

DATA SCIENCE (DATA)

DATA*1000 Programming for Data Science Winter Only (LEC: 3) [0.50]

This course is designed to provide students with the foundational skills needed for data analysis and visualization using a programming language such as Python. Topics include handling and manipulating data structures, cleaning and preparing datasets, and visualizing data to develop insights. There will also be an exploration of core data structures, and key data analysis tools such as NumPy, Pandas, SQL, and Matplotlib. Data Preprocessing, Feature Engineering, and Basic Modeling as well as techniques for handling missing data; scaling and normalization; feature selection and encoding categorical data will be studied. Some basic machine learning algorithms will be discussed.

Department(s): Department of Mathematics and Statistics

Location(s): Guelph

DATA*3000 Introduction to Machine Learning Winter Only (LEC: 3) [0.50]

This course will cover the fundamentals of data science and machine learning, focusing on model development, evaluation, and deployment. Both supervised and unsupervised learning will be introduced. Students will learn the key steps in building and deploying machine learning models and will develop an understanding of the issues involved with overfitting and underfitting. Classification and regression methods will be studied along with their evaluation metrics. Other topics will include machine learning algorithms including ensemble methods, support vector machines, the kernel trick and k-nearest neighbours as well as cross-validation and hyperparameter tuning.

Prerequisite(s): DATA*1000, MATH*2200, STAT*3100, STAT*3240

Department(s): Department of Mathematics and Statistics

Location(s): Guelph

DATA*4000 Deep Learning Winter Only (LEC: 3) [0.50]

This course covers both unsupervised learning and deep learning techniques. Clustering algorithms such as k-means clustering, density-based spatial clustering, hierarchical clustering and spectral clustering will be studied along with clustering evaluation metrics. Dimensionality reduction and anomaly detection will also be studied. Deep learning concepts including neural networks, activation functions, convolutional neural networks, recurrent neural networks, and the use of frameworks such as TensorFlow/Keras and PyTorch will be explored finishing with advanced deep learning techniques such as generative models and transfer learning.

Prerequisite(s): DATA*3000

Department(s): Department of Mathematics and Statistics

Location(s): Guelph