

Samsung Innovation Campus: Artificial intelligence

Course Objectives

- Understand the foundational math behind data science and machine learning: linear algebra, probability and statistics.
- Be able to do data preprocessing with the Python libraries (NumPy and Pandas) for the execution of optimal machine learning models and data visualization.
- Explore supervised and unsupervised learning and be able to apply the most suitable machine learning algorithm.
- Learn to process textual data to derive high quality information from text and apply new insights to real-world business (NLP)
- Build and train deep neural networks, use the deep learning libraries such as TensorFlow and Keras to gain proficiency, as well as handle various deep learning techniques.

Course Breakdown

- ✓ Lecture (215hrs.) + Capstone Project (50hrs.)
- ✓ Lecture covers most subject areas in general concepts of each technology.
- ✓ Focuses on building fundamental capabilities of AI modeling on a concrete foundation of mathematics, including linear algebra, probability and statistics.
- ✓ Introduces A to Z in Machine Learning tools, from NumPy to Keras, and techniques including CNN and practice with hands-on exercises.
- ✓ Offers 50 hours of real-world problem-solving experience as a capstone project, handling open-source data with participants' own AI

Course Content	Duration
Week 1: Math for Data Science & Probability and Statistics	53H
Unit 1: Introduction	2H
Unit 2: Basic Math for Data Science	5H
Unit 3: Understanding Data Science: Vector	6H
Unit 4: Understanding Data Science: Matrix	6H
Unit 5: Understanding Deep Learning: Derivatives	6H
Unit 6: Understanding of Probability	6H
Unit 7: Understanding of Statistics I	6H
Unit 8: Understanding of Statistics II	6H
Unit 9: Statistical Hypothesis Testing	6H
Quiz	4H
Week 2: Introduction to Artificial Intelligence & Exploratory Data Analysis: NumPy Arrays for Optimized Numerical Computation & Pandas	33H
Unit 1: The Concept of Artificial Intelligence	1H
Unit 2: Applications of Artificial Intelligence	1H
Unit 3: Techniques in Artificial Intelligence	1H
Unit 4: Artificial Intelligence: Trends and Markets	1H
Unit 5: Course Roadmap	1H
Unit 6: NumPy Array Data Structure for Optimal Computational Performance	6H
Unit 7: Optimal Data Exploration Through Pandas	7H
Unit 8: Pandas Data Preprocessing for Optimal Model Execution	7H
Unit 9: Data Visualization for Various Data Scales	7H
Quiz	4H
Week 3: Machine Learning 1 – Supervised Learning	29H
Unit 1: Machine Learning Based Data Analysis	3H
Unit 2: Application of Supervised Learning Model for Numerical Prediction	3H
Unit 3: Application of Supervised Learning Model for Classification	3H
Unit 4: Decision Tree	3H

Unit 5: Naïve Bayes Algorithm	3H
Unit 6: KNN Algorithm	4H
Unit 7: SVM Algorithm	4H
Unit 8: Ensemble Algorithm	4H
Quiz	2H
Week 4: Machine Learning 2 – Unsupervised Learning	29H
Unit 1: Unsupervised Machine Learning Algorithm	6H
Unit 2: Hierarchical Clustering	7H
Unit 3: Non-Hierarchical Clustering	7H
Unit 4: Linear Factor Model for Dimensionality Reduction	7H
Quiz	2H
Week 5: Neural Network and Deep Learning & Various Deep Learning Topics	46H
Unit 1: Basics of Neural Network	7H
Unit 2: Basics of TensorFlow	7H
Unit 3: Deep Learning Methods using TensorFlow and Keras	7H
Unit 4: CNN Model	7H
Unit 5: RNN for Sequential Data Modeling	7H
Unit 6: Generative Adversarial Neural Network to Create Non-Existent Images	7H
Quiz	4H
Week 6: Natural Language Processing and Language Models for Text Mining	25H
Unit 1: Text Mining	5H
Unit 2: Text Preprocessing	6H
Unit 3: Language Model	6H
Unit 4: Natural Language Processing with Keras	6H
Quiz	2H
Total Class Hours	215H

Course Assessment:

The scoring assessments of the students will follow the below criteria:

Criteria	Weight
Quiz <ul style="list-style-type: none"> - Quiz will be placed at the end of each week - Approximately 5 ~ 20 questions per quiz 	40 %
Capstone Project <ul style="list-style-type: none"> - Project is measured based on the quality of final product, presentation and teamwork 	60 %
Participation <ul style="list-style-type: none"> - Participation is measured by the instructor throughout the course 	+α
Total	100%

Certification:

The students will be eligible for a certification when both qualifications below are met.

Qualification	Cut-off Rate
1. Attendance higher than	90 %
2. Total grade for assessment higher than	50 %
► Certified when both qualifications are met	-