Western University
Faculty of Engineering
Department of Electrical and Computer Engineering

ECE 9014A: Data Management & Applications
Course outline Fall 2018

Description: The advancement in data collection and storage technologies allowed access to a massive amount of data in every field. Terms like data science and big data have been massively trending recently which indicates the importance of the topic. The goal of this course is to give the students an overall understanding of the data science process to provide them with the background they need to be able to utilize it in their perspective areas.

Instructor: Shaimaa Ali, PhD
> **sali242@uwo.ca**
> Consultation Hours: Wednesdays 1:00pm – 2:00pm - Room TEB 380

Lecture Hours: 3 hours/week

Recommended References:
- "Fundamentals of database systems", R. Elmasri, S. Navathe, Pearson Education Inc., 2017, ISBN: 978-0133970777
- "Data Mining: Concepts and Techniques", J. Han, M. Kamber, J. Pei, Elsevier Inc., 2011, ISBN: 978-9380931913
- "Learning Pentaho Data Integration 8CE", Maria Carina Roldan, Packt Publishing,2017, ISBN:978-1-78829-243-6
- "R Data Mining: Implement data mining techniques through practical use cases and real world datasets", Andrea Cirillo, Packt Publishing, 2017, ISBN: 978-1-78712-446-2
- "Storytelling with Data: A Data Visualization Guide for Business Professionals", Cole Nussbaumer Knaflic, Wiely, 2015, ISBN: 978-1119002253

Learning Competencies and Objectives:
- **Learning Competency 1 (LC 1):** By the end of this course the students should be able to understand and speak the language used in data science to be able to follow it's advances as well as recognize opportunities to advance their career.
  - **Learning Objective 1.1 (LO 1.1) :** The students should be able to describe and use the main terminology in the field.
  - **Learning Objective 1.2 (LO 1.2) :** The students should be able to describe the overall knowledge discovery in databases (KDD) process. (Note: a more recent term of the same process is the data science process)
- **Learning Competency 2 (LC 2):** By the end of the course the students should be able to understand and use a data management platform to collect and manage data
  - **Learning Objective 2.1 (LO 2.1):** The students should be able to understand and create an Entity-Relationship-Model (ERM) to represent the data requirements for a practical project.
  - **Learning Objective 2.2 (LO 2.2):** The students should be able to understand and create a relational model based on an entity-relationship-model.
  - **Learning Objective 2.3 (LO 2.3):** The students should be able to understand and apply normalization rules to enhance the maintainability of a relational model.
  - **Learning Objective 2.4 (LO 2.4):** The students should be able to understand and use the standards of the Structured Query Language (SQL)
  - **Learning Objective 2.5 (LO 2.5):** The students should be able to write and execute SQL statements in an actual relational database management system.
- **Learning Competency 3 (LC 3):** By the end of the course the students should be able to understand and implement data integration from multiple databases to allow for higher level analysis.
  - **Learning Objective 3.1 (LO 3.1):** The students should be able to understand the concepts related to data warehousing.
  - **Learning Objective 3.2 (LO 3.2):** The students should be able to understand and create and implement a star-schema design.

- - **Learning Objective 3.3 (LO 3.3):** The students should be able to understand and create and implement a snow-flake design.
  - **Learning Objective 3.4 (LO 3.4):** The students should be able to understand and use Online-Analytical Processing (OLAP) to create meaningful reports out of an integrated data warehouse.
- **Learning Competency 4 (LC 4):** By the end of the course the students should be able to understand and apply data mining techniques to find answers for more sophisticated questions from a given dataset.
  - **Learning Objective 4.1 (LO 4.1):** The students should understand the main concepts related to data mining.
  - **Learning Objective 4.2 (LO 4.2):** The students should understand and apply predictive data mining techniques on a given dataset.
  - **Learning Objectives 4.3 (LO 4.3):** The students should understand and apply descriptive data mining techniques on a given dataset.
- **Learning Competency 5 (LC 5):** By the end of the course the students should be able to create meaningful visualizations to communicate results of data analysis.
  - **Learning Objective 5.1 (LO 5.1):** The students should be able to create meaningful visualizations.
  - **Learning Objective 5.2 (LO 5.2):** The students should be able to create well organized reports based on their data
  - **Learning Objective 5.3 (LO 5.3):** The students should be able to tell a story using meaningful visualizations.
- **Learning Competency 6 (LC 6):** By the end of the course the students should be able to keep themselves up-to-date with the advances in the data collection, integration and mining.
  - **Learning Objective 3.1 (LO 6.1):** The students should be able to describe briefly some of the new trends introduced by the instructor.
  - **Learning Objective 3.2 (LO 6.2):** The students should be able to do their own research and learn about advances in field on their own.

Learning Activities and Evaluation:

Learning Activity	Weight and notes
In-Class assignment	20% to evaluate the attention and participation during the class
Group (4-5) Project	50% (will be divided into a set of submissions to help evaluate and support the progress of the project) • 10% Teamwork and management tasks • 10% Relational DB tasks • 10% Data warehousing tasks • 10% Data mining tasks • 10% Group presentation and report
Final Exam	30% will be closed book

Cheating and Plagiarism:
University policy states that cheating is a scholastic offence (see Scholastic Offence Policy in the Western Academic Calendar). The commission of a scholastic offence is attended by academic penalties that might include expulsion from the program. If you are caught cheating, there will be no second warning.

Plagiarism is a major academic offence. Students must complete their reports and assignments in their own words. Appropriate citations must be included when ideas are obtained from another source. All submissions maybe subject to textual similarity review via commercial plagiarism detection software (Turnitin http://www.turnitin.com) under the licensing agreement established by Western University.

Accessibility: Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at (519) 661-2111 X 82147 for any specific question regarding an accommodation.

Support Services:

Office of the Registrar, http://www.registrar.uwo.ca/

Student Development Centre, http://www.sdc.uwo.ca/

USC Student Support Services, http://westernusc.ca/services/

Students who are in emotional/mental distress should refer to Mental Health @ Western, http://www.health.uwo.ca/mental_health/, for a complete list of options on how to obtain help.