

GMS 5905: Section 1H75 - Programming for Biomedical Research & Clinical Practice

Spring 2021 - 3 credits

Contact Information

Course Director

Srikar Chamala, Ph.D., Assistant Professor (Clinical Bioinformatics & Biomedical Informatics)

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- Office Location: 4800 SW 35 Drive, Gainesville, FL 32608

Class & Office Hours

- Held from **January 12, 2021** to **April 19, 2021**
- Class meetings:
 - Tuesday, 12:00 to 1:30 PM; Join URL: <https://ufl.zoom.us/j/841215391>
OR
 - Thursday, 5:15 to 6:45 PM; Join URL: <https://ufl.zoom.us/j/841215391>
- Office Hours: *Mondays* and *Wednesdays* from 11:00 AM to 12:00 PM via Zoom Web meeting
 - Join URL: <https://ufl.zoom.us/j/841215391>
 - The above information will also work for office hour appointments scheduled via email
 - Begin your email subject line with "GMS5905" for emails related to this course. Copy TA(s) in the email too.

TA

TBA

- Email: TBA

Anonymous Feedback/Concerns Reporting

Course members can express their concerns or send feedback ANONYMOUSLY about this course to the Course Director (Dr. Srikar Chamala) by filling out the online form listed below. You will still receive an official UF Course evaluation at the end of the semester. However, this will give Dr. Chamala an opportunity to immediately resolve any issue that may arise.

- [Feedback Form Web Link](#)

***NOTE: If you have any doubts or questions regarding course material please DO NOT use this form instead email TA(s) or the course director directly.

Course Information

Course Overview

This course provides hands-on informatics training in Unix/Linux operating systems and Python programming language, which are crucial programming skills in the field of pathology and other healthcare data sciences. Additionally, advanced data analysis and visualization concepts are taught through usage of data science python libraries. In this course students will explore and solve practical problems using previously published scientific datasets in the fields of clinical, genomics, and laboratory medicine. This course will build fundamental computational skills necessary among researchers, pathologists, clinicians, and other healthcare professionals for pursuing specialized and advanced informatics training in the areas of clinical bioinformatics, biomedical informatics, artificial intelligence, digital pathology imaging, etc.

- Week 1: Getting Started with Python
- Week 2: Conditional Statements and Iterations
- Week 3: Modules and File Manipulation
- Week 4: Functions and Data Structures
- Week 5: Python Wrap Up Project
- Week 6: Pandas Data Structures Exploration
- Week 7: Indexing, Filtering and Visualization of Data Structures
- Week 8: Methods on Data Frame/Series
- Week 9: More functions in Data Frames
- Week 10: Application
- Week 11: Getting Started with Unix
- Week 12: File Management
- Week 13: File Management continued
- Week 14: Writing Bash Scripts
- Week 15: Submitting Jobs on high performance computing

Course Goals

Upon successful completion of the course, the student will be able to:

1. Navigate through Unix/Linux environments
2. Analyze clinical genomics and health informatics datasets by using high performance computing servers
3. Create high quality programs, interpret and evaluate those written by others, in Unix and Python for effectiveness and efficiency
4. Make informed decisions on informatics server and programming needs in a biomedical clinical and research setting

5. Develop computational thinking problem-solving methodology – formulating a problem and expressing its solution for a computer to process
6. Efficiently extract relevant information from large data tables for data exploration and data visualization

Prerequisites and Requirements

- No prerequisites. I assume *no* knowledge of programming or computing
- **Need to bring a laptop** to the class for doing assignments
 - Laptop should be set up with [UF Wi-Fi](#) connection and test it prior to the class
- All the class material is provided. Below are the free eBooks that we will be using for the class, please download and keep a local copy.
 - Halterman, Richard L. "Learning to program with python" (2011). Free Download Link
 - https://web.itu.edu.tr/hulyayalcin/MAK230E_PythonProgramming/%5B2011%5D%5B%5BHalterman%5DLEARNINGTOPROGRAMWITHPYTHON.pdf
 - Tutorialspoint. "Python 3" (2016). Free Download Link below
 - https://www.tutorialspoint.com/python3/python_tutorial.pdf
 - VanderPlas, Jake. Python data science handbook: Essential tools for working with data. " O'Reilly Media, Inc.", 2016. [Free Download Link](#)

Course Offering Format

The class will be offered in flipped classroom format, where students will go through specific course materials online including videos and assigned readings prior to the class (ordered in a to do list format to maximize learning). During the class, students will apply the concepts they learned by practicing informatics exercises with the guidance of the instructor and peers. Attendees of this class includes full-time working professionals with busy schedules. To accommodate these diverse schedules the course is offered in two sections (one and half hours each), where same content would be taught in each of the sections. Attendees will be given the flexibility to attend any one (or even both) of the sections per week based on their needs and availability.

If you have difficulty accessing the course site or need other technical assistance contact the Help Desk at 352-392-HELP (4357) or helpdesk@ufl.edu.

Course Assignments - Point Distribution

There will be four types of course assignments due every week. See the below table for the point distribution. All of the assignments are **non-proctored and are open book/internet**. Assignments can be done by discussing with peers, however *direct copy and paste of others work is not allowed*.

- **Quizzes** – Every week there will be one quiz assignment, which will be due on Monday by 11:59 PM (with exception of first quiz) of the corresponding week. Material covered in the quizzes are from the material listed under "Before Class Assignments" section of that week. You will receive a second attempt to improve your score.

- **Before-class Exercises** – Every week there will be one before assignment (with exception of last week), which will be due on Monday by 11:59 PM (with exception of first week) of the corresponding week. Material covered in the before-class exercises are from the material listed under "Before Class Assignments" section of that week. Solution Python code must be executable (no failures) for points to be awarded (there will be no partial credit given).
- **In-class Assignment** – An assignment will be due every week on Friday by 11:59 PM. You will start working on this in-class with your peers, but you will likely need more time to complete it and can continue working with others outside of class time.
- **Peer Review** – Each of the submitted in-class assignments will be assigned to two students in the class for peer review which is due every Monday by 11:59 PM. Example, a student submits an in-class assignment by Friday, of the first week, which will be assigned to two students who will have to peer review within three days and submit it by Monday 11:59 PM.

Note: *It is very important to complete "Before Class Assignments" list before the class as it will not only impact the score on the quizzes but also your ability to perform in-class exercises.*

Assignment	Points Possible	Due
Quizzes	700	Mondays by 11:59 PM
In-class Exercises	1600	Fridays by 11:59 PM
Before-class Exercises	400	Mondays by 11:59 PM
Peer Reviews (2/week)	300	Mondays by 11:59 PM
TOTAL	3000	

Note: Students will be notified of assignment due dates. Please check your Canvas portal for announcements on a regular basis.

Grades

Grade points is in accordance with UF policies:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Letter Grade	Points (minimum)
A	2,700
B+	2,550
B	2,400
C+	2,250
C	2,100

Letter Grade	Points (minimum)
D+	1,950
D	1,800
E	<1,800

Policies

Attendance and late work

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>. Late work will only be accepted with prior instructor approval.

Disabilities

“Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university’s counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- *University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, www.counseling.ufl.edu/cwc/*
 - Counseling Services
 - Groups and Workshops
 - Outreach and Consultation
 - Self-Help Library
 - Training Programs
 - Community Provider Database
- Student Complaints: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf

Honor Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and

integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Online Course Evaluations

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>