IS 601 Python for Web API Development

Semester

Course Modality:
This is an online course, which will be conducted fully online, asynchronously via Canvas. For more information on using Canvas and other supported learning tools, visit the IST Service Desk Knowledgebase.

Course Workload: This course values your time and effort and aims to provide a rewarding learning experience. You can expect to dedicate approximately **7.5 hours** to the course per week. This estimate includes, but is not limited to, time spent on readings, watching course videos, completing assignments, participating in discussions, and reviewing feedback.

Instructor Information

Instructor	Email	Office Hours
Keith Williams	kwilliam@njit.edu	GIT 3410 / Zoom

*I will respond to all emails/Inbox messages within 24 hours. Quizzes, homework, and discussions will be graded weekly.

General Information

Course Description

This course is meant as an introduction to the Python programming language through the lens of transferring data on the web. Students will learn the general structures and syntax of Python programs and be able to generate their own programs to move data via HTTP. Students will work with common web interchange formats to both make requests and provide responses. By the conclusion of the course, students will have built a backend web program that supports creating, reading, updating, and deleting objects stored on a database.

Prerequisites/Co-requisites

None.

Course Learning Outcomes

By the end of the course, students will be able to:

1. Utilize GIT for version control and collaborative development.
2. Navigate and execute basic commands in a Linux environment.
3. Create Python applications with automated testing.
4. Set up GitHub Actions for Continuous Integration (CI), automating the execution of tests and Docker builds to demonstrate DevOps principles to ensure software quality.
5. Develop a command-line application using the REPL pattern.
6. Implement object-oriented programming principles in Python.
7. Apply professional terminology and concepts related to web systems development.
8. Create and manipulate CSV files using Python.
9. Apply containerization techniques to containerize applications using Docker
10. Create, Consume and Test REST APIs using Python.
11. Integrate Python programs with SQL databases to create and manipulate data.
12. Serialize, deserialize, and validate JSON using Python with Pydantic.
13. Utilize best practices for software development security by implementing secure authentication and authorization techniques, including encryption, hashing, and encoding.

Required Materials

None.

Grading Policy

NJIT Grading Legend

Final Grade Calculation

Final grades for all assignments will be based on the following percentages:

Assignments and Reflections	**20%**
Quizzes	**10%**
Discussions	**10%**
Midterm and Final Projects (20% each)	**40%**
Midterm and Final Exams (10% each)	**20%**

Course Work

Assignments and Reflections: (20% of grade)

In this course, there will be weekly assignments which will encompass a wide range of hands-on tasks designed to equip you with essential skills for web systems development. These assignments will ask you to perform specific tasks such as creating different types of applications, developing a REST API using Python and FastAPI, working with databases, containerizing a python application using Dockers and developing command-line

applications, just to name a few. By completing these assignments, students will gain a comprehensive skill set essential for modern web systems development.

There will also be reflection activities meant to provide learners with the opportunity to evaluate their progress, consolidate their understanding, and identify areas for further improvement. These activities encourage students to assess the concepts, skills, and insights they've gained, while also reflecting on challenges they faced and how they overcame them.

Quizzes: (10% of Grade) Each week, you will be required to complete short quizzes designed to reinforce your understanding of professional terminology and key concepts related to web systems development.

Discussions: (10% of Grade) You are expected to participate in biweekly discussions forums in Canvas. When all students participate in a discussion, it creates an active learning environment that will help you better understand the materials and be more successful in the class. You will post your initial response to the prompt by Sunday at 11:59 pm and respond to two classmates by Tuesday at 11:59 pm of the following week.

Midterm and Final Project: (40% of grade) You will be required to complete both a midterm and final project in this course. These projects will synthesize the skills learned in previous assignments and must be completed on-time. The midterm project involves creating a calculator using object-oriented design patterns. The final project will task you with creating a REST API back end to support the provided front end. By the end of these projects, students will be well-prepared to tackle advanced challenges in web systems development and possess a solid foundation for professional growth in the field.

Midterm and Final Exam: (20% of grade) There will be a midterm and final which will reinforce your understanding of professional terminology and key concepts related to web systems development. The midterm covers modules 1-6 and the final exam covers Modules 7-14. These exams will consist of multiple-choice questions and will utilize Respondus Lockdown Browser in order to ensure academic honesty.

Feedback

You will receive feedback on your assignments, midterm and final projects through Canvas.

Letter to Number Grade Conversions

A	90-100
B+	85-89
B	80-84
C+	75-79
C	70-74
F	0-64

Exam Information and Policies

NJIT policy requires that all midterm and final exams must be proctored, regardless of delivery mode, in order to increase academic integrity. Note that this does not apply to essay or authentic based assessments. Effective beginning Fall semester 2019, students registered for a fully online course section (e.g., online or Hyflex mode) must be given the option to take their exam in a completely online format, with appropriate proctoring.

Any course that uses online proctoring for exams may require you to do an environmental scan. You are responsible for selecting a location where you are comfortable with yourself and your room being video and audio recorded. You may be asked to use your camera to scan all four walls of the room you are in, as well as the workspace, desk, and area around the computer. Ideally, your exam environment should be well-lit and free from distractions and interruptions.

In this course you will be required to use the following proctoring method to ensure academic integrity for exams:

Respondus LockDown Browser

This course will be utilizing:

- LockDown Browser: A locked browser used to prevent students from printing, copying, going to another URL, or accessing other applications during an assessment in Canvas.
- Monitor: Used in conjunction with LockDown Browser, Monitor is the usage of a webcam to record a user during the exam session.

In using LockDown Browser, students need:

- High-speed internet connection
- Windows or Apple Operating System

In using Monitor, students need:

- Webcam (internal or external)
- Microphone and Audio (internal or external)
- NJIT ID or Photo-Issued ID
- To perform an environment check

Helpful Resources:

- Introduction to Respondus LockDown Browser for Students Video
- Respondus Monitor Resources
- Respondus Computer Requirements
- Tips for Ensuring a Smooth Experience
- Respondus Privacy Policies
- Questions or Problems? Contact:
    - Respondus Live Chat

IST Service Desk: 973-596-2900 or Help.njit.edu

Policy for Late Work

Coursework must be submitted by the required due date or there will be a 10% reduction in grade per 24 hours late.

Exceptional Circumstances: If you face unforeseen emergencies or extenuating circumstances that prevent you from meeting deadlines, please contact the instructor as soon as possible to discuss potential accommodations. Documentation may be required to support such exceptions.

Academic Integrity

"Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the NJIT academic code of integrity policy.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary

action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu"

Generative AI

In this course, it is expected that you use ChatGPT, Claude, or another generative AI tool of your choice; however, you must use it to answer questions and give you feedback on your code. Please do not copy and paste code without understanding it. The assignments in this course are structured in a way that requires you to think critically, manage your time effectively, and to know what to ask the AI agent. Generative AI is excellent at coding and answering questions; however, it has difficulty writing complete programs. Many companies are requiring that their developers use Gen AI tools due to the increased productivity gains, so it's very important that you learn the vocabulary and concepts in the course, which will enable you to effectively use generative AI in your work.

Netiquette

Throughout this course, you are expected to be courteous and respectful to classmates by being polite, active participants. You should respond to discussion forum assignments in a timely manner so that your classmates have adequate time to respond to your posts. Please respect opinions, even those that differ from your own, and avoid using profanity or offensive language.

Weekly Expectations

This course is organized by weekly modules. Each week, students must watch a weekly lecture video, complete the reading assignments, quiz, hands-on assignment, and reflection. There will also be a bi-weekly class discussion forum. You will need to make your initial post by Sunday and reply to at least two classmates by Tuesday (of the following week). All assignments, quizzes and reflections will be due Tuesday of the following week as well.

Course Schedule

Week	Topic	Assignments
1	Setting Up the Development Environment with GIT and Linux	1. Module 1: Discussion-Initial post-Sun| Peer Replies-Tues 2. Module 1: Assignment-Tues 3. Module 1: Quiz-Tues 4. Module 1: Reflection-Tues
2	Introduction to VSCode, Python, and Testing	1. Module 2: Assignment-Tues 2. Module 2: Quiz-Tues 3. Module 2: Reflection-Tues
3	Introduction to Object-Oriented Programming (OOP) and Advanced Testing in Python	1. Module 3: Discussion-Initial post-Sun| Peer Replies-Tues 2. Module 3: Assignment-Tues 3. Module 3: Quiz-Tues 4. Module 3: Reflection-Tues
4	Advanced Object-Oriented Programming (OOP) and	1. Module 4: Assignment-Tues 2. Module 4: Quiz-Tues 3. Module 4: Reflection-Tues

Week	Topic	Assignments
	Comprehensive Testing in Python	
5	Advanced Design Patterns and Data Management with pandas in Python	1. Module 5: Discussion-Initial post-Sun| Peer Replies-Tues 2. Module 5: Assignment-Tues 3. Module 5: Quiz-Tues 4. Module 5: Reflection-Tues
6	Midterm Assessment– Enhancing the Python Calculator Application	1. Module 6: Quiz-Tues 2. Midterm Exam-Tues 3. Mid-Course Reflection-Tues
7	Docker and Containerization	1. Module 7: Discussion-Initial post-Sun| Peer Replies-Tues 2. Module 7: Assignment-Tues 3. Module 7: Quiz -Tues 4. Midterm Project-Tues 5. Module 7: Reflection-Tues
8	Introduction to Web Applications and Testing	1. Module 8: Assignment-Tues 2. Module 8: Quiz-Tues 3. Module 8: Reflection-Tues
9	Databases and Web Applications	1. Module 9: Discussion-Initial post-Sun| Peer Replies-Tues 2. Module 9: Assignment-Tues 3. Module 9: Quiz -Tues 4. Module 9: Reflection-Tues
10	Secure User Accounts, Pydantic Validation, and CI/CD	1. Module 10: Assignment-Tues 2. Module 10: Quiz-Tues 3. Module 10: Reflection-Tues
11	Modeling Calculations and Pydantic Schemas	1. Module 11: Discussion-Initial post-Sun| Peer Replies-Tues 2. Module 11: Assignment-Tues 3. Module 11: Quiz-Tues 4. Module 11: Reflection-Tues
12	Implementing and Testing User & Calculation Routes	1. Module 12: Assignment-Tues 2. Module 12: Quiz-Tues 3. Module 12: Reflection-Tues
13	JWT Login & Registration with Front-End and Playwright Tests	1. Module 13: Discussion-Initial post-Sun| Peer Replies-Tues 2. Module 13: Assignment-Tues 3. Module 13: Quiz-Tues 4. Module 13: Reflection-Tues
14	Completing BREAD for Calculations and Final Project	1. Module 14: Assignment-Tues 2. Module 14: Quiz-Tues 3. Module 14: Final Project-Tues 4. Module 14: Final Course Reflection-Tues
15	Final Exam	1. Module 15: Final Exam-TBD

Additional Information and Resources

Accessibility:

This course is offered through an accessible learning management system. For more information, please refer to Canvas's Accessibility Statement.

Requesting Accommodations:

The Office of Accessibility Resources and Services works in partnership with administrators, faculty, and staff to provide reasonable accommodations and support services for students with disabilities who have provided their office with medical documentation to receive services.

If you are in need of accommodations due to a disability, please contact the Office of Accessibility Resources and Services to discuss your specific needs.

Resources for NJIT Online Students

NJIT is committed to student excellence. To ensure your success in this course and your program, the university offers a range of academic support centers and services. To learn more, please review the "Student Services" page in Canvas, which includes information related to technical support.