

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

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Office Hours: 9:00– 10:00 AM MW (Virtual office hours) or by appointment

**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.

**1. Technology Information and Requirements**

Technology Requirements

Minimum technical requirements for UK courses and suggested hardware, software, and internet connections are available at ITS Student Hardware & Software Guidelines.

Technical Support: For account help, contact UK's Information Technology Customer Services online, by email, or by phone at 859-218-HELP (4357).

**2. Resources**

Distance Learning Library Services

Carla Cantagallo, Distance Learning Librarian, 859-218-1240

**3. Midterm Grades for Undergraduate Students (Senate Rules 6.1.3.A)**

Mid-term grades will be posted in myUK by the deadline established in the Academic Calendar.

#### **4. Excused Absences (Senate Rules 5.2.4.2)**

Senate Rules 5.2.4.2 defines the following as acceptable reasons for excused absences: (a) significant illness, (b) death of a family member, (c) trips for members of student organizations sponsored by an educational unit, trips for University classes, and trips for participation in intercollegiate athletic events, (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 instructor of record. Students should notify the professor of absences prior to class when possible.

If a course syllabus requires specific interactions (e.g., with the instructor or other students), in situations where a student's total EXCUSED absences exceed 1/5 (or 20%) of the required interactions for the course, the student shall have the right to request and receive a "W," or the Instructor of Record may award an "I" for the course if the student declines a "W." (Senate Rules 5.2.4.2.1)

(If an attendance/interaction policy is not stated in the course syllabus or the policy does not include a penalty to the student, the Instructor cannot penalize the student for any unexcused absences.)

#### **5. Verification of Absences (Senate Rules 5.2.4.2.A, B, C, and E)**

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 due to: significant illness; death in the household, trips for classes, trips sponsored by an educational unit and trips for participation related to intercollegiate athletic events; and interviews for full-time job opportunities after graduation and interviews for graduate and professional school. (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.)

#### **6. Academic Policies in relation to COVID-19**

Excused Absences: Quarantine

Academic policies regarding excused absences can be found in the Senate Rules under "Excused Absences." The Senate Council has interpreted excused absences for the Fall 2020 semester to include an excuse from required in-person interactions if the student has been directed to self-quarantine by the University (including its app), a medical professional, public health professional, or government official.

#### **7. Fall Academic Calendar and Reading Days**

Several modifications to the academic calendar have been made in response to the COVID-19 situation. The current calendar is available [here](#).

The calendar features a Reading Day. The current Dead Week restrictions on certain instructional activities would continue to apply to Reading Days. An additional restriction would apply to Reading Days, namely no required class meetings or, more generally, no “required interactions.” Reading Days are not academic holidays.

### **8. Face Covering/Distancing Policy**

In accordance with University guidelines, students must wear UK-approved face coverings in the classroom and academic buildings (e.g., faculty offices, laboratories, libraries, performance/design studios, and common study areas where students might congregate). If UK-approved face coverings are not worn over the nose and mouth, students will be asked to leave the classroom.

Students should complete their daily online wellness screening before accessing university facilities and arriving to class.

Students should not move chairs or barriers in classrooms and should socially distance at all times, leaving a six (6) foot radius from other people. Masks and hand sanitizer can be found {specific location in building} if needed.

Students should leave enough space when entering and exiting a room. Students should not crowd doorways at the beginning or end of class.

The instructor may choose to remove a mask when pedagogically necessary at the front of the classroom and behind a clear barrier. The instructor's mask will be replaced when it is no longer necessary to have it removed, or when the class meeting is complete.

### **9. Class Recording Notification**

The University of Kentucky Student Code of Conduct defines Invasion of Privacy as using electronic or other devices to make a photographic, audio, or video record of any person without their prior knowledge or consent when such a recording is likely to cause injury or distress.

Meetings of this course may be recorded. All video and audio recordings of lecturers and class meetings, provided by the instructors, are for educational use by students in this class only. They are available only through the Canvas shell for this course and are not to be copied, shared, or redistributed.

As addressed in the Student Code of Conduct, students are expected to follow appropriate university policies and maintain the security of linkblue accounts used to access recorded class materials. Recordings may not be reproduced, shared with those not enrolled in the class, or uploaded to other online environments.

If the instructor or a University of Kentucky office plans any other uses for the recordings, beyond this class, students identifiable in the recordings will be notified to request consent prior to such use. In anticipation of such cases, students may be asked to complete an “authorization of use” form by a faculty member.

Video and audio recordings by students are not permitted during the class unless the student has received prior permission from the instructor. Any sharing, distribution, and or uploading of these recordings outside of the parameters of the class is prohibited. Students with specific recording accommodations approved by the Disability Resource Center should present their official documentation to the instructor.

All content for this course, including handouts, assignments, and lectures are the intellectual property of the instructors and cannot be reproduced or sold without prior permission from the instructors. A student may use the material for reasonable educational and professional purposes extending beyond this class, such as studying for a comprehensive or qualifying examination in a degree program, preparing for a professional or certification examination, or to assist in fulfilling responsibilities at a job or internship.

#### **10. Religious Observances (Senate Rules 5.2.4.2.D)**

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. Please check the course syllabus for the notification requirement. If no requirement is specified, two weeks prior to the absence is reasonable and should not be given any later. Information regarding major religious holidays may be obtained through the Ombud's website or calling 859-257-3737.

#### **11. Make-Up Work (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 instructor must give the student an opportunity to make up the work and/or the exams missed due to the excused absence, and shall do so, if feasible, during the semester in which the absence occurred. The instructor shall provide the student with an opportunity to make up the graded work and may not simply calculate the student's grade on the basis of the other course requirements, unless the student agrees in writing.

#### **12. Accommodations Due to 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. Visit the DRC website, email the DRC, contact them by phone at (859) 257-2754, or visit their office on the corner of Rose Street and Huguelet Drive in the Multidisciplinary Science Building, Suite 407.

#### **13. Non-Discrimination Statement and Title IX Information**

UK is committed to providing a safe learning, living, and working environment for all members of the University community. The University maintains a comprehensive program which protects all members from discrimination, harassment, and sexual misconduct. For complete information about UK's prohibition on discrimination and harassment on aspects such as race, color, ethnic origin, national origin, creed, religion, political belief, sex, and sexual orientation, please see the electronic version of UK's Administrative Regulation 6:1 ("Policy on Discrimination and Harassment") . In accordance with Title IX of the Education Amendments of 1972, the University prohibits discrimination and harassment on the basis of sex in academics, employment, and all of its programs and activities. Sexual misconduct is a form of sexual harassment in which one act is severe enough to create a hostile environment based on sex and is prohibited between members of the University community and shall not be tolerated. For more details, please see the electronic version of Administrative Regulations 6:2 ("Policy and Procedures for Addressing and Resolving Allegations of Sexual Assault, Stalking, Dating Violence, Domestic Violence, and Sexual Exploitation"). Complaints regarding violations of University policies on discrimination, harassment, and sexual misconduct are handled by the Office of Institutional Equity and Equal Opportunity (IEEO), which is located in 13 Main Building and can be reached by phone at (859) 257-8927. You can also visit the IEEO's website.

Faculty members are obligated to forward any report made by a student related to IEEO matters to the Office of Institutional Equity and Equal Opportunity. Students can confidentially report alleged incidences through the Violence Intervention and Prevention Center, Counseling Center, or University Health Services.

#### **14. Academic Integrity– Prohibition on Plagiarism (Senate Rules 6.3.1)**

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 on the Academic Ombud page. 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 Rule 6.3.1 (see current 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: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.

### **Academic Integrity – Prohibition on Cheating (Senate Rules 6.3.2)**

Cheating is defined by its general usage. It includes, but is not limited to, the wrongfully giving, taking, or presenting any information or material by a student with the intent of aiding himself/herself or another on any academic work which is considered in any way in the determination of the final grade. The fact that a student could not have benefited from an action is not by itself proof that the action does not constitute cheating. Any question of definition shall be referred to the University Appeals Board.

### **Academic Integrity – Prohibition on Falsification/Misuse of Academic Records (SR 6.3.3)**

Maintaining the integrity, accuracy, and appropriate privacy of student academic records is an essential administrative function of the University and a basic protection of all students. Accordingly, the actual or attempted falsification, theft, misrepresentation or other alteration or misuse of any official academic record of the University, specifically including knowingly having unauthorized access to such records or the unauthorized disclosure of information contained in such records, is a serious academic offense. As used in this context, "academic record" includes all paper and electronic versions of the partial or complete permanent academic record, all official and unofficial academic transcripts, application documents and admission credentials, and all academic record

transaction documents. The minimum sanction for falsification, including the omission of information, or attempted falsification or other misuse of academic records as described in this section is suspension for one semester.

### **Course Material Copyright Statement**

Materials distributed or made available to students in connection with this course may be copyright protected. They are intended for use only by students registered and enrolled in this course and only for the instructional activities associated with and for the duration of this course. They may not be converted to or retained in another medium or disseminated further.

### **Bias Incident Support Services**

Bias Incident Support Services (BISS) provides confidential support and advocacy for any student, staff, or faculty member impacted by bias, hatred, and/or an act of identity-based violence. BISS staff aid impacted parties in accessing campus and community resources, including the Bias Incident Response Team, the University's official reporting system for acts that negatively impact a sense of belonging. Campus and community consultation and educational opportunities centered on inclusion, diversity, equity and belonging is a resource also provided by BISS. For more detailed information please visit the BISS website or contact them via email.

### **Counseling Center**

The UK Counseling Center (UKCC) provides a range of confidential psychological services to students enrolled in 6 credit hours or more, psychoeducational outreach programming (including QPR suicide prevention), and consultation to members of the UK community (students, faculty, staff, administrators, parents, concerned others). Please visit the website <https://www.uky.edu/counselingcenter/> for more detailed information, or call 859.257.8701.

### **Martin Luther King Center**

The Martin Luther King Center (MLKC) supports an inclusive learning environment where diversity and individual differences are understood, respected, and appreciated as a source of strength. The MLKC's year-round programs and activities that focus on the importance of cultural awareness and cross-cultural understanding support its three primary goals: 1) sponsoring cultural and educational programming; 2) offering opportunities for student support and development; and 3) through programmatic linkages with a wide variety of civic and community agencies, promoting community outreach, engagement, and collaboration. Students can reach the MLKC via phone at (859) 257-4130, by visiting them in Gatton Student Center Suite A230, via email, and by visiting the MLKC website.

### **Office of LGBTQ\* Resources**

UK is committed to supporting students and upholding the University's efforts to promote inclusion among our community. UK faculty and staff employees support inclusion and diversity throughout the University, including the ways in which faculty structure classroom conversations and manage those dynamics. To assist in these efforts, students are welcome to provide the names and pronouns they prefer. One easy way to do this is by using the pronoun feature of UK's Name Change Form. (More information about the form can be found on the Office of LGBTQ\*'s website.) Otherwise, students can provide this information to faculty members directly.

Discrimination based on sexual orientation, gender expression, and gender identity is prohibited at UK. If you have questions about support, advocacy, and community-building services related to sexual orientation, gender expression, or gender identity, students are encouraged to visit the website of the Office of LGBTQ\* Resources.

### **Veteran's Resource Center**

Being both a member of the military community and a student can bring some complexities. If you are a member of the military or a military veteran or dependent, please let me know when these challenges arise. Drill schedules, calls to active duty, mandatory training exercises, issues with GI Bill disbursement, etc. can complicate your academic life. Please let me know if you experience complications and I will do my best to work with you.

If you are a military student serving in the National Guard or Reserve it is in your best interest to let all of your professors know that immediately. You might also consider sharing a copy of your training schedule as well as any orders activating you. The Veterans Resource Center (VRC) can provide a letter for your professors validating your absence but be aware that there is no current UK policy protecting military students who miss class due to short term activations such as long weekend drills, annual training or emergency activations. See the instructor or the VRC for details.

The VRC is a great resource for members of our military family. If you have questions regarding your VA benefits or other related issues, the VRC has a full complement of staff to assist you. The VRC also provides study and lounge space, as well as free printing. Please visit the VRC website, email the DRC, visit them in the basement of Erikson Hall, or call the director, Tony Dotson, at (859) 257-1148.

### **Violence Intervention and Prevention (VIP) Center**

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 a faculty member or TA/RA/GA, 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. If you would like to speak with someone who may be able to afford you confidentiality, you can visit the Violence Intervention and Prevention (VIP) Center's website (offices located in Frazee

Hall, lower level; email them; or call (859) 257-3574), the Counseling Center's (CC) website (106 Frazee Hall; (859) ), and the University Health Services (UHS) website; the VIP Center, CC, and UHS are confidential resources on campus. The VIP Center accepts walk-in appointments.

### 15. Discussing Grades

Students who have grade or exam concerns must approach the professor during office hours, or through appointment. Once grades are posted online, you may visit the professor during office hours or by appointment. Please contact the professor if you do not find your score posted.

Students who wish to discuss grades or scores earned have one week from the date grades are posted to do so. Grades will not be addressed after this time period has expired. Students need to contact the professor for an appointment to discuss the issue. Students must bring a written explanation of their dispute with them to this appointment. If the matter is still unresolved, students need to contact the Director of Instructional Communication & Research. Students that do not fulfill these requirements will not be addressed and the original grades will be final.

### 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>)

## Tentative Course Schedule - Spring 2021

Date	Topics	Assignments Due
<b>Module 1: /25-1/29</b>		
M 1/25	Course Introduction	
W 1/27	Introduction to data science	Section 1 (p. 2- 7)
<b>Module 2: 2/1-2/5</b>		
M 2/1	Essential concepts – A brief introduction to developments in data science	
W 2/3	Data types in Statistics	Chapter 1
<b>Module 3: 2/8-2/12</b>		
M 2/8	Introduction to R software - R studio installation	Chapter 2
W 2/10	R Basics (PPT)	
<b>Module 4: 2/15-2/19</b>		
M 2/15	R Basics (RStudio)	Chapter 3
W 2/17	CW # 1 – R basics	
<b>Module 5: 2/22-2/26</b>		
M 2/22	Handling data in R (RStudio)	Chapter 4 & 5
W 2/26	CW# 2 – Handling data in R	
<b>Module 6: 3/1-3/5</b>		
M 3/1	Descriptive statistics (RStudio)	Chapter 6
W 3/3	CW # 3 - Basic statistics	Due - Assignment # 1
<b>Module 7: 3/8-3/12</b>		
M 3/8	Sampling distributions (PPT, Jupyter)	Chapter 7
W 3/10	Data frame and vectors in R (Revision of previous work) (RStudio)	
<b>Module 8: 3/15-3/19</b>		
M 10/5	Hypothesis testing (PPT)	Chapter 8
W 10/7	t-Test (PPT)	Chapter 10
<b>Module 9: 3/22-3/26</b>		
M 3/22	t-test (RStudio)	<b>MIDTERM</b>
W 3/24	CW # 4 – hypothesis testing and t-test	
<b>Module 10: 3/29-4/2</b>		
M 3/29	Correlation	Due- Assignment # 2
W 3/31	Linear regression	
<b>Module 11: 4/5-4/9</b>		
M 4/5	Linear regression and Correlations (RStudio)	
W 4/7	CW # 5 – Linear regression	
<b>Module 12: 4/12-4/16</b>		

M 4/12	Multiple linear regression	
W 4/14	CW # 6 - Multiple linear regression	
<b>Module 13: 4/19-23</b>		
M 4/19	Model selection	Due Assignment # 3
W 4/21	Model selection – (RStudio) CW # 7	
<b>Module 14: 4/26-4/30</b>		
M 4/26	Text Mining	
W 4/28	Text Mining (RStudio) CW # 8	
<b>Module 15: 5/3-5/7</b>		
M 5/3	A brief intro to kNN classifier.	
W 5/5	Catching up day. Q&A	Due Assignment # 4