

CMSC 330 – Data Science Skills Syllabus

Catalog listing:	CMSC 330 - Data Science Skills Section C90
Semester Term:	Spring 2023
Course Level:	Undergraduate
Prerequisites:	CMSC 210 – Computers and Programming
Instructor:	Abigail Byram
Office:	(Online)
Phone:	804 332-8012
Email:	byramag@vcu.edu
Classroom:	Virtual
Class website:	Canvas
Virtual Office Hours:	Tuesday 6 – 7 pm via the Zoom tab in Canvas; or by appointment

1.0 – Overview (Catalog Course Description):

Semester course; 3 lecture hours, virtual. 3 credits. Prerequisite: CMSC 210 or permission of instructor. Introduction to data science skills. The course introduces students to the foundations of data science and the tools used to collect, analyze, and represent data. Students will apply these principles in both analysis and visualization projects.

2.0 – Course Goals

Student Learning Outcomes

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

- Knowledge of data science concepts (foundations and background of data science)
- Knowledge of data analytics and visualization use cases and importance of its application within various business contexts
- Knowledge of the significance of information and visualization within functional areas
- Ability to think about out all aspects of data in within a functional area
- Ability to use spreadsheet software/data analysis tools for data science
- Familiarity with statistical concepts including data distribution, variance, and sampling

- Familiarity with statistical inference, significance, and confidence intervals
- Understand and interpret basic regression
- Generate and interpret basic statistics
- Sort, aggregate, filter and clean data
- Join datasets from different sources, including from different storage and retrieval technologies
- Conduct conditional logic
- Manipulate data spreadsheet software/data analysis tools for data science
- Ability to fetch data and to conduct ad hoc analysis (summarize, estimate, predict data; use pivot tables)
- Knowledge of basic visualization types and uses (e.g. how to present data)
- Familiarity with advanced visualizations and uses (e.g. networks and trees, mapping and spatial data)
- Knowledge of data types and visualizations that work most effectively for that data type (e.g. tables vs graph vs heat map)
- Knowledge of exploratory and explanatory visualization (e.g. able to distinguish between the concepts)
- Knowledge of visual perception / basic graphic design theory and color theory (e.g. human perception assumptions and limitations) and ways to accommodate for visual impairment
- Knowledge of a visualization program's publishing capabilities
- Publish data visualizations (e.g. using tableau in a web browser or mobile device)
- Effectively convey information to your audience and develop a compelling narrative using data
- Ability to create a static visualization using the most appropriate method for a specific data set
- Ability to create a basic interactive visualization using appropriate methods for the structure of the data
- Knowledge of major data ethical challenges and how to use data ethically (e.g. how to prevent bias, do no harm, and identify areas of concern)
- Conceptual understanding of how to protect your company and protect IP
- Appropriately cite, protect, and share of data

Major Topics Covered:

- Data quality and analysis
- Data storage and management
- Data manipulation and visualization techniques
- Ethical and security considerations in data science

3.0 – Course Schedule

Course schedule is posted in Canvas under the Schedule page. This page is the source of truth for weekly assignments and deadlines. Any updates to the course schedule will be provided on this page and shared as a course announcement. All assignment deadlines are on Sunday of the specified week at 11:59pm with the exception of the Final Exam (see schedule and assignment due dates for more detail).

4.0 – Textbook, Technology, and Lab Access:

Computational and Inferential Thinking: The Foundations of Data Science by Ani Adhikari, and John DeNero, with contributions by David Wagner; 2018. This text is available for free at inferentialthinking.com

Zoom will be used for office hours for the course. Look for the Zoom link for each week's scheduled meeting in Canvas.

You are required to subscribe to Vocareum Labs in order to complete the lab assignments on their platform. There is a fee associated with this resource. When you log in, you will be prompted to pay (online to Vocareum) with a grace period up to Jan. 30, 2021. The per student price is \$40.

Technology Support

Engineering & VCU Resources:

- **Personal Computer Requirement:** For our current system requirements and recommendations, see: <https://egr.vcu.edu/admissions/accepted/computer-recommendations/>
- **Remote Access to Public Lab computers:** To provide remote access, we use the Citrix App2Go environment to provide full and exclusive control over "the next available" computer in the lab. See this link for more details: <https://wiki.vcu.edu/x/Oa0tBg>
- **VCU Library:** Use VCU Libraries to find and access library resources, spaces, technology and services that support and enhance all learning opportunities at the university. (<https://www.library.vcu.edu/>)
- **VCU provides a lot of software available for students to download to their personal computers.** For a list of software and the specifics for each, see: <https://ts.vcu.edu/software-center/>. In particular, [Microsoft Office](#) is available free to students.
- **VCU is transitioning to Canvas.** See the Canvas Student Guide at this link: <https://community.canvaslms.com/t5/Student-Guide/tkb-p/student>
- **For IT help in the College of Engineering**, see our Wikipedia for "student" help at: <https://wiki.vcu.edu/display/EGRITHELP>
- **VCU's Technology Services (TS) provides support for "central IT" services.** If you have a technical issue with any of the following services, please submit a ticket with VCU Technology Services at <https://itsupport.vcu.edu/> or call (804) 828-2227. VCU TS maintains and supports these services and will be able to provide assistance to you.
 - VCU Cisco VPN
 - 2Factor or Dual Authentication (DUO)
 - Blackboard/Canvas
 - Gmail or other Google Apps
 - Zoom videoconferencing
 - VCU App2Go (Application server)
 - Resetting VCU password
- **For IT issues related to College of Engineering teaching and research,** email egrfixit@vcu.edu
- **For loaner Chromebooks for emergency purposes:** See this link for more details: <https://vcutsmnpc.getconnect2.com/>

5.0 – Evaluation:

General Instructions

1. It is expected that you will spend between 9-12 hours a week on this class completing readings, activities, and engaging with your peers. For every credit hour it is expected that students are putting in 3-4 hours of work. This is a 3 credit class therefore you should expect to spend 9-12 hours per week on this class. In addition it is expected that you are logging into the course several times throughout the week to complete assignments and engage with your classmates.

2. You will need access to the internet and a browser that supports Jupyter notebooks to complete lab assignments. We recommend using Google Chrome to complete Jupyter notebook lab assignments.
3. There are reading and practice sections each week, but the practice problems in these sections are ungraded. Only the lab assignments count toward your final score for the course.
4. All assignments must be completed on or before the due date specified. Only assignments submitted on or before the due date will be considered for grading. No assignments will be accepted after the due date unless special permission has been given **prior to the due date**.
5. No makeup assessments will be given unless special permission has been given prior to the date of the assessment. Request to adjust scores or re-grade assessments must be made the week in which the assessment is returned, requests after this time will be denied.
6. Do your own work. Plagiarism applies to source code as with any other intellectual property. Plagiarized code is a form of cheating and will be treated as such.
7. This class is completely online, all information will be delivered through the online learning environment. Assignments and projects will be submitted online.
8. This is a 15-week course that will require participation and collaboration with fellow classmates. Be prepared to complete assignments as well as participate in group discussions on topics related to online teaching and learning.
9. Follow the course schedule to be sure you are keeping up with discussion, activities and assignments.

General Online Course Technology Requirements

- Participants need access to a personal computer (Mac or Windows) and the Internet for major amounts of time for this course.
- Browser that is compatible with Canvas. To see if your browser is compatible with Canvas, visit the Canvas [Browser Checker](#)
- Your computer will need speakers to hear sound for videos and audio files.
- You will need access to word processing software such as Microsoft Word or Google Docs. Please note that any software that you use must be able to save files as Microsoft files (example *.doc or *.docx) or PDF.
- Adobe Acrobat Reader or an equivalent PDF reader.
- A webcam and microphone on your computer. A cell phone camera and microphone may suffice depending on the quality of the cell phone. It is your responsibility to ensure your cell phone and microphone is able to allow for real time video conferencing and video and audio recording.

General Online Course Technology Skills Required

- It is expected that you are able to use and check your official VCU email address daily.
- You should be able to upload documents to Canvas.
- You should be able to use word processing software.
- You will be expected to interact with me and your peers using Canvas tools. Instruction for the use of each tool will be given when the tool is introduced.

Grading:

Category	Weight Percentage
Discussions	10%
Individual Assignments	50%
Project 1	10%
Project 2	10%
Midterm Exam	10%
Final Exam	10%

Grading scheme:

A = 100-90%

B= 89-80%

C= 79-70%

D= 69-60%

F = Less than 60%

Late Policy

All assignments except for exams may be extended for full credit up to 1 week beyond the original due date **if an extension is requested before the due date**. If no prior notice is given, assignments may still be submitted up to 1 week late, but with a 10% grade reduction. No assignments will be accepted beyond 1 week late except under extenuating circumstances.

Extra Credit

There are two opportunities for extra credit in the course: 1. the [Extra Credit Presentation](#) at the semester midpoint and 2. extra credit for 80% of the course responding to Course Evaluations. See more details in the assignment page or in upcoming announcements.

Student responsibilities

(source: One VCU: Responsible Together available at: <https://together.vcu.edu/students/>)

When we return, things will look and feel different as we take necessary steps to protect the well-being of our community. Here is what is expected of you:

1. Monitor your health daily. Testing will occur according to protocols.
2. Wear a face covering or mask in common areas, including class.
3. Apply physical distance guidelines to all settings.
4. Clean and disinfect personal and shared spaces before and after use.

5. Cleaning supplies will be available in numerous locations.
6. Report symptoms associated with COVID-19 to VCU Student Health
7. A call center hotline will be available later in the summer.
8. Not sharing is caring during this unique pandemic. Please do not share
9. calculators, tools, lab supplies, etc.

Following rules regarding face coverings or masks, cleaning and disinfecting, and physical distancing is required. Students will receive reminders for daily health monitoring. Staff in the Dean of Students office will be notified after incidents of non-compliance. Refusal to comply with rules can include progressive disciplinary action up to and including suspension, based on the VCU Student Code of Conduct.

Requesting accommodations

The university recognizes that some students who previously did not need Section 504 Academic Accommodations, and who have a qualifying condition or disability, may need support or assistance during the return to campus process. A modified approach for the temporary and more permanent need for accommodation has been developed and implemented to provide students with full access to programs and activities related to their academic majors. Because every case is different, student requests are evaluated on a case-by-case basis. Please share your need for an accommodation with the Student Accessibility and Education Office , or for MCV Campus students, the Division for Academic Success , after you have worked directly with your faculty member.

Health and Well-being

Navigating the anticipated stressors of daily life can often be challenging enough. When unexpected stressors emerge or when we are faced with uncertainty, it can be tough to know how to cope. Try out some of these tips and resources for health and wellness to see if they are a right fit for you.

Symptoms or Diagnosis: If an on-campus student identifies symptoms, has tested positive for COVID-19 or has come into contact with someone diagnosed with COVID-19, that student should contact University Student Health Services . At that point, isolation should begin and contact tracing will be performed by Student Health Services. Symptoms will be monitored and the student should refer to a medical provider if symptoms worsen or be released from isolation after 14 days, if symptom-free.

Nondiscrimination policy

VCU is committed to providing a safe, equitable and inclusive environment for all its employees, patients and students. Discrimination or discriminatory harassment is not only unlawful, it is harmful to the well-being of our university community. Our university's core values, specifically those related to diversity and inclusion, have withstood many difficult situations and trying times, and they will not falter now.

Reports of discrimination, bullying, harassment and/or stereotyping of persons of color or those impacted by COVID-19 or otherwise, will not be tolerated. Be assured that VCU will make every effort to address and prevent the occurrence of unlawful discrimination and, if necessary, take prompt and appropriate action to remedy and prevent its reoccurrence. Every member of our community is asked to:

- Become familiar with the university's policies on Preventing and Responding to Discrimination and Duty to Report and Protection from Retaliation in the VCU Policy Library.

- Consult with Equity and Access Services or VCU Human Resources for additional guidance on how to file a report of discrimination.
- Contact the Office of Institutional Equity, Effectiveness and Success (IES) on how to address and maintain a culture of inclusion.
- Encourage individuals who may need an ADA accommodation for a known or newly acquired disability, to contact the ADA/504 Coordinator in ADA Services.
- Bookmark and share information on university or community agencies that offer support or services, such as VCU's Counseling Services or Ombudsperson.
- Explore training and educational opportunities on diversity and inclusion at IExcel Education and through the Office of Institutional Equity, Effectiveness and Success .
- Offer nonjudgmental support and empathy to those affected by current events and this health crisis.

Message from your Instructor

I am grateful for your presence and input in this online course. I appreciate and welcome you regardless of your immigration status, country of origin and/or citizenship, race, ethnicity, religious affiliation, gender/sex, gender identity, sexual orientation, age, or dis/ability. Thank you for enriching our world, sharing your vital experience, and contributing to the diversity that makes our intellectual community vibrant and evermore creative.

Tips for Success:

- When taking online and hybrid courses, your self-motivation and self-pacing are absolutely critical. For this course, you should plan to work about 7-9 hours per course module as we move through the materials. Be sure to plan your time accordingly.
- Nothing in this course is meant to make you feel stuck. If you find yourself spending a lot of time without making progress reach out for help! You can ask questions on the related Discussion boards, bring the problem into office hours, or shoot me an email, I'm here to help!
- Make yourself a calendar with all of your due dates across ALL of your courses. Plan for when you will work on each one for completion in advance of the due dates.
- Make sure you note any "online" course that still have a required meeting time (such as a Google Meet or Zoom session).
- Avoid the common assumption that online courses are easier or should be easier. That is a MYTH!!
- Plan Ahead!! Study as you go instead of at the last minute!

Where to post questions

Questions of general interest should first be posted to the discussion board (only if they have not already been answered) so that other students can benefit from the response or have an opportunity to respond to your question.

Only questions of a private nature should be communicated to me through email. When sending a message to me, please allow a minimum of 24 hours for a response . Most of the time I will respond much faster, but sometimes meetings and other courses take over my schedule.

Netiquette Guidelines

Netiquette is a set of rules for behaving properly online. Your instructor and fellow students wish to foster a safe online learning environment. All opinions and experiences, no matter how different or controversial they may be perceived, must be respected in the tolerant spirit of academic discourse. You are encouraged to comment, question, or critique an idea but you are not to attack an individual. Working as a community of learners, we can build a polite and respectful course community. The following netiquette tips will enhance the learning experience for everyone in the course:

- Do not dominate any discussion.
- Give other students the opportunity to join in the discussion.
- Do not use offensive language. Present ideas appropriately.
- Be cautious in using Internet language. For example, do not capitalize all letters since this suggests shouting.
- Popular emoticons such as ☺ can be helpful to convey your tone but do not overdo or overuse them.
- Never make fun of someone's ability to read or write.
- Share tips with other students.
- Keep an "open-mind" and be willing to express even your academically informed opinion.
- Think and edit before you push the "Send" button.
- Do not hesitate to ask for feedback.
- Using humor is acceptable

(adapted from UWSP)

Be Proactive in Communication

If you find that you have any trouble keeping up with assignments or other aspects of the course, make sure you let your instructor know as early as possible. As you will find, building rapport and effective relationships are key to becoming an effective professional. Make sure that you are proactive in informing your instructor when difficulties arise during the semester so that we can help you find a solution.

(adapted from UWSP)

VCU Honor System

VCU recognizes that honesty, truth, and integrity are values central to its mission to advance knowledge and student success both in the world VCU students will enter, or return to, once they have graduated and in the university community as a microcosm of that world. In a community devoted to learning, a foundation of honor must exist if that community is to thrive with respect and harmony. Therefore, all members of the university community must conduct themselves in accordance with the highest standards of academic honesty, ethics, and integrity at all times.(from <https://conduct.students.vcu.edu/vcu-honor-system/>)

Campus emergency information

What to know and do to be prepared for emergencies at VCU:

- Sign up to receive [VCU text messaging alerts](#). Keep your information up-to-date. Within the classroom, the professor will keep his or her phone on to receive any emergency
- Know the safe evacuation route from each of your Emergency evacuation routes are posted in on-campus classrooms.

- Listen for and follow instructions from VCU or other designated Within the classroom, follow your professor's instructions.
- Know where to go for [additional emergency information](#).
- Know the emergency phone number for the VCU Police (828-1234).
- Report suspicious activities and
- Keep your permanent address and emergency contact information current in

Important dates

You can view important dates for the semester in the [academic calendar](#).

Attendance Policy

Attendance can be gauged in an online or hybrid course. Regular participation in the discussion forums, the timely submission of required assignments, and the prompt notification of problems in the course all constitute “class attendance” online. Students are expected to participate in all class activities, submit all assignments, and complete all tests and examinations in accordance with the class syllabus and outline. Students who cannot participate in or complete assigned class activities, assignments, tests, and examinations by the designated deadlines owing to circumstances should contact the instructor prior to any incidences or immediately following all unforeseen emergencies. Simply logging into the Canvas course does not constitute attendance. Maintaining communication with the instructor via phone or email is a must when absences occur. Please note that it is your responsibility to understand and complete the course assignments. You are expected to read all the material posted in Canvas or disbursed through email. If you do not ask questions, it will be assumed that you understand the assignments.

Discussions

Most weeks we will be discussing a chapter/topic from the textbooks in the course. You are expected to contribute to the forum discussions during the week listed in the Course Schedule. Discussion Forums will be monitored through the entire semester. All forum contributions must be written in a business professional fashion, using correct spelling, complete sentences, and appropriate grammar. Forum contributions not following this format will not be graded.

For each forum, students will be required to read all other students forums and comment on at least two other forum contributions. These comments are a requirement for full credit for the forum contributions.

Military short-term training or deployment

If military students receive orders for short-term training or for deployment/mobilization, they should inform and present their orders to Military. Student Services and to their professor(s). For further information on policies and procedures contact Military Student Services at 828-5993 or access the corresponding policies.

Please visit <http://go.vcu.edu/syllabus> and review all syllabus statement information. The full university syllabus statement includes information on safety, registration, the VCU Honor Code, student conduct, withdrawal and more.