CISC 504
Principles of Programming Languages
Late Fall 2018

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Catalog Data:

This introductory computer science course is a prelude to computing and computer programming using the Python 3 computing language. This foundational scientific computing course will begin by defining computer science, and will cover machine language, high level languages, working with integrated development learning environments, specifically Jupyter, coding with Python 3, Python libraries and functions, data types (numeric, string), variables, dictionaries, sequences (lists, tuples) , conditional statements (if, else, elif), loops (while, for), Boolean logic and operators, Numpy and Scipy libraries, importing data using Pandas dataframes/tables, exploring datasets, , data manipulation, and data visualization, top down algorithmic design and development (conceptualization, development/ programming, testing, and exception handling/debugging), and graphics . The concepts learned in this course comprise the principles of programming languages and scientific computing/data science.

Course Prerequisites:

A bachelor's degree (BA / BS / BE) in computer science or a related technical field (e.g., electrical and computer engineering, information science, operations research) typically suffices. Applicants who have majored in other fields are encouraged to communicate with the program director, (Mshaalan@HarrisburgU.Edu).

Course Learning Outcomes:

After taking this class, student should be able to:
1- Code and write programs/modules with Python 3
2- Solve computational problems using data driven solutions, loops, conditional statements, Python libraries and functions.
3- Be able to tackle a problem using top-down approach to develop an algorithmic solution.
4- Be able to import, clean, and explore a dataset
5- Be able to test their code and debug /handle any exceptions/errors.

Course Grading Distribution:

Projects and Assignments: 60%

Midterm 15%

Final Exam 15%

Attendance and Participation 10%

Textbook and References:

Python Programming: An Introduction to Computer Science, 3rd Ed. Franklin, Beedle & Associates, 2016 ISBN-13: 978-1590282755, ISBN-10: 1590282752

Reference:

How to Code in Python 3 by Lisa Tagliaferri, Digital Ocean, New York City, New York, USA. This work is licensed under a Creative Commons Attribution-Non-Commercial-Share-Alike 4.0. ISBN 978-0-9997730-1-7. It can be accessed for free at the following link:

https://assets.digitalocean.com/books/python/how-to-code-in-python.pdf

Grading

The following grading will help you understand how you will be graded. You should review the designated grading criteria before beginning work on a graded item. You should also review the Grading Criteria before submitting a graded item to make sure you have fulfilled the expectations. Finally, you should review the grading criteria when you receive the scores in order to see in what areas you did well and in what areas you need to improve.

Your work will be evaluated according to the following general guidelines:

Excellent: Exceptional effort. Individual was always prepared to discuss, present, and provide feedback. Work reflects consistent participation and engagement in a manner that reflects a deep interest in and understanding of the course content. Regular contributions are consistently thoughtful, constructive, and beneficial to all involved in the course. Assignments and projects are thoroughly and thoughtfully completed, always indicating additional work, insight, and integration of ideas. Assignments and projects are completed on time, according to requirements, and with a thorough understanding of how individual pieces of the course build upon and integrate with each other. (Range of grades: A 95-100)

Above Average: Good effort. Individual was often prepared to discuss, present, and provide feedback. Work reflects consistent participation and engagement in a manner that reflects an advanced interest in and understanding of the course content. The majority of contributions are consistently thoughtful, constructive, and beneficial to all involved in the course. Assignments and projects are thoroughly and thoughtfully completed, often showing some additional work, insight, or integration of ideas. Assignments and projects are completed on time, according to requirements, and with an understanding of how individual pieces of the course build upon and integrate with each other. (Range of grades: A- 90-94, B+ 87-89)

Average: Basic Effort. Individual was sometimes prepared to discuss, present, and provide feedback. Work reflects consistent participation and engagement in a manner that reflects some interest in and understanding of the course content. Some contributions are thoughtful, constructive, and beneficial to all involved in the course. Assignments and projects are completed, occasionally showing some additional work, insight, or integration of ideas. Assignments and projects are completed on time, according to requirements, and with a basic understanding of how individual pieces of the course build upon and integrate with each other. (Range of grades: B 84-86)

Below Average: Lack of Effort. Individual was rarely prepared to discuss, present, and provide feedback. Work reflects some participation and engagement, but in a manner that reflects little interest in and understanding of the course content. A few contributions are thoughtful, constructive, and beneficial to all involved in the course. Assignments and projects are completed, but do not show additional work, insight, or integration of ideas. Assignments and projects are completed on time, but lack requirements and indicate little understanding of how individual pieces of the course build upon and integrate with each other. (Range of grades: B- 80-83; C+ 77-79; C 74-76)

Unacceptable: No Effort. Individual was never prepared to discuss, present, and provide feedback. Work reflects no participation and engagement and there is no interest in and understanding of the course content. Contributions are nonexistent or contain no thoughtful or constructive elements. Assignments and projects are not completed on time. (Range of grades: F 73 or lower)

A 95-100; A- 90-94; B+ 87-89; B 84-86; B- 80-83; C+ 77-79; C 74-76; F 73 or lower.

Missed or Late Assignments and Deferred Exams
Without approval from the instructor; missed, presentations, or quizzes cannot be made up and will receive a grade of zero.

Deadlines for any assignments are noted on the Course Schedule. If a paper, assignment, forum post, or journal is submitted late, and accepted by the instructor, it will be penalized by 10% per day (24 hour day). For example, if a paper is worth 100 points, but submitted a day after the deadline, the paper can earn a score no higher than a 90. No student should wait until the last minute to submit an assignment that is due; printer or technology problems are not a valid excuse for submitting an assignment late.
The *Catalog* describes the policy for deferred examination requests. No student has the right to defer an examination and request a make-up exam without *written* approval from the instructor of a course. A student is responsible for requesting a deferral; all such requests should be accompanied by documentation related to the reason for the request - a serious injury, illness, or extenuating condition that the student could not have prevented.

The *Catalog* outlines what to do if a request is made within 24 hours of the exam. If a student knows that s/he must miss an exam well in advance, the student must notify the instructor in advance in writing (via email) and request a deferral. An exam should not be considered deferred until and unless a student has the approval of the instructor in writing. A student who fails to take an examination when scheduled and who does not receive a deferral from the instructor will receive a failing grade of zero on the examination.

If a student shows up late for an exam or quiz, she/he will only have the remaining scheduled test time to complete her/his work. If a student shows up after an exam or quiz has already been administered, no special arrangements for the student to take the exam or quiz is required of the instructor.

Documented severe illnesses, hospitalizations, deaths of immediate family members, arrest, major religious holidays, or other similar emergencies are the only circumstances under which course work might be accepted without penalty or deferred (make-up) exams will be offered.

Participation/Attendance
Having a working microphone is MANDATORY for this course. You may be called on to answer questions during a class, if you do have a microphone to answer or you do not answer (such as you have stepped away the computer), you will be marked as absent for the class.

Each absence to a weekly session results in a deduction to the student's final grade unless the student shows evidence of listening to the session recording. Absences can lower a student's final course

participation grade by 10%. Note: graduate students must maintain a 3.00 cumulative grade point average in order to remain in good academic standing.

If an absence is unavoidable, an e-mail or a voice message should be sent to the instructor before the class begins. This is a professional courtesy; informing an instructor does not mean the absence is excused. Please note that this is also discussed above under Classroom Expectations. If a student is late, s/he may be marked as absent.

It is a student's responsibility to find out what has been missed in the event of an absence. It is best for a student to obtain information or notes from another student. Faculty members are not obligated to provide students with individualized instruction or lecture notes.

Absences are rarely "excused." Documented severe illnesses, hospitalizations, deaths of immediate family members, arrest, major religious holidays, or other similar emergencies are the only circumstances under which an absence will not negatively affect a student's participation/attendance grade. Ordinary doctor or dentist appointments should be scheduled such that they do not conflict with classes. Any assignment that is submitted late because of an absence may still be penalized, as noted below. Students are expected to inform their instructors *first*; each instructor has discretion over course grades. Students should also contact the Office of Compliance (KGreen@harrisburgu.edu) in the event of a personal emergency. A student can provide documentation of the emergency to the Office of Compliance, which will then inform each instructor that documentation was received.

Online Orientation
You are enrolled on *Moodle* in the Graduate Online Orientation course which you are required to access and review prior to starting as a student at the university. The course should be in your list of Moodle courses; the link to the online orientation courses is
https://moodle.harrisburgu.edu/course/view.php?id=596.
You will be enrolled in this orientation course as long as you are an active graduate student at Harrisburg University.

Student Support Services
Smarthinking™ is an online tutoring service that is free to students. A student can take advantage of live one-on-one sessions with a professional tutor in the subject for which help is needed. A student may also submit essays for feedback in advance of a deadline and receive timely responses. This service can be accessed at the click of a button from within any Moodle course. For more information, contact tutoring@HarrisburgU.edu. For technology questions, students should first visit the Technology tab at *MyHU*.

Disability Services
Any student with a documented disability who feels that he/she may need an accommodation based on the impact of a disability should contact the Office for Disability Services. Students should reach out to the Office for Disability Services as early as possible in order to receive services in a timely manner. All meetings and information will remain confidential. For veteran services, please contact Melissa Morgan, Director of Student Services at (MMorgan@harrisburgu.edu).

Veteran Services
For veteran services, please contact Melissa Morgan, Director of Student Services at (MMorgan@harrisburgu.edu).

Other University Services
For access to other University services visit myHU at https://myhu.harrisburgu.edu/ics. They include:

1. Your instructor! Ask questions in class, via email, or during office hours.
2. Anything to do with your student status and/or visa, email the International Student Coordinator at InternationalStudentServices@harrisburgu.edu.
3. Advising, study skills, time-management, email the Assistant Director of Student Affairs, Advising@HarrisburgU.edu
4. For computer, software, or printer problems submit a request to Helpdesk@HarrisburgU.edu
5. Research resources and Library, e-mail: Library@HarrisburgU.edu
6. Tutoring, e-mail: Tutoring@HarrisburgU.edu
7. If a student has questions regarding the CPT requirements or anything about their Visa, contact InternationalStudentServices@harrisburgu.edu and someone in our International Department can assist you.

Statement of Academic Integrity:

According to the University's Student Handbook: "Academic integrity is the pursuit of scholarly activity free from fraud and deception, and is the educational objective of this institution". Academic dishonesty includes, but is not limited to cheating, plagiarism, fabrication of information or citations, facilitating acts of academic dishonesty by others, unauthorized possession of examinations, submitting work of another person, or work previously used without informing the instructor, or tampering with the academic work of other students. Any violation of academic integrity will be thoroughly investigated, and where warranted, punitive action will be taken. Students should be aware that standards for documentation and intellectual contribution may depend on the course content and method of teaching, and should consult the instructor for guidance in this area.

Honor Code - We as members of Harrisburg University community pledge not to cheat, plagiarize, steal, or lie in matters related to academic work. As a Community of Learners, we honor and uphold the HU Honor Code.

Plagiarism

All students are required to abide by the Student Honor Code of Conduct described in the *Student Handbook*, which includes academic integrity and responsibility for learning. Students are responsible for understanding the requirements for each course, for complying with the rules, and for reading, understanding, and complying with the Student Honor Code of Conduct. The *Student Handbook* is located on *MyHU*under the home tab.

There is zero tolerance for plagiarism at Harrisburg University. The Student Honor Code of Conduct prohibits academic dishonesty and deception, including plagiarism and cheating. All students will be held accountable for plagiarism. Faculty may use *Turnitin* or other originality checking software as a tool to detect plagiarism in student work.

A faculty member will penalize a student grade the first time that plagiarism has been detected. *Incidences of plagiarism, cheating, or any form of academic dishonesty will result in, at a minimum, a grade of zero for the related assignment.* Any student wishing to challenge the faculty decision may follow the Disciplinary Process for Student Incidents of Misconduct described in the *Student Handbook* available on MyHU. Subsequent incidents of suspected plagiarism, any second case of plagiarism against a student, or any incident of suspected plagiarism for which the student has challenged the faculty decision will be reported by faculty and handled according to the Disciplinary Process for Student Incidents of Misconduct described in the *Student Handbook.* Incidences of plagiarism, cheating, or any form of academic dishonesty will result in, at a minimum, a grade of zero for the related assignment and/or for the entire course. Any student found guilty of misconduct as a result of any Disciplinary Process will have a disciplinary record at the university.

Plagiarism is generally "submitting the work of another as one's own" (*Student Handbook*). Plagiarism often occurs when the student fails to credit the source of borrowed ideas or words appropriately.

Plagiarism may be intentional or inadvertent. Some examples of plagiarism include, but are not limited to: Copying all or part of a work without crediting the source, with or without the original creator's knowledge and/or permission (Works may include a phrase, written or musical, a graphic element, a proof, specific language, or an idea derived from such work.);

Presenting the spoken or written ideas of another, published or unpublished, as one's own and/or as original by failing to appropriately credit the source;

Incorrectly quoting including, but not limited to, failure to include quotation marks around borrowed language;

Incorrectly paraphrasing including, but not limited to, relying too heavily on the original language, words, and structure;

Incorrect attribution including, but not limited to, omitting necessary information from a citation, failure to include in-text references where necessary, and/or false citation;

Plagiarism is behavior that undermines the fundamental and essential values inherent in the pursuit of knowledge within academic programs and research. Learning requires the accurate, honest, thoughtful evaluation of information in order to advance our collective achievements in science & technology, and to solve the problems we face as a society. A dedicated student or academic builds upon the work of others in an open and transparent manner and documents the sources or contributions to the creation of knowledge.

All students are required to quote or paraphrase borrowed material correctly and to cite the source of such borrowed material completely following current *American Psychological Association* (APA) guidelines for style, format, and content, or another style of citation approved by the course instructor. Students may seek writing and citation assistance from Student Services (caltieri@harrisburgu.edu or ASCENT on *Moodle*), the University Librarian (library@harrisburgu.edu), or online resources such as The OWL at Purdue (https://owl.english.purdue.edu/owl/section/2/10/).

Instructor Office Hours:
The course instructor will be available to meet/talk individually with students when necessary. Students may send a request via email to schedule a one-on-one meeting with their instructor.

Problems Arise:
Problems happen to people when they are least expected. If any problems arise that you expect may impact your work in this class -- **PLEASE CONTACT ME AS SOON AS POSSIBLE! I want to see every student succeed -- but I can only help if I know as soon as possible!**

Course Outline:

Lesson	Assignments and Evaluations
Week 1: Intro to Computer Science	I- Administrative matters (Syllabus Review) II- What is scientific computing? III- Computer hardware IV- Computer languages V- A brief history of Python

	VI- Why python as an introductory language? VII- Working with code editors / Intro to Jupyter VIII- Installing Anaconda Python distribution IX- Running your first programs Assignment 1: Exercise 1: Install Anaconda, launch Jupyter, run code snippets, print ("Hello CISC 504"), complete exercises listed in lesson1, and submit assignment. Readings: Chapter 1 from Zelle book
Week 2: Writing Simple Programs	I- The program development Process II- What is an Algorithm? III- Creating flowcharts for algorithms IV- Example program V- Variable assignment VI- Expressions Assignment 2: Create flowchart of a simple algorithm and evaluate some simple expressions. Readings: Chapter 2 from Zelle book
Week 3: Computing with Numeric Data	I- Numeric data types (floats and integers) II- Using the math library and Numpy library III- Converting numeric data Assignment 3: Applying the math and numpy libraries to solve simple quantitative problems and Readings: Chapter 3 from Zelle book
Week 4: Computing with Strings	I- What are strings II- String creation III- String manipulation (parsing, slicing and concatenation) IV- String Methods V- String Encoding and decoding VI- String Formatting Assignment 4: String manipulation Readings: Chapter 4 from Zelle book
Week 5: Graphics	I- The purpose of objects II- Graphics programming III- Into to Turtle library IV- Using graphical object V- Graphical future value example VI- Choosing coordinates VII- Interactive graphics VIII- Graphics modules references Assignments: Complete and submit exercise listed at the end of lesson 5.

Week 6: Functions and Libraries	I- Using functions II- Role of functions III- Future value example program with function IV- Functions that return values V- Examples of Numpy library functions VI- Functions and program structure Assignment 5: Complete exercises listed at the end of lesson 6.
Week 7: Control Structures - Decision Making	I- Control structures 1 (decision making) II- Simple decisions III- Two –way decisions IV- Multi-way decisions V- Exception handling Assignment: Develop program which involves a two way decision
Week 8: Control Structures - Boolean Logic and Loops	I- For loops II- Indefinite loops III- Common loop patterns IV- Computing with Booleans V- Other common structures Midterm
Week 9: Data Collections – Sequences, Tuples, Arrays	I- Working with lists and indices II- Statistics with Lists III- Tuples IV- Dictionaries Assignment: Use indices for string manipulation and develop a dictionary
Week 10: Dataset Structures and Pandas Frames	I- What is a dataset II- Structures of Person-centered data e.g. one entry per person vs. multiple entry per person-event based- e.g. insurance claims data III- Flat and Relational Datasets IV- Types of Variables in a dataset (Numeric/continuous, Discrete/categorical, Time, Spatial Coordinates) V- Intro to Pandas library- Importing a dataset with Pandas Assignment: Create a csv file and use the pd.read_csv function to import data and label variables
Week 11:Exploring a Dataset	I- Data Cleaning II- Exploring Continuous Variables (Distribution, spread, mean and median). III- Exploring Categorical Variables with Frequencies, row and column percentages IV- Data Modeling Project: Download, import and clean one of the suggested

	datasets.
Week 12:Data Visualization	I- Histograms II- Box and whisker plots III- Heat maps IV- Scatter plots V- Pie charts VI- Interactive Data Visualization with Bokeh library Project: Visually explore your dataset by developing histograms, pie charts, box and whisker plots or other graphs.
Week 13:Algorithm Analysis and Design	I- Deduction and induction II- Top-down algorithm design III- Searching IV- Recursive problem solving V- Sorting algorithms VI- Exception handling Exercise: Develop an algorithm which uses a binary decision tree and code the algorithm using python.
Week 14: Object Oriented Design (OOD)	I- Intro to OOD II- Case Study III- OOD Concepts Homework: Complete exercise listed at end of lesson