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| UW_Odette_2L_horz-01 |
| **BSMM-8740: Data Analytic Methods & Algorithms**  **Master of Management**  **Summer 2023** |

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| **Class section** | 001 | | | | |
| **Class meetings** | Tuesday and Friday, 8 AM to 10 AM | | | | |
| **Instructor** | Dr. Ali El-Sharif | | | | |
| **Office hours** | Tuesday and Friday,  10 AM to 11 AM | | **Office** | | Microsoft Teams |
| **Telephone** | Microsoft Teams | | **E-mail** | | elsharif@uwindsor.ca |
| **Course Website** | <https://brightspace.uwindsor.ca> | | | | |
| **Textbook** | The Elements of Statistical Learning - Data Mining, Inference, and Prediction.  Second Edition by Trever Hastie, Robert Tibshirani, and Jerome Firedman. Available for free at <https://web.stanford.edu/~hastie/ElemStatLearn/> | | | | |
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| **Program Administrator** | TBD | **Email** | |  | |
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***The Odette School of Business and the University of Windsor sit on the Traditional territory of the Three Fires confederacy of First Nations, comprised of the Ojibway, the Odawa, and the Potawatomie.***

### CALENDAR DESCRIPTION:

### This course is the exploration of an analytical framework for method selection and model building to help students develop professional capability in data-based techniques of data analytics. A focus will be placed on comparing and selecting appropriate methodology to conduct advanced statistical analysis and on building predictive modeling in order to create a competitive advantage in business operations with efficient analytical methods and data modeling.

### LEARNING OBJECTIVES:

The general objectives of this course are to:

* Describe the concepts and issues associated with analytical framework for method selection and model building
* Describe the assumptions, limitations, and advantages of various statistical techniques for building predictive models
* Develop an understanding of various data analytics algorithms
* Demonstrate a capacity for interpersonal interactions

# MASTER OF MANAGEMENT COMPETENCIES:

For BSMM-8740 the following competencies are taught and tested:

| **Program Competencies** | **Course Competencies** | **Tested by** |
| --- | --- | --- |
| **C3 Problem Solving**  Apply an evidence-based decision model to evaluate and recommend the best available alternative to resolve an international business problem. | Apply an evidence-based decision model to evaluate and recommend the best available alternative to resolve an international business problem. | Lab Assessments |
| **C4 Literacy and Numeracy Skills**  Analyze both qualitative and quantitative data and findings, distinguishing and evaluating their relevance to the resolution of international business issues. | Analyze both qualitative and quantitative data and findings, distinguishing and evaluating their relevance to the resolution of international business issues. | Quizzes, Midterm Examination, and Final Examination |

COURSE CONTENT:

| **Date** | **Topic** | **Reading Assignment** |
| --- | --- | --- |
| May 23 | Course Introduction  Supervised Machine Learning Review | Chapter 1 – Introduction  Chapter 2 – Overview of Supervised Learning |
| May 26 | Lab Orientation  Supervised Machine Learning Lab | *Optional Data Camp Online Module*  Supervised Learning with scikit-learn |
| May 30 | Linear Classifiers (Logistic Regression and Support Vector Machines) | Chapter 4 – Linear Methods for Classification  Chapter 12 – Support Vector Machines and Flexible Discriminants |
| Jun 2 | Linear Classifiers Lab | *Optional Data Camp Online Module*  Linear Classifiers in Python |
| Jun 6 | Model Selection and Optimization | Chapter 7 – Model Assessment and Selection |
| Jun 9 | Model Selection and Optimization Lab | *Optional Data Camp Online Module*  Assignment — Model Validation in Python  Assignment — Hyperparameter Tuning in Python |
| Jun 13 | Tree-Based Models and Ensemble Learning | Chapter 15 – Random Forest  Chapter 16 – Ensemble Learning |
| Jun 16 | Tree-Based Models and Ensemble Learning | *Optional Data Camp Online Module*  Machine Learning with Tree-Based Models in Python |
| **Reading Week, June 19 - 23** | | |
| Jun 27 | Feature Engineering and Data Pre-Processing | A survey of feature selection and feature extraction techniques in machine learning. <https://doi.org/10.1109/sai.2014.6918213> |
| Jun 30 | Canada Day – University Closed |  |
| Jul 4 | Feature Engineering and Data Pre-Processing Lab | *Optional Data Camp Online Module*  Feature Engineering for Machine Learning in Python  Preprocessing for Machine Learning in Python |
| Jul 7 | Explainable AI (XAI) | Why should I trust you? Explaining the predictions of any classifier.  <https://doi.org/10.18653/v1/n16-3020>  A Unified Approach to Interpreting Model Predictions.  <https://dl.acm.org/doi/10.5555/3295222.3295230> |
| Jul 11 | Explainable AI (XAI) Lab |  |
| Jul 14 | An Introduction to Deep Learning | Kaggle Tutorial – Introduction into Deep Learning  [**https://www.kaggle.com/learn/intro-to-deep-learning**](https://www.kaggle.com/learn/intro-to-deep-learning) |
| Jul 18 | Deep Learning Lab | *Optional Data Camp Online Module*  Introduction to Deep Learning in Python |
| Jul 21 | An Introduction to Recommender Systems | A Complete Guide To Recommender Systems — Tutorial with Sklearn, Surprise, Keras, Recommenders  <https://towardsdatascience.com/a-complete-guide-to-recommender-system-tutorial-with-sklearn-surprise-keras-recommender-5e52e8ceace1> |
| Jul 25 | Recommender Systems Lab | *Optional Data Camp Online Module*  Building Recommendation Engines in Python |
| Jul 28 | An Introduction to Natural Language Processing | Getting Started with Natural Language Processing (NLP) — preprocessing, word embeddings, text classification, and more!  <https://towardsdatascience.com/getting-started-with-natural-language-processing-nlp-2c482420cc05> |
| Aug 1 | Natural Language Processing Lab | *Optional Data Camp Online Module*  Introduction to Natural Language Processing in Python |
| Aug 4 | Machine Learning Bias Identification and Mitigation. | Lecture Notes based on open-source packages (Fair Learn and IBM Fairness 360) |
| Aug 8 | Machine Learning Bias Identification and Mitigation Lab | *Optional Online Reference*  [**https://fairlearn.org/**](https://fairlearn.org/)  [**https://aif360.mybluemix.net/**](https://aif360.mybluemix.net/) |
| Aug 11 | Alternative class week |  |

The above schedule is subject to change. Students will be notified of any changes. Additional readings may be assigned as necessary.

KEY DATES FOR EXAMS/ASSIGNMENTS:

|  |  |
| --- | --- |
| **Date** | **Exam/Assignment** |
| Jun 9, 2023 | Lab Assessment 1 |
| Jun 16, 2023 | Quiz1 |
| Jun 27, 2023 | Midterm Examination |
| Jul 16, 2023 | Lab Assessment 2 |
| Jul 25, 2023 | Quiz 2 |
| Aug 1, 2023 | Lab Assessment 3 |
| Aug 12-21, 2023 | Final Examination |

\*Final exams will take place during the university specified final exam period. Students are advised to read Senate Policy on the Conduct of Tests and Exams.

### IMPORTANT PROGRAM DATES:

A list of important program dates can be found on the Brightspace Master of Management Program page at <https://brightspace.uwindsor.ca/d2l/le/calendar/136263>.

### GRADING:

Grades will be assigned on the following basis:

|  |  |
| --- | --- |
|  | **%** |
| Quizzes | 20 |
| Lab Assessments | 30 |
| Midterm Examination | 25 |
| Final Examination | 25 |
| **TOTAL** | **100** |

GRADING SCALE POLICIES:

All course work is to be marked and final grades submitted using the 100% scale beginning September 1, 2013. In accordance with the Senate resolution, instructors are to submit whole numbers (e.g., 88, 76, etc.) as percentages. The following University-wide grade descriptors are in effect and will be printed on the back of transcripts:

|  |  |
| --- | --- |
| **Letter Grade** | **Percentage  Range** |
| A+ | 90-100 |
| A | 85-89.9 |
| A- | 80-84.9 |
| B+ | 77-79.9 |
| B | 73-76.9 |
| B- | 70-72.9 |
| C+ | 67-69.9 |
| C | 63-66.9 |
| C- | 60-62.9 |
| F | 0-59.9 |

EXAM/ASSIGNMENT DESCRIPTIONS:

### **Quizzes**

The quizzes can consist of true/false, multiple choice, short answer, and essay questions from all material covered before the date of the mid-term exam. When writing quizzes, you must abide by University of Windsor policies governing plagiarism and academic integrity. Quiz submissions may be subjected to review by automated tools to verify their originality.

### **Lab Assessments**

Lab assessments will require learners to demonstrate the ability to apply methods and techniques to machine learning problem using Python and explain the steps they followed to solve a problem. Assessments must be completed in person during lab sessions.

### **Midterm Examination**

The midterm exam can consist of true/false, multiple choice, short answer, and essay questions from all material covered before the date of the mid-term exam. When writing this exam, you must abide by University of Windsor policies governing plagiarism and academic integrity. Exam submissions may be subjected to review by automated tools to verify their originality.

**Final Examination**

The final exam can consist of true/false, multiple choice, short answer, and essay questions covering all course material, including material discussed during lab sessions. When writing this exam, you must abide by University of Windsor policies governing plagiarism and academic integrity. Exam submissions may be subjected to review by automated tools to verify their originality.

DIGITAL LEARNING RESOURCES:

Digital resources may be used in this course. They may be required resources which will be used for assessment purposes. The assessments that will rely on these resources constitute 0% of the grade for this course. These resources can be purchased from Not Applicable . The assignment of digital learning resources at the University of Windsor is governed by a policy entitled The Use of Digital Learning Resources for Instructional an Assessment Purposes, which can be reviewed at <https://www.uwindsor.ca/provost/sites/uwindsor.ca.provost/files/digital_learning_resource_policy_final_with_link_0.pdf>

Should you have any concerns about the assignment of digital learning resources for this course, please let the Master of Management Program Director know in writing, as the University regularly reviews this policy based on campus community feedback.

ODETTE SCHOOL OF BUSINESS COURSE POLICIES:

Please refer to the Odette School of Business Course Policies document for specific information on the following subjects. This Course Policies document is available electronically on each course website, on the Brightspace Master of Management Program page at <https://brightspace.uwindsor.ca/d2l/le/content/136263/viewContent/654482/View?ou=136263> and also in paper form outside each Area Secretary’s office on the 4th floor of the Odette building. (Adopted Fall 2009)

**Academic Integrity and Code of Conduct**

**Missed Exams and Late Assignments**

**Registration, Adding, and Dropping Courses**

**Odette School of Business Grade Conversion Scale**

**Odette School of Business Grading Policy**

**Student Evaluation of Teaching (SET)**

MASTER OF MANAGEMENT PROGRAM ETIQUETTE:

The Master of Management program is a culturally inclusive program where it is expected that students, faculty, and staff will recognize, appreciate, and benefit from diversity so as to enhance the learning experience. Promoting a culturally inclusive learning environment encourages individuals to collaborate and develop intercultural respect. The following outlines the protocol for Master of Management students while they are at the University of Windsor:

* All students will communicate in English at all times. It is important for students to continually improve language skills and be inclusive of others from different backgrounds.
* Students will demonstrate respectful behavior toward their peers and professors, regardless of culture, language, values, beliefs, or ideas.

SECONDARY DATA USE, EVALUATION, FOCUS GROUPS AND INTERVIEWS:

This course will be evaluated as part of internal or external quality assurance processes and reporting requirements to funding agencies and as research data for scholarly use. As a student in this course your online student data will be used for evaluating the course delivery and your engagement in the various aspects of the course. This will only occur after final grades have been submitted and approved so it will no effect on your grade. This course data provides information about your individual course usage and activity during the time that you are enrolled in the course. Your anonymized, aggregated data may also be used in the future in reports, articles or presentations.

During the final week of the course you may also be invited to participate in further research about the course. If you decide to participate you may be asked to fill out anonymous online questionnaires that solicit your impressions about the course design and student learning in the course. The survey participation is voluntary and no questions of a personal nature will be asked. Your participation will have no effect on your grade and your instructor will not know who participated in the surveys.

Finally, at the end of the survey you may also be asked if you want to participate in a focus group or interviews after final grades have been assigned to gather yours and other student opinions about specific course delivery methods and technologies used.

COMMITMENT TO STUDENT WELLNESS:

**Feeling Overwhelmed?**

From time to time, students face obstacles that can affect academic performance. If you experience difficulties and need help, it is important to reach out to someone.

For help addressing mental or physical health concerns on campus, contact (519) 253-3000:

- Student Health Services at ext. 7002 (<http://www.uwindsor.ca/studenthealthservices/>)

- Student Counselling Centre at ext. 4616 (<http://www.uwindsor.ca/studentcounselling/>)

- Peer Support Centre at ext. 4551

**24 Hour Support is Available**

- My Student Support Program (MySSP) is an immediate and fully confidential 24/7 mental health support that can be accessed for free through chat, online, and telephone. This service is available to all University of Windsor students and offered in over 30 languages. Call: 1-844-451-9700, visit <https://keepmesafe.myissp.com/>  or download the My SSP app: [Apple App Store](https://apps.apple.com/us/app/my-ssp/id1112006222)/[Google Play](https://play.google.com/store/apps/details?id=com.onetapsolutions.morneau.myissp&hl=en).

A full list of on- and off-campus resources is available at  <http://www.uwindsor.ca/wellness>.

Should you need to request alternative accommodation contact your Instructor, Program Administrator, or Director.

APPENDICES: