

Machine Learning

ITAO 70310

Fall 2018

Instructor: Fred Nwanganga
Assistant Teaching Professor
332 Mendoza College of Business
(574) 631-7598 (office) | (574) 303-4770 (mobile/text)
fnwangan@nd.edu

Class Time and Location: Mondays and Wednesdays, from 8:00 AM to 9:50 AM in Room L068, Mendoza College of Business.

Office Hours: Tuesdays, from 1:00 PM to 3:00 PM; Wednesdays, from 10:00 AM to 12:00 AM.

If you wish to see me, please make an appointment so that I know to expect you. You may book appointment slots during my office hours using [this link](#).

If you would like to see me outside my office hours, simply send me an email. I will also make myself available to you before and after our class sessions, as well as at any other time that works for both of us.

Course Description: This course will introduce the fundamental concepts of machine learning, with a focus on the most common techniques and applications used by practitioners for both supervised and unsupervised learning using R.

Besides being introduced to techniques for data acquisition, preparation and exploration, students will learn how to choose an appropriate machine learning model, train the model, evaluate the model and draw meaningful insight from the model. The machine learning algorithms and methods covered in the course include clustering, association rules, logistic regression, probabilistic (bayesian) classification, black box methods such as artificial neural networks and support vector machines, decision trees and several ensemble methods.

Learning Goals: By successfully completing this course, you will fulfill the following objectives:

- Gain a foundational understanding of both supervised and unsupervised machine learning.
- Develop an applied knowledge of data collection, exploration and transformation concepts.
- Understand the theoretical concepts behind clustering, association rules, decision trees, naive bayes, logistic regression, neural networks and support vector machines.
- Develop an applied knowledge of when and how to apply various machine learning models to business problems using R

Supplemental Materials: There is no required text for this class but you can use the following as supplements to the material covered in the course:

[Machine Learning with R \(Second Edition\)](#)

Brett Lantz
ISBN 978-1784393908

[R for Data Science](#)

Hadley Wickham and Garrett Golemund
ISBN 9781491910399

(Note: If you do not want a hard copy, you can [access this book online](#) at no charge.)

[DataCamp](#)

A free account to DataCamp is also available to you, through the University, for the duration of the course. DataCamp provides some alternative perspectives and explanations for some of the material covered in this course. Make use of it as often as is required or needed.

Honor Code: This class is conducted in accordance with the University’s Academic Code of Honor. I have a zero-tolerance policy for violations of this policy. To quote from du Lac, “*At a minimum, a student found responsible for an Honor Code violation usually fails the assignment in question. A more serious offense may result in failure of an entire course, or suspension or dismissal from the university.*”

My expectation for this course is that you will collaborate with other students during our in-class hands-on exercises. I expect that you will complete homework assignments on your own. You may discuss general strategies for solving problems with other students, but the assignment you turn in should be entirely your own work.

The final exam is to be taken in a closed-book manner, with no access to external resources or collaboration of any kind.

Grading: Grades for the course will be determined using the following weightings:

Item	Weight
Assignments and Quizzes	65%
Final Exam	25%
Participation	10%

Letter grades will be assigned based upon your weighted average in the course. I *generally* use the following scale for assigning letter grades in this course:

Range	Grade	Range	Grade
93.0 or above	A	77.0 - 79.9	C+
90.0 - 92.9	A-	73.0 - 76.9	C
87.0 - 89.9	B+	70.0 - 72.9	C-
83.0 - 86.9	B	60.0 - 69.9	D
80.0 - 82.9	B-	59.9 or below	F

However, it is important to note that the IT, Analytics and Operations department follows a grading policy for graduate courses that the overall GPA for a course must fall into the range of 3.3-3.6. After computing final grades according to my standard formula, I will compute the overall GPA for the class. If the overall GPA falls outside the required range, I will adjust the grading scale accordingly.

Assignments: You will have one self-study assignment and three application assignments in this class. The self-study assignment will be worth 5% of your final grade, while the application assignments will each be worth 10%. Be careful to follow the specific instructions for the content, formatting, and submission of each assignment.

You are expected to turn assignments in on time. **All assignments are due by 11:55 PM ET (just before midnight)** on the indicated date. Assignments turned in after the deadline but within one week of the due date/time will be assessed a 25% penalty. No assignments will be accepted more than one week after the deadline.

Participation: The success of this class depends upon your active participation and the dedication of your full attention to our class discussions. For this reason, class participation will be included in the calculation of your final grade.

You may use electronic devices in class to take notes and to follow along with the examples that we use. Please be considerate of others and silence all of your electronic devices. Also, please take care to make sure that your device use is not a distraction to you or others.

Course Schedule

Session	Topic	Assignment Due
Monday 8/20	Intro to Machine Learning	
Wednesday 8/22	Data Exploration & Preparation	Self-study Assignment
Monday 8/27	Quiz and Lab 1	
Wednesday 8/29	Association Rules	
Monday 9/3	Clustering	Assignment 1
Wednesday 9/5	Quiz and Lab 2	
Monday 9/10	Lazy Learning	
Wednesday 9/12	Regression Methods	Assignment 2
Monday 9/17	Probabilistic Learning	
Wednesday 9/19	Greedy Learners	
Monday 9/24	Quiz and Lab 3	
Wednesday 9/26	Black Box Methods	
Monday 10/1	Ensemble Methods	Assignment 3
Wednesday 10/3	Reading Day (no class)	
Wednesday 10/4 (7:30-9:20 AM)	Final Exam	