NEW JERSEY CENTER
FOR TEACHING & LEARNING

Progressive Science Initiative® (PSI®)
CSCI6333: Learning and Teaching Programming in Python

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Course Credit: 3.0 NJCTL credits

Dates & Times:
This is a 3-credit, self-paced course, covering 8 modules of content. The exact number of hours that you can expect to spend on each module will vary based upon the module coursework, as well as your study style and preferences. You should plan to spend approximately 15 hours per credit working online, and up to 30 hours per credit working offline.

Graduate Student Handbook: www.njctl.org/graduate-handbook/

COURSE DESCRIPTION:
This course is for teachers to learn the content of *PSI Programming in Python* and how to teach that course to students. It focuses on fundamental programming skills and thought processes required for successful programming in any language while integrating components of Python. Topics include an Introduction to Programming; Operators & Logic; Algorithmic & Control Structures; Lists; Functions; Classes; Inheritance; and Libraries & APIs.

STUDENT LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

1. Demonstrate proficiency in programming in Python, as listed in the module learning outcomes below.
2. Integrate PSI materials (including presentations, labs, practice problems, etc.) to support student learning and deliver effective instruction.
3. Create a social constructivist learning environment through the use of formative assessment questions, interpreting the results of this assessment to effectively facilitate student-led discussions that support deeper understanding of the content.
4. Integrate multiple attempts to demonstrate student mastery of content knowledge, as encouraged/fostered by the PSI pedagogy.
5. Implement learning plans that are aligned to secondary computer science standards and allow for differentiation based on the needs of learners.

TEXTS, READINGS, INSTRUCTIONAL RESOURCES:
Required Texts:

- PSI Programming in Python uses a free digital textbook accessible at: https://njctl.org/materials/courses/programming-in-python/
- Participants will download SMART Notebook presentations, homework files, labs, and teacher resources from the PSI AP Computer Science Principles

COURSE REQUIREMENTS:
In order to receive a Passing grade, the participant must complete the following course requirements:

1. Activities: A number of different learning activities will ensure participant engagement and learning in the course. These include:
   - Engage in video module lessons which demonstrate minimized direct instruction followed by frequent formative assessment
   - Completion of formative assessments aligned to learning objectives which include detailed analysis when answered incorrectly.
   - Interaction with module discussion boards that allow conversation with peers and course instructors about the module's content, delivering that content to students. Discussion boards also serve as a place to ask and answer questions related to the module's content.
2. Short Answer Assignment: Each module requires one (1) original response to a given prompt. These prompts are typically based upon course lessons and require teachers to analyze, reflect, and make connections between the module's content and their own classroom practice.
3. Mastery Exercises: For each module, these multiple-choice question quizzes assess the content knowledge gained in a module. Participants have the opportunity to retake; random questions are pulled from a larger question bank on each attempt ensuring varied questions.
4. Programming Assignments/Labs: In each module, a Python file is submitted to demonstrate an understanding of the graded programming assignment. These assignments are
   problem-based questions that require the writing of a program. These promote a deeper understanding of logical reasoning and the applications of programming. A culminating lab activity occurs in the final module.
5. Module Exam: One is completed at the end of each module. It is a culminating exam consisting of multiple choice and free response questions aligned to the standards and objectives of the module.
6. Reflection Paper: At the end of the course, participants are required to reflect on the knowledge taught in the course, make connections, and compare/contrast their current pedagogy with new strategies gained in this assignment.
7. Final Exam: At the end of the course, a comprehensive exam consisting of Multiple Choice and Free Response questions assesses the content knowledge learned throughout the course and aligns to the AP College Board Exams.

GRADE DISTRIBUTION AND SCALE:
Grade Distribution:

Module Exams	70%
Final Exam	10%

Programming Assignments/Labs	6%
Short Answer Assignments	6%
Mastery Exercises	6%
Reflection Paper	2%

Grade Scale:

A	93 – 100
A-	90 – 92
B+	86 – 89
B	83 – 86
B-	80 – 82
C+	77 – 79
C	73 – 76
C-	70 – 72
D	60.0 – 69.9
F	59.9 or below

ACADEMIC STANDING:
NJCTL has established standards for academic good standing within a student's academic program. Students enrolled in any NJCTL online course must receive an 80 or higher to successfully complete a course and receive credit for that course. An 80 is equivalent to a GPA of 2.7 or B-. Additionally, students in an endorsement program must receive a cumulative GPA of 3.0 for all courses combined in order to successfully complete the program.

ACADEMIC INTEGRITY:
Students must assume responsibility for maintaining honesty in all work submitted for credit and in any other work designated by the instructor of the course. Academic dishonesty includes cheating, fabrication, facilitating academic dishonesty, plagiarism, reusing /repurposing your own work, unauthorized possession of academic materials, and unauthorized collaboration.

CITING SOURCES WITH APA STYLE:
All students are expected to follow proper writing and APA requirements when citing in APA (based on the APA Style Manual, 6th edition) for all assignments.

DISABILITY SERVICES STATEMENT:
We are committed to providing reasonable accommodations for all persons with disabilities. Any student with a documented disability requesting academic accommodations should contact the Dean of Students, Melissa Axelsson, for additional information to coordinate reasonable accommodations for students with documented disabilities (melissa@njctl.org).

NETIQUETTE:
Respect the diversity of opinions among the instructor and classmates and engage with them in a courteous, respectful, and professional manner. All posts and classroom communication must be conducted

according to the student code of conduct. Think before you push the send button. Did you say just what you meant? How will the person on the other end read the words?

Maintain an environment free of harassment, stalking, threats, abuse, insults or humiliation toward the instructor and classmates. This includes, but is not limited to, demeaning written or oral comments of an ethnic, religious, age, disability, sexist (or sexual orientation), or racist nature; and the unwanted sexual advances or intimidations by email, or on discussion boards and other postings within or connected to the online classroom.

If you have concerns about something that has been said, please let your instructor know.

CLASS SCHEDULE:

Module	Module Learning Outcomes	Assignments
1 – Introduction to Programming	• Differentiate between data types, strings and variables. • Concatenate strings. • Understand coding input and output. • Correctly use comments in Python to annotate your programs. • Debug Python code when basic errors are identified.	• Short Answer Assignment • Graded Programming Assignment • Mastery Exercise • Module Exam
2 – Operators & Logic	• Write comparisons in Python using math operators, including modulus. • Apply order of operations correctly, as it pertains to writing simple programs. • Write programs using comparison and logical operators. • Write a program using `Random()`.	• Short Answer Assignment • Graded Programming Assignment • Mastery Exercise • Module Exam
3 – Algorithms & Control Structure	• Differentiate between what is and what is not an algorithm. • Differentiate between the three different types of control structures; sequence, iteration and selection. • Write efficient programs using the most appropriate control structure as an organizational planning structure. • Write code using nesting to repeat specific portions of a program.	• Short Answer Assignment • Graded Programming Assignment • Mastery Exercise • Module Exam
4 - Lists	• Create lists in Python. • Traverse and search lists. • Compare strings and lists to find the commonality of each.	• Short Answer Assignment • Graded Programming Assignment • Mastery Exercise • Module Exam
5 – Functions	• Utilize basic functions in programs. • Create lists using functions. • Return values and vary parameters.	• Short Answer Assignment • Graded Programming Assignment • Mastery Exercise • Module Exam
6 - Libraries & APIs	• Select and implement appropriate built in ArrayLists to perform key tasks when writing programs. • Create array lists to increase the versatility and complexity when writing programs. • Understand the elements of an ArrayLists and how to create, modify or refer to them. • Understand the differences of arrays and ArrayLists and when to integrate them accordingly when writing programs. • Compare and contrast simple data structures to program with object orientation in mind. • Understand the existence and scope of variables and how they are affected through various actions throughout the structure of	• Short Answer Assignment • Graded Programming Assignment • Mastery Exercise • Module Exam

	a program. ● Examine and debug compiler and runtime errors within programs. ● Understand how content is implemented in a student-centered classroom as it applies to logic and algorithmic design.	
7 - Classes	● Create classes to model and define programs. ● Write user-defined classes to divide a complex problem into simpler parts. ● Describe how various data types and objects are stored. ● Write code segments to access user-defined methods and variables within classes. ● Differentiate between the use of public, private and static types when writing programs. ● Understand the scope of a variable within a class through the construction of object-oriented programs. ● Compare and contrast simple data structures to program with object orientation in mind. ● Examine and debug compiler and runtime errors within programs. ● Understand how content is implemented in a student-centered classroom as it applies to logic and algorithmic design.	● Short Answer Assignment ● Graded Programming Assignment ● Mastery Exercise ● Module Exam
8 - Inheritance	● Understand how inheritance works between classes and implement appropriately when writing a program. ● Define subclasses from superclasses using inheritance. ● Understand polymorphism and dynamic binding through the constructs of a program. ● Use downcasting when appropriate in program writing. ● Invoke subclasses and superclasses appropriately within the context of a program. ● Use appropriate data structures when writing programs to analyze and interpret massive data collections. ● Understand the existence and scope of variables and how they are affected through various actions throughout the structure of a program. ● Examine and debug compiler and runtime errors within programs. ● Understand how content is implemented in a student-centered classroom as it applies to logic and algorithmic design..	● Short Answer Assignment ● Graded Programming Assignment ● Mastery Exercise ● Module Exam
9 - Final Exam	● Review module topics ● Discussion board posts and Zoom meeting with instructor, as needed	● Reflection Paper ● Final Exam

9 – Reflection & Final Exam	• Final Exam Review • Zoom call with professor to prepare for final exam, if needed	• Reflection Paper • Final Exam