



**EPSILON**  
EMPOWER YOUR CAREER  
**AI Institute**

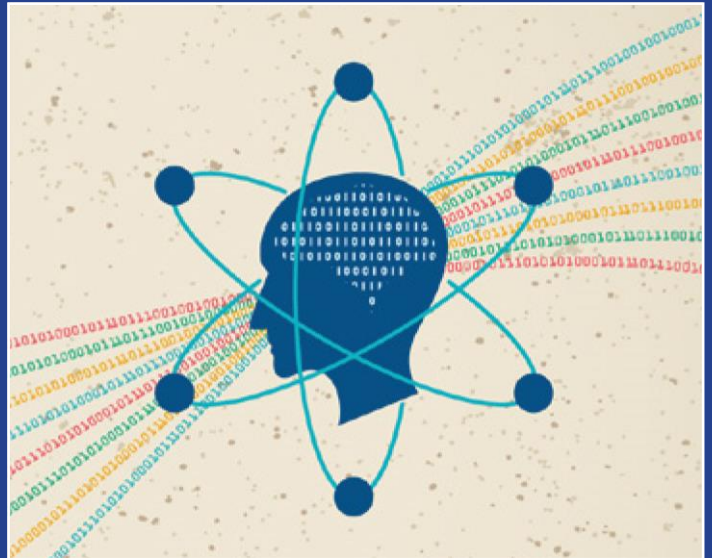
# MACHINE LEARNING SPECIALIST CERTIFICATE



# OVERVIEW

“ We are now solving problems with machine learning and artificial intelligence that were... in the realm of science fiction for the last several decades. And natural language understanding, machine vision problems, it really is an amazing renaissance. ”

— **Jeff Bezos**  
Founder, Amazon



Artificial intelligence (AI) and machine learning algorithms are transforming systems, experiences, processes, and entire industries. It's no wonder that business leaders see these data-driven technologies as fundamental for the future—and that practitioners fluent in both fields are in high demand.

At Epsilon AI Institute, we are fascinated by their world-changing potential, and we've created the Machine Learning Specialist Certificate to help students understand the fundamentals of AI and machine learning and how to apply them to solve complex, real-world problems.

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# ***ABOUT EPSILON AI INSTITUTE***

EPSILON AI INSTITUTE is a global AI training provider dedicated to preparing Trainees worldwide for an Artificial Intelligence (AI) Future and the 4th Industrial Revolution. The world is drastically changing with all leading nations and blocs creating AI Plans & Strategies. Our goal is to train talents worldwide to build this AI Future. We are doing this by equipping Trainees with practical skills in AI (Deep Learning & Machine Learning) and Data Science. Our core strength is offering long-term and short-term courses in AI and help Trainees to become, a better-equipped and empowering them to face this competitive era. The era of artificial intelligence is upon us.

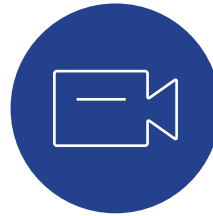
EPSILON AI INSTITUTE is committed to leading change and developing careers through competency-based education in the AI Area, Each term we introduce new, innovative programming to remain current with customer needs and changes in the work world.

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# HIGHLIGHTS

This Certificate is designed to teach the underlying concepts of AI and machine learning and how they can be used to solve real-world problems. Trainees will gain a deep knowledge of the math of machine learning, including relevant tools and languages and popular algorithms and their applications. They'll also gain a better understanding of the principles and practices of artificial intelligence (AI) and how to put them to work, from the basics of heuristic and uniformed search to adversarial search, game creation and natural language processing.

Going beyond the theory, our approach invites participants into a conversation, where learning is facilitated by subject matter experts and enriched by practitioners in the fields of machine learning and artificial intelligence.



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**Video Lectures**



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**Discussions**



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**Assignments /  
Application Projects**

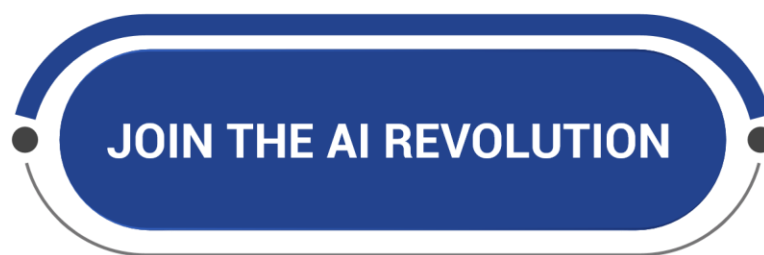


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**Capstone Project**

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# AI SOLUTIONS FOR REAL-WORLD PROBLEMS



**Tools, languages and algorithms of machine learning**



**Principles and techniques of artificial intelligence**



**Hands-on project experience**



**Advance your career in machine learning & AI**

# SYLLABUS

## MODULE 1: PYTHON 3

### Introduction

- Setting up python
- Syntax
- First python program
- Variables & data types
- Numbers and math
- Strings
- Operators and bitwise
- Data structures of python
  - Tuples
  - Lists
  - Sets
  - Dictionaries
- Conditional logic and control flow
- Functions and loops

### Object-oriented programming (OOP)

- CLASSES
- INHERITANCE
- PYTHON GENERATORS
- PYTHON DECORATORS

## MODULE 2: DATA ANALYSIS

### Data analysis

- Anaconda / jupyter notebooks
- Database with sqlite
- Numpy and matrix operations
- Pandas
- Data visualization

## MODULE 3: MACHINE LEARNING

### Linear algebra

- Vectors
- Matrices
- Operations on matrices
- Dot product
- Eigen values and eigen vectors

### Calculus

- Functions
- Derivatives and gradients
- Step function, sigmoid function, relu
- Cost function
- Minimum and maximum values

### Statistics and Probability

- Descriptive statistics
  - Introduction
  - Sampling techniques
  - Measures of central tendency
  - Measures of variability
  - Skewness and outliers
- inferential statistics
  - T-test and anova
  - Chi-square test
  - Spearman correlation coefficient
  - Pearson correlation coefficient
  - Regression analysis
- Probability
  - Probability laws
  - Bayesian theorem
  - Probability distribution
  - Gaussian distribution
  - Sampling distribution
  - Central limit theorem

### Introduction to ML

- The difference between ml, big data, data analysis and deep learning

### Data preprocessing

- Importing libraries
- Data acquisition
- Data cleaning
- Handling missing data
- Categorical data
- Data splitting
- Feature scaling

### Regression problem

- Linear regression
- Polynomial regression
- Regression evaluation metrics

### Classification problem

- Logistic regression
- Naive bayes
- K-nearest neighbour classifier
- Support vector machine (svm)
- Decision tree classifier
- Ensemble learning
- Classification evaluation metrics

### Intro to building machine learning API

### Clustering problems

- Dimensionality reduction
- K-means
- Hierarchical clustering
- Association rules
- Clustering evaluation

### Model selection and evaluation

- Cross-validation
- Hyperparameter tuning

## Result communication and report

### Introduction to Deep Learning / NLP / Computer Vision

- Intro to deep learning with keras
- Intro to ann – artificial neural network
- Intro to cnn\_convolution neural network
- Intro to rnn\_recurrent neural network
- Intro to autoencoder
- Intro to reinforcement learning / inverse reinforcement learning
- Intro to nlp
- Intro to computer vision

## **MODULE 4: CAPSTONE PROJECT**

# PREREQUISITES

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The Certificate requires an undergraduate knowledge of statistics, (descriptive statistics regression, sampling, distributions, hypothesis testing, interval estimation, etc.) calculus, linear algebra (vectors, matrices, derivatives), and probability.

Participants are required to possess a basic knowledge of Python since all assignments/application projects will be done using the Python programming language.



# APPLICATION ASSIGNMENTS

The Certificate requires learners to work on application assignments, which require learners to apply the concepts they have learned to datasets and derive inferences. These assignments are intentionally made to be challenging and we expect learners to spend substantial time and effort solving them. At the end of the Course, we expect learners to be able to apply the concepts to solve many of the business problems they face at their workplace.



## Movie Recommendation Engine

You will build a movie recommendation engine by applying collaborative filtering and topic modelling techniques. You use a dataset which contains 20 million viewer ratings of 27,000 movies.



## House Price Prediction

You will write code to predict house prices based on several parameters available in the Ames City dataset compiled by Dean De Cock using least squares linear regression and Bayesian linear regression.



## Human Activity Recognition

You will predict the human activity (walking, sitting, standing) that corresponds to the accelerometer and gyroscope measurements by applying the nearest neighbours technique.



## Credit Card Fraud Detection

You will detect potential frauds using credit card transaction data. You will apply the random forest method to identify fraudulent transactions.



## Market Segmentation

You will create market segments using the US Census dataset and by applying the k-means clustering method.



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[.www.epsilonai.org](http://www.epsilonai.org)

Schedule a call with a Program Advisor to learn how this course can help you

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Apply for the program here

[APPLY NOW](#)

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We attempt to respond to queries in 24 hours or less. However, over weekends and holidays, our responses may take up to 72 hours.