

**COURSE SYLLABUS**

**Course Title:** Intro to Machine Learning

**Course #** DTS\* 220

**Course Description:** 3 credits

This course focuses on machine learning as an integral tool for data science, including how to use data to automatically understand the world, make complex decisions, and even predict the future. Several algorithms will be introduced along with which language (Python or R) is better suited for which algorithm based on the particular goal in mind. Programming language(s) will be used.

**Pre-Requisite:** C or better in DTS\* 201

**Goals:**

Students will understand the basics of how machine learning is applied in real world problems and the algorithms used.

**Outcomes:**

Upon successful completion of this course, students will be able to:

1. Explain machine learning and its various tools
2. Describe theoretical foundations, algorithms, methodologies, and applications for machine learning
3. Evaluate a problem and decide which algorithm and language is best
4. Explain the difference between supervised, unsupervised and reinforcement learning

**Topics Covered:**

1. Introduction to machine learning and the differences between ML and AI
2. Understanding the essentials of big data
3. Defining the role of algorithms in ML
4. How training works with algorithms
5. R & Python installations and basics
6. Matrices basics
7. Bayesian point of view on probability
8. Defining the most common error functions
9. How proper sampling methods are crucial in ML
10. Biased samples, overfitting, underfitting, and snooping
11. Decision tree basics
12. Cleaning data and the importance of outliers
13. Clustering data
14. Illustrating linear models for regression and classification
15. Neural network basics
16. Understanding what deep learning is
17. Basic formulation of linear support vector machines (SVM)
18. Intro to random forests
19. Classifying images
20. Intro to Natural Language Processing (NLP)
21. Intro to singular value decomposition (SVD)

**NORTHWESTERN CONNECTICUT COMMUNITY COLLEGE**

**Spring 2021**

**Course:** Intro to Machine Learning  
**Course Number:** DTS\*220 (CRN 1406)  
**Meeting Days/Times:** Online  
**Instructor:** Prof. Crystal Wiggins  
**Communication:**  
    MS Teams Preferred  
    Email [cwiggins@nwcc.edu](mailto:cwiggins@nwcc.edu)  
**Office Hours:** Online via MS Teams\

**Text Book:**

Machine Learning for dummies by John Paul Mueller & Luca Massaron.  
ISBN: 978-1-119-24577-3

**Course Resources:**

RStudio (free online resource)  
Anaconda/Jupyter Notebook (free online resource)

**Grading Policy**

The semester grade will be calculated as follows:  
    Discussion Posts & Assignments                      100%

**Grades:** Grades will be kept up-to-date in the Blackboard gradebook.

**Grading** will be in accordance with the college catalog as follows:

		<u>Percentages</u>	
A	93 – 100	C-	70 – 72
A-	90 – 92	D+	67 – 69
B+	87 – 89	D	63 - 66
B	83 – 87	D-	60 – 62
B-	80 – 83	F	below 60
C+	77 – 79		
C	73 – 76		

**Attendance:** You are expected to check blackboard and email **at least 3** times a week.

**Online Policies—Netiquette**

If you were attending an on-ground class, I would make you aware of behavior expectations (cell phones are shut off, common courtesy toward your classmates, etc). Online courses can be a bit trickier. There is a tendency to “hide” behind the computer and emails, and often, things get said in emails or discussion posts that you might otherwise not have said if you were face to face. So please, **THINK BEFORE YOU POST**. Ask yourself if what you are about to post or email is something you would say to me or a classmate in person; *if you wouldn't say it in person, then don't post/email it!* Remember, EVERYONE can see what you post on the Discussion Board! If you have something of a more personal nature to discuss with me, feel free to message me via Blackboard Messenger.

**Please also note:**

Some course content as presented in Blackboard Learn is not fully supported on mobile devices at this time. While mobile devices provide convenient access to check in and read information about your courses, they should not be used to perform work such as taking tests, completing assignments, or submitting assignments.

Week	Dates	Topic	Assignments/Posts	Due Dates
<b>Part 1: Introducing How Machines Learn</b>				
1	1/22 – 1/31	Chapter 1: Getting the Real Story Chapter 2: Learning in the Age of Big Data	> Read pg. 9-33 > Discussion Post: The Five Tribes	Sunday 1/31 by 11:59pm
2	2/1 – 2/7	Chapter 3: Having a Glance at the Future	> Read pg. 35-44 > Discussion Post: ML in Your Field	Sunday 2/7 by 11:59pm
<b>Part 2: Preparing Your Learning Tools</b>				
3	2/8 – 2/14	Chapters 4 – 7: R and Python	> Read (skim) pg. 47-135 > Assignment: Create a program in Python	Sunday 2/14 by 11:59pm
<b>Part 3: Getting Started with the Math Basics</b>				
4	2/15 – 2/21	Chapter 9: Demystifying the Math Behind ML	> Read pg. 147-165 > Assignment: Math Behind ML	Sunday 2/21 by 11:59pm
5	2/22 – 2/28	Chapter 10: Descending the Right Curve	> Read pg. 167-180 > Discussion Post: Further Examples for ML Algorithms	Sunday 2/28 by 11:59pm
6	3/1 – 3/7	Chapter 11: Validating ML Chapter 12: Starting with Simple Learners	> Read pg. 181-209 > Assignment: Write your first ML example!	Sunday 3/7 by 11:59pm
<b>Part 4: Learning from Smart and Big Data</b>				
7	3/8 – 3/14	Chapter 12(cont'd): Naïve Bayes Chapter 13: Preprocessing Data	> Read pg. 209-215 (Naïve Bayes) & 219-236 (Preparing Data Review) > Assignment: Naïve Bayes	Sunday 3/14 by 11:59pm
	3/15 – 3/21	<b>SPRING BREAK</b>		
8	3/22 – 3/28	Chapter 14: Leveraging Similarity	> Read pg. 237-256 > Assignment: Complete the Quiz on KNN	Sunday 3/28 by 11:59pm

9	3/29 – 4/4	Chapter 15: Working with Linear Models the Easy Way	> Read pg. 257-278 > Discussion Post: Linear vs Logistic Regression	Sunday 4/4 by 11:59pm
10	4/5 – 4/11	Chapter 16: Hitting Complexity with Neural Networks	> Read pg. 279-295 > Discussion Post: Further Exploration into Neural Networks	Sunday 4/11 by 11:59pm
11	4/12 – 4/18	Chapter 17: Going a Step beyond Using SVM	> Read pg. 297-313 > Assignment: Applying SVM	Sunday 4/18 by 11:59pm
12	4/19 – 4/25	Chapter 18: Resorting to Ensembles of Learners	> Read pg. 315-330 > Assignment: Revise SVM (Week 11)	Sunday 4/25 by 11:59pm
		<b>Part 5: Applying Learning to Real Problems</b>		
		Chapter 19: Classifying Images	> Read pg. 333-347	
13	4/26 – 5/2	Chapter 20: Scoring Opinions and Sentiments Chapter 21: Recommending Products and Movies	> Read pg. 349-368 & 369-382	Sunday 5/2 by 11:59pm
<b>Part 6: The Part of Tens</b>				
14	5/3 – 5/9	Chapter 22: Ten Machine Learning Packages to Master Chapter 23: Ten Ways to Improve Your Machine Learning Models	> Read pg. 385-390 & 391-398 > Discussion Post: Choose a Topic That Interests You	Sunday 5/9 by 11:59pm
15	5/10 – 5/16	Final Discussion Post	> Discussion Post: What Did You Like the Most?	Sunday 5/16 by 11:59pm