

DSA 8401: Applied Machine Learning in Data Science

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Course Outline:

Week	Content
Week 1	Introduction to Machine Learning and Applications
Week 2	Supervised Learning: Regression – Linear, Polynomial
Week 3	Supervised Learning: Classification – Logistics, Decision Trees
Week 4	Supervised Learning: Classification – Random Forest, SVM, k-NN
Week 5	CAT1: 20%
Week 6	Unsupervised Learning: Clustering – k-means, DBSCAN
Week 7	Unsupervised Learning: Hierarchical – Agglomerative
Week 8	Recommendation Systems – Collaborative
Week 9	Recommendation Systems – Content-based
Week 10	CAT2: 20%
Week 11	Deep Learning: Concepts and Forward Propagation
Week 12	Deep Learning: Image Processing with CNN
Week 13	Deep Learning: Optimization
Week 14	Natural Language Processing
Week 15	Natural Language Processing
Week 16	Revision
Week 17	Revision
Week 18	End of Semester Exam/Unit Project: 60%

Mode of Delivery:

Lectures, tutorials, handouts, practical sessions, hybrid classes

Instruction Materials and Equipment:

Audiovisual equipment, simulations, and computer programming

Course Assessment:

CATS (40%) and End of Semester Exam/Unit Project (60%)

Reading Material:

- Aurelien Geron (2019) Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow. O'Reilly Media Inc.
- Andreas Muller and Sarah Guido (2017). Introduction to Machine Learning with Python. O'Reilly Media Inc.
- Hastie, T., Tibshirani, R., Friedman, J., & Franklin, J. (2005). The elements of statistical learning: data mining, inference and prediction. The Mathematical Intelligencer, 27(2), 83-85. ISBN: 9780387952840.
- Duda, R. O., Hart, P. E., & Stork, D. G. (2012). Pattern classification. John Wiley & Sons. ISBN: 9780471056690.
- Bishop, C. M. (1995). Neural networks for pattern recognition. Oxford university press. ISBN: 9780198538646.
- Barber, D. (2012). Bayesian reasoning and machine learning. Cambridge University Press.