**Machine Learning**

**COMP 642**

*Professor: Dr. Janell Straach*

*Contact Information:* [*janell.straach@rice.edu*](mailto:janell.straach@rice.edu) *713-348-2266*

*Office Hours : Thursday 5pm to 6pm CST*

### Course Materials:

This course does not have a required book. Suggested resources will be provided in the course material if you want supplemental reading material.

### Software Requirements:

For the course, you will not be required to install specific software for the exercises but you have the option to replicate the environment on your own machine if you prefer. Details will be provided in the course material.

### Course Overview:

Machine learning is the process of automatically inferring a function from a set of data. In essence, machine learning techniques seek to automate the inductive learning process that humans do so well. Furthermore, the availability of large training sets combined with significant computing power has made machine learning an extremely important body of knowledge across a large range of application domains. A small sample of some of the application domains include robotics, medicine, speech/facial recognition, and driving autonomous vehicles. This course will focus on providing a foundational understanding of modern algorithms in machine learning, focusing on practical applications.

Learning outcomes include:

* Understand the fundamental concepts underlying machine
* Acquire a good “toolbox” of machine learning methods and techniques for problems of interest
* Develop good programming competence in readily available machine learning packages and systems.

### Course Requirements & Assignment Details:

| **Weekly Activity** | **Dependent on** | **Deadline** | **Grade weight** | **Time estimate** |
| --- | --- | --- | --- | --- |
| Videos + in-video questions | Previous module |  | 5% | 1-2 hrs/week |
| Quizzes | Associated videos | Sunday 10pm Central | 10% | 0.5-1 hr/week |
| Reading Assignments | Associated Videos |  | 0% | 0-1 hrs/week |
| Assignments (reading & homeworks) | Associated videos and quizzes | Friday 10pm Central | 25% | 3-6 hrs/week |
| Feedback Form |  | Sunday 10pm Central | 0% | 0-1 hr/week |
| Video summary + Q&A session |  | Tuesday | 0% | 1.5-2 hrs/week |

| **Semester Activity** | **Dependent on** | **Deadline** | **Grade weight** | **Time estimate** |
| --- | --- | --- | --- | --- |
| Exam 1 | Modules 1 thru 5 | TBD | 15% | 2 hours |
| Exam 2 | Modules 6 thru 11 | TBD | 15% | 2 hours |
| Project |  | TBD | 30% |  |

### Course Outline:

|  |  |
| --- | --- |
| 1 | Introduction |
| 2 | ML End to End Process |
| 3 | Parametric Models |
| 4 | Non Parametric Models |
| 5 | Dimensionality Reduction |
| 6 | Model Evaluation |
| 7 | Unsupervised Learning |
| 8 | Neural Networks |
| 9 | Convolutional Neural Networks |
| 10 | Recurrent Neural Networks |
| 11 | Ensemble Learning & Reinforcement Learning |

### Honor Code:

All Masters of Computer Science students are sworn to adhere to the tenets set forth in Rice University’s Honor Code. All written assignments for this class submitted to the instructor must carry the signed Honor Code pledge: “On my honor, I have neither given nor received any unauthorized aid on this (examination, quiz or paper).” (with signature and/or student ID number). Failure to include this pledge will result in an ungraded and returned assignment.

Please be aware of the Honor Code addendum that is part of the Student Handbook. This will provide more specific language about how the Honor Code should be adhered to as part of the Computer Science program.

### Attendance Policy:

Attendance is not required, but strongly encouraged for all live class sessions. The benefit of this program is the time spent during these live sessions interacting with your classmates and faculty, with much of the learning coming from these interactions. You will not be penalized for not attending, but please note that attendance in these live sessions is a major part of not only learning the content, but also the experience as a whole.

### Disability-based Accommodations:

If you have a documented disability that may affect academic performance, you should: 1) make sure this documentation is on file with Disability Resource Center (Allen Center, Room 111 / adarice@rice.edu / x5841) to determine the accommodations you need; and 2) meet with me to discuss your accommodation needs.

### Title IX:

Rice University cares about your wellbeing and safety. Rice encourages any student who has experienced an incident of harassment, pregnancy discrimination, gender discrimination, or relationship, sexual, or other forms interpersonal violence to seek support through The SAFE Office. Students should be aware when seeking support on campus that most employees, including myself, as the instructor/TA, are required by Title IX to disclose all incidents of non-consensual interpersonal behaviors to Title IX professionals on campus who can act to support that student and meet their needs. For more information, please visit  [safe.rice.edu](mailto:safe.rice.edu) or email [titleixsupport@rice.edu](mailto:titleixsupport@rice.edu).