HARRISBURG UNIVERSITY
OF SCIENCE AND TECHNOLOGY

ANLY 560
FUNCTIONAL PROGRAMMING METHODS FOR ANALYTICS Spring 2021

Section 50 Executive Format

Course Syllabus

Date(s): 1/9/2021 - 4/29/2021

Live Sessions : Monday, 7:00 PM-8:30 PM EST

Session Link: Adobe Connect

- Campus Visits:
  - Saturday 8:00 APM – 12:00 PM, 01/16/2021, Room 1046 (tentative)
  - Saturday 8:00 APM – 12:00 PM, 02/20/2021, Room 1046 (tentative)
  - Saturday 8:00 APM – 12:00 PM, 04/10/2021 Room 1046 (tentative)

Professor: Feyzi Bagirov
Email: FBagirov@harrisburgu.edu
Office Hours: Through the class forum, email and via chat (by appointment)

COURSE OVERVIEW

This course provides the student with the required knowledge and skills to handle and analyze data using a variety of programming languages as well as a variety of programming tools and methods. Depending on current industry standards, the student will be provided with the opportunity to develop knowledge and skills in programming environments such as Java, SQL, and Python. In addition, the student is introduced to current industry standard data analysis packages and tools such as SQL Workbench, NumPy and Pandas, and the Eclipse IDE for Java.

The syllabus for this course is a subject to updates and changes during the course. Students will be notified of any changes via announcements, email or other means. An updated copy of the syllabus will be maintained at the Learning Management System.

COURSE OBJECTIVES

By the end of this course, students should be able to:

- Understand the roots of modern programming concepts that relate to the analysis of data.
- Be able to differentiate a variety of programming and scripting languages by comparing and contrasting their relative advantages and disadvantages to analytics.
- Given a specified research problem be able to:
  - Acquire the required data
  - Determine the best analysis tools, techniques and methods,
  - Complete a data analysis, and
  - Draft a report of the results of that analysis.

COURSE TEXTBOOK AND REFERENCES

This course is a “lab” course that will be taught through the use of course notes and a variety of articles.

TECHNOLOGY REQUIREMENTS

- R and RStudio available at: https://www.r-project.org/ and https://www.rstudio.com/
- Java (for developers): http://www.oracle.com/technetwork/java/javase/downloads/jdk9-downloads-3848520.html
- Install the Eclipse IDE for Java Developers @ http://www.eclipse.org/downloads/eclipse-packages/
- Python 3.X.X available at: https://www.python.org/
- SQL available as MySQL at: https://dev.mysql.com/downloads/mysql/ to install MySQL on a Mac see the notes at: https://dev.mysql.com/doc/mysql-osx-excerpt/5.7/en/osx-installation.html

HOMEWORK

A variety of weekly exercises will be suggested to reinforce the material covered in this course. These exercises will not be graded but will help with completion of assigned, graded laboratories and quizzes.

GRADING CRITERIA

Your final grade will be composed of the following:

- Exams: 30%
- Laboratories: 50%
- Participation: 20%

The graduate school valid grades are A, B, C, and F.

Grade scale:

Letter	Value Range
A	100>=x >= 90
B	90 > x > =80
C	80 > x >= 70
F	70 > x

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COURSE CONDUCT AND LATE SUBMISSIONS

A few rules will help us to get the most of our investment in ANLY 560:
• You should plan to dedicate 10 hours a week for this course.
• Moodle is going to be our platform for almost all course activities.
• In addition, we will have at least one synchronous session on weekly basis.
• Attending synchronous sessions and actively participating in the discussions is highly recommended as it is where the basic concept(s) of each unit are explained, assignments are discussed and your questions answered.
• I anticipate that you will need 3 to 4 hours, to budget for solving homework assignments.
• You are responsible for all the readings, even if the material is not explicitly covered in class. You should read the class materials prior to class (or synchronous session) and be prepared to discuss and ask questions about the readings and assignments.
• You should also re-read the material after class (or live session) as not every topic will be covered during class time. Many passages in the text may need to be read several times to gain clarity. Also, taking notes on the material you are

reading and reflecting on the reading and these notes will help you better understand the issues, concepts and techniques that are being presented.

• All work must be completed and turned-in on or before the due date. **No late work will be accepted whether it is laboratories, any exams, or any quiz.** Late means after the due date posted on Moodle. Note that a computer's failure is not an excuse (it represents poor planning on your part).

• Your work should be properly referenced and adhere to standards of both academic integrity and proper form. Generally, I prefer the APA style (see http://www.apa.org/).

• All class credit-related electronic mail must be done using Harrisburg's electronic mail service and the student's assigned Harrisburg University ID. By 'credit-related' I mean all work to be evaluated for credit. Any work submitted through a different mail system will NOT be accepted.

• All activities will be assigned individually unless mentioned in the assignment.

• Students who participate in University-sanctioned events (such as athletics) must make prior arrangements and give the instructor ample notice. Missing class (or a synchronous session) for practice is not advised.

COURSE PROJECT ROAD MAP HU CORE COMPETENCIES

At the conclusion of this course a student will have met the following core competencies that reflect HU's mission:

- Critical Thinking and Problem-Solving skills are demonstrated by the student's ability to: identify and clarify the problem, gather information, evaluate the evidence, consider alternative solutions, choose and implement the best alternative.
- Communication - The core communication skills are demonstrated by the student's ability to: Express ideas and facts to others effectively in a variety of formats, particularly written, oral, and visual formats, communicate effectively by making use of information resources and technology.
- Teamwork and Collaboration - The students will be working with others to increase involvement in learning and by sharing one's own ideas and responding to others' reactions to sharpen thinking and deepen understanding.
- Information Technology - The students will be making effective use of the .NET information resources and technology.

COURSE SCHEDULE & OUTLINE

Course Schedule of Topics, Assignments, and Assessments

Week	Dates	Topics	Assignments
1	1/9-1/17	**1st executive session (1/16):** **Course Introduction** • Understand course expectations • Understand overall flow of semester • Describe key programming paradigms such as imperative, functional, declarative, and object-oriented • Explain the advantages and disadvantages of scripted and compiled languages • Describe each of the 3 control structures: Sequence, selection, and iteration • Identify control structures in various programming languages • Discuss key aspects of structured, unstructured, and tidy data	
2	1/18-1/24	**Software Version Control** • Describe the concept of version control • List the benefits of version control • Be able to use GitHub to manage the versioning of software	
3	1/25-1/31	**Declarative Programming I** • Understand the key concepts of the declarative programming paradigm • Understand how SQL implements the declarative programming paradigm • Understand how Python implements the declarative programming paradigm	
4	2/1-2/7	**Declarative Programming II** • Understand the basic programming concepts of Python • Be able to connect to and manipulate a database through Python • Understand how Python implements the declarative programming paradigm	

5	2/8-2/14	**Imperative Programming I** • Understand the basic concepts of the imperative programming paradigm • Apply the programming control constructs to the Java language	
6	2/15-2/21	**2nd executive session (2/20):** **Imperative Programming II** • Compare the implementation of programming constructs in Java and Python	
7	2/22-2/28	**Imperative Programming III** • Use Python to clean data for analysis • Understand the concept of data wrangling	
8	3/1-3/7	**Imperative Programming IV** • Apply elements of the imperative programming paradigm to scrape a webpage in Python.	
9	3/8-3/14	**Exam 1** • This exam will consist of multiple choice and short answer questions. There will be 12 questions and you will have 4 hours to complete it. • Other than answering concept questions, you will be required to perform SQL and Python programing. Ensure that you are very familiar with the Sakila database	
10	3/15-3/21	**Object Oriented Principles I & II** • Understand the basic concepts of the object orientated programming paradigm • Implement those concepts in Java • Implement object oriented concepts in multiple languages	
11	3/22-3/28	**Object Oriented Principles III** • Use a dependency management build system - Maven • Apply object orientated concepts to a data application • Describe the characteristics of Object-Relational Mapping	
12	3/29-4/4	**Q&A session**	
13	4/5-4/11	**3rd executive session (4/10):** **Event Driven Programming** • Understand the concepts of event driven programming. • Recognize examples of functional programming in common languages.	

		• Explain how the characteristics of event driven programming are different from imperative programming.	
14	4/12-4/18	**Exam 2**	
15	4/19-4/29	**Course wrap-up**	– Classes End –

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- Consider alternative solutions,
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Communication - the core communication skills are demonstrated by the student's ability to:
- Express ideas and facts to others effectively in a variety of formats, particularly written, oral, and visual formats,
- Communicate effectively by making use of information resources and technology.

Teamwork and Collaboration - the students will be working with others to increase involvement in learning and by sharing one's own ideas and responding to others' reactions to sharpen thinking and deepen understanding.

Information Technology - the students will be making effective use of the .NET information resources and technology.

Competency Assessment: One assignment in this class will also be assessed to evaluate your level of proficiency in an HU core competency (http://www.harrisburgu.net/academics/core-competencies.php) directly connected to that assignment. This competency assessment will not impact your grade in this course, but can be used as a gauge for you to self-evaluate your progress in developing your skill level in specified core competencies attached to the assignment.

STATEMENT ON 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.