Department of Computer Science

Spring 2021 Course Syllabus

***CS 484 INTRODUCTION TO MACHINE LEARNING***

Thursday, 6:45 pm to 9:35 pm

January 21, 2021 to May 6, 2021

McCormick Tribune Campus Center 723

Mr. Ming-Long Lam, Ph.D.

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# PREREQUISITES

For Undergraduate Students, a minimum grade of C in MATH151 and CS116, or equivalents. For Graduate Students, a minimum grade of C in CS401 and CS402, or equivalents.

# COURSE DESCRIPTION

This is a survey style course in machine learning concepts and algorithms. Basic knowledge of statistical and probability theory is expected. During the course, the instructor will introduce the techniques, present the mathematical concepts, and describe the algorithms used in machine learning. The primary goal is to help you formulate the ways to execute machine learning algorithms and to evaluate their performances. The second goal is to raise your awareness of the strengths and the limitations of various machine learning algorithms.

The topics include K-Means Clustering, Nearest Neighbors, Decision Tree, Naive Bayes, Logistic Regression, Support Vector Machines, Neural Network, Ensemble Model, and Gradient Boosting. The focus is on practical aspects of machine learning, including data preparation, experimental design, and modern tools for building machine learning systems.

# LEARNING OUTCOMES

* Explain the Machine Learning motivation and applications
* Translate a business problem into a closely related set of machine learning tasks
* Explain and apply various machine learning algorithms, including, Decision trees, Naive Bayes, Logistic regression, and Neural networks
* Evaluate various machine learning algorithms for various problems
* Be aware of model bias and ethical issues when creating models
* Recognize strengths and mitigate disadvantages of the machine learning algorithms
* Present analytical solutions that add business values for decision making

# TOPICS

* What is Machine Learning?
* Memory-Based Reasoning
* Association Rule Learning
* Clustering
* Decision Trees
* Multinomial Logistic Regression
* Learner Evaluation and Comparison
* Dimension Reduction
* Naïve Bayes
* Neural Networks
* Support Vector Machines
* Model Ensemble

# SOFTWARE

**Required**: Python 3.7.5 (Windows, macOS, or Linux), available from the Anaconda distribution. The Spyder development environment is preferred, but not required.

# REFERENCE

**Recommended**: Ming-Long Lam (2020). *A Practitioner's Guide to Machine Learning*, Kendall Hunt Publishing Company. <https://he.kendallhunt.com/product/practitioners-guide-machine-learning>

# EVALUATION

* Assignments account for 50% of your course score
* One Mid-Term Test accounts for 25% of your course score
* One Final Examination accounts for 25% of your course score

# GRADING SCALE

|  |  |  |
| --- | --- | --- |
| A | Excellent | 90% and above |
| B | Average | 75% and less than 90% |
| C | Passed | 60% and less than 75% |
| E | Failed | Less than 60% |

# ATTENDANCE

This class will meet once a week on Thursday evening from 6:45 PM until 9:35 PM. All course goals, session learning objectives, and assessments are supported through lectures, activities, and discussions. Your attendance is thus required and paramount to your success in this class. You are allowed to miss no more than two (2) sessions, provided that you notify the instructor in advance.

# LATE WORK

All assignments must be submitted to the Blackboard site <https://blackboard.iit.edu> for the course on or before the due date. If you turn in an assignment late, 5% of your earned score may be deducted for every 24 hours after the deadline. Assignments turned in more than seven days late will not receive any credit. In the case of unexpected events, you must contact the instructor before the assignment due date to receive a grace period. Students can only receive up to two (2) grace periods in the course.

# CODE OF ACADEMIC HONESTY

It is contrary to justice, academic integrity, and to the spirit of intellectual inquiry to submit another’s statements or ideas of work as one's own. To do so is plagiarism or cheating, offenses punishable under the Illinois Tech's disciplinary system. Because these offenses undercut the distinctive moral and intellectual character of the Illinois Tech, we take them very seriously.

Proper acknowledgment of another's ideas, whether by direct quotation or paraphrase, is expected. In particular, if any written or electronic source is consulted and the material is used from that source, directly or indirectly, the source should be identified by author, title, and page number, or by website and date accessed. Any doubts about what constitutes "use" should be addressed to the instructor. Please review the information in <https://web.iit.edu/student-affairs/handbook/fine-print/code-academic-honesty>.

# REQUESTING REASONABLE ACCOMMODATIONS

Reasonable accommodations will be made for students with documented disabilities. To receive accommodations, students must obtain a letter of accommodation from the Center for Disability Resources which is located in Room 1C3-2 on the first floor at 3424 S. State Street. The Center for Disability Resources can also be reached at 312.567.5744 or [disabilities@iit.edu](mailto:disabilities@iit.edu). Please visit the center’s site <https://web.iit.edu/cdr> for more information.