

San José State University  
Department of Applied Data Science

DATA 200  
Computational Programming for Analytics

Section 22  
Spring 2023

**Course and Contact Information**

Instructor: Ron Mak  
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Email: [ron.mak@sjsu.edu](mailto:ron.mak@sjsu.edu)  
Website: <http://www.cs.sjsu.edu/~mak/>  
Office hours: MW 4:30 – 5:30 PM in person, Clark Hall CL 325  
Class days/time: M: 6:00 – 8:45 PM  
Classroom: BBC 021  
Prerequisites: Classified standing or instructor consent.

**Course Catalog Description**

“Computational thinking and problem solving; data structures, algorithms, iterations, functions, and other core concepts; standard libraries; functional programming and object-oriented programming; applications to data processing, data analytics, data visualization, and database manipulation.”

**Course Format**

This class will meet in person in the classroom. Exams will be given in the classroom.

**Faculty Web Page and Canvas**

Course materials, syllabus, assignments, grading criteria, exams, and other information will be posted at my [faculty website](http://www.cs.sjsu.edu/~mak) at <http://www.cs.sjsu.edu/~mak> and on the [Canvas Learning Management System course login website](http://sjsu.instructure.com) at <http://sjsu.instructure.com>. You are responsible for regularly checking these websites to learn of any updates. You can find Canvas video tutorials and documentations at <http://ges.sjsu.edu/canvas-students>

## Course Goals

This course emphasizes learning the Python programming language and its libraries well enough to develop **data analytical applications**. Class meetings will encourage high class participation. Mini-labs during each class meeting will give you opportunities to try what you just learned.

## Course Learning Outcomes (CLO)

Upon successful completion of this course, students will be able to:

CLO 1: Understand the role of Python and its libraries for data analytics.

CLO 2: Program in Python proficiently for developing analytical applications.

CLO 3: Apply appropriate data structures to formulate domain data.

CLO 4: Apply algorithms to solve analytical problems.

CLO 5: Choose correct Python libraries and call their functions appropriately.

CLO 6: Design and develop user-friendly interactive GUI-based analytical applications.

## Recommended Books

Title:	<b>Python for Everyone, Edition 2.0</b>
Authors:	Cay Horstmann and Rance Neceise
Publisher:	Wiley, 2019
ISBN:	978-1-943153-67-1
	An excellent book for beginning programmers. Dr. Horstmann was a professor in the Computer Science Department at SJSU.
Title:	<b>Intro to Python for Computer Science and Data Science: Learning to Program with AI, Big Data and The Cloud</b>
Authors:	Paul Deitel and Harvey Deitel
Publisher:	Pearson Education, 2019
ISBN:	978-0135404676
	Another excellent book for beginning programmers, more focused on data science.
Title:	<b>Python for Programmers with Introductory AI Case Studies</b>
Authors:	Paul Deitel and Harvey Deitel
Publisher:	Pearson Education, 2019
ISBN:	978-0135224335
	Essentially the same book as the one above but without the introductory material for beginning programmers. <b>The first part of the class will be based on the first ten chapters of this book.</b>
Title:	<b>Hands-On Data Analysis with Pandas, second edition</b>
Authors:	Stephanie Molin
Publisher:	Packt Publishing, 2021
ISBN:	978-1-80056-345-2
	<b>The last part of the class will be based on the first two sections of this book.</b>

## A Useful Website

- **PyQt5 Tutorial**  
<https://www.tutorialspoint.com/pyqt5/index.htm>

## Software to Install

You will need **Python**.

A good way to install Python is via **Anaconda**: <https://www.anaconda.com>. This will install the Python interpreter, Jupyter notebook, and several key data science libraries.

After installing Anaconda, you can execute the following commands if you need to update the installed packages to their latest versions:

```
conda update conda
conda update --all
```

If you want to create animations with **Matplotlib** inside a Jupyter notebook, you must install the **ipyml** tool with these commands:

```
conda install -c conda-forge ipyml
conda install nodejs
jupyter labextension install @jupyter-widgets/jupyterlab-manager
jupyter labextension install jupyter-matplotlib
```

To create Python programs with a GUI (graphical user interface), install **Qt Designer** which will enable you to design windows with labels, text boxes, menus, buttons, etc.:

<https://build-system.fman.io/qt-designer-download>

Install the **PyQt5 modules** with this command:

```
pip3 install PyQt5
```

Then you will be able to create GUI-based Python applications that enable users to interact with your database via forms.

## Course Requirements and Assignments

Weekly assignments will provide practice with Python programming and give you experience developing code for analytical applications. Each assignment will be worth up to 100 points. Late assignments will lose 20 points and an additional 20 points for each 24 hours after the due date.

The university's syllabus policies:

- [University Syllabus Policy S16-9](http://www.sjsu.edu/senate/docs/S16-9.pdf) at <http://www.sjsu.edu/senate/docs/S16-9.pdf>.
- Office of Graduate and Undergraduate Program's [Syllabus Information web page](http://www.sjsu.edu/gup/syllabusinfo/) at <http://www.sjsu.edu/gup/syllabusinfo/>

“Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.”

## Technology Requirements

Students are required to have an electronic device (laptop, desktop, or tablet) with a camera and microphone. SJSU has a free [equipment loan program](https://www.sjsu.edu/learnanywhere/equipment/index.php) available for students:

<https://www.sjsu.edu/learnanywhere/equipment/index.php>

Students are responsible for ensuring that they have access to reliable Wi-Fi during tests. If students are unable to have reliable Wi-Fi, they must inform the instructor, as soon as possible or at the latest one week before the test date to determine an alternative. See [Learn Anywhere](#) website for current Wi-Fi options on campus.

## Quizzes

Frequent online quizzes will test understanding (not memorization) of the material taught during the semester. Instant messaging, e-mails, texting, tweeting, file sharing, or any other forms of communication with anyone else during the quizzes will be strictly forbidden.

The quizzes take the place of a midterm and final exam (i.e., no midterm or final exams).

## Grading Information

Individual total scores will be computed with these weights:

30%	Quizzes
70%	Assignments

This class is not graded but instead is credit/no credit (CR/NC). Your total weighted score must be at least 70 out of 100 to earn a CR.

## University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Program's [Syllabus Information web page](#) at <http://www.sjsu.edu/gup/syllabusinfo/>.

# DATA 200

## Computational Programming for Analytics

Section 21  
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### Course Schedule (subject to change with fair notice)

Week	Date	Topics
1	Jan 25	Waiver test
2	Feb 1	<b>Python fundamentals</b> Overview of the course The role of Python in data analytics Introduction to Python programming
3	Feb 8	Control statements
4	Feb 15	Functions
5	Feb 22	Sequences: lists and tuples
6	Mar 1	Dictionaries and sets
7	Mar 8	Array-oriented programming with <b>NumPy</b>
8	Mar 15	Strings: a deeper look
9	Mar 22	Files and exceptions
		<i>Spring break, March 27 – March 31</i>
10	Apr 5	Object-oriented programming
11	Apr 12	<b>Python for data analytics applications</b> <b>Pandas</b> dataframes
12	Apr 19	Data visualization with <b>Matplotlib</b>
13	Apr 26	Plotting with <b>Seaborn</b> and customization techniques
14	May 3	GUI programming with <b>PyQt</b>
15	May 10	Advanced Python