COURSE DESCRIPTION

Students will acquire an integrated set of skills spanning data processing, statistics & machine learning, along with a good understanding of the synthesis of these skills and their applications to solving problem. The course is an introduction of the fundamental topics of data science study, including: (1) principles of data processing & representation, (2) theoretical basis & advances in data science, (3) modeling & algorithms, & (4) evaluation mechanisms. Real-world engineering problems & data will be used as examples to illustrate and demonstrate the advantages & disadvantages of different algorithms & compare their effectiveness as well as efficiency, & help students to understand & identify the circumstances under which the algorithms are most appropriate.

COURSE HIGHLIGHTS

Students will acquire an integrated set of skills spanning data processing, statistics and machine learning, along with a good understanding of the synthesis of these skills and their applications to solving problem.
- Algorithms and Machine Learning
- Data cleaning
- Self-Selected Project

COURSE FORMAT/PREREQUISITES

- In Person | **15 week** semester
- Graduate prerequisites include **SIE 530**, equivalent courses such as **SIE 500** taken in parallel or consent of instructor
- **3-credit** hour | You may apply it towards SIE MS and PhD programs
- All office hours held via **Zoom**

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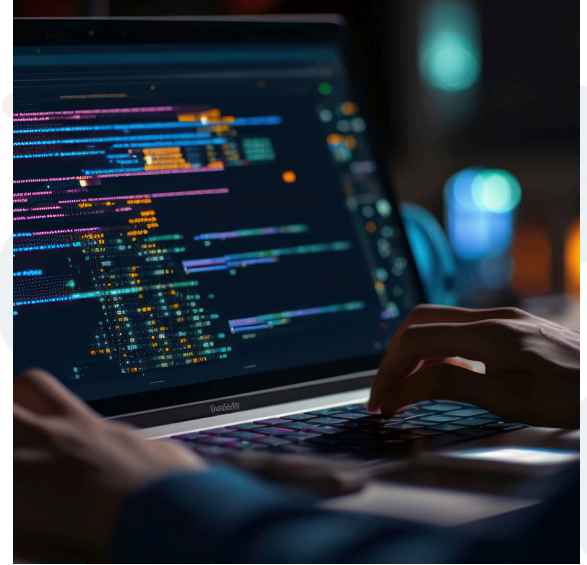
PROGRAM DIRECTOR
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ENROLLMENT
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COURSE SCHEDULE

WEEK 1
▶ Course introduction and Overview

WEEK 2
▶ Data Structure & Representation
▶ Data Integration & Preprocessing with Python

WEEK 3
▶ Data Similarity vs. Dissimilarity
▶ Data Transformation & Discretization

WEEK 4
▶ Concepts and Principles for Computer to Learn
▶ Learning Procedure & Approximation-Generalization Tradeoff

WEEK 5
▶ Supervised Learning - Linear Regression I
▶ Linear Regression II

WEEK 6
▶ Supervised Learning - Logistic Regression I
▶ Logistic Regression II

WEEK 7
▶ Link Functions & Linear Discriminant Analysis
▶ Overfitting & Cross Validation

WEEK 8
▶ Model Selection & Information Criteria
▶ Review Session for Exam I &Project Discussion

WEEK 9
▶ Exam I
▶ Margin Concept and Support Vector Machines

WEEK 10
▶ Support Vector Machines & Kernel Methods

WEEK 11
▶ Cross Validation & Bootstrap

WEEK 12
▶ K-Nearest Neighbors Method
▶ K-Means Method

WEEK 13
▶ Decision Tree
▶ Project Preparation

WEEK 14
▶ Project Preparation
▶ Project Preparation

WEEK 15
▶ Review Session for Exam II
▶ Exam II

Real-World Application

Flexible/Interactive Learning

Bridge Theory & Practice

Innovative Curriculum

Distinguished Faculty

FROM EFFICIENCY TO INNOVATION—LEAD THE FUTURE OF INDUSTRIAL ENGINEERING.