MARYVILLE UNIVERSITY COURSE SYLLABUS

SPRING 2019

DSCI 302/502 - 01

INTRODUCTION TO R

**Instructor’s Information:**

Instructor: Matthew Husky

Email: mhusky1@maryville.edu

Office Hours: TR 10:00-11:00 and By Appointment in Adjunct Faculty Office Kern 3117

**Course Information**:

Meeting Schedule: TR 12:30-1:45

Course Dates:

1/15, 1/17, 1/22, 1/24, 1/29, 1/31, 2/5, 2/7, 2/12, 2/14, 2/19, 2/21, 2/26, 2/28, 3/5, 3/7, 3/19, 3/21, 3/26, 3/28, 4/2, 4/4, 4/9, 4/11, 4/16, 4/18, 4/23, 4/25, 4/30, 5/2

Credit Hours: 3

Location: Reid 1320

Prerequisites: Math 117

**Required Text(s):** An Introduction to R (Version 3.5.1) by W.N. Venables, D.M. Smith and the R Core Team

**https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf**

**Optional Text(s): R Programming**

**https://en.wikibooks.org/wiki/R\_Programming**

**Course Description:**

The course covers practical issues in data analysis and graphics which includes programming in R, debugging R codes, Jupyter Notebook, cloud computing, data exploration and data visualization. Project-based method is used to help students develop effective problem-solving skills and effective collaboration skills.

**Learning Objectives:**

This is a fast-paced introductory course to the R programming languages. It is intended for those with little programming background. By the end of this course, you should be able to:

• Manipulate various R datatypes, such as vectors, arrays, matrices, lists and data frames etc.

• Write your own functions using loops and conditional execution.

• Build simple statistical models and generate graphics.

• Isolate and fix common errors in R programs.

• Write small-scale R programs using the above skills.

Full-time relevant practical training is an integral component of the course, allowing students to optimize their classroom discussion and discover real world application of course content. Students without current professional positions should call on previous employment opportunities to fulfill the learning outcomes.

**INSTRUCTIONAL METHODS /** **EXPECTATIONS:**

The main methods of instruction are the interactive lecture and student discussion. Problem sets will be given frequently to monitor and reinforce the learning process.

Students will read the assigned materials in order to be able to actively participate in class discussions. The class will begin with a lecture over the day’s subject. The time remaining will be used to answer questions and discuss previously assigned problem sets, and to give students time to work individually or in small study group.

**Course Requirements:**

The student will be expected to complete the following types of activities, which shall figure as part of the final grade in the course:

HOMEWORK, PROJECTS, QUIZZES, TESTS, GROUP PROJECTS

Graduate students will be required to complete additional projects as assigned.

**There are no make-up tests.** The midterm and final exams must be taken on the dates given unless other arrangements are made *beforehand*. Delayed grades can only be given in cases of extreme and sudden emergency. All in-class tests are 75 minutes. Time is NOT extended for late arrivals.

**TENTATIVE SCHEDULE:**  Schedule is subject to change, it is the student’s responsibility to stay current with all changes.

|  |  |  |
| --- | --- | --- |
| **Week** | **Dates** | **Topics** |
| **1** | 1/15, 1/17 | Introduction and preliminaries (Chapter 1) |
| **2** | 1/22, 1/24 | Simple manipulations; numbers and vectors (Chapter 2), Problem set 1 |
| **3** | 1/29, 1/31 | Objects, their modes and attributes and factors (Chapter 3, 4) |
| **4** | 2/5, 2/7 | Arrays and matrices (Chapter 5), Problem set 2 |
| **5** | 2/12, 2/14 | Lists and data frames (Chapter 6) |
| **6** | 2/19, 2/21 | Reading data from files (Chapter 7), Problem set 3 |
| **7** | 2/26, 2/28 | Probability distributions (Chapter 8) |
| **8** | 3/5, 3/7 | Grouping, loops and conditional execution (Chapter 9), Problem set 4 |
| **9** | 3/12, 3/14 | **SPRING BREAK** |
| **10** | 3/19, 3/21 | Grouping, loops and conditional execution (Chapter 9), Problem set 5 |
| **11** | 3/26, 3/28 | Writing your own functions (Chapter 10), Problem set 6 |
| **12** | 4/2, 4/4 | Writing your own functions (Chapter 10), Problem set 7 |
| **13** | 4/9, 4/11 | Statistical models in R (Chapter 11), Problem set 8 |
| **14** | 4/16, 4/18 | Graphical procedures (Chapter 12) |
| **15** | 4/23, 4/25 | Graphical procedures (Chapter 12), Final Project |
| **16** | 4/30, 5/2 | *Final Exam* |

**Please check Canvas for due dates and times of the project assignments, midterm, final, and team projects.**

NOTE: This syllabus is subject to change at the discretion of the instructor to accommodate instructional and/or student needs.

**GRADING POLICY:** A 93 – 100%,A- 90-92%, B+ 87 – 89%,B 83-86%,B- 80-82%,C+ 77-79%,C 73–76%,C- 70-72%, D 60 – 69%, F below 60%. Grades will be based on the percentage of a student’s accumulated points out of the total possible points. A grade of a C or above is necessary for fulfilling the requirement. Grading is not “on a curve”, so it is theoretically possible for every student in this course to earn an “A”, or everyone could earn an “F”.

**ATTENDANCE:** This course moves at a rapid pace, and each topic builds on the one(s) before it. Keeping up with homework assignments is vital to success, and absence from class is very detrimental. Attendance is 3 points each day. *Please be courteous to me and to your fellow classmates by arriving on time, staying in the room the entire class period, and do not leave early!!!*  All these actions count one point against attendance per occurrence, as does sleeping in class, texting, reading books, etc. Attendance points are not earned if you do not attend. This includes funerals, school activities, car problems, illness, job or military duties. Maryville’s policy on attendance: “Because successful work depends largely upon regular class attendance, Maryville University makes no provision for a system of ‘cuts’ or excused absences.”

# Academic Support

*The Division of Student Success* provides assistance and support for all students. Services include peer tutoring, individual consultation to assist students with achieving their academic goals, study skills materials, Writing Studio, and accommodations for students with documented disabilities. Academic Success services are located on the main floor of the University Library. Writing and math tutors are also available for BYOH (Bring Your Own Homework) Sunday through Wednesdays from 6:30-8:30p.m. and Saturdays from 11:00a.m.-2:00 p.m. Call 314-529-9228 or email peertutors@maryville.edu for more information. We provide accommodations and supports for students with documented disabilities as defined by the Americans with Disabilities Act. If you have a documented disability and wish to discuss academic accommodations, please call 314.529.9374 as soon as possible.

# Academic Integrity Policy

Because Maryville values academic integrity both in the character of our students and in the reputation of the university, all instances of academic dishonesty are addressed with consequences. These consequences range from a failing grade on a test or an assignment to suspension or expulsion from the university.

# Technology in Class

Personal electronics (e.g., laptops, iPads, cell phones) can be used to enhance learning and instruction in a variety of ways, but during class time they should NOT BE USED. Texting and the use of other electronic devices for non-class-related activities should be reserved for class break times. Additionally, no audio and/or video recordings may be used without the instructor’s permission, and cannot be distributed to others without the instructor’s permission. Use of cell phones in the class will result in loss of points.

# Campus Notification System: Saints Alert

All members of the Maryville University community, including students, staff, and faculty, are strongly encouraged to sign up for the campus notification system that is designed to enhance and improve communication in the event of an emergency. You may sign up for Saints Alert, the campus notification system at: [https://intranet.maryville.edu/PublicSafety/alert.asp.](https://intranet.maryville.edu/PublicSafety/alert.asp)

**Cheating and/or Plagiarism:**

An instructor who has evidence that a student may have cheated or plagiarized an assignment or test should confer with the student. Students may then be asked to present evidence (sources, first draft, notes, etc.) that the work is his own. If the instructor determines that cheating or plagiarism has occurred, he may assign a failing grade to the test, the assignment, or the course, as he sees fit. **USING A CELL PHONE DURING A QUIZ OR TEST IS CHEATING. A ZERO WILL BE ASSIGNED TO**

**THE TEST WITH NO CHANCE OF MAKEUP. THE INCIDENT IS REPORTED TO**

**THE COLLEGE. IF AN ALARM/RING GOES OFF IN THE MIDDLE OF THE TEST FORCING YOU TO TURN IT OFF, AN AUTOMATIC 15% IS SUBRACTED FROM THAT TEST/QUIZ SCORE.**

**WITHDRAWAL:** It is the student’s responsibility to officially withdraw from a course by the Administration Office. Failure to attend DOES NOT CONSTITUTE OFFICIAL WITHDRAWAL and will result in a grade of “F” for the course.

**Federal Credit Hour Report: Table of Minimum Hours of Instruction and Outside-of-Class Work**

**Course Title:** DSCI 302/502 Intro to R Number of Credit Hours: 3

**Learning Outcomes:**  DSCI 302

1. The students will be able to install R, R Studio and Jupyter notebook

2. The students will be able to use vectors, logical vectors character vectors, index vectors and selecting and modifying subsets of a data set.

3. The students will be able to get and set attributes and change the length of an object.

4. The students will be able to understand the factors and use the \*apply functions.

5. The students will be able to use arrays and matrices and perform matrix operations.

6. The students will be able to construct, modify and work with lists and data frames.

7. The students will be able to read data from files.

8. The students will be able to generate the probability distributions.

9. The students will be able to write the loops and conditional expressions.

10. The students will be able to write your own functions.

11. The students will be able to understand the formulae in R syntax.

12. The students will be able to build the linear models.

13. The students will be able to build generalized linear models.

14. The students will be able to build nonlinear least squares models.

15. The students will be able to use high level potting commands.

16. The students will be able to use low level plotting commands.

17. The students will be able to generate graphics with ggplot2.

DSCI 502

1. The students will be able to install R, R Studio and Jupyter notebook

2. The students will be able to use vectors, logical vectors character vectors, index vectors and selecting and modifying subsets of a data set.

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15. The students will be able to use high level potting commands.

16. The students will be able to use low level plotting commands.

17. The students will be able to generate graphics with ggplot2.

18. The students will be able to solve the real world problems they defined through the group project using R.

19. The students will be able to summarize and communicate in writing the real world problems.

*The following table summarizes the minimum clock hour estimates for this course in*  *compliance with Maryville University credit hour policy and Federal Guidelines (34 CFR Section*  *668.8).*

***Note****: The hours presented in the table below provide estimates for the average time required for completion of course components.  Students may require additional time to successfully master topics, complete projects or to comprehend required readings.  Completing the times listed below does not guarantee a specific level of success in the course.*

|  |  |
| --- | --- |
| **Hours of Instruction1** | **Hours (Carnegie unit)2** |
| Classroom | 45 |
| Labs |  |
| Studio |  |
| Field Experience (Clinical, Practicum) |  |
| **Subtotal** | 45 |
|  |  |
| **Hours of Student Work Outside of Class3** | **Clock Hours4** |
| Required Discussions/Conferences/Field |  |
| Classroom Preparation (Readings/Practice/Assignments/Tutorials/Problems) | 60 |
| Quiz Study, Exam Study and Exams | 75 |
| Projects (Research/Papers/Presentations) | 45 |
| **Subtotal** | 180 |
| **TOTAL HOURS** | 225 |

1 Minimum requirement for 1 credit hour are defined as 15 hours of instruction accompanying a minimum of 30 hours of out-of-class work.  Hours of instruction and out-of-class work may be redistributed proportionately to reflect modified academic calendars, formats of study, and academic activities as established by the institution.  Hours listed may exceed minimum requirements.

250 minutes of actual instruction time is the equivalent of 1 “Carnegie unit” or “Carnegie hour”.  This unit of time is used only in the calculation of “Hours of Instruction” and should not be used in calculations of “Hours of Student Work Outside of Class”.

330 hours of out-of-class preparation per 1 credit hour is typical.  Courses that deviate from this minimum due to particular pedagogical needs must meet the equivalent work requirement as specified in note 1 above.  Hours listed may exceed minimum requirements.

460 minutes of out of class work is the equivalent of 1 “Clock Hour”. This unit of time is used only in the calculation of “Hours of Student Work Outside of Class” and should not be used in calculations of “Hours of Instruction”.