designs to guarantee performance goals and ensure that all error conditions are caught. Laboratory experiments dealing with Algorithms and Data Structures.
Prerequisite(s): None
Co-requisites: SE 215

**SE 239: Computer Networks** **3 (3-0-0)**
The course teaches the fundamental concepts of communication networks and is concerned specifically with network architectures and protocols. The objective of the course is to allow students to develop a thorough understanding of the architectures of networks and the basic principles and protocols that allow the transmission of data over networks.
Prerequisite(s): EE 210

**SE 252: Database Management Systems** **3 (3-0-0)**
The focus is to teach database fundamentals required in the development and evolution of most software applications by providing a basic introduction to the principles of relational database management systems such as Entity-Relationship approach to data modeling, relational model of database management systems and the use of query languages.
Prerequisite(s): SE 215
Co-requisites: SE 252 L

**SE 252 L: Database Management Systems Lab** **1 (0-2-0)**
Laboratory experiments dealing with database management systems.
Prerequisite(s): None
Co-requisites: SE 252

**SE 254: Operating Systems** **3 (3-0-0)**
Theory and construction of operating systems, including real-time and embedded systems aspect from an engineering point of view, stressing performance measurement and metrics. Quality of Service issues leading to certification that an operating system will satisfy hard real-time constraints.
Prerequisite(s): SE 215
Co-requisites: SE 254 L

**SE 254 L: Operating Systems Lab** **1 (0-2-0)**
Laboratory experiments dealing with Operating Systems.
Prerequisite(s): None
Co-requisites: SE 254

**SE 301: Analysis of Algorithms** **3 (3-0-0)**
This course examines the design and analyses algorithms with an emphasis on their application in real world environments. Topics include time complexity, space complexity, and optimization strategies for various algorithms. Students will gain experience with sorting, searching, and graph algorithms, as well as dynamic programming techniques. Special focus will be placed on algorithmic problem-solving in real world environments.
Prerequisite(s): SE 215

**SE 316: Application Development** **3 (3-0-0)**
This course covers the principles of applications deployed on different platforms such as mobiles, web, and cloud. Students will explore different development environments, and understand concepts from memory management, user interface design, GPS, and motion sensing. Multiple programming languages will be explored such as markup languages (e.g., XHTML, XML), scripting languages (e.g., JavaScript, PHP, Ruby), Ajax, web services, and database integration (e.g., MySQL). Through project-based learning, students will develop professional-quality applications for real-world deployment.
Prerequisite(s): SE 215

**AI 317: Computer Vision** **3 (3-0-0)**
This course explores the fundamental techniques and algorithms in Computer Vision, focusing on image processing, object detection, feature extraction, and pattern recognition. Students will learn to develop applications that enable computers to analyse and understand visual data from the real world.
Prerequisite(s): SE 215

**AI 320: Data Mining** **3 (3-0-0)**
This course introduces students to the fundamentals of Data Mining, focusing on techniques used to extract patterns and knowledge from large datasets. This course covers foundational data mining techniques such as association rule mining, clustering, and classification. Emphasis is placed on understanding the theoretical concepts behind these methods while applying them to practical scenarios. Students will explore tools and libraries used for data mining tasks and tackle projects that simulate real-world applications.
Prerequisite(s): SE 215, DSE 201

**CSE 330: Introduction to Cybersecurity** **3 (3-0-0)**
This course provides an overview of core cybersecurity concepts, emphasizing the fundamental principles, tools, and procedures used to secure information systems. Students will employ the CIA triad as a guiding framework, explore prevalent threats, and examine various information security solutions. The course focuses on security and risk management, business impact analysis (BIA), asset security, vulnerabilities, threats and countermeasures, identity and authentication management, incident response and BCP/DRP, as well as key compliance and regulatory issues. By the end of the course, students will have broad, practical knowledge of cybersecurity, including the ability to identify security risks, implement effective defensive measures, and approach cybersecurity challenges with strategic thinking.
Prerequisite(s): SE 239
Co-requisites: SE 254

**AI 346: Introduction to Big Data** **3 (3-0-0)**

In this course the students will learn the Big Data platform and data governance to efficiently store and manage massive amounts of data. In addition, they will learn Big Data architecture, such as Hadoop, Map Reduce, Hbase, Big SQL and BigSheets. Students will use tools to capture, store and analyse structured and unstructured data.

Prerequisite(s): SE 252, SE 254

**AI 347: Introduction to Machine Learning** **3 (3-0-0)**

This course introduces machine learning with a practical approach covering some of the most common learning models, algorithms, tools, and techniques. From supervised learning, it covers linear regression, logistic regression, and neural networks. From unsupervised learning, it covers Kmeans clustering, dimensionality reduction (principal component analysis), and anomaly detection. The course also discusses practical aspects considered when applying machine learning: data visualization, model selection, flow, model evaluation (testing, validation, overfitting, underfitting, bias, variance), regularization, and large-scale machine learning.

Prerequisite(s): SE 252, SE 254

**AI 360: Agent Based Systems** **3 (3-0-0)**

This course introduces machine learning with a practical approach covering some of the most common learning models, algorithms, tools, and techniques. From supervised learning, it covers linear regression, logistic regression, and neural networks. From unsupervised learning, it covers Kmeans clustering, dimensionality reduction (principal component analysis), and anomaly detection. The course also discusses practical aspects considered when applying machine learning: data visualization, model selection, flow, model evaluation (testing, validation, overfitting, underfitting, bias, variance), regularization, and large-scale machine learning.

Prerequisite(s): SE 215, SE 239

**AI 361: Human-Centered AI** **3 (3-0-0)**

This course explores the intersection of AI and human interaction, focusing on ensuring that artificial intelligence remains under human control. It emphasizes designing AI systems that meet human needs, operate transparently, deliver fair and equitable outcomes, and respect privacy.

Prerequisite(s): AI 213

**AI 390: Software Engineering Summer Internship** **(0 CRHs)**

An internship is an important aspect of the AI curriculum that provides the student with hands-on experience and a good sense of what an actual job in an organization will be like. Students are required to join an IT department in a government or private organization for a summer period of at least 8 weeks in the last summer prior to student graduation. Students should be able to relate the internship experience to the knowledge that he or she has gained through the AI program courses.

Prerequisite(s): Department approval

**SE 400: Theory of Computation** **3 (3-0-0)**

This course introduces fundamental concepts in the theory of computation. Students will be introduced to formal languages, automata, computability and computational complexity. These include finite automatons, Turing machines, grammars, decidable problems, reductive procedures and different kinds of computational problems. The course aims to explore these theoretical concepts to apply on practical issues of interest to software engineering, data science, and AI, for instance, natural language processing, algorithmic development and evaluation of computational efficiency. By the end of this course, students will be able to assess the performance bounds of computing models and their applicability towards modern computing problems.

Prerequisite(s): SE 151, AI 347

**AI 455: Generative AI** **3 (3-0-0)**

This course focuses on the principles and applications of generative AI, including Generative Adversarial Networks (GANs) and Large Language Models (LLMs). In this course, students explore generative AI essentials, how to ethically use artificial intelligence, its implications for authorship, and what regulations for generative AI could look like. The course emphasizes both the theoretical foundations and practical applications of generative models in areas like content generation, and AI-driven design.

Prerequisite(s): AI 347

**AI 475: Game Theory** **3 (3-0-0)**

Game theory underpins several important recent advancements in AI such as multi-agent reinforcement learning and generative adversarial networks. Applications within computer science include the use of games in automated verification & model checking to model computing systems in an unknown and possibly adverse environment. In AI, games are applied to the analysis of multiagent systems. Recently, with the advent of the internet and e-commerce, many game theoretic questions in the interplay between economics & computing have received extensive attention. These include electronic auctions, & more generally mechanism design questions (inverse game theory) related to finding incentive structures for cooperation between independent entities on the internet. The course introduces students to the theory of non-cooperative games covering both its economic and algorithmic aspects. Topics that will be covered include equilibria, their existence and quality, equilibrium learning and computation.

Prerequisite(s): SE 301

**AI 480: Natural Language Processing** **3 (3-0-0)**

This course introduces the concepts and techniques used in natural language processing (NLP), including text preprocessing, word embeddings, and language models. Students will explore applications such as sentiment analysis, machine translation, and chatbot development. Projects focus on using modern NLP libraries and frameworks to solve practical challenges.

Prerequisite(s): SE 400

**SE 481: Ethics for Engineers** **1 (1-0-0)**

This course will explore the effects of technology on society. Especially the ethical questions that arise when technology interacts with humans. Topics will include secrecy of data, privacy issues, legal obligations, and protecting the society by limiting the reach of technology.

Prerequisite(s): AI 495

**AI 495: Capstone Project I** **3 (0-6-0)**

This course is the first part of a two-semester senior-year capstone project for AI students. It aims to complement theoretical knowledge with in-depth, hands-on experience in AI project development. Students will work in teams on projects relevant to the AI sector, focusing on tasks such as requirement analysis, system architecture, design, implementation, testing, validation, project management, and maintenance. In this part, students will develop a project plan, provide a software requirement specification document, and create a high-level design for an AI-driven application or system.
Prerequisite(s): AI 346, AI 347, AI 360, AI 361

**AI 496: Capstone Project II** **3 (0-6-0)**

Building on the groundwork laid in AI 495, this course focuses on implementing and completing the capstone project. Students will execute their proposed solutions, including AI model development and performance evaluation. Teams will utilize industry-standard tools and techniques to develop a functional prototype or system. The course culminates with a comprehensive project report and a formal presentation to faculty and industry stakeholders, demonstrating the ability to tackle complex, real-world problems with AI-enabled strategies. Emphasis is placed on teamwork, project management, and effective communication of findings. Student teams are required to deliver the executable code, submit a final report, and present and demonstrate their AI solution, showcasing its functionality and impact.
Prerequisite(s): AI 495

**Technical Elective Courses**

**AI 362: Technical Elective 1 (Product Management for AI)** **3 (3-0-0)**

This course introduces the principles of AI product management, focusing on developing, launching, and managing AI-driven products. Students will learn about the product lifecycle, from concept to market launch, while addressing key challenges such as user needs, ethics, and scalability in AI applications.
Prerequisite(s): AI 213

**AI 471: Technical Elective 2 (Deep and Reinforcement Learning)** **3 (3-0-0)**

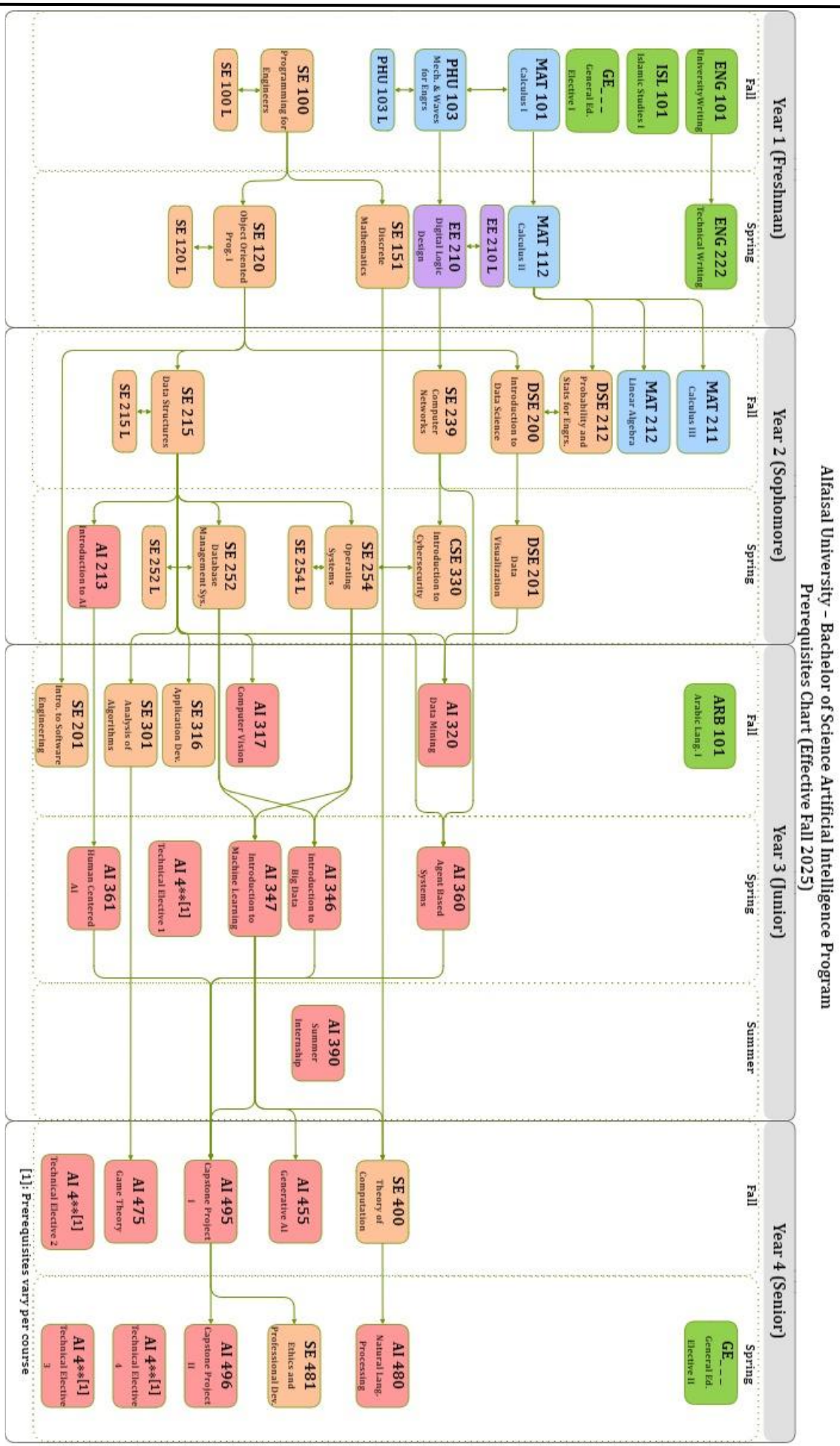
This course introduces Deep Reinforcement Learning (DRL), an emerging field combining deep learning and reinforcement learning to create intelligent agents that learn through trial and error. Students will learn the fundamentals of DRL, including core concepts, algorithms, and architectures used to build and train deep reinforcement learning models. The course also covers neural networks like CNNs and RNNs. Students will gain hands-on experience applying these techniques to real-world AI problems.
Prerequisite(s): AI 347

**AI 472: Technical Elective 3 (Expert Systems)** **3 (3-0-0)**

This course introduces students to expert systems in general and to rule-based systems in specific. Students learn how to build a rule-based expert system in a variety of application areas. They also learn advanced programming techniques which include topics of inexact reasoning, intelligent database management methods, and how to develop a community of expert systems. Students are also given the opportunity to demonstrate their understanding of the technology by building a rule-based expert system that addresses a real-world problem.
Prerequisite(s): AI 213

**AI 483: Technical Elective 4 (AI in Robotics) 3 (3-0-0)**

This course focuses on integrating AI with robotics to develop intelligent autonomous systems. Students will study perception, decision-making, motion planning, and control using AI techniques like computer vision, reinforcement learning, and path planning algorithms. The course emphasizes practical applications in robotic systems, including autonomous navigation, object manipulation, and human-robot interaction.
Prerequisite(s): AI 213


Alfaisal University – Bachelor of Science Artificial Intelligence Program
Prerequisites Chart (Effective Fall 2025)
Year 1 (Freshman)
Year 2 (Sophomore)
Year 3 (Junior)
Year 4 (Senior)
Fall
Spring
Summer
ENG 101 University Writing
ISL 101 Islamic Studies I
GE_ _ _ General Ed. Elective I
MAT 101 Calculus I
PHU 103 Mech. & Waves for Engrs
PHU 103 L
SE 100 Programming for Engineers
SE 100 L
ENG 222 Technical Writing
MAT 112 Calculus II
EE 210 L
EE 210 Digital Logic Design
SE 151 Discrete Mathematics
SE 120 Object Oriented Prog. I
SE 120 L
MAT 211 Calculus III
MAT 212 Linear Algebra
DSE 212 Probability and Stats for Engrs.
DSE 200 Introduction to Data Science
SE 239 Computer Networks
SE 215 Data Structures
SE 215 L
ARB 101 Arabic Lang. I
DSE 201 Data Visualization
CSE 330 Introduction to Cybersecurity
SE 254 Operating Systems
SE 254 L
SE 252 Database Management Sys.
SE 252 L
AI 213 Introduction to AI
AI 320 Data Mining
AI 317 Computer Vision
SE 316 Application Dev.
SE 301 Analysis of Algorithms
SE 201 Intro. to Software Engineering
AI 360 Agent Based Systems
AI 346 Introduction to Big Data
AI 347 Introduction to Machine Learning
AI 4**[1] Technical Elective 1
AI 361 Human Centered AI
AI 390 Summer Internship
GE_ _ _ General Ed. Elective II
AI 480 Natural Lang. Processing
SE 481 Ethics and Professional Dev.
AI 496 Capstone Project II
AI 4**[1] Technical Elective 4
AI 4**[1] Technical Elective 3
SE 400 Theory of Computation
AI 455 Generative AI
AI 495 Capstone Project I
AI 475 Game Theory
AI 4**[1] Technical Elective 2
[1]: Prerequisites vary per course