

ICT390-002: Special Topics In Ict: Data Science (Spring 2020)

FALL 2020 - ICT 390-002: SPECIAL TOPICS IN ICT - INTRODUCTION TO DATA SCIENCE

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Virtual office hours:

Tuesdays and Thursdays @ 10 am - 11 am

Course Description

This introductory class explores the interplay between society and technology by statistically examining small and big data to make inferences and predictions. In this course, we will learn how to use R programming for acquiring, cleaning, analyzing, exploring, and visualizing data; making statistical inferences and predictions; basic machine learning algorithms (such as, linear regressions and introduction to k-Nearest Neighbors (k-NN)); and communicating results effectively.

Student Learning Outcomes

- An understanding of data collection procedures.
- An understanding of statistical analysis procedure for making inferences and predictions.
- A practical and statistical understanding of regression models.
- An applied understanding of data preparation.
- Learn the necessary skills in R programming to access and prepare data for basic machine learning models.

Required Materials

You are **not** required to **purchase** any textbook for this course. The reading from the online sources will be available on the Canvas course site.

Course Policies

Attendance and Participation

If you are absent on a day when an assignment is due, you will be allowed to hand in or make up that work **only** if the absence is **officially excused**. You will be asked to provide official written documentation for excused absences within one week of the absence. If you do not turn in the written documentation on time, the absence will be counted as unexcused. Please see the definition of excused absences in the next section.

If you know ahead of time you will be absent from class without an unexcused absence, please discuss this with your instructor and turn in any assignments ahead of time. Excuses for University-sponsored activities must be made *prior* to such absences. **No make-up work is available for in-class exercises or workshops unless approved in advance by your instructor.**

Note: Please reference the definition of excused absences in the current edition of *Student Rights and Responsibilities* or on the [web \(Links to an external site.\)](#). For any emergency situations, **e-mail your instructor** as soon as you know about the situation.

Excused Absences

Students need to notify the professor of absences prior to class when possible. *Senate Rules 5.2.4.2* defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, (e) interviews for graduate/professional school or full-time employment post-graduation, and (f) other circumstances found to fit “reasonable cause for nonattendance” by the professor.

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day in the semester to add a class. Two weeks prior to the absence is reasonable, but should not be given any later. Information regarding major religious holidays may be obtained through the Ombud (859-257-3737, http://www.uky.edu/Ombud/ForStudents_ExcusedAbsences.php ([Links to an external site.](#))).

In situations where a student’s total EXCUSED absences exceed 1/5 (or 20%) of the class periods scheduled for the semester, students are strongly encouraged to withdraw (take a “W”) from the class as per university policy. If a student has excused absences in excess of one-fifth of the class contact hours for that course, the student shall have the right to receive a ‘W’, or the Instructor of Record may award an ‘I’ for the course if the student declines to receive a ‘W.’

Per *Senate Rule 5.2.4.2*, students missing any graded work due to an excused absence are responsible: for informing the Instructor of Record about their excused absence within one week following the period of the excused absence (except where prior notification is required); and for making up the missed work. The professor must give the student an opportunity to make up the work and/or the exams missed due to an excused absence, and shall do so, if feasible, during the semester in which the absence occurred.

Verification of Absences

Students may be asked to verify their absences in order for them to be considered excused. *Senate Rule 5.2.4.2* states that faculty have the right to request “appropriate verification” when students claim an excused absence because of illness, or death in the family. Appropriate notification of absences due to University-related trips is required prior to the absence when feasible and in no case more than one week after the absence.

Academic Integrity

Per University policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assignment on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the university may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. Complete information can be found at the following website: <http://www.uky.edu/Ombud> ([Links to an external site.](#)). A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Senate Rules 6.3.1 (see <http://www.uky.edu/Faculty/Senate/> ([Links to an external site.](#)) for the current set of *Senate Rules*) states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to be the result of their own thought, research, or self-expression. In cases where students feel unsure about a question of plagiarism involving their work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording, or content from another source without appropriate acknowledgment of the fact, the students are guilty of plagiarism.

Plagiarism includes reproducing someone else's work (including, but not limited to a published article, a book, a website, computer code, or a paper from a friend) without clear attribution. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work, which a student submits as his/her own, whoever that other person may be. Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student and the student alone.

When a student's assignment involves research in outside sources or information, the student must carefully acknowledge exactly what, where and how he/she has employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content, and phraseology intact is plagiaristic. However, nothing in these Rules shall apply to those ideas, which are so generally and freely circulated as to be a part of the public domain.

Please note that any assignment you turn in may be submitted to an electronic database to check for plagiarism.

Accommodations due to a disability

If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (DRC). The DRC coordinates campus disability services available to students with disabilities. It is located on the corner of Rose Street and Huguelet Drive in the Multidisciplinary Science Building, Suite 407. You can reach them via phone at (859) 257-2754 and via email at drc@uky.edu. Their web address is <http://www.uky.edu/DisabilityResourceCenter> ([Links to an external site.](#)).

Military Members and Veterans

We recognize the complexities of being a member of the military community and also a student. If you are a member of the military or a military veteran or dependent, please inform your instructor if you are in need of special accommodations. Drill schedules, calls to active duty, mandatory training exercises, complications with GI Bill disbursement, and other unforeseen military and veteran-related developments can complicate your academic life. If you are aware of a complication, we will work with you and put you in contact with University staff members who are trained to assist you. Please contact the Coordinator of the University of Kentucky Veterans Resource Center at 859-257-1148 for additional assistance. Visit their [website \(Links to an external site.\)](#) for more available resources.

Non-Discrimination Statement and Title IX Information

The University of Kentucky faculty is committed to supporting students and upholding the University's non-discrimination policy. Discrimination is prohibited at the UK. If you experience an incident of discrimination, we encourage you to report it to Institutional Equity & Equal Opportunity (IEEO) Office, 13 Main Building, 859-257-8927.

Acts of Sex- and Gender-Based Discrimination or Interpersonal Violence

If you experience an incident of sex- or gender-based discrimination or interpersonal violence, we encourage you to report it. While you may talk to or share information with a faculty member, instructor, TA, or RA, understand that as a "Responsible Employee" of the University these individuals **MUST** report any acts of violence (including verbal bullying and sexual harassment) to the University's Title IX Coordinator in the IEEO Office (859-257-8927). If you would like to speak with someone who may be able to afford you confidentiality, the Violence Intervention and Prevention (VIP) program (Frazee Hall – Lower Level; [VIP Center \(Links to an external site.\)](#); 859-257-3574), the Counseling Center (106 Frazee Hall, [UK Counseling Center \(Links to an external site.\)](#); 859-257-8701), and University Health Service (830 S. Limestone; [Student Health \(Links to an external site.\)](#) 859-323-2778) are confidential resources on campus.

Classroom Policies

Submission of Assignments

All written assignments (first/rough and final drafts) **MUST** be submitted to Canvas. If you have submitted correctly, you will see a screen confirming your submission and you can check the grade book to see the assignment has been submitted.

Late Assignments

No late work is accepted. Do not wait until the last minute to submit an assignment; a problem with Canvas, your Wi-Fi connection, your laptop, etc., does not count as an excuse to submit work late.

Responsible Technology Use

E-mail: During the semester, you will receive emails from me with updates and reminders. You are expected to regularly check your **official UK email address**. Practice good mechanics when writing emails! Writing emails to your friends/family can be informal, but when you write emails to your instructors, professors, and potential employers, they should be well-written with as few mistakes as possible.

Canvas

Things happen over the course of a semester, which means the daily schedule may change during the semester. You will be responsible for checking the online syllabus and schedule before beginning your homework for each of our class meetings for any changes or updates. I will post all assignments on Canvas. If you lose an assignment page or handout, you are expected to get a copy from Canvas rather than from me. Make sure to set up your notifications.

Description of Course Activities and Assignments

Your final grade will be determined based on your performance on each of the following items:

- Classwork exercises [8] - 80 points
- Assignments [4] - 160 points

Grading Scale

Percentage	Final Grade
90-100%	A
80-89%	B
70-79%	C
60-69%	D
59% and below	E

Mid-term Grade

- Mid-term grades will be posted in myUK by the deadline established in the Academic Calendar (<http://www.uky.edu/registrar/calendar> (Links to an external site.))

Important Link:

- Spring Semester Academic [Dates](#) (Links to an external site.)

Tentative Course Schedule - Spring 2020

Date	Content	Readings/Due dates
	<i>Week 1</i>	
R 1/16	Course Introduction	
	<i>Week 2</i>	
T 1/21	Introduction to data science Essential concepts	Section 1 (p. 2- 7)
R 1/23	Data types in Statistics	Chapter 1
	<i>Week 3</i>	
T 1/28	Introduction to R software - R studio installation	Chapter 2
R 1/30	R Basics (PPT)	
	<i>Week 4</i>	
T 2/4	R Basics (RStudio)	Chapter 3
R 2/6	CW # 1 – R basics	

Week 5

T 2/11 Handling data in R (RStudio) Chapter 4 & 5

R 2/13 CW# 2 – Handling data in R

Week 6

T 2/18 Descriptive statistics (RStudio) Chapter 6

R 2/20 CW # 3 - Basic statistics Due - Assignment # 1

Week 7

T 2/25 Sampling distributions (PPT, Jupyter) Chapter 7

R 2/27 Data frame and vectors in R (Revision of previous work) (RStudio)

Week 8

T 3/3 Hypothesis testing (PPT) Chapter 8

R 3/5 t-Test (PPT) Chapter 10

Week 9

T 3/10 t-test (RStudio)

R 3/12 CW # 4 – hypothesis testing and t-test

Week 10: SPRING BREAK

3/16-3/20 Spring Break

Week 11

T 3/24 Correlation Due- Assignment # 2

R 3/26 Linear regression

Week 12

T 3/31 Linear regression and Correlations (RStudio)

R 4/2 CW # 5 – Linear regression

Week 13

T 4/7 Multiple linear regression

R 4/9 CW # 6 - Multiple linear regression

Week 14

T 4/14 Model selection Due Assignment # 3

R 4/16 Model selection – (RStudio) CW # 7

Week 15

T 4/21 Text Mining

R 4/23 Text Mining (RStudio) CW # 8

Week 16

T 4/28 A brief intro to kNN classifier.

R 4/30 Catching up day. Q&A Due Assignment # 4

Week 17: Finals Week

No final exams