* + 1. **Machine Learning**

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| **Course Name:** | **Machine Learning** |
| **Course Code:** | **COM 3102** |
| **Level of Course:** | **Year Three, Semester One** |
| **Credit Units:** | **4** |
| Brief Course Description: | The course aims at imparting knowledge and practical skills of Machine Learning (ML) with python to undergraduate students.  The students will learn difference between the two main types of machine learning methods: supervised and unsupervised. Supervised learning algorithms include classification and regression. Unsupervised learning algorithms entail Clustering and Dimensionality Reduction. Also, student will learn how statistical modeling relates to machine learning and how to compare them. Real- life examples of the different ways machine learning affects society are part of the course. Finally, students will work on Machine Learning final project to  solve real-life industrial problems. |
| Objectives: | 1. Explore student to different types of Machine Learning. 2. Introduce students to the basic concepts and techniques of Machine Learning. 3. Introduce student to Python libraries for Machine Learning. 4. Teach student how to solve common machine learning problems such as regression, classification, clustering. 5. Learn how to develop machine-learning systems rapidly. 6. Explore different ways of verifying and evaluating the result. |
| Learning Outcomes: | On completion of this course unit, the students will be able to:   1. Differentiate between the two main types of machine learning methods: supervised and unsupervised 2. Apply supervised learning algorithms, including classification and regression. 3. Apply unsupervised learning algorithms, including Clustering and Dimensionality Reduction. 4. Demonstrate how statistical modeling relates to machine learning and how to compare them. 5. Demonstrate real-life examples of the different ways machine learning affects society. |
| Requirements: | Fully fledged Computer Lab with Internet connection as well as Microsoft  Office installation (MS Word and Excel) |
| Mode of Delivery: | This course is taught by lectures, tutorials, practical assignments, projects, case studies, Demonstrations and examinations. |
| Mode of assessment: | Course work = 40% Examination = 60%  Total = 100% |
| Content | **Week 1 &2 Introduction to Machine Learning 8 hours**   * Applications of Machine Learning * Supervised and Unsupervised Learning * Python libraries suitable for Machine Learning   **Week 3 Regression 4 hours**   * Linear Regression   + Linear Regression algorithm   + Solutions to Real-life problems with Linear Regression   + Model evaluation methods in Linear Regression   **Week 4 &5 Regression 8 hours**   * Non-linear Regression   + Non-linear Regression algorithm.   + Solutions to Real-life problems with Non-linear Regression   + Model evaluation methods in Non-linear Regression   **Week 6 & 7 Classification 8 hours**   * K-Nearest Neighbour (KNN).   + K-Nearest Neighbour Algorithm.   + Solutions to Real-life problems with KNN.   + Model evaluation methods in KNN.   **Week 8, 9 & 10 Classification 12 hours**   * Decision Trees (DT).   DT Algorithm.   * Solutions to Real-life problems with DT. * Model evaluation methods in DT. * Logistic Regression.   + Logistic Regression Algorithm.   + Solutions to Real-life problems with Linear Regression.   + Model evaluation methods in Logistics Regression. * Support Vector Machines (SVM).   + SVM Algorithm.   + Solutions to real-life problems with SVM.   + Model Evaluation methods in SVM.   **Week 11 &12 Unsupervised Learning 8 hours**   * K-Means Clustering. * Hierarchical Clustering.   **Week 13 Unsupervised Learning 4 hours**   * Density-Based Clustering.   **Week 14 Recommender Systems 8 hours**   * Content-based recommender systems. * Collaborative Filtering.   **Week 15 Capstone Project 4 hours**   * Machine Learning Project   **Week 16 & 17: Examinations** |
| Study Materials: | **Essential Books:**   1. Himanshu Singh (2019), *Practical Machine Learning and Image Processing*. ISBN-13 (pbk): 978-1-4842-4148-6, Allahabad, Uttar Pradesh, India. 2. Chris Albon (2018), *Machine Learning with Python Cookbook*: *Practical Solutions from Preprocessingto Deep Learning.* O’Reilly Media, USA. 3. Aurélien Géron (2017), *Hands-On Machine Learning with Scikit-Learn*   *and TensorFlow*. O’Reilly Media, USA. |