CSE 4256: Programming in Python

Course Description

Python programming for students well-versed in programming with another imperative language.

Transcript Abbreviation: Python Programming
Grading Plan: Satisfactory/Unsatisfactory
Course Deliveries: Classroom
Course Levels: Undergrad
Student Ranks: Junior, Senior
Course Offerings: Autumn, Spring
Flex Scheduled Course: Never
Course Frequency: Every Year
Course Length: 14 Week
Credits: 1.0
Repeatable: No
Time Distribution: 2.0 hr Lab
Expected out-of-class hours per week: 1.0
Graded Component: Laboratory
Credit by Examination: No
Admission Condition: No
Off Campus: Never
Campus Locations: Columbus
Prerequisites and Co-requisites: Prereq: 2122, 2123, or 2231; and 2321
Exclusions:
Cross-Listings:

Course Rationale: Python is a popular programming language with many applications across science,

engineering, and data analytics. CSE does not currently offer Python.

The course is required for this unit's degrees, majors, and/or minors: No
The course is a GEC: No
The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.0901
Subsidy Level: Baccalaureate Course

Programs

Abbreviation	Description
BS CSE	BS Computer Science and Engineering

General Information

The three representative texts (listed below) are all available free online through Safari.

Course Goals

Master the use of Python programming language constructs for control flow, literals, expressions, function invocation, and package import
Master the use of Python's built-in types, including lists, tuples, strings, sets, dictionaries, and deques

Master the use of Python features such as slices, list comprehensions and generators
Be competent with functional programming in Python
Be competent with object oriented programming in Python
Be competent with design patterns in Python
Be competent in implementing graph theory data structures and algorithms in Python
Be competent with regular expressions in Python
Be familiar with a Python library/toolkit such as Numpy, NLTK or NetworkX

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Overview of the course and the Python language			2.0					
Fundamental Python classes and functions			4.0					
Object-oriented programming in Python			4.0					
Applications of graph theory			5.0					
Design Patterns			3.0					
Text processing and regular expressions			2.0					
Functional programming			4.0					
A Python library such as Numpy, NLTK, or NetworkX			4.0					

Representative Assignments

Create a simple text-based adventure game using Python classes.
Implement breadth-first search and depth-first search in Python; Apply BFS and DFS in solving a search problem.
Apply text processing and regular expressions.
Build an application using NumPy.

Grades

Aspect	Percent
Homework	25%
Projects	25%
In-class activities	50%

Representative Textbooks and Other Course Materials

Title	Author
A Whirlwind Tour of Python	Jake VanderPlas
Functional Programming in Python	David Mertz
Python Cookbook	David Beazley

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
*	a	An ability to apply knowledge of mathematics, science, and engineering.
	b	An ability to design and conduct experiments, as well as to analyze and interpret data.

Course Contribution		College Outcome
**	c	An ability to design a system, component, or process to meet desired needs.
	d	An ability to function on multi-disciplinary teams.
*	e	An ability to identify, formulate, and solve engineering problems.
	f	An understanding of professional and ethical responsibility.
	g	An ability to communicate effectively.
	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
*	i	A recognition of the need for, and an ability to engage in life-long learning.
	j	A knowledge of contemporary issues.
**	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

BS CSE Program Outcomes

Course Contribution		Program Outcome
*	a	an ability to apply knowledge of computing, mathematics including discrete mathematics as well as probability and statistics, science, and engineering;
	b	an ability to design and conduct experiments, as well as to analyze and interpret data;
**	c	an ability to design, implement, and evaluate a software or a software/hardware system, component, or process to meet desired needs within realistic constraints such as memory, runtime efficiency, as well as appropriate constraints related to economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability considerations;
	d	an ability to function on multi-disciplinary teams;
*	e	an ability to identify, formulate, and solve engineering problems;
	f	an understanding of professional, ethical, legal, security and social issues and responsibilities;
	g	an ability to communicate effectively with a range of audiences;
	h	an ability to analyze the local and global impact of computing on individuals, organizations, and society;
*	i	a recognition of the need for, and an ability to engage in life-long learning and continuing professional development;
	j	a knowledge of contemporary issues;
**	k	an ability to use the techniques, skills, and modern engineering tools necessary for practice as a CSE professional;
*	l	an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;
**	m	an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;
*	n	an ability to apply design and development principles in the construction of software systems of varying complexity.

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