

# CS 789: Mining Internet of Things Data

UNIVERSITY OF NEVADA LAS VEGAS

Department of Computer Science

Spring/2022

Instructor:

Phone:

Office:

Email:

Class Time: TuTh: 5:30 PM – 6:45 PM

Office hours:

Class website: UNLV WebCampus (<https://www.it.unlv.edu/webcampus>)

Explores the basic methods and techniques in data mining and its applications to mining Internet of Things (IoT) data. The course covers five applications of IoT and mining those data. Those five application topics include smart environment, smart healthcare, agriculture and climate, and sports and other industry. Each topic includes five parts: introduction, data properties, state-of-the-art algorithms, coding, and a guest lecture. The state-of-art algorithms in those five topics resolve the following research questions: pre-processing data, fusing multi-modal data, handling small sample problems, learning with feedback based on reinforcement learning, and transferring learned knowledge. The coding parts offer hand-on experience and each guest lecture will be given based on well-known experts in the field (e.g., fellows).

From Machine-to-Machine to the Internet of Things - Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stamatis Karnouskos, Stefan Avesand, David Boyle

Learning from Data: A Short Course - Yaser Abu Mostafa, Malik Magdon-Ismael, and Hsuan-Tien Lin

Pattern Recognition and Machine Learning -

Christopher M. Bishop

The Elements of Statistical Learning: Data Mining, Inference, and Prediction - Trevor Hastie, Robert Tibshirani, and Jerome Friedman

Machine Learning: A Probabilistic Perspective (Adaptive Computation and Machine Learning series) – Kevin P. Murphy

This course gives advanced algorithms for the analysis of IoT data. After taking this course the student will have a thorough grasp of both algorithmic and application foundations in data mining and IoT data.

Upon completion of this course, students will:

- Develop an appreciation for capabilities and limitations of IoT data and data mining techniques
- Understand the mathematical, statistical, and theoretical foundations of a wide variety of data mining, machine learning, and artificial intelligence algorithms
- Implement data mining algorithms to analyze data in multiple domains
- Evaluate the model performance

CS 302 and Math 251

Grades will be based on following:

Homework (3), 30%

Project Report (1), 35%

Project Presentation, 15%

Critical Questions (9), 10%

Guest Speaker Summary (4), 8%

Extra Credits, 2%

Grades will be posted throughout the semester.

Grading scale is as follows:

A	A-	B+	B	B-	C+	C	C-	D	F
>90	90-85	85-80	80-75	75-70	70-65	65-60	60-55	55-45	<45

Graded assignments will be returned to you as soon as possible. It is your responsibility to check the grade summaries for posting errors.

- Any score issues must be identified to the instructor within a week after grade releases.
- If you fixed the problems in the assignment within a week, I would restore half of the points in order to encourage you to keep practicing.
- Scores are final after that.
- Late work will take 10% off for 24 hour period and 30% off for 48 hour period.

### **Critical Questions:**

You will have one required reading for almost all class periods.

Prior to the beginning of those class periods labeled as critical question due, you are to submit to Blackboard with three sentences as below which demonstrates that you have thoughtfully read and evaluated the paper for the class period. We will use the questions to enrich classroom discussion about the material. The submission page is under the Assignments tab in Blackboard.

Critical questions:

- i. one sentence to summarize the paper;
- ii. one sentence to highlight the innovative part of the paper;
- iii. one question to suggest the improvement of the paper.

### **Summaries:**

We will bring in 5 experts this semester who will talk about state-of-the-art research in data mining and machine learning as well as its applications. You will be required to write a *one-page* discussion of 4 of the 5 invited talks. The summaries are due prior to the beginning of the next class period and are to be submitted to Blackboard. The submission page is under the Assignments tab in Blackboard. The write-up will include:

- i. a summary of the talk and paper (if provided)
- ii. a discussion of how the work fits within the context of the materials being discussed in class
- iii. your ideas about how the speaker's work could be improved or extended in the future

Each student enrolled in a course offered by the Department of Computer Science is expected to do his/her own work when preparing written or programming assignments, as well as, examinations. He/she must adhere to the academic integrity policy provided by his/her instructor and the university. It is also each student's responsibility to notify the instructor if he/she becomes aware of any activities that would violate the academic integrity policy of the class.

### **Academic Integrity Policy**

## **Public Health Directives**

Face coverings are currently mandatory for all faculty and students in the classroom. Students must

the end of class



reasonably avoided. There should be a good faith effort by both the instructor and the student to agree to a reasonable resolution. When disagreements regarding this policy arise, decisions can be appealed to the Department Chair/School Director, College/School Dean, and/or the Faculty Senate Academic Standards Committee.

For purposes of definition, extracurricular activities may include, but are not limited to academic recruitment activities, competitive intercollegiate athletics, fine arts activities, liberal arts competitions, science and engineering competitions, and any other event or activity sanctioned by a College/School Dean, and/or by the Executive Vice President and Provost.

### **Rebelmail**

Rebelmail is UNLV's official email system for students and by University policy, instructors and staff should only send emails to students' Rebelmail accounts. Rebelmail is one of the primary ways in which students receive official University communications, information about deadlines, major Campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the University. Sending emails within WebCampus-Canvas is also acceptable.

### **Tutoring and Coaching**

The Academic Success Center (ASC), at the Claude I. Howard Building, provides tutoring, academic success coaching, and other academic assistance for all UNLV undergraduate students. For information regarding tutoring subjects, tutoring times, and other ASC programs and services, please visit the [ASC website](https://www.unlv.edu/asc), <https://www.unlv.edu/asc>, or call 702-895-3177. The ASC is located across from the Student Services Complex (SSC). Academic success coaching is located on the second floor of SSC A, Room 254. Drop-in tutoring is located on the second floor of the Lied Library, and on the second floor of the College of Engineering building (TBE A 207).

### **UNLV Writing Center**

One-on-one or small group assistance with writing is available free of charge to UNLV students at the [Writing Center](https://writingcenter.unlv.edu/), <https://writingcenter.unlv.edu/>, located in the Central Desert Complex, Building 3, Room 301 (CDC 3-301). Walk-in consultations are sometimes available, but students with appointments receive priority assistance. Students may make appointments in person or by calling the Center, telephone 702-895-3908. Students are requested to bring to their appointments their Rebel ID Card, a copy of the instructions for their assignment, and two copies of any writing they have completed on their assignment.