Instructor: Dr. Bo Yu
Office: Rowe 4118
Telephone: (902) 494-8995
E-mail: bo.yu@dal.ca
Office hours: Monday 1:00~2:00pm
Course website: https://dal.brightspace.com/
Teaching Assistant info: To be announced

COURSE DESCRIPTION
This course serves as an introduction to data science, an increasingly set of skills and techniques for business intelligence, effective governance, and the research process. The amount of data we generate increases year by year. As computers have begun to play roles in many aspects of our daily life, our actions and interactions leave digital traces. This has led both to an explosion in the amount of data that we generate and an increased interest in analyzing and understanding that data. This class will give you an introduction to the skills you need to effectively collect, manipulate, and analyze data yourself.

Rather than being constrained to using any specific data analysis software, we will focus on using the flexible programming language Python. You will receive a thorough introduction to Python, learning how to use a variety of its built-in capabilities as well as a number of available data analysis packages. By the end of this course, you should be capable enough to begin teaching yourself and expanding your data science skills.

COURSE PRE-REQUISITES
None

LEARNING OBJECTIVES
This course will introduce students to computer programming, computational thinking and data analysis. The instruction will help students become more familiar with using their computer to automate tasks—especially data-oriented tasks—and improve students’ understanding of how computation works. By doing so, it will give students a foundation from which to build upon in order to learn more advanced and specialized computational research and data analytic skills in the future.

LEARNING OUTCOMES
Upon completion of the course, students are expected to have gained basic knowledge or proficiency in the following areas:

• Understand the principles of data analysis
• Learn the basics of data manipulation (sometimes referred to as data wrangling or data munging)
• Achieve a foundation in data visualization skills
• Become competent with the Python programming language
• Become familiar with SQL
• Achieve a critical appreciation for computational methods and computational thinking
• Learn about the IT requirements for data analysis
• Plan and implement an information management framework
• Understand how to construct and maintain datasets
• Develop essential skills for teamwork

INSTRUCTIONAL METHODS
This class will largely adopt a lab-style workshop method. The instructor will take a role of being a coach who guide students and help them to construct their experiences. Students will be responsible for reading the assigned materials and completing assignments between each class meeting. Most of the meeting time will be spent doing hands-on programming and data analysis work. Although most of the class time will be hand-on, there will be some lecture-style instruction as well.

LEARNING MATERIALS

Database and SQL
W3schools >>SQL, https://www.w3schools.com/sql/
Codecademy Learning SQL: https://www.codecademy.com/learn/learn-sql

Python
eBook for Programming:

Online tutorials:
Codecademy>>Learning Python: https://www.codecademy.com/learn/learn-python
W3schools>>Python, https://www.w3schools.com/python/default.asp

Synthesis
Codecademy>>Data science: https://www.codecademy.com/learn/paths/data-science

Programming tool
This course requires students to have a development tool that supports Python. Students are recommended to have own laptops. Canopy is suggested. Canopy Express is a free version. It can be downloaded from this link: https://store.enthought.com/downloads/

METHODS OF EVALUATION

Detailed instructions regarding each assessment components will be provided. The assessment components are directly related to the attention to instructions, clarity of expression and presentation, and evidence of significant analysis and reflection.

See also the SIM Grading Policy.
<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>DETAILS</th>
<th>DUE</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Assignments</td>
<td>Assignment 1: Database with Access</td>
<td></td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>Assignment 2: Python programming I</td>
<td></td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>Assignment 3: Python programming II</td>
<td></td>
<td>5%</td>
</tr>
<tr>
<td>Team Assignment</td>
<td>OpenData analysis and visualization</td>
<td></td>
<td>25%</td>
</tr>
<tr>
<td>Exam</td>
<td>A take-home exam needs to be completed with 24 hours</td>
<td></td>
<td>30%</td>
</tr>
<tr>
<td>Team Project</td>
<td>Python programming with MySQL</td>
<td></td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td>Code Review Report</td>
<td></td>
<td>5%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>100%</td>
</tr>
</tbody>
</table>

*Individual Assignments*
There will 3 individual assignments, including both Database and Python lessons. The assignments will be hands-on practices. Students will start the assignments in selected classes and thereafter complete and submit them after the class. In order to successfully complete the assignment, students are encouraged to complete the tutorials of recommended SQL and Python online tutorials.

*Team Assignment*
Students will complete a group assignment. They can select a dataset that is available at the Open Data Nova Scotia ([https://data.novascotia.ca/browse](https://data.novascotia.ca/browse)). Students need to develop their own knowledge about the dataset and are able to present their insights in visualizations. SAP cloud analytics will be adopted as the tool. The delivery is a short report and a presentation in class. Although students are allow to examine the data by using statistic or advanced analytics approaches, analytics approaches are not the main focus of this assignment. The key purpose of this assignment is let student know how to obtain data, handle them in database, and then understand the nature of the data.

Students within the same teams are encouraged to attend the Open Data Contest that will hosted annually by the School of Information Management. The scheduled date will be Mar. 2nd and 3rd. Two bonus marks will be offered for attending this contest.

*Team Project*
Students need to complete a group project. This project helps students to learn how to process data by programing and using a database management system. Each group needs to submit an initial version of the assignment. Then, the submitted project will be assigned to other groups for review. A short code review report needs to be completed and submitted. Each group needs review another group’s project. The guidelines of code review will be provided. Each group needs to write a code review report by highlighting the problem and providing comments. Please provide a clear reason for any suggestion or modification of the source code.

*Exam*
Students will have a take-home programming exam. There will be 3 or 4 questions that need students to solve. Students can use any resource, including computer, notes, and book. They can search the internet. But, students during the exam are not allowed to discuss with anyone else. The exam will be before the team project. Students will start the exam in class. They can ask the instructor to clarify all
the requirements in class. They can complete the exam after class. In total, students have 24 hours to complete the exam after the exam questions are released on the BrightSpace.

**INTEGRATION OF MLIS Competencies**

<table>
<thead>
<tr>
<th>PROGRAM COMPETENCY</th>
<th>COURSE LEARNING OUTCOME</th>
<th>COURSE ASSESSMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Management of Information Technology</td>
<td>• Learn about the IT requirements for data analysis&lt;br&gt; • Understand how to construct and maintain datasets</td>
<td>Assignments, exam and project</td>
</tr>
<tr>
<td>2. Information Management Leadership</td>
<td>• Become competent with the Python programming language&lt;br&gt; • Become familiar with SQL</td>
<td>Assignments and project</td>
</tr>
<tr>
<td>3. Risk &amp; Change Management</td>
<td>• Achieve a critical appreciation for computational methods and computational thinking</td>
<td>Project</td>
</tr>
<tr>
<td>4. User-centred Information Services</td>
<td>• Understand the principles of data analysis&lt;br&gt; • Learn the basics of data manipulation (sometimes referred to as data wrangling or data munging)&lt;br&gt; • Achieve a foundation in data visualization skills</td>
<td>Project</td>
</tr>
<tr>
<td>5. Research and Evaluation</td>
<td>• Plan and implement an information management framework</td>
<td>Project and code review</td>
</tr>
<tr>
<td>6. Workplace Skills &amp; Attributes:</td>
<td>• Develop essential skills for teamwork</td>
<td>Project and code review</td>
</tr>
<tr>
<td>(a) Collaborate &amp; communicate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) Organize, Plan &amp; Manage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) Develop Personally &amp; Professionally</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CLASS POLICIES**

**Attendance**

Class attendance is required in all MLIS courses and is included in the participation mark. Attendance records will be kept by the instructor.

**Absence from class (one class)**

Students are required to inform the instructor ahead of time of any absence from class. This absence may affect participation marks or class activities.
Absence from class (extended)
- **Emergencies**
  - Contact the MLIS Program Coordinator and provide a list of the courses you are taking and your instructors’ names.
- **Illness**
  - Contact your instructor(s) as soon as possible **prior to class** to inform him or her of your illness.
  - All absences due to illness must be supported by a physician’s note to be submitted to the MLIS Program Coordinator (JoAnn Watson) with a list of courses you are taking and your instructors’ names.

**Citation Style**
SIM courses use APA as the default standard citation style. Unless the instructor provides alternative written instructions, please use the APA citation style in your assignments to briefly identify (cite) other people’s ideas and information and to indicate the sources of these citations in the References list at the end of the assignment. For more information on APA style, consult Dalhousie Library website at [https://libraries.dal.ca/help/style-guides.html](https://libraries.dal.ca/help/style-guides.html) or the APA’s Frequently Asked Questions about APA

**Late penalties for assignments**
A penalty for late assignments will be assessed, unless prior permission has been given by the instructor to submit an assignment late, which normally will be for extended illness, medical, or family emergencies only (see above). Late submissions will be assessed a penalty of five percent per day, including weekends. Assignments will not normally be accepted seven days or more after the due date; in such cases the student will receive a grade of zero.

**SIM GRADING POLICY**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>90-100</td>
<td>Demonstrates original work of distinction.</td>
</tr>
<tr>
<td>A</td>
<td>85-89</td>
<td>Demonstrates high-level command of the subject matter and an ability for critical analysis.</td>
</tr>
<tr>
<td>A-</td>
<td>80-84</td>
<td>Demonstrates above-average command of the subject matter.</td>
</tr>
<tr>
<td>B+</td>
<td>77-79</td>
<td>Demonstrates average command of the subject matter.</td>
</tr>
<tr>
<td>B</td>
<td>73-76</td>
<td>Demonstrates acceptable command of the subject matter.</td>
</tr>
<tr>
<td>B-</td>
<td>70-72</td>
<td>Demonstrates minimally acceptable command of the subject matter.</td>
</tr>
<tr>
<td>F</td>
<td>&lt;70</td>
<td>Unacceptable for credit towards a Master's degree.</td>
</tr>
</tbody>
</table>

**ACCOMMODATION POLICY FOR STUDENTS**

Students may request accommodation as a result of barriers experienced related to disability, religious obligation, or any characteristic protected under Canadian human rights legislation.

Students who require academic accommodation for either classroom participation or the writing of tests and exams should make their request to the Advising and Access Services Center (AASC) prior to or at the outset of the regular academic year. Please visit [www.dal.ca/access](http://www.dal.ca/access) for more information and to obtain the Request for Accommodation form.

A note taker may be required as part of a student’s accommodation. There is an honorarium of $75/course/term (with some exceptions). If you are interested, please contact AASC at 494-2836 for more information or send an email to [notetaking@dal.ca](mailto:notetaking@dal.ca).
Please note that your classroom may contain specialized accessible furniture and equipment. It is important that these items remain in the classroom, untouched, so that students who require their usage will be able to fully participate in the class.

ACADEMIC INTEGRITY

In general:

The commitment of the Faculty of Management is to graduate future leaders of business, government and civil society who manage with integrity and get things done. This is non-negotiable in our community and it starts with your first class at Dalhousie University. So when you submit any work for evaluation in this course or any other, please ensure that you are familiar with your obligations under the Faculty of Management’s Academic Integrity Policies and that you understand where to go for help and advice in living up to our standards. You should be familiar with the Faculty of Management Professor and Student Contract on Academic Integrity, and it is your responsibility to ask questions if there is anything you do not understand.

Dalhousie offers many ways to learn about academic writing and presentations so that all members of the University community may acknowledge the intellectual property of others. Knowing how to find, evaluate, select, synthesize and cite information for use in assignments is called being “information literate.” Information literacy is taught by Dalhousie University Librarians in classes and through Dalhousie Libraries’ online Citing & Writing tutorials.

Do not plagiarize any materials for this course. For further guidance on what constitutes plagiarism, how to avoid it, and proper methods for attributing sources, please consult the University Secretariat’s Academic Integrity page.

Please note that Dalhousie subscribes to plagiarism detection software that checks for originality in submitted papers. Any paper submitted by a student at Dalhousie University may be checked for originality to confirm that the student has not plagiarized from other sources. Plagiarism is considered a very serious academic offence that may lead to loss of credit, suspension or expulsion from the University, or even the revocation of a degree. It is essential that there be correct attribution of authorities from which facts and opinions have been derived. At Dalhousie, there are University Regulations which deal with plagiarism and, prior to submitting any paper in a course; students should read the Policy on Intellectual Honesty contained in the Calendar.

Furthermore, the University’s Senate has affirmed the right of any instructor to require that student assignments be submitted in both written and computer readable format, e.g.: a text file or as an email attachment, and to submit any paper to a check such as that performed by the plagiarism detection software. As a student in this class, you are to keep an electronic copy of any paper you submit, and the course instructor may require you to submit that electronic copy on demand. Use of third-party originality checking software does not preclude instructor use of alternate means to identify lapses in originality and attribution. The result of such assessment may be used as evidence in any disciplinary action taken by the Senate.

Finally:
If you suspect cheating by colleagues or lapses in standards by a professor, you may use the confidential email: ManagementIntegrity@dal.ca which is read only by the Assistant Academic Integrity Officer.
Faculty of Management clarification on plagiarism versus collaboration:

There are many forms of plagiarism, for instance, copying on exams and assignments. There is a clear line between group work on assignments when explicitly authorised by the professor and copying solutions from others. It is permissible to work on assignments with your friends but only when the professor gives you permission in the specific context of the assignment. University rules clearly stipulate that all assignments should be undertaken individually unless specifically authorised.

Specific examples of plagiarism include, but are not limited to, the following:

- Copying a computer file from another student, and using it as a template for your own solution
- Copying text written by another student
- Submitting the work of someone else, including that of a tutor as your own

An example of acceptable collaboration includes the following:

- When authorised by the professor, discussing the issues and underlying factors of a case with fellow students, and then each of the students writing up their submissions individually, from start to finish.

UNIVERSITY STATEMENTS

ACCESSIBILITY

The Advising and Access Centre serves as Dalhousie’s Centre for expertise on student accessibility and accommodation. Our work is governed by Dalhousie’s Student Accommodation Policy, to best support the needs of Dalhousie students. Our teams work with students who request accommodation as a result of: disability, religious obligation, an experienced barrier related to any other characteristic protected under Canadian Human Rights legislation.

STUDENT CODE OF CONDUCT

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don’t follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can’t be reached, or would be inappropriate, procedures exist for formal dispute resolution.

DIVERSITY AND INCLUSION

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality.

Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness (Strategic Priority 5.2).
RECOGNITION OF MI’KMAQ TERRITORY
Dalhousie University would like to acknowledge that the University is on Traditional Mi’kmaq Territory.

The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit the office in the McCain Building (room 3037) or contact the programs at elders@dal.ca or 902-494-6803 (leave a message).

COURSE SCHEDULE

<table>
<thead>
<tr>
<th>Class</th>
<th>Date</th>
<th>Topic</th>
<th>Important Deadline</th>
</tr>
</thead>
</table>
| 1     | Jan 7 | -Orientation  
-Introduction of data science  
-IDE (Integrated Development Environment)  
-Python IDE "Hello world" | |
| 2     | Jan 14 | - Intro of DB  
- DB Manipulation Language | |
| 3     | Jan 21 | - Queries | |
| 4     | Jan 28 | - Multiple table  
- Aggregate Functions | Assignment 1 is due on Feb 3 |
| 5     | Feb 4 | Python programming  
-How to use IDE  
-Python Syntax  
-Strings and Console Output | |
| 6     | Feb 11 | Python programming  
- Loops  
- Conditionals and Control Flow  
Group assignment workshop | Assignment 2 is due on Feb 17 |
|       | Feb 18 | Winter Study Break | |
| 7     | Feb 25 | Python programming  
- Lists & Dictionaries  
- Functions  
Group assignment workshop | Team assignment is due in this week. The date will be announced. 
Open Data Nova Scotia Contest on Mar. 2nd and 3rd. |
| 8     | Mar 4 | Python programming  
- Advanced Topics in Python  
- Working with files  
- Connect to DB | Assignment 3 is due Mar 10 |
| 9     | Mar 11 | Exam | |
| 10    | Mar 18 | -Project workshop | |
| 11    | Mar 25 | -Project workshop | Team project is due Mar 27 |
| 12    | Apr 1 | -Project demo and Review | Code review report is due before class |