

**NATIONAL UNIVERSITY OF SINGAPORE**  
**NUS Business School**  
**Department of Analytics & Operations**

**DAO2702/DSC2008 Programming for Business Analytics**

Session: Semester 1, 2021/2022

Instructor: Xiong Peng [bizxio@nus.edu.sg](mailto:bizxio@nus.edu.sg)

**Description:**

This module is an introductory course to business analytics and data science. It covers basic Python programming and preliminary statistics, with a great emphasis on addressing practical business problems and real datasets. Data science is an interdisciplinary field that requires business insights and expertise, proficiency in programming, as well as a strong background in mathematics and statistics. Therefore, lectures and tutorials in this semester would focus on trainings in the following perspectives:

- Python programming and Pythonic coding styles
- Analytical and visualization packages
- Math and statistics
- Practical business insights and problem solving skills

**Syllabus:**

1. Basics of Python programming
  1. Data structures and flow control
  2. Functions and packages
2. Data analysis with Python
  1. Analytical tools: NumPy, SciPy, Pandas
  2. Data visualization: Matplotlib
  3. Data collection and cleaning
3. Statistical inference
  1. Sampling and inference
  2. Confidence intervals
  3. Hypothesis testing
4. Linear regression
  1. Model assumptions and interpretations
  2. Categorical variables and modelling nonlinearity
  3. Package Statsmodels for regression analysis

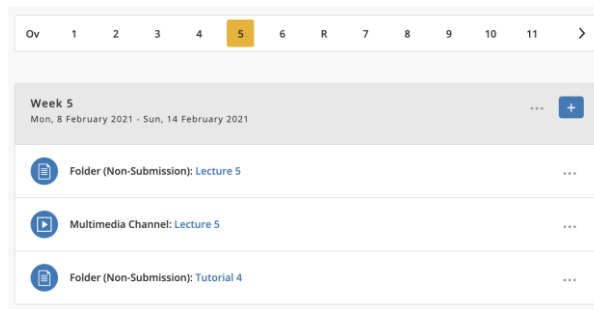
**Software:**

**Anaconda:** [installation](#)

**Class Materials:**

- Offline lecture video uploaded in LumiNUS multimedia channels
- Jupyter Notebook files as lecture notes
- Jupyter Notebook files as tutorial case studies
- Jupyter Notebook files as exercises
- Slides as supplementary
- The folder "Advanced topics" provides supplementary reading materials. They are not tested but may be helpful for your project.

Materials for each week can be located via **LumiNUS->Module Overview**.



### Reference Books:

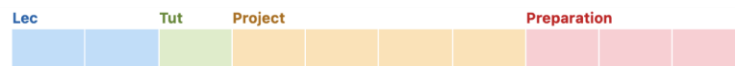
Python programming:

- Python data science handbook, by Jake VanderPlas

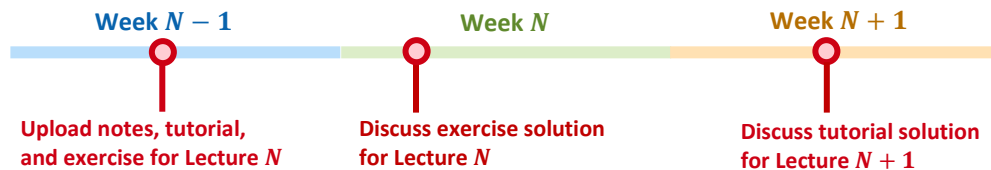
Statistics and data analysis:

- Introductory econometrics, by Jeffrey M. Wooldridge
- An introduction to statistical learning, by Trevor Hastie et al.
- Storytelling with data, by Cole Nussbaumer Knaflic

### Workload:



- Students are required to review lectures covered in each week
- Students are supposed to work on exercises for each week. The solutions will be uploaded in the next week, and there is no need to submit the assignment.
- All tutorial case studies are related to topics covered in previous lectures.



### Assessments:

#### **Continuous Assessment:**

Class Participation 10%

- Answering questions posted by the instructor on the forum.
- Posting questions and answering questions post by other students will also be considered
- The class participation will be given according to 1) the quality of the posts; 2) the time of the posts.
- A question may be closed if it is answered by many students.

Group Project 20% for report and 15% for presentation

- Team work. Each team has five to six members.
- You may choose your own teammates **(in the same tutorial session)** by filling a survey. **All team members need to fill the survey.** If you fail to fill the survey before the deadline, we will randomly assign you to a team. **The random team may have fewer members.**
- **If you ask for changing to another team after the deadline without valid reasons, then there will be a 20% penalty on your report.**
- An eight-page (4 pieces of double-sided paper) report and a formal 10 to 15-minute presentation.
- In the video, please provide the name of the current presenter, **otherwise there will be a 20% penalty on your presentation.**
- Your grade of the project would also be affect by the peer evaluation of your teammates. **Zero mark for zero contribution!**
- **Zero mark for plagiarism.**

- More details can be found from Appendix B.

**Final Examination:** 55%

- Paper-based close-book examination: a number of multiple-choice questions and a written question.
- You are allowed to take a double-sided A4 cheat-sheet and a calculator with you. Other notes or electronic devices are prohibited.
- All topics covered in lectures/exercises/tutorials could be tested.
- **It might become an open-book coding exam, in case of tighter measures against COVID-19.**

### **Schedule:**

*Week 1.*

**Course Overview**

**Introduction to Programming and Business Analytics**

*Week 2.*

**Introduction to Python Programming**

*Week 3.*

**Control flows**

*Week 4.*

**Built-in compound data types: strings and lists**

*Week 5.*

**Built-in compound data types: tuples and dictionaries**

*Week 6.*

**Functions, modules, and packages**

*Week 7.*

**Data arrays and data visualization**

*Week 8.*

**Basics of Pandas**

*Week 9.*

**Facts from data**

*Week 10.*

**Confidence intervals and hypothesis testing**

*Week 11.*

**Introduction to regression analysis**

*Week 12.*

**Regression analysis for explanatory modeling**

*Week 13.*

**Nonlinearity and categorical variables**