## MIS 64060 - Machine Learning - Fall 2019 Thursdays, 6:35 pm - 9:20 pm, 209 BSA

Instructor: Murali Shanker

Email: [mshanker@kent.edu](mailto:mshanker@kent.edu)

Phone: +1 330 672 1165

Office Hours: T: Noon - 2:00 p.m., Th: 5:00 - 6:30 p.m, and by appointment - A401 BSA

### Course Description

Fundamentals of Machine Learning is one of the core courses of the Master of Science in Business Analytics (MSBA) program. In this course, students learn some fundamentals of machine learning as they can be applied to solve various business problems. Specifically, the course concentrates on classification modelling, segmentation and clustering, and recommendation systems. Students entering the course should be able to operate a computer and navigate Blackboard Learn, have skills in word processing software such as Microsoft Word and have the willingness to learn some basic computer programming using the R language.

### Learning Outcomes

By the end of this course, students will be able to:

* Think critically about how to use machine learning algorithms to solve a given business problem.
* Know how to formulate business problems and identify relevant data to use in modeling frameworks.
* Know how to evaluate the appropriateness and estimate the performance of various machine learning models for a given task.
* Know how to use software tools (such as R) effectively to implement machine learning algorithms for data mining/visualization and analytics;
* Foster the communication and presentation of statistical results and inferences.

### University Policies

Students are required to be aware of and follow all general and academic policies established by Kent State University.

#### Students with Disabilities

University policy 3342-3-01.3 requires that students with disabilities be provided reasonable accommodations to ensure their equal access to course content. If you have a documented disability and require accommodations, please contact the instructor at the beginning of the semester to make arrangements for necessary classroom adjustments. Please note, you must first verify your eligibility for these through Student Accessibility Services (contact 330-672-3391 or visit [www.kent.edu/sas](http://www.kent.edu/sas) for more information on registration procedures).

#### Course Enrollment and Withdrawal

University policy requires all students to be officially registered in each class they are attending. Students who are not officially registered for a course by published deadlines should not be attending classes and will not receive credit or a grade for the course. Each student must confirm enrollment by checking his/her class schedule (using Student Tools in FlashLine) prior to the deadline indicated.

If registration errors are not corrected by this date and you continue to attend and participate in classes for which you are not officially enrolled, you are advised now that you will not receive a grade at the conclusion of the semester for any class in which you are not properly registered. Also, it is your responsibility to check the withdrawal dates for each semester.

Every class has its own schedule of deadlines and considerations. To view the add/drop schedule and other important dates for this class, go to Student > Resources > Courses and Registration in FlashLine. Choose View or Print Course Schedule and Purchase Textbooks. To see the deadlines for this course, click on the CRN. The add/drop schedule and important dates may also be found on the Drop or Add a Course link. Click on the green clock next to the course under Registration Deadlines.

#### Plagiarism and Academic Integrity

Students enrolled in the university, at all its campuses, are to perform their academic work according to standards set by faculty members, departments, schools and colleges of the university; and cheating and plagiarism constitute fraudulent misrepresentation for which no credit can be given and for which appropriate sanctions are warranted and will be applied.

For more information see the Kent State policy on plagiarism in the University policies sectionof the Getting Started in Your Online Course link within the Start Here folder.

#### Subject to Change Statement

The syllabus and course schedule may be subject to change. Changes will be communicated via email or the Blackboard Learn announcement tool. It is the responsibility of students to check email messages and course announcements to stay current in their online courses.

### Course Content and Instruction

**Textbook**: There are no required textbooks, but here are some recommended readings:

* Peng, Roger D. R programming for data science. Lulu. com, 2015. This book is freely available at: <https://leanpub.com/rprogramming>. The following parts of the book should be covered:
  + Part 4: Getting Started with R, page 9
  + Part 5: R Nuts and Bolts, pages 10-22
  + Part 6: Getting Data in and out of R, pages 23-30
  + Part 14: Control Structures 62-69
* <https://www.dataminingbook.com/book/r-edition>

**Software**:

* We will be using [R](https://www.r-project.org/). Please also install a copy of [RStudio](https://www.rstudio.com/). Extensive [help](https://cran.r-project.org/manuals.html) for R is available online. You can also install [Swirl](http://swirlstats.com/), which will help you learn R. Here is [further](https://libguides.library.kent.edu/statconsulting/r) documentation from the library on the use of R.
* You will also build a [Shiny](https://shiny.rstudio.com/) app for your presentation. Install that.
* We will also be using [GitHub](https://github.com/) and [Git](https://git-scm.com/). Please install them, and create a personal account on GitHub. You can also install the [desktop](https://desktop.github.com/) client for GitHub. Both Git and GitHub are well [documented](https://help.github.com/categories/bootcamp/).
* The GitHub address for our class is <https://github.com/KSU-MSBA/64060.git>. Synchronize that to your computer.

### Assessments

Your grade will be based on your performance of the following assessments.

* Individual assignments (approximately 4-6) - 50%
* Quizzes / Midterm - 25%
* Final Examination / Project - 25%

### Grades

The course will follow the standard +/- grading system. Total percentage below 64 will result in a failing grade for the course.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Grade | A | A- | B+ | B | B- | C+ | C | C- | D+ | D |
| Min % | 94 | 90 | 87 | 84 | 80 | 77 | 74 | 70 | 67 | 64 |

### Content Outline

|  |  |  |
| --- | --- | --- |
| Module | Title | Time frame |
| Module 0 | Boot Camp | Week 1 |
| Module 1 | Introduction to Machine Learning | Week 2 |
| Module 2 | Introduction to R | Week 3 |
| Module 3 | Fundamental Concepts in Supervised Learning | Week 4 |
| Module 4 | KNN Classification | Weeks 5-6 |
| Module 5 | Naïve Bayes Classification | Week 7 |
| Module 6 | K-mean clustering algorithm | Weeks 8-9 |
| Module 7 | DBSCAN clustering algorithm | Weeks 10-11 |
| Module 8 | Hierarchical Clustering | Weeks 12-13 |
| Module 9 | Recommendation Systems | Weeks 14-15 |