**CS 5301 – Programming Foundations for Data Analytics**

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| **Section:** 22373  **Semester:** Fall 2025  **Class Location:** The course features asynchronous learning (recorded videos, PowerPoint slides etc.). |
| **Instructor:** Dr. Benjamin Soibam  **Office: OMB** N714  **E-mail:** soibamb@uhd.edu  **Tel:** (713) 226-5216  **Office Hours:**  **Day(s)/Time(s):**TR [2:30 pm – 3:30 pm], T [1:00 – 2:00 pm] via Zoom or in person.  Also, by appointment at a different time.  Zoom Meeting ID: 7216088849  Zoom Passcode: soibam  **Teaching Assistant:** Ms. Phuc Vu  **Office hours:** TBD  **Email:** vup10@gator.uhd.edu |

**Catalog Description:** The course provides essential foundations of the R programming language for developing powerful and reusable data analysis models. The students will get hands-on training on writing programs to facilitate discoveries from data. The topics include data import/export, data types, control statements, functions, and data visualization.

**Course Prerequisites:** With consent of the instructor.

**Learning Outcomes:** After taking this course, students should be able to

1. Write programs in R language and use R packages to achieve data structuring, data visualization, mathematical computations, statistical summaries, and basic data modeling.
2. Develop R programs for statistical analysis, and basic data modeling.
3. Apply programming knowledge in exploring real-world datasets and writing reusable data analysis tools.

**Online Course Support:**

* **Since this is a fully online asynchronous course, the Canvas system** will be used for all course materials. As the semester progresses, all materials will be posted there including lecture notes, and course announcements.
* **Mode of Instruction:** Fully online, meaning the course features asynchronous learning (recorded videos, PowerPoint slides, etc.). **Lectures for each week will consist of videos and slides and will be uploaded to canvas at the beginning of the week.**
* **Email response: Outside of office hours, students can communicate with me via email. Normally, I respond to student emails within 24 hours. If I do not respond within 24 hours, please send me another reminder. Course-related emails from me would be sent to your UHD gator mail. Therefore, you MUST check your UHD gator in a timely manner.**

**Hardware and Software Requirements:** You will need a computer with a video camera and a microphone. The computer needs to support (install and run) at least video conferencing tools (e.g., Zoom), Respondus Lockdown browser, presentation tools (e.g., Microsoft PowerPoint), and writing tools (e.g., Microsoft Word).

To avoid being disconnected at critical moments, we encourage you to access courses, in particular exams, on a computer that is hardwired to the Internet router (via Ethernet using a Cat 5 or Cat 6 cable) as opposed to depending on Wi-Fi whenever possible.

**Textbooks**

**(Course materials will be based on these books which are available online of free)**:

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| --- | --- |
| * Hands-On Programming with R by Garrett Grolemund and Hadley Wickham, 1 edition, O'Reilly Media.   ISBN-13: 978-1449359010  Available online here https://d1b10bmlvqabco.cloudfront.net/attach/ighbo26t3ua52t/igp9099yy4v10/igz7vp4w5su9/OReilly\_HandsOn\_Programming\_with\_R\_2014.pdf   * R for Data Science by Hadley Wickham, and Garrett Grolemund, 2016, 1 edition, O'Reilly Media.   Paper Book-ISBN 13: 978-1491910399  Available online here http://r4ds.had.co.nz/ |  |
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**Course Topics:** The following topics will be covered as time permits.

* **R language**

1. Introduction to R
2. Data Visualization using R
3. R Datatypes
4. Data Import/Export and Data Frames
5. Pipes and user defined Functions
6. Vector Data Structures and conditional execution and Iteration
7. Basic Data transformation using dplyr package
8. Data Cleaning
9. R Strings
10. R mapping functionalities

**Topic Prerequisites:** The course is essentially self-contained. Background in writing computer programs is preferred but not required.

**Workload:** 5-7 hours/week

**Course Grade:** Course grades will be determined as follows:

Table 1: Grading criteria

|  |  |
| --- | --- |
| **Assignment** | **Weight** |
| Midterm 1 | 15 % |
| Midterm 2 | 15 % |
| Programming Assignments | 25 % |
| Final | 25% |
| Quizzes | 20 % |

Your final course grade will be determined by the standard college formula based on your course average:

90-100 🡪 "A", 80-89 🡪 "B", 70-79 🡪 "C", 60-69 🡪 "D", 0-59 🡪 "F"

**Mode of Assessment:**

* **Programming assignments:** will be take-home andare to be completed and turned in *by the due date*. **For each late day, 15 percent of the total possible points will be deducted** (a day ends at the due time). No work will be accepted more than 2 days late.
* **All Quizzes:** will be take-home.
* **Exams:** Students may require to take Midterms and Final using Respondus lockdown browser. **A computer and webcam is required.** Install the latest version of respondus lockdown browser from UHD website. More details will be provided via announcements. Make-up exams will only be given in cases of documented emergencies. It is your responsibility to contact your instructor with documentation before the exam of your emergency as soon as possible.
* **Quizzes:** Make-up quizzes will only be given in cases of documented emergencies. It is your responsibility to contact your instructor with documentation before the quiz due date as soon as possible. All missed grades will be recorded as zeros.
* **Use of any generative artificial intelligence (AI) tools**, including ChatGPT, is considered a violation of the UHD Academic Honesty Policy in this course. Students are not allowed to use any such tools to produce partial or full products pertaining to any course assessments.

**Syllabus Subject to Change**

This syllabus is tentative and subject to change. Changes, if any, will be announced.

Table 2: Tentative Course Schedule

| Week | Topics | Assessment |
| --- | --- | --- |
| Week 1 | Getting Started with R and R Studio  R Basics  R vectors |  |
| Week 2 | Rmd Files  R factors, list, Matrices | * Quiz1 |
| Week 3 | R Data frames, Reading/Writing text files using R | * Quiz2, Assignment1 |
| Week 4 | Logical subsetting  Dealing with missing values  excel spreadsheets and R. | * Quiz3 |
| Week 5 | Data visualizations using R package ggplot2. | * Assignment2 |
| Week 6 |  | * Midterm 1 |
| Week 7 | Iterations (loops) in R | * Quiz4, Assignment3 |
| Week 8 | Control structures/Conditional statements in R | * Quiz5 |
| Week 9 | How to write your own functions in R | * Quiz6, Assignment4 |
| Week 10 | **Data Transformation with** **dplyr** **package** |  |
| Week 11 |  | * Midterm2 |
| Week 12 | R strings using stringr package  **Data Transformation with** **dplyr** **package** | * Quiz7, Assignment5 |
| Week 13 | R strings using stringr package | * Quiz8 |
| Week 14 | Data Cleaning | * Quiz9, Assignment6 |
| Week 15 | R functions map | Quiz10 |
| Date for the final will be announced later | | |

**CLASS POLICIES**

**Course materials must not be distributed or shared in any form outside of this course. Prior permission must be obtained from the instructor before such action.**

**UHD Class Engagement Requirement**

You must engage with course materials via **Canvas** and/or (depending on your faculty’s syllabus and course requirements) connect with your faculty member before the 10th calendar day of class, failure to do so will result in your being administratively dropped from this course. Being dropped from this course may affect your enrollment status and/or your financial aid eligibility. If you are dropped from this course, you may appeal through the Office of the Registrar. Once dropped, you will lose access to the course materials in Blackboard until your appeal is resolved.

**Course/Instructor related matters**

Please communicate with me first regarding any course/Instructor related matters. To avoid confusion, send me an email first before you send any form of communication to the department chair, Dean and other administrative officials.

In addition to the policies specified in this course syllabus, all UHD courses also follow shared policies published on [our syllabus website](https://www.uhd.edu/academics/Pages/UHD-Common-Course-Syllabus-Policies.aspx) addressing the following areas:

·        Responses to University-Wide Disruptions

·        Academic Honesty

·        Accessibility and Statement of Reasonable Accommodations

·        Attendance and Roster Certification

·        Book Purchasing

·        Recording of Class Sessions

·        Religious Holy Days

·        Safety Precautions

·        Student Support Services

·        Student Counseling Services

·        Technology Requirements

·        Testing and Final Exams

·        Use of Canvas, Gatormail, and Zoom