STA 308: Introduction to Programming and Scripting for Data Analytics

Fall 2023

Table of Contents

Bulletin Description

Introduction to computer programming concepts used for solving mathematical problems and manipulating data. Control structures, functions, formatted input/output, character and string processing, arrays, procedural and functional programming, basic elements of object-oriented programming. Emphasis on programming languages in high demand for data analytics.

Back to Table of Contents

Prerequisites

An introductory statistics course: STA 261 or STA 301 or ISA 225 or POL 306.

Section and Instructor Information

Both Sections
 	
- Instructor: **Tom Fisher**
- Email: *fishert4@miamioh.edu*
- Office hours: MWF: 2:15-2:30 (Section B, in person, after class)
        MWF: 3:45-4:00 (Section A, in person, after class)
        TuTh: afternoon [generally 2:00-3:30 by may vary)
        (via Zoom or in person, [schedule appointment](#))
- Home Page: https://tjfisher19.github.io/	

Section A (2:50 pm - 3:45 pm): Guest Lecturer (first ~5 weeks) - Instructor: **Michael Hughes** - Email: *hughesmr@miamioh.edu* - Home Page: https://tinyurl.com/55fjbfsy	

*** Both sections meet in Scale-Up Classrooms in Upham - Note: drinks/food are NOT permitted in the classroom.

Detailed Class Description

STA 308 is one of the first courses in the "core" of the Bachelor of Arts in Data Analytics. Unlike STA 363, which focuses on statistical modeling and analysis through *coding*, and some of you may be taking simultaneously or already have credit, STA 308 is an **introductory programming course** for students planning to study analytics. In this course you will be learning the fundamentals of programming and using the computer to solve data analytics problems.

Upon successful completion of STA 308 students should enroll in STA 309. The two courses combined should well prepare you for solving data analytics problems in a wide-variety of applications including all the *tracks* in the Data Analytics degree program.

What this class is	What this class is NOT
- Programming! - With an eye towards statistics/analytics applications - Learning to use the computer to solve problems involving data - Implementing algorithms - Accessing functions and features in supplied programming packages - Thinking like a computer program by - Using logic & thinking procedurally - Breaking down a problem into smaller problems - Using programming tools to *solve* these problems - Aggregating small solutions to solve larger problems - Debugging programs to fix syntax and logic errors - Learning multiple programming languages - R and Python - Discipline agnostic	- Simply a *coding* course - You will need to learn more than a few commands - You will need to learn to *think* like a computer - A software engineering or design course - We will not be building *apps* - A computer science course - We will not be building data structures - We will not be mathematically analyzing algorithms - A statistics/data science class - Do not expect to learn new statistical techniques - Do not expect to learn "machine learning" here - Those topics are covered in other classes

Class Topics

The class is structured into **three primary modules** or units.

Foundations of Modern Statistical Programing (3-5 weeks)

- *Readability* of code (i.e., good practices)
- *Reproducibility* of code & results (e.g., code & data repositories)
- Basic computer architecture (ideas of RAM, caching, processing)
- Computer file systems and file input/output (I/O)
- Essential programming concepts for analytics (the "data frame" -- working with modern data)
- Employing contributed software via libraries

Intermediate Programming topics (3-5 weeks)

- Conditionals & looping mechanisms
- String and date structures
- Function writing and access
    - Looping over functions (a more modern way)
- Introduce the concept of parallel computing

Using a second programming language (4-5 weeks)

- The first two module topics will be introduced using the R Project for Statistical Computing
- We will recap many of the same topics in the Python programming language
- Additional topics may be covered.

Caution / Advice:

- Concepts in a programming course build up over a semester. If you do not understand a concept early in the semester, then you will find you have a poor foundation for learning more complicated concepts.
- Keep current and do not fall behind.
    - If you find yourself struggling, seek help!

Back to Table of Contents

Class Format

Expect this class to be very interactive and require regular student participation. You learn programming by doing it! The material in the first (approximately) 10 weeks will build on itself and use the software language R. Then, we will review many of the same ideas, and introduce new procedures, in the software language Python. When we cover Python, it is expected that you will already have a firm understanding of many programming concepts by then.

Back to

Quizzes, In-class activities and Small Group Activities

Expect regular in-class assignments, mini homeworks and short quizzes in this course. We will use these assignments/quizzes to assess the class's learning and adjust the curriculum, or its pace, if necessary. Each individual assignment is low stakes, but the accumulation of assignments will have a meaningful impact on your grade. In many of these activities/assignments you will be encouraged to work together in groups as, not only will it help you learn from each other, it is reminiscent of how modern analytics is performed in industry.

Back to

Homeworks

Homeworks will be assigned throughout the semester (anticipating *upwards of 6* assignments) to assess your overall comprehension of the material. The first assignment will be given in the first few days and there is an ungraded Homework #0. Graded homework will be due about every week to two weeks. Late homework will **not** be accepted unless granted **prior** permission from the instructor.

Back to

Mid Semester & Final Evaluations

Two mid-semester evaluations will be given along with a Final evaluation. You can think of these as corresponding to exams but the format may not necessarily be in the form of an "exam." This course is meant to be very applied, so the format is to be determined but should be expected to be a mix of traditional exam with a take-home portion, perhaps even in the form of a project.

Back to

Class Materials

You will need access to a computer to complete this course. Any of the major operating systems (Windows, Mac or Linux) is acceptable. You will use a computer in nearly every class meeting to experiment with code. A small notebook may be useful to take notes in class.

Back to [Table of Contents](#)

Course Textbook

There is no required textbook for this course but we will be using material from several sources.

Back to [Table of Contents](#)

Backup

No allowance will be made for computer or network failures. Be sure to back up your work frequently, and do not wait until the last minute to complete the assignment. To back up a file, save it first to one computer drive such as your UDS / M drive or the hard drive of your home computer, and then save it again to a portable drive. Do not trust that a thumb drive is sufficient. Email to yourself is a simple option. Use Google Drive or campus drives.

Software

In this course we will be utilizing R and RStudio extensively. You can download both pieces of software for free from:

- http://cran.r-project.org/   [R language - select local download mirror]

- http://www.rstudio.com/   [Integrated Development Environment - great choice for using R!]

Countless resources are available for help in using R - Google "R Tutorial" and check out Youtube for examples.

We also will be introducing and using Python later this semester (last 5 weeks). We will provide instructions on getting it installed at that time but for those eager to learn you can download the base software from:

- http://www.python.org/downloads   [Most recent version 3.9.6]

- Many IDEs are available for Python - see https://hackr.io/blog/best-python-ide
  We will likely use Spyder, Atom or Jupyter Notebooks. We will determine that later.

Countless resources are also available for help using Python - Use Google and YouTube.

We recommend you complete Homework #0 as soon as possible.

Back to Table of Contents

Discussion Boards

The discussion boards on Canvas are available for you to post questions, discussions and to help your fellow classmates. Please note that the posting of solutions is in violation of the academic integrity code. Those postings will be deleted and students may be prosecuted for a violation of academic integrity standards. The boards are activated as a way to communicate with your classmates.

Back to Table of Contents

Notable Dates on Calendar

Date(s)	Topic
Mon, Aug 28	Classes begin
Mon, Sep 04	Labor Day -- **no class**
Fri, Sep 15	Last day to drop without a "W"
Late September/Early October	First midterm evaluation (exact date & structure TBD)
Oct 02-09	Midterm Grades available in this window
Fri, Oct 13	Fall Break – **no class**

Mon, Oct 30	Last day to drop with a "W"
Tue, Oct 31	Last day to apply for May Graduation
Early November	Second midterm evaluation (exact date & structure TBD)
Wed, Nov 22	Start of Thanksgiving Break -- **no class**
Fri, Nov 24	University closed -- **no class**
Fri, Dec 08	Last Day of Classes
Dec 11 – 15	Final Exam week (Assessment TBD)

Back to

Attendance policy

Students are expected to attend class every day. The format of the class is such that lectures are interactive (students will actively code, following along with the instructor). Further, there will be upwards of fifteen "in-class" assignments, quizzes and activities. Missing class regularly does not bode well for success in this class.

In accordance with the Miami University Class Attendance policy, students who are absent from class to such an extent as to make the student's work inefficient or to impair the morale of the class will be dropped from the course.

Reasonable accommodations may be made when a student is absent and the instructor is provided advanced notice.

Back to

Student & Instructor Expectations:

You, as a student, should try your best to:

- Attend every class.

- Check the Canvas class site at least once per day during the workweek.

- Check your Miami email every 24 hours (more often if you have sent an email to the instructor or a classmate)

- Read Announcements that are sent via Canvas. Check Announcements on Canvas before emailing your instructor, as the information may have already been posted.

- Post questions you have about the course in the Discussion Forums. If you can answer another student's question, without violating the academic integrity policy, please feel free to do so.

- Actively participate in all class sessions, discussions, assignments, and other activities required in this course.

- Post your ideas and assignments; react to others' ideas, and exchange thoughts with fellow students and the instructor.

- Complete any readings in a timely manner so you can get help if needed.

- Submit assignments at the very least by their due date/time.

- Spend at least 6-9 hours a week outside class, studying, reading from supplemental sources, and completing assignments.

- Submit work that demonstrates a clear understanding of the material.

- Ask questions if you don't understand!

- Keep an open mind regarding the material and the opinions of others.

- Notify the instructor, in a timely manner (within 24 hours), if you have any problems.

The instructor will try his/her best to:

- Check the Canvas class site every day to monitor progress.

- Check email at least twice a day, Monday through Friday.

- Respond to all emails within 24 hours (except on weekends).

- Post all grades within 7 days of assignment due dates, except for homeworks which may require up to 2 weeks.

- Make every effort to meet with students who request a meeting.

Back to Table of Contents

Academic Integrity

Academic Integrity is at the heart of the mission and values of Miami University and is an expectation of all students. Maintaining academic integrity is a reflection of your character and underpins your learning and understanding of the course material.

According to the Miami University Student Handbook, "Academic dishonesty is defined as any activity that compromises the academic integrity of the institution or subverts the educational process."

Examples of academic dishonesty include but are not limited to:

- Referencing outside sources or course notes while taking an exam.

- Referencing non-permitted websites while taking a quiz

- Collaborating with another person in any way while taking a quiz or exam

- Copying someone else's solutions to a problem and submitting it as your own work

- Posting class material and assignments to sites not affiliated with Miami University

- Plagiarism - Using another's ideas without citation and calling them your own

- Using Artificial Intelligence to complete an assignment when not permitted

All Miami University policies concerning academic integrity apply to this course. See the Student Guide to Academic Integrity for details.

Suspected Dishonesty: Any suspected instances of academic dishonesty will be handled under Miami University's [Academic Integrity policy](#). It is a student's responsibility to read this policy. Lack of knowledge or understanding of the appropriate academic conduct is not an excuse for committing academic dishonesty.

Students who are found responsible for committing academic dishonesty will receive a sanction that ranges from a zero on the assignment to an F in the course, which could contain the AD transcript notation. Students who are found responsible for committing two acts of dishonesty (academic or Code of Student Conduct section 102 (Dishonesty)) automatically will be suspended from Miami University.

Students should act honestly in the completion of all course assignments, and ask the instructor for clarification on any assignment guidelines that are not clear.

Back to [Table of Contents](#)

Communication Guidelines & Netiquette

Announcements: Please subscribe to the Course Announcements so you can be automatically notified about important information through your email. To subscribe for auto-email notifications, click on the subscribe button. ✓ Subscribe , it will turn green with "subscribed", ✓ Subscribed .

Discussion Forum: This is the place to ask questions about course content, homework, and "in-class" assignments. General questions about the course should also be asked here so that all students may benefit from the answers. Check here for answers to your questions before sending an email to the instructor or graduate assistants. Questions you do not wish to share with the class should be sent directly to your instructor.

Contacting Your Instructor: Email is the best way to reach your instructor. However, if you would prefer to have a conversation, you may speak to your instructor during office hours or send your instructor an email to set up a time to meet. Given today's ease of communication, it is your responsibility to contact your instructor within 24 hours if you are having any problems. While instructors will attempt to answer emails quickly, it may take up to 24 hours (or longer on weekends) for you to receive a response. Many faculty

receive over 50 emails a day. We ask that you put "STA 308: *summary of your email*" in the subject line of your email to help sort; we will try to do the same with announcements and emails.

Communication Guidelines: Email is the official mode of communication for the University. You are responsible for any communication that is sent to your Miami email account, so please be sure to check your account frequently. If you have your email forwarded to your preferred account, please be sure you have enough server space for your Miami emails and please check to see that your server will accept Miami emails.

You will be asked to communicate with other students in this class via email. You may access email tools on the Canvas class site. All group members are responsible for initiating contact with one another as soon as the assignment is opened. Failing to make contact with your group members is not an excuse to miss completing an assignment.

Netiquette:* Diversity has many manifestations, including diversity of thought, opinion, and values. We encourage **all learners to be** polite and **respectful** of that diversity and to refrain from inappropriate or offensive commentary. If inappropriate or offensive content is either emailed or posted on the class site, we may recommend college disciplinary action. Students guilty of academic misconduct, either directly or indirectly through participation or assistance, are subject to disciplinary action through the regular procedures of Miami University. Learners as well as faculty should be guided by common sense and basic etiquette. Criticism should be presented in a positive light. The following are good guidelines to follow:

- Be professional in your correspondence with the instructors and with other students.

- Never post harassing, threatening, or embarrassing comments.

- Never post content that is harmful, abusive; racially, ethnically, or religiously offensive; vulgar; sexually explicit; or otherwise potentially offensive.

- Never post, transmit, promote, or distribute content that is known to be illegal.

- If you disagree with someone, respectfully respond to the subject, not the person.

- Treat others as you would like to be treated.

- It can be difficult to communicate emotion in email, so use emoticons such as 🙂 or ;-) when appropriate.

- Be timely in your communication with others.

- Be as brief and succinct as possible.

- Include a descriptive subject line in all emails.

- Use proper spelling and grammar.

- Cite sources appropriately including URLs of sites you use for code inspiration.

Remember that "tone" can usually be detected accurately in verbal communication, but often can be misunderstood in electronic communication. Because of this phenomenon, we encourage you to err on the side of politeness.

*adapted from Regents Online Campus Collaborative

For more information on netiquette check Netiquette Rules for Electronic Communications.

Back to Table of Contents

ADA & Students with Disabilities

Miami University is committed to ensuring equal access to students with disabilities. Miami's Office of Student Disability Services (SDS) assists students with determining eligibility for services and accommodation planning. Miami's AccessMU provides resources and guidance toward equal opportunity for all individuals. Refer to Miami University's Accessible Technology Policy for definitions and additional information.

Students who are entitled to disability-related academic adjustments, auxiliary aids, etc., must register with SDS to receive accommodations in university courses. Please understand that formal communication from SDS must be presented prior to the coordination of accommodations for this course. For more information, see Student Disability Services and/or the Rinella Learning Center. Students may also contact SDS at (513) 529-1541 or via email at sds@miamioh.edu.

If you have a disability, please contact me, and I will be glad to make any necessary accommodations.

Back to Table of Contents

Diversity & Discrimination

All Miami University policies concerning diversity and equal opportunity will be upheld in this class.

Miami University is a community dedicated to intellectual engagement. Our campuses consist of students, faculty, and staff from a variety of backgrounds and cultures. By living, working, studying, and teaching, we bring our unique viewpoints and life experiences together for the benefit of all. This inclusive learning environment, based upon an atmosphere of mutual respect and positive engagement, invites all campus citizens to explore how they think about knowledge, about themselves, and about how they see themselves in relation to others. Our intellectual and social development and daily educational interactions, whether co-curricular or classroom related, are greatly enriched by our acceptance of one another as members of the Miami University community. Through valuing our own diversity, and the diversity of others, we seek to learn from one another, foster a sense of shared experience, and commit to making the university the intellectual home for us all.

Please see the General Bulletin for more information.

Miami University is committed to providing equal opportunity and an educational and work environment free from discrimination on the basis of sex, race, color, religion, national origin, disability, age, sexual orientation, gender identity, military status, or veteran status. Miami shall adhere to all applicable state and federal equal opportunity/affirmative action statutes and regulations.

Please see the Miami University policies regarding discrimination and harassment for more information.

Back to Table of Contents

Resources and Support for Students

As an instructor, I have a duty to report. This means I am required to promptly report to the Deputy Title IX Coordinator (titleix@miamioh.edu or 513-529-1870) any information a student shares with me regarding harassment, discrimination, sexual misconduct and interpersonal violence, or retaliation. A report does not initiate an investigation. It engages a discussion of your resources, supportive measures, and options available. If students want to speak with someone confidentially, they can speak with Student Counseling Services, Student Health Services, and an advocate with Women Helping Women.

Speaking with a confidential resource person does not preclude students from making a formal report to the University if and when they are ready.

https://miamioh.edu/diversity-inclusion/programs-resources/report-incident/index.html

For more information, please visit https://miamioh.edu/campus-safety/sexual-assault/ and https://www.miamioh.edu/diversity-inclusion/oeeo/index.html.

COVID-19 Policies and Illness Considerations

Students, faculty or staff should **not come to campus when ill** or under orders from the Butler County General Health District to isolate because of a diagnosis or quarantine because of close contact with someone who tested positive for COVID-19. However, students are ultimately responsible for material covered in class, regardless of whether the student is absent or present. Instructors are not expected to create a facsimile of in-class instruction, but should identify reasonable ways to accommodate the absence and may wish to make some or all of their office hours remotely accessible to assist in this accommodation. If your absence is of significant duration or severity, as your instructor I will advise you about other options that might be available including assigning an incomplete grade or requesting a medical withdrawal.

Currently, there is no universal mask requirement on campus at this time. The University asks members of the community to honor an individual's request to wear a mask in their space. Face masks have been shown to be an effective means of limiting the spread of COVID-19 and other airborne viruses.

Final Grade Calculation

At the conclusion of the semester, final grades will be compiled using the following point distribution:

Item	Contribution to Final Grade
In-class Assignments & Quizzes ● Expect regularly	15%

(at least once a week but should expect more) • Quizzes would be short • An in-class assignment may be interactive with peers • In-class assignments may extend to short-term homework	
Homework • More in-depth application of covered material • Some may be challenging	35%
Mid Semester Evaluations	30%
Final Evaluation	20%

Grading Scale

A+ = [97, 100]   A = [93, 97)   A- = [90, 93)

B+ = [87, 90)   B = [83, 87)   B- = [80, 83)

C+ = [77, 80)   C = [73, 77)   C- = [70, 73)

D+ = [67, 70)   D = [63, 67)   D- = [60, 63)

F = [0, 60)

Back to