Syllabus
Machine Learning: Applications and Practices
Introduction to Meteorology
Course link: https://people.cmix.louisiana.edu/yuan/2023_Summer_Tutorial_Courses.html

Instructors: Dr. Xu Yuan, Dr. Li Chen, Dr. Hao Wang, Dr. Sytske Kimball, and Dr. Eric Rappin
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Lecture series (machine learning):   Wednesday: 10:30am - 11:45am
Hands-on series: Friday: 10:30am – 12:00am
Location:
UL Lafayette Oliver Hall 113 (Students from Univ. of South Alabama, Western Kentucky, and Southern Univ., please use the link of https://ullafayette.zoom.us/j/94437650828)
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Lecture series on Introduction to Meteorology:
Monday, Tuesday: 10:30am – 11:45am
Q&A series:
Thursday: 10:30am – 11:30am
Location:
Please use the following links for all students:
https://wku.zoom.us/j/96834157071?pwd=bEd5WnRpdHhmSDNEN2xTSlhkN0Z4dz09 (Dr. Rappin's lectures)
https://southalabama.zoom.us/j/98200735803 (Dr. Kimball's lectures)

Goals:
- Attending students will learn fundamental knowledge of machine learning applications and large language models.
- Attending students will have the code practice for applying machine learning algorithms on real-world data from Twitter networks and Weather Stations.
- In addition, attending students will also learn meteorology basics through watching pre-recorded video clips at their convenient schedules, coupled with Q&A live sessions on Thursdays.

Tentative Topics: The Machine Learning class gives the introduction of traditional machine learning algorithms and some deep learning algorithms as well as large language models. The real examples are provided for practicing students to understand how to implement machine learning algorithms for handling the real-world tasks, including the classification and prediction. The Introduction to Meteorology class aims to impart basic meteorology knowledge to attending students.

2023 Summer Tutorial Courses
Machine Learning: Applications and Practices; Introduction to Meteorology

Week	Agenda		
	Date	**Machine Learning**	**Introduction to Meteorology**
Week 1	05/31 *10:30-11:45am*	**Lecture 1:** Course Overview and Introduction of Machine Learning	
	06/02 *10:30-11:45am*	**Lab 1:** Install Python; Run simple machine learning algorithms to warm up	
Week 2	06/07 *10:30-11:45am*	**Lecture 2:** Feature Selection and ML for Twitter Classification	● Zoom Lecture: The sun as the primary weather Forcing factor (Dr. Rappin) (06/08) *10:30-11:30am*
	06/09 *10:30-11:45am*	**Lab 2:** Labeling Twitter Data, Coding for Feature Extraction	
Week 3	06/14 *10:30-11:45am*	**Lecture 3:** Neural Networks and Deep Learning Fundamentals	● Zoom Lecture: Observing Weather with Radar (Dr. Kimball) (06/15) *10:30-11:30am*
	06/16 *10:30-11:45am*	**Lab 3:** Coding for Each ML Algorithm	
Week 4	06/21 *10:30-11:45am*	**Lecture 4:** Neural Networks and Deep Learning Fundamentals	● Zoom Lecture: What happens when the sun hits the Earth's Surface? (Dr. Rappin) (06/22) *10:30-11:30am*
	06/23 *10:30-11:45am*	**Lab 4:** Coding for LSTM and CNN	
Week 5	06/28 *10:30-11:45am*	**Lecture 5:** Weather Forecasting: Introduction to Mesonet and WRF-HRRR data, and Forecasting Modelets	● Zoom Lecture: Where weather affects us: The Boundary Layer (Dr. Rappin) (06/29) *10:30-11:30am*
	06/30 *10:30-11:45am*	**Lab 5:** Downloading Data of Interests and Extracting features, Runing Modelets	
Week 6	07/05 *10:30-11:45am*	**Lecture 6:** Reinforcement Learning	● Zoom Lecture: Forecasting Basics (Dr. Rappin) (07/06) *10:30-11:30am*
	07/07 *10-11:15am*	**Lab 6:** Coding for RL	
Week 7	07/12 *10:30-11:45am*	**Lecture 7:** Introduction of Large Language Models (LLMs)	● Zoom Lecture: Measuring the Weather with Instruments and Weather Stations (Dr. Kimball) (07/13) *10:30-11:30am*
	07/14 *10-11:15am*	**Lab 7:** Hands-on experience with training and using LLMs (1)	
Week 8	07/19 *10:30-11:45am*	**Lecture 8:** How does ChatGPT work?	● Zoom Lecture: Hurricanes (Dr. Kimball) (07/20) *10:30-11:30am*
	07/21 *10:30-11:45am*	**Lab 8:** Hands-on experience with training and using LLMs (2)	
Week 9	07/26 *10:30-11:45am*	**Lecture 9:** Applications and Adaption of LLMs	● Zoom Lecture: Severe Weather (Dr. Rappin) (07/27) *10:30-11:30am*
	07/28 *10:30-11:45am*	**Lab 9:** Reporting	

Assignments:
1) Label the spam messages from Twitter data
2) Run the weather parameter predictions from different Mesonet stations