

Course: DS – 630 Machine Learning (WINTER TRIMESTER 2020)

Prerequisites: Undergraduate Statistics, Algorithms and data structures, and programming experience with Windows and/or MacOS

Course Description:

Machine learning is the science (and art) of programming computers so they learn from data. It is the field of study that gives computers the ability to learn from experience without being explicitly programmed. This course covers the theory and practical algorithms for machine learning. Major topics include classification, decision trees, support vector machines, ensemble methods, neural networks, and deep learning. Students will have an opportunity to experiment with machine learning techniques (especially using Python) and apply them to solve selected problems in the context of a term project.

Course Learning Outcomes:

By the end of this course, students will be able to:

- Understand machine learning landscape
- Learn theory and algorithms for key machine learning algorithms
- Know how to apply machine learning theory and algorithms to practical problems
- Understand and explain machine learning application output and results

Assignments and Grading:

Categories	Weights
Discussion and participation*	15%
Assignments (seven equally weighted assignments)**	35%
Mid-term exam	15%
Course project (2 project components, work individually or with a partner)***	20%
Final exam	15%
TOTAL	100%

* **Discussion topics are available/due every week or every two weeks on BlackBoard. At least one substantive post for each discussion topic is required (10%).** In addition, please respond to your classmates' discussion or feel free to discuss other relevant topics that you are willing to share (5%).

** Note that please **do not submit your homework by email, please submit through the blackboard system.** Late homework will be penalized with **10% deduction** for each extra day of being late.

*** Project description is attached in the detailed course plan

Required Texts and Materials:

Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, Aurelien Geron. O'Reilly Media; 2nd edition (October 15, 2019).
ISBN-10 : 1492032646, ISBN-13 : 978-1492032649

Supplemental Texts and Materials:

Use below links as reference for python and machine learning:

Python tutorial: <https://docs.python.org/3/tutorial/index.html>

Python tutorial: <https://jakevdp.github.io/PythonDataScienceHandbook/>

Course Outline:

Week	Weekly Objectives/Topics
1	<ul style="list-style-type: none">• Setting up Python environments• The machine learning landscape
2	<ul style="list-style-type: none">• End-to-end machine learning project• Classification
3	<ul style="list-style-type: none">• Training models• Support vector machines
4	<ul style="list-style-type: none">• Decision trees• Ensemble learning and random forests
5	<ul style="list-style-type: none">• Midterm Exam
6	<ul style="list-style-type: none">• Dimensionality reduction• Unsupervised learning techniques
7	<ul style="list-style-type: none">• Neural networks with Keras
8	<ul style="list-style-type: none">• Training deep neural networks
9	<ul style="list-style-type: none">• Custom models and training with TensorFlow• Loading and preprocessing data with TensorFlow
10	<ul style="list-style-type: none">• Deep computer vision using CNN
11	<ul style="list-style-type: none">• Final Project Report

Accessibility and Accommodations

Saint Peter's faculty are responsible for providing access to education which is free from discrimination. Students apply for academic accommodations by submitting the appropriate forms to the Center for Academic Success and Engagement. Academic accommodations are approved based on a student's individualized needs. For more information please visit the [Accommodations and Services](#) webpage.

Online Etiquette and Anti-Harassment Policy

The use of University sponsored emails, portals as well as information and material accessed on the Saint Peters network should be in aligned with University values and Student Code of Conduct. University guidelines for responsible use of technology can be found in the [Student Handbook](#).

Academic Integrity

Academic dishonesty is unacceptable and will not be tolerated. Cheating, forgery, dishonesty, plagiarism, copyright infringement, impersonation and collusion in dishonest acts undermine the educational mission of the University. Please review the [Student Code of Conduct](#).

Student Support Services

If you need any additional help, please contact TRiO Student Support Services:
<https://www.saintpeters.edu/academics/programs-services/trio/>