Chaminade University OF HONOLULU

Chaminade Science www.chaminade.edu

Course Syllabus

Course Number: CS 201

Course Title: Programming in R

Department Name: Data Science

College/School/Division Name: Natural Sciences and Mathematics

Term: Spring 2020

Course Credits: 3

Class Meeting Days: Mondays, Wednesdays, and Fridays

Class Meeting Hours: 3:30-4:20PM

Class Location: Tredtin Hall, Room DSC

Instructor Name: Mark Speck, PhD

Email: mark.speck@chaminade.edu

Phone: (808) 739-7496

Office Location: Tredtin DSC 1

Office Hours:

Instructor Website: https://datascience.chaminade.edu

1. University Course Catalog Description

This course is an introduction to R that will cover the R topics and language. This course will include lectures, discussions, assignments, hands-on experiences with real data, and a project that could be used for future classes and investigation. The goal of the course, it will prepare students for the next data science courses and practice by providing students with skills, knowledge, techniques, and a data science mindset. Students in this course will learn the data science process of collecting, storing, and curating data; ingestion and wrangling data; R language; R used for database systems; analyzing data using R; visualizations; and reporting the results of the analysis.

2. Course Overview

This course will teach the student the basics in using the R Statistical Language including familiarity with the environment and the basic structures the language uses for analyzing data in a data science context. A final analysis project of the student's design will be used for bringing together the different skills learned during the semester.

3. Program Learning Outcomes

Upon completing the B.S. degree program in Data Science Analytics and Visualization the student will demonstrate the following:

1. Source, describe and curate large data sets ('big data') that may not be amenable to conventional statistical analysis, including domain and file specific metadata

2. Demonstrate understanding of foundational mathematical and statistical concepts and operations that underlie data management, analysis and interpretation

3. Apply computational approaches and tools such as R, SQL and Python languages to problems associated with data management, analysis and interpretation

4. Explain and identify the concepts of "Big Data" storage structures, specifically NoSQL DBs and the tools built around Map/Reduce that allow data scientists to use them

5. Apply basic data modeling, identifying and applying predictive models to support decision- making

6. Analyze and apply an ethical framework and collective standards in which data scientists must operate, considering data confidence and context in the design of systems or practices that ensure equity, validity, confidence and privacy of data

7. Plan and execute data science tasks within multidisciplinary teams

8. Develop and implement approaches to effective data translation, dissemination and communication between domains, stakeholders and the public

9. Perform a domain-specific capstone project addressing a stakeholder-generated use case

4. Course Learning Outcomes and Linkage to Program Learning Outcomes

At the conclusion of DS 101, students will:

Course Learning Outcomes	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9
1. Collect, store, and curate data.	X		X						
2. Explain the process of data ingestion and wrangling.	X		X						
3. Understand the language basics of R.			X						
4. Apply R in developing a project.			X				X		
5. Apply R in querying a database.			X						
6. Apply R to perform various statistical analyses.			X				X		
7. Produce, synthesize, interpret, evaluate, and report results and visualizations to various audiences.			X				X	X	

5. Course Prerequisites

None

6. Required Learning Materials

R for Data Science, available here: https://r4ds.had.co.nz/
R Programming for Data Science: http://leanpub.com/rprogramming
Additional materials will be provided on Canvas as needed

7. Course Website:

8. Technical Assistance for Canvas Users:

Search for help on specific topics at help.instructure.com. Chat live with Canvas Support 24/7/365. Watch this video to get you started with online guides and tutorials. Contact the Chaminade IT Helpdesk for technical issues: helpdesk@chaminade.edu, or call (808) 735-4855

9. Assessment.

Attendance	5 points
R assignments (10X)	50 points
Project proposal	5 points
Presentation	10 points
Project	30 points
Total	**100 points**

Grading will be based on student points earned from attendance, quizzes, and case-study development milestones. Case studies will be developed based on material and sources discussed in class. A team approach to problem solving will be used to help individual develop their unique case studies.

10. Grading Scale

Letter grades are given in all courses except those conducted on a credit/no credit basis. They are interpreted as follows:

A 90-100% 90 points or more: Outstanding scholarship and an unusual degree of intellectual initiative

B 80-89% 80-89 points: Superior work done in a consistent and intellectual manner

C 70-79% 70-79 points: Average grade indicating a competent grasp of subject matter

D 60-69% 60-69 points: Inferior work of the lowest passing grade, not satisfactory for fulfillment of prerequisite course work.

F <60% 59 points or less: Failed to grasp the minimum subject matter; no credit given

11. Course Schedule

Week	Date	Lesson	Assignment
1	1/13-17	• Introduce syllabus. • Everyone introduces themselves. • What is R and why is it important?	
2	1/20	Fr. Chaminade/MLK Day	
2	1/22-24	• Introduce R and language. • Getting started	
3	1/27-31	• R basics	
4	2/3-7	• Getting data in and out • Storing data	Assignment 1 Project proposal due
5	2/10-14	• Connecting to external files	Assignment 2
6	2/17	Presidents' Day	
6	2/19-21	• Subsetting R objects • Vectorized operations	Assignment 3
7	2/24-28	• Managing data frames.	Assignment 4

8	3/2-6	• Control structures	Assignment 5
9	3/9-13	• Functions	Assignment 6
10	3/16-20	• Loop functions • Regular expressions	Assignment 7
11	3/23-27	Spring Break	
12	3/30-4/3	• Debugging • Profiling R code • Simulation	Assignment 8
13	4/6-8	• Special topics: logistic regression, decision trees, data mining, or other advanced topics.	Assignment 9
13	4/10	Good Friday	
14	4/13-17	• Data analysis	Assignment 10
15	4/20-24	• Work on projects/project presentations.	
16	4/27-5/1	• Project presentations.	Project due

12. Alignment of Natural Sciences Courses with Marianist and Hawaiian values of the University.

The Natural Sciences Division provides an *integral, quality education:* sophisticated integrative course content taught by experienced, dedicated, and well-educated instructors.

- We *educate in family spirit* – every classroom is an *Ohana* and you can expect to be respected yet challenged in an environment that is supportive, inclusively by instructors who take the time to personally get to know and care for you.
- We *educate for service, justice and peace*, since many of the most pressing global issues (climate change, health inequity, poverty, justice) are those which science and technology investigate, establish ethical parameters for, and offer solutions to.
- We *educate for adaptation and change*. In science and technology, the only constant is change. Data, techniques, technologies, questions, interpretations and ethical landscapes are constantly evolving, and we teach students to thrive on this dynamic uncertainty.

The study of science and technology can be formative, exploring human creativity and potential in the development of technologies and scientific solutions, the opportunity to engage in the stewardship of the natural world, and the opportunity to promote social justice. We provide opportunities to engage with the problems that face Hawai'i and the Pacific region through the Natural Sciences curriculum, in particular, those centered around severe challenges in health, poverty, environmental resilience, and erosion of traditional culture. The Marianist Educational Values relate to Native Hawaiian ideas of *mana, na'auao, ohana*, *aloha* and *aina*. We intend for our Natural Sciences programs to be culturally-sustaining, rooted in our Hawaiian place, and centered on core values of *Maiau,* be neat, prepared, careful in all we do; *Makawalu*, demonstrate foresight and planning; *`Ai,* sustain mind and body; *Pa`a Na`au*, learn deeply.

13. Additional departmental and university policies

13.1. Late Work Policy

Requests for extensions due to extenuating circumstances (medical problems, for example) will be considered but in general work received after the deadline will not be graded. Computer problems are not an excuse for late work.

13.2. Grades of "Incomplete"

Students and instructors may negotiate an incomplete grade when there are specific justifying circumstances. An Incomplete Contract (available form the Divisional Secretary and the Portal) must be completed. When submitting a grade the "I" will be accompanied by the alternative grade that will automatically be assigned after 90 days. These include IB, IC, ID, and IF. If only an "I" is submitted the default grade is F. The completion of the work, evaluation, and reporting of the final grade is due within 90 days after the end of the semester or term. This limit may not be extended.

13.4. Instructor and Student Communication

Questions for this course can be emailed to the instructors at mark.speck@chaminade.edu and laura.tipton@chaminade.edu. Online, in-person, and phone conferences can be arranged. Response time will take place up to 3 days.

The University provides a Chaminade email address for all students. Official Chaminade communications will be sent to the students' Chaminade email address and instructors will use only this email to communicate with students. It is the responsibility of the student to check their email frequently. Report email-related problems to the Helpdesk at 808-735-4855 or helpdesk@chaminade.edu

13.5. Cell phones, tablets, and laptops

Music Devices and Cellular Phones: Unless specifically permitted by your instructor, use of music devices and cell phones is prohibited during all Natural Science and Mathematics classes, as it is discourteous and may lead to suspicion of academic misconduct. Students unable to comply will be asked to leave class. Out of consideration for your classmates, please set your cell phone to silent mode during class. Students are encouraged to bring laptops or tablets to class as the instructor will assign online activities and readings that will require the use of a laptop or tablet. Laptops and tablets should not be misused, such as checking distracting websites. Use your best judgment and respect your classmates and instructor.

13.6. Disability Access

If you need individual accommodations to meet course outcomes because of a documented disability, please speak with me to discuss your needs as soon as possible so that we can ensure your full participation in class and fair assessment of your work. Students with special needs who meet criteria for the Americans with Disabilities Act (ADA) provisions must provide written documentation of the need for accommodations from the Counseling Center by the end of week three of the class, in order for instructors to plan accordingly. If a student would like to determine if

they meet the criteria for accommodations, they should contact the Counseling Center at (808) 735-4845 for further information (counselingcenter@chaminade.edu).

13.7. Title IX Compliance

Chaminade University of Honolulu recognizes the inherent dignity of all individuals and promotes respect for all people. Sexual misconduct, physical and/or psychological abuse will NOT be tolerated at CUH. If you have been the victim of sexual misconduct, physical and/or psychological abuse, we encourage you to report this matter promptly. As a faculty member, I am interested in promoting a safe and healthy environment, and should I learn of any sexual misconduct, physical and/or psychological abuse, I must report the matter to the Title IX Coordinator. If you or someone you know has been harassed or assaulted, you can find the appropriate resources by visiting Campus Ministry, the Dean of Students Office, the Counseling Center, or the Office for Compliance and Personnel Services. Should you want to speak to a confidential source you may contact the following:

- Chaminade Counseling Center| 808 735-4845.
- Any priest serving as a sacramental confessor or any ordained religious leader serving in the sacred confidence role

13.8. Attendance Policy

The following attendance policy is from the 2018-2019 Academic Catalog (p. 57-58): Students are expected to attend regularly all courses for which they are registered. Student should notify their instructors when illness or other extenuating circumstances prevents them from attending class and make arrangements to complete missed assignments. Notification may be done by emailing the instructor's Chaminade email address, calling the instructor's campus extension, or by leaving a message with the instructor's division office (Natural Science and Math 1 (808) 440-4204). It is the instructor's prerogative to modify deadlines of course requirements accordingly. Any student who stops attending a course without officially **withdrawing** may receive a failing grade.

Unexcused absences equivalent to more than a week of classes may lead to a grade reduction for the course. Any unexcused absence of two consecutive weeks or more may result in being **withdrawn** from the course by the instructor, although the instructor is not required to **withdraw** students in that scenario. Repeated absences put students at risk of failing grades.

Students with disabilities who have obtained accommodations from the Chaminade University of Honolulu ADA Coordinator may be considered for an exception when the accommodation does not materially alter the attainment of the learning outcomes. Federal regulations require continued attendance for continuing payment of financial aid. When illness or personal reasons necessitate continued absence, the student should communicate first with the instructor to review the options. Anyone who stops attending a course without official withdrawal may receive a failing grade or be withdrawn by the instructor at the instructor's discretion.

Class begins at 11:30 AM and ends at 12:50 PM; there is no accepted variation to this schedule.

13.9. Academic Conduct Policy

See the current Undergraduate Academic Catalog and the Student Handbook available from Student Affairs.