



**NANYANG  
TECHNOLOGICAL  
UNIVERSITY**  
SINGAPORE

IE0005

# Introduction to Data Science and Artificial Intelligence

School of Electrical and Electronic Engineering  
Nanyang Technological University, Singapore





## Learning Outcomes

- identify and define data-oriented problems and data-driven decisions in real life,
- discuss and illustrate the problems in terms of data exploration or visualization,
- apply basic machine learning tools to extract inferential information from data,
- compose an engaging “data-story” to communicate the problem and inference,
- outline the roles and requirements of artificial intelligence in practical cases,
- discuss and explain fundamentals of state space search and reinforcement learning.



## Course Delivery

### LAMS sequences

Online Lectures and Short Quizzes  
(follows CE/CZ1015)

### Summary Lectures

8 hours of face-to-face lectures

### Labs

Group Discussions and Exercises  
Mini Project

**Course Coordinator: Wesley Tan,**  
**[wesleytan@ntu.edu.sg](mailto:wesleytan@ntu.edu.sg)**

**Summary lectures (Weeks 1, 3, 5, 7): Tay Wee Peng,**  
**[wptay@ntu.edu.sg](mailto:wptay@ntu.edu.sg)**

**Summary lectures (Weeks 9, 10, 11, 13): Wen Bihan,**  
**[bihan.wen@ntu.edu.sg](mailto:bihan.wen@ntu.edu.sg)**

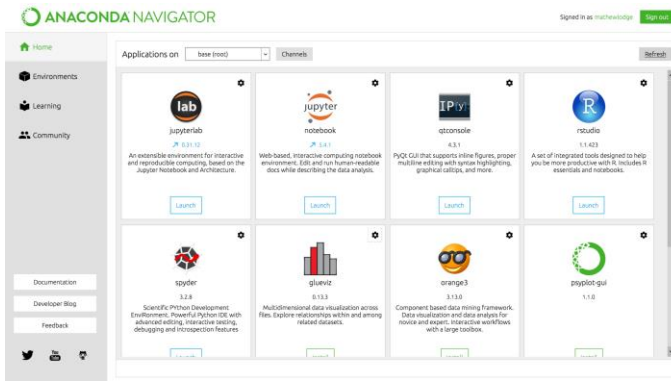


# Labs

- Each student assigned to a lab group.
- Each lab (Weeks 1-7):
  - Conducted by a TA
  - Lab supervisor (not necessarily lecturers TWP or WBH) grades your lab quiz and mini-project, answers any questions, and helps you in this course.
    - **Wesley Tan**, [wesleytan@ntu.edu.sg](mailto:wesleytan@ntu.edu.sg)
    - **Chen Lihui**, [elhchen@ntu.edu.sg](mailto:elhchen@ntu.edu.sg)

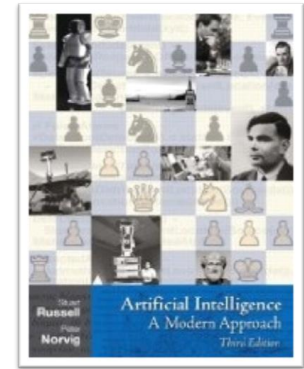
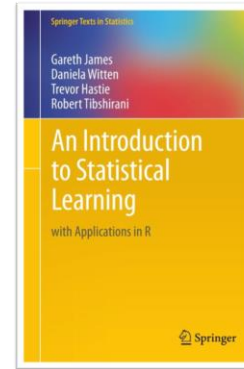
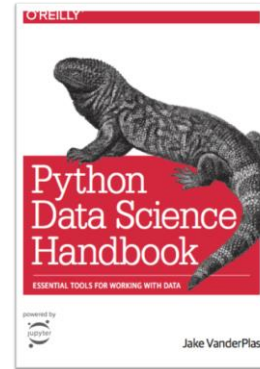
# References and Resources

## Computing Platform



We will use the Anaconda platform.  
Python (version at least 3.8) within Jupyter Notebook.

## No Single Textbook



You may refer to these three books (not mandatory).






# Performance Evaluation

**No Final Examination**

## Continuous Assessments

Mini-Quizzes within LAMS	10%
Midterm Quiz	15%
Final Quiz	25%
Lab Quiz	20%
Mini Project (Group)	30%

**Must attempt Midterm Quiz, Final Quiz, Lab Quiz and Mini Project to pass the course.**

<b>Week 1</b>	Python Programming Language	Yes	Basic Python Programming	
<b>Week 2</b>	Data-Analytic Thinking The Data Pipeline		Data Acquisition	LAMS Mini-Quiz
<b>Week 3</b>	Statistics and Visualization	Yes	Basic Statistics	LAMS Mini-Quiz
<b>Week 4</b>	Exploratory Data Analysis		Exploratory Analysis	LAMS Mini-Quiz
<b>Week 5</b>	Basics of Machine Learning Linear Regression	Yes	Linear Regression	LAMS Mini-Quiz
<b>Week 6</b>	Data-driven Classification	Yes	Classification Trees	LAMS Mini-Quiz
<b>Week 7</b>	Data-driven Identification		Clusters and Anomalies	LAMS Mini-Quiz Midterm Quiz
Recess				
<b>Week 8</b>	Digital Storytelling and Visualization	--		Lab Quiz
<b>Week 9</b>	AI Introduction and State-of-the-Art	Yes	Project	
<b>Week 10</b>	Intelligent Agents	Yes	Project	
<b>Week 11</b>	Solving Problems by Search	Yes	Project	
<b>Week 12</b>	Constraint Satisfaction and Game Playing		Project	
<b>Week 13</b>	Agent Decision Making and Reinforcement Learning	Yes	Presentation	Final Quiz

**Have  
Deadline**

**Outside  
Lab**

# Midterm, Lab & Final Quizzes

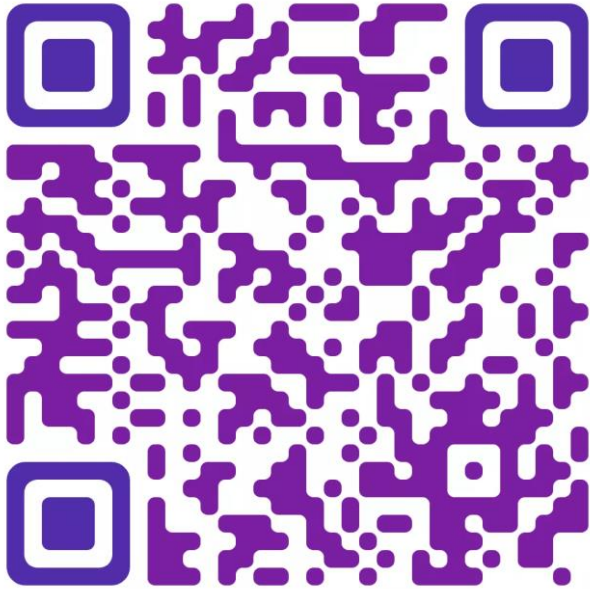
- Midterm quiz will be held in **Week 7 (TBC)**.
- Lab quiz will be held in **Week 8, during lab**.
- Final quiz will be held in **Week 14 (TBC)**.
- The venues and times will be notified in due course.
- Attendance will be taken during the quiz.
  - Bring along student ID
  - Students without any ID (with photo) are to sign against their names in attendance list. Need to show ID to tutor later before marks can be accepted
- Those who miss a quiz with approved LOA or valid MC should email the course coordinator on the day or the next day of the quiz with a softcopy of the MC/LOA to request for a make-up session.
- The make-up quiz will be held within 1 week of the quiz.



# Summary Lectures

- Not a replacement for LAMS.
- Cover only the bare minimum that you need.
- Discussions and clarifying your questions.

# Padlet



Optional additional discussion sessions on 21/08, 04/09, 25/09 via:

Microsoft Teams meeting  
**Join on your computer, mobile app or room device**

[Click here to join the meeting](#)

Meeting ID: 489 843 194 146

Passcode: P7acpM

[Download Teams](#) | [Join on the web](#)

[Learn More](#) | [Meeting options](#)

<https://padlet.com/wptay/ie0005-ay23-24-sem-1-tdotzb5l4do38klp>

# C vs Python – Compiled vs Interpreted (1)

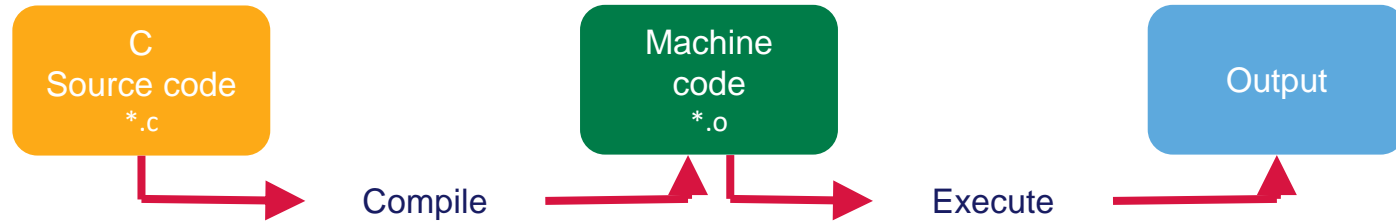
- C – Compiled



- Convert source code to machine understandable code

# C vs Python – Compiled vs Interpreted (1)

- C – Compiled



- Convert source code to machine understandable code
- Execute the machine code

! Faster execution BUT strict structure !

# C vs Python – Compiled vs Interpreted (2)

- Python – Interpreted



- Execute programme directly from source code
- Source is compiled to a bytecode (\*.pyc) during Python execution but it does NOT require an explicit compilation

! Flexible and interactive BUT slower execution !



# Python for Data Science

## Python installation

- Install *Anaconda* for your operating system <https://www.anaconda.com/download/>
  - Package manager: conda
- Python <https://www.python.org/>
  - Packager manager: pip
  - pip install numpy, pandas, matplotlib, seaborn, scikit-learn, jupyterlab/notebook

## Interface

- Chrome
- Vscode: <https://code.visualstudio.com/>
- PyCharm: <https://www.jetbrains.com/pycharm/>