

Syllabus: Introduction to Machine Learning Fall 2020

ICT 390-002: Introduction to Machine Learning Fall 2020

Instructor Raj Gaur

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Virtual Office MWF 10 – 11 am and by appointment

Hours Zoom address: <https://uky.zoom.us/j/91334858810> (<https://uky.zoom.us/j/91334858810>)

Course Website <http://www.uky.edu/canvas>

Course Description: This course has been designed to help you learn complex theory, algorithms, and coding libraries related to Machine Learning in a methodical manner. This course will help you will develop new skills and improve your understanding of Data Science. The main focus of this course is getting a good handle over both regression and classification models used for machine learning.

Learning Outcomes:

- Learn the necessary skills in R programming to access, prepare data, and analyze for machine learning models.
- Intuitional and practical understanding of supervised Machine Learning models for regression and classification.
- A practical and statistical understanding of regression and classification models.
- Learn the necessary skills in R programming to access and prepare data for modeling.
- Ability to make accurate predictions using robust Machine Learning models.
- Know which Machine Learning model to choose for each type of problem

Prerequisites: A working knowledge of R software and should have taken courses in basic statistics.

Course Learning Targets, Outcomes, and Assessments: This course has been designed to provide students with opportunities to acquire skills, knowledge, conceptual understanding, classroom experience, and professional practice related to their ICT majors.

Course Delivery: This course is designed as a **Hybrid** course and lectures, activities, and assignments are supplemented through the use of Canvas.

Required Texts:

Suggested readings will be provided on Canvas.

Technology Requirements: Minimum technical requirements for UK courses and suggested hardware, software, and internet connections are available at [ITS Student Hardware & Software Guidelines](http://www.uky.edu/its/student-hardware-software-guidelines) (<http://www.uky.edu/its/student-hardware-software-guidelines>). Requirements include: Computer with internet access or access to UK computer facilities; access to digital video recording devices and Microsoft Office. See <https://download.uky.edu/> (<https://download.uky.edu/>) for free versions.

Technical Support: For account help, contact UK's [Information Technology Customer Services online](http://www.uky.edu/UKIT) (<http://www.uky.edu/UKIT>), by [email \(mailto:218help@uky.edu\)](mailto:218help@uky.edu), or by phone at 859-218-HELP (4357).

COURSE POLICIES

1. Attendance and Punctuality

This class is a community whose success is dependent on everyone's participation. Also, there is a strong correlation between class attendance and grades. Therefore, attendance is vital for your achievement. Please reference the definition of excused absence in current edition of *Students Rights and Responsibilities* or on the web at <http://www.uky.edu/studentconduct/code-student-conduct> (<http://www.uky.edu/studentconduct/code-student-conduct>). For any emergency situation that arises, e-mail your instructor as soon as you know about the situation.

Excused Absences

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.

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 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.)

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](https://www.uky.edu/ombud/religious-observation-accommodations) [_\(https://www.uky.edu/ombud/religious-observation-accommodations\)](https://www.uky.edu/ombud/religious-observation-accommodations) or calling 859-257-3737.

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.

Important Spring Semester Dates: <https://www.uky.edu/registrar/fall-2020-semester>
[_\(https://www.uky.edu/registrar/fall-2020-semester\)](https://www.uky.edu/registrar/fall-2020-semester)

*Mid-term grades will be posted in myUK by the deadline established in the [Academic Calendar](http://www.uky.edu/registrar/content/academic-calendar)
[_\(http://www.uky.edu/registrar/content/academic-calendar\)](http://www.uky.edu/registrar/content/academic-calendar).

2. Academic Integrity Policy

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](http://www.uky.edu/deanofstudents/student-rights-and-responsibilities) [_\(http://www.uky.edu/deanofstudents/student-rights-and-responsibilities\)_](http://www.uky.edu/deanofstudents/student-rights-and-responsibilities). Complete information can be found on the **[Academic Ombud](http://www.uky.edu/Ombud)** [_\(http://www.uky.edu/Ombud\)_](http://www.uky.edu/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](http://www.uky.edu/Faculty/Senate/)** [_\(http://www.uky.edu/Faculty/Senate/\)_](http://www.uky.edu/Faculty/Senate/)) 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.

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.

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.

3. 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](http://www.uky.edu/DisabilityResourceCenter) (<http://www.uky.edu/DisabilityResourceCenter>), [email the DRC](mailto:drc@uky.edu) (<mailto:drc@uky.edu>), contact them by phone at (859) 257-2754, or visit their office on the corner of Rose Street and Huguélet Drive in the Multidisciplinary Science Building, Suite 407.

4. Non-Discrimination Statement and Title IX Policy

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 \("Policy on Discrimination and Harassment"\)](https://www.uky.edu/regs/sites/www.uky.edu.regs/files/files/ar/ar6-1.pdf) (<https://www.uky.edu/regs/sites/www.uky.edu.regs/files/files/ar/ar6-1.pdf>). 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 \("Policy and Procedures for Addressing and Resolving Allegations of Sexual Assault, Stalking, Dating Violence, Domestic Violence, and Sexual Exploitation"\)](https://www.uky.edu/regs/sites/www.uky.edu.regs/files/files/ar/ar6-2_final_0682018_08-01-18_corrections.pdf) (https://www.uky.edu/regs/sites/www.uky.edu.regs/files/files/ar/ar6-2_final_0682018_08-01-18_corrections.pdf). 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](https://www.uky.edu/eeo/) [\(https://www.uky.edu/eeo/\)](https://www.uky.edu/eeo/).

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.

Important Notes

- **You are responsible for all information, announcements, and changes addressed in classes and/or Canvas.**
- **The instructor reserves the right to alter the syllabus during the semester, if necessary.**

6. 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.

Grades

All grading will be calculated as objectively as possible; however, in cases of qualitative assessment, evaluation will be based on the instructor's judgment. Rubrics are used for assessing assignments and are provided to students when assignments are introduced in class. Grades will be based on the scores accumulated by the student divided by the total number of possible points.

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

- Assignments [4] - 200 points

Grading Scale

Percentage	Final Grade
90-100%	A

80-89%	B
70-79%	C
60-69%	D
59% and below	E

Incompletes. A grade of “I” (incomplete) will be given in emergency situations only, and will be at the discretion of the instructor. Students will have one year to complete all work if an “I” is awarded. The incomplete must be completed prior to student teaching.

Spring 2020 ICT 390-002 Tentative Schedule

Date	Topics	Assignments Due
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Module 1: 8/17-8/21

M 8/17	Course Introduction	
W 8/19	What is Machine Learning? Qs about R	
F 8/21	Virtual lab – Help with installing R or getting started	

Module 2: 8/24-8/28

M 8/24	Data preprocessing - Intuition	
W 8/26	Application in R	
F 8/28	Virtual lab	

Module 3: 8/31–9/4

M 8/31	Simple linear regression	
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Module 8: 10/5-10/9

M 10/5 Evaluating regression model performance

W 10/7 Application in R

F 10/9 Virtual lab

Module 9: 10/12-10/16

M 10/12 Classification (Logistic Regression) **MIDTERM**

W 10/14 Application in R

F 10/16 Virtual lab Assignment # 2

Module 10: 10/19-10/23

M 10/19 kNN algorithm

W 10/21 Application in R

F 10/23 Virtual lab

Module 11: 10/26-10/30

M 10/26 Support Vector Machines (SVM)

W 10/28 Application in R

F 10/30 Virtual lab Assignment #3

Module 12: 11/2-11/6

M 11/2 Decision Tree for classification

