Ira A. Fulton Schools of Engineering
Arizona State University

Course Syllabus - Spring A 2022

CSE 575: Statistical Machine Learning

Contact Information

Instructor: Subhasish Das

Teaching Assistants: Nithin Jayakar Padala (npadala@asu.edu)
Srikar Reddy Kalam (skalam@asu.edu)
Aayush Sharma (ashar313@asu.edu)

Content Questions: Weekly discussion forums

Slack Channel: Direct Link: asu-2221-cse575-34399.slack.com
Note: You must join/access this workspace using your ASURITE credentials.

Content Issues: Course “Report an Issue” tool (clickable link on every content page)

Technical Support: Coursera Learner Help Center
Note: Please make sure you are logged in so that support personnel recognize you as an ASU learner.

General Support: mcsonline@asu.edu
Note: When sending an email about this class, please include the prefix "CSE 575" in the subject line of your message.
Please use this email address for questions that are private in nature. If it is a question that would benefit your classmates, and is not private in nature, please post in the discussion forums.

Course Description

Deriving generalizable models from some given training data is central to statistical machine learning. Statistical machine learning has found wide applications in many fields including artificial intelligence, computer vision, natural language processing, finance, bioinformatics, and etc. This course provides a systematic introduction to common learning paradigms in statistical

machine learning, accompanied by an exploration of a set of foundational algorithms. Main topics covered include supervised learning, unsupervised learning, and deep learning.

Specific topics covered include:

- Mathematical foundations for machine learning
- Maximum likelihood estimation
- Naive Bayes classification
- Logistic regression
- Support vector machines
- Probabilistic graphical models
- Mixture models
- K-means clustering
- Spectral clustering
- Dimensionality reduction
- Principal component analysis
- Neural networks and deep learning
- Convolutional neural networks

Technologies covered include:

- Python
- Matlab
- Jupyter Notebooks
- Google Colab
- PyTorch

Course Objectives

Learners completing this course will be able to:

- Describe common misconceptions of machine learning
- Define machine learning
- Distinguish between supervised learning and unsupervised learning
- Compare numerical and graphical data representations
- Describe applications of machine learning
- Apply common probability distributions in machine learning applications
- Use maximum likelihood estimate (MLE) for parameter estimation
- Differentiate between generative and discriminative models for supervised learning
- Implement fundamental learning algorithms such as Naive Bayes and Logistic Regression
- Interpret empirical comparisons of Naive Bayes and Logistic Regression
- Differentiate between linearly separable and non-separable support vector machines
- Explain the role of the kernel trick in support vector machines
- Explain options for picking magic parameters in support vector machines
- Implement the more advanced learning algorithm known as support vector machines
- Differentiate between clustering in supervised vs. unsupervised learning.
- Explain how to efficiently cluster data.

- Apply the K-means algorithm.
- Explain the relationship between the several K-means variants.
- Illustrate the process of dimensionality reduction.
- Apply the PCA algorithm.
- Explain the relationship between PCA and SVD.
- Describe the big-picture view of how neural networks work.
- Identify the basic building blocks and notations of deep neural networks.
- Explain how, in principle, learning is achieved in a deep network.
- Explain key techniques that enable efficient learning in deep networks.
- Appraise the detailed architecture of a basic convolutional neural network.
- Compare the basic concepts and corresponding architecture for auto-encoder and recurrent neural networks.
- Describe an example network for image classification.
- Explain the parameters defining the network.
- Identify common tricks for improving classification performance.
- Describe unique challenges in using deep networks for sequential data.
- Describe the difference between image-based and video-based classification tasks.
- Explain the value of using video action recognition to contrast the difference between image-based and video-based classification tasks.
- Evaluate a video-based classification example using deep learning.
- Describe basic concepts and architecture for GANs.
- Compare variants of GANs and their applications.

Learning Outcomes

Learners completing this course will be able to:

- Distinguish between supervised learning and unsupervised learning
- Apply common probability distributions in machine learning applications
- Use cross validation to select parameters
- Use maximum likelihood estimate (MLE) for parameter estimation
- Implement fundamental learning algorithms such as logistic regression and K-means clustering
- Implement more advanced learning algorithms such as support vector machines and convolutional neural networks
- Design a deep network using an exemplar application to solve a specific problem
- Apply key techniques employed in building deep learning architectures

Estimated Workload/ Time Commitment Per Week

Average of 18 - 20 hours per week

Required Prior Knowledge and Skills

This course will be very challenging, and learners are expected to learn the necessary technologies on their own time.

Proficient Mathematical Skills and Theoretical Understanding

- Basics of linear algebra
- Basics of probability and statistics
- Basics of calculus and set theory
- Basics of algorithm design and analysis

Strong Application Skills

- Programming in Python
- Ability to effectively read Python code
- Confidence executing at least one programming language:
    - Python
    - Matlab
    - R

Note: The course project will be completed using the language that the student chooses. However, the course team will not be able to help the student if they choose any language that is not Python, Matlab.

Proficient Experience

- High level programming language (Python or Matlab)
- Ability to implement Machine Learning Algorithms using python
- Familiarity with any one of the following frameworks:
    - Jupyter Notebook
    - Google Colab
    - Pytorch
- Familiarity with the following tools/libraries:
    - Numpy
    - Pandas
    - Tensorflow
    - Keras
    - Matplotlib
    - Scikit Learn

Technology Requirements

Hardware

- Personal computer with major OS and 8 GB RAM or higher and an x86-64 CPU
- Webcam
- Microphone

Software and Other

- Reliable, strong Internet connection
- Technology integrations will be provided through Coursera
- Jupyter Notebook
- Pytorch
- Matlab

- GPU environment like Google Colab or personal setup on your own
- Anaconda

Textbook and Readings

At the graduate level, inquiry, research, and critical reading are part of the learning experience; however, this course does not have a required textbook. A reference textbook is provided within the course. See Week 1 for more information and to download the reference textbook PDF.

All required readings are provided within or are accessible through the course. You will find them in the week each one is assigned.

Course Content

Instruction

- Video lectures
- Other video or media
- Readings
- Virtual office hours hosted by the course team
- Live events hosted by the instructor. These will be recorded and uploaded to the course site.

Assessments

- Knowledge checks: ungraded, auto-feedback, untimed
- Mini-Assignments: auto-graded, untimed
- Graded quizzes: auto-graded, untimed
- Graded discussions: course team graded
- Individual projects: instructor-graded
- Midterm exam and final exam: proctored, auto-graded and/or instructor-graded

Details of the main instructional and assessment elements in this course:

Each course in the MCS program is uniquely designed by expert faculty, so learners can best master the learning outcomes. As a result, course features and experiences are not the same across all MCS courses. Learners are expected to plan accordingly to accommodate for these differences.

Lecture videos: The concepts you need to know are presented through a collection of video lectures. You may stream these videos for playback within the browser by clicking on their titles or download the videos. Where available, you may download the slides that go along with the videos. To further support learning, all of the videos include transcripts and most include PDF

lecture slides. Weekly overview videos, assignment videos, and project-related videos do not have PDF lecture slides because they are not lectures and have associated documents specific to them.

Discussion forums: Discussion forums are present each week in the course and include designated forums for each project. Although the course team is engaged in these discussions, the forums are spaces to clarify, support, and enrich learner-to-learner communication and learning. *If you have specific questions that you would like to be considered to be addressed in the weekly Live Event hosted by the instructor, please indicate your request in your post.*

Graded discussion forums: There are six graded discussion prompts in this course. Each prompt provides a space for you to respond. After responding, you can see your peers' responses, and are required to respond to at least one classmate to receive full credit.

Knowledge checks: Each week includes at least one knowledge check quiz to help you assess your understanding of the topics. You will be allowed unlimited attempts for each one. There is no time limit on how long you take to complete each attempt at the quiz, and these quizzes are not counted toward your final grade in the class.

Mini-Assignments: Mini-assignments are weekly graded opportunities for you to practice applying the week's content. These are often in the form of quizzes and you will get 3 attempts to submit your answers. Some weeks will have mini-assignments with anywhere from 1 to 6 questions. These are worth 20% of your grade. There is a late penalty of 25% for each day past the deadline.

Graded quizzes: Each week includes one graded quiz, consisting of 10 questions. Week 7 has two quizzes. You will be allowed one attempt for each of these quizzes. There is no time limit on how long you take to complete each attempt at the quiz. For academic integrity purposes, once grades are made available, learners will see their overall total scores. Correct and incorrect answers and feedback to each question will ***not*** be provided. Read the Graded Quiz and Exam Policy for more information. *There is an automatic 25% grade penalty for each day late past the deadline. The lowest scored quiz will be dropped at the end of the class.*

Projects: This course includes three individual projects. The first project, "Density Estimation and Classification" is due in week 3. The second project is due in week 5 and contains two parts that are both related to different strategies of K-means techniques. The final project, "Classification Using Neural Networks and Deep Learning" is due in Week 7. There is a 25% grade penalty for each day late past the deadline.

Request for Faculty Review: MCS Project Portfolio: This is an optional task for degree students wanting to use this course's projects as part of their portfolio degree requirement/specialization requirements. Review your onboarding course and the Welcome and Start Here section of your course for more details. The submission space is towards the end of the course. *Although there are no late penalties, these requests must be submitted by the*

designated deadline. The Request for Faculty Review: MCS Project Portfolio does not count toward your final grade in the class.

Proctored exam(s): You will have two (2) proctored, timed exams, a midterm and a final. Grades are made available once all learners have completed the exam. We will hold an hour MT office hour a week after the finishing MT exam and will announce about its time/day later. The MT office hour will be held by one the GSA and will not be recorded. Please don't send any email regarding the MT/ Final exam questions to the course staff. No late exams will be permitted. An automatic late penalty of 100% is applied after the scheduled due date and time. For academic integrity purposes, once grades are made available, learners will see their overall total scores. Correct and incorrect answers and feedback to each question will ***not*** be provided. Read the Graded Quiz and Exam Policy for more information. *An automatic late penalty of 100% is applied to exams after the scheduled due date and time. No late exams will be permitted or accepted and will result in a score of zero points (0). This does not include established accommodations for learners with disabilities.*

Midterm

Details

- **Content covered:** Weeks 1, 2, 3 and 4
- **Question type(s):** multiple choice questions
- **Number of questions:** 20 content questions + 1 academic integrity question = 21 total questions
- **Availability: Wednesday, February 2nd 2022 at 12:01 AM AZ Time - Tuesday, February 8th 2022 11:59 PM AZ Time**
- **Duration:** Plan for 15 minutes for proctoring set up and 1.5 hours (90 minutes) for the exam

Final

Details

- **Content covered:** Weeks 4, 5, 6 and 7
- **Question type(s):** multiple choice questions
- **Number of questions:** 20 content questions + 1 academic integrity question = 21 total questions
- **Availability: Wednesday, February 23rd 2022 12:01 AM - Tuesday, March 1st 2022 11:59 PM Arizona Time**
- **Duration:** Plan for 15 minutes for proctoring set up and 1.5 hours (90 minutes) for the exam

Exam Allowances

Both exams are closed resource exams. No materials, resources, technologies, or communication is permitted during the exams. By design, these allowances will not be

changing. You are expected to scan your testing space using your webcam for the proctor. Proctoring also requires you to have sound and a microphone. Please plan accordingly.

- **Hardcopy and/or digital books and/or reference materials (all)**: None
- **Calculators (all)**:Computer calculator only
- **Notes in any format of any kind (all)**: One hand-written or typed,
- letter-sized paper is allowed - notes may be on both sides of the paper
- **Web (all)**:None
- **Software (all)**: None - and all virtual machines must be closed prior to
- starting proctoring
- **Other technologies, devices, and means of communication (all)**: None
- **Whiteboard, scratch paper, writing utensils, erasing resources**: Learners are *strongly* encouraged to use the whiteboard option instead of scratch paper.
    - If using a whiteboard, learners may have erasable whiteboard markers and what is needed to erase writing on the whiteboard; please have extra whiteboard markers and eraser resources in your testing area.
    - If using scratch paper, learners may have an unlimited amount of blank scratch paper of any size, writing utensils (e.g., pens, pencils, markers, and/or highlighters) and erasers; please have extra ones in your testing area should you run out of ink, the pencil breaks, etc.
    - Before the exam concludes and the proctoring session ends, all scratch paper must be destroyed and all whiteboard markings must be erased. The last question in the exam will be a confirmation of learners executing these ASU academic integrity actions.
- **Other**: Learners are to independently take the exam in a single session without leaving the testing space (e.g., no bathroom breaks) to ensure proctoring of the entire session. Once you open the exam, your testing session begins. You will be allowed one (1) attempt to take and complete each exam. Learners are to stay within a clear view of the proctor throughout the duration of the proctored exam session. You will be unable to open the exam until the exam proctor enters the password during the date and time you scheduled to take your exam with ProctorU.
- **Note**: All virtual machines must be closed *prior* to starting proctoring.

Proctoring

ProctorU is an online proctoring service that allows learners to take exams online while ensuring the integrity of the exam for the institution.

- You are expected to scan your testing space using your webcam for the proctor. Proctoring also requires you to have sound and a microphone. Please plan accordingly.

- You are strongly encouraged to schedule your exam(s) within the first two weeks of the course to ensure you find a day and time that works best for your schedule. Time slots can fill up quickly, especially during high volume time periods.
    - You *must* set up your proctoring at least 72 hours prior to the exam.
- **The exam proctor will input the exam password**.
- Additional information and instructions are provided in the *Welcome and Start Here* section of the course.
- **When you are going to schedule exams, you *must* pick "Coursera" as your institution.**
- Note: Learners with exam accommodations through SAILS (Student Accessibility and Inclusive Learning Services) should not schedule exams until they receive an invitation specifically for them from ProctorU.
- Your ID needs to be in English. See your MCS Onboarding Course for more information.

Course Grade Breakdown

Course Work	Quantity	Team or Individual	Percentage of Grade
Graded Discussions	6	Individual	5%
Graded quizzes	8	Individual	5%
Mini-assignments	7	Individual	20%
Projects*	3	Individual	30%
Midterm exam	1	Individual	20%
Final exam	1	Individual	20%

*The project(s) count for 30% or more of the overall course grade, so this is a portfolio eligible course. See the MCS Graduate Handbook for more information about the portfolio requirement if you are a degree student.

Grade Scale

You must earn a cumulative grade of 70% to earn a "C" in this course. You must earn at least a "C" to receive graduate credit. This course has no grade curving. All graded coursework will be included to calculate grades (i.e., no graded items will be dropped). Grades will not be rounded. Grades in this course will *not* include pluses or minuses.

**The instructor reserves the right to adjust individual grades based on, but not limited to: violations of academic integrity.*

100 - 97: A+
96.9 - 93: A
92.9 - 90: A-
89.9 - 87: B+
86.9 - 83: B
82.9 - 80: B-
79.9 - 77: C+
76.9 - 73: C
72.9 - 70: C-
69.9 - 67: D+
66.9 - 63: D
62.9 - 60: D-
59.9 - 0: E

A	90% - 100%
B	80% - 89%
C	70% - 79%
D	60% - 69%
E	<60%

Course Schedule

Week/Title	**Begins at 12:01 AM Arizona (AZ) Time**	**Ends at 11:59 PM Arizona (AZ) Time**
1: Orientation & Introduction	Monday, January 10, 2022	Sunday, January 16, 2022
2: Supervised learning-Naive Bayes & Logistic Regression	Monday, January 17, 2022	Sunday, January 23, 2022
3: Linear Machines and SVM	Monday, January 24, 2022	Sunday, January 30, 2022
4. Graphical Models	Monday, January 31, 2022	Sunday, February 6, 2022

Midterm Exam	Wednesday, February 2nd, 2022	Tuesday, February 8th, 2022
5: Unsupervised Learning & Data Clustering	Monday, February 7, 2022	Sunday, February 13, 2022
6: Spectral Clustering and Dimensionality Reduction	Monday, February 14, 2022	Sunday, February 20, 2022
7: Dimensional Reduction, Neural Networks, Deep Learning, and Exemplar Applications	Monday, February 21, 2022	Sunday, February 27, 2022
8: Final Exam and Course Wrap-Up	Monday, February 23, 2022	Wednesday, March 1, 2022

**Grades are due March 4th, 2022 (Please see the ASU Academic Calendar for additional information.)*

Live Events

This course has two types of live events: **live sessions** and **virtual office hours**. Check the Live Events page in your course for your local time and access details. Although we try to be consistent for our learners' planning purposes, the Live Event schedule is subject to change throughout the course, so stay up-to-date on Live Event details by checking your Course Announcements and the Live Events page in your course.

Read about the specific policies related to Live Events in the Policy section of this syllabus: Live Events, Policy Regarding Expected Classroom Behavior, and the Student Code of Conduct for more detailed information.

Live Sessions - Weekly

Live Sessions are a valuable part of the learning experience because learners can meet with the course instructor and fellow classmates to learn more about course topics, special topics within the field, and discuss coursework. If you are able to attend these Live Sessions, you are strongly encouraged to do so. If you have specific questions or topics of interest to be discussed during the live events, please indicate your request in your discussion forum post. Although it may not be possible to address all requests live, the instructor is interested in tailoring the live events to your questions and interests. The instructor will be following a set agenda, so please be mindful of that when engaging in the live session.

Live Sessions hosted by the faculty will be recorded and uploaded to the course.

Tuesdays from 5-6pm AZ time

Virtual Office Hours - Weekly
Virtual Office Hours offer a chance for learners to get their questions answered from the course team. Although the course team is responsive to trends in the discussion forums and mcsonline@asu.edu emails, virtual office hours focus on addressing learners' specific questions related to content: clarifications, reteaching, assessment review, etc. These sessions are not intended to address program or course design questions or feedback. Assistants do not have the authority to weigh in or make decisions regarding those items, so please do not include those at this time. These sessions are specific to helping learners learn materials and understand various course assessments. Feedback of that nature is best addressed in the communication channel: mcsonline@asu.edu and please include it in your course survey.

Virtual office hours are recorded, but not uploaded into the course.

Office hour dates and times TBD

Assignment Deadlines and Late Penalties

Unless otherwise noted, all graded work is due on Sundays at 11:59 PM Arizona time.
An automatic late penalty of 25% for each day late will be applied for work submitted after the scheduled due date and time.

Course Outline with Assignments

Week 1: Orientation and Introduction (1/10- 1/16)

Content

- [ ] Introduction to Machine Learning
- [ ] Machine Learning Examples

Other Tasks

- [ ] Schedule your proctoring with ProctorU for your proctored exam
- [ ] For learners needing accommodations, submit requests through Connect and review the ASU Student Accessibility and Inclusive Learning Services website. Note: Learners with exam accommodations through SAILS should not schedule exams until they receive an invitation specifically for them from ProctorU.
- [ ] Knowledge Check: Define Machine Learning
- [ ] Knowledge Check: Illustrating Machine Learning with Examples

Graded Coursework

- [ ] Week 1 Graded Discussion
- [ ] Week 1 Graded Quiz

- [ ] Mini-assignment: Introduction to Machine Learning

Week 2: Supervised learning-Naive Bayes & Logistic Regression (1/17- 1/23)

Content

- [ ] Review key concepts in calculus, set theory, and linear algebra
- [ ] Review of random variables and their distributions
- [ ] Common densities in machine learning
- [ ] Set-up of supervised learning; Regression
- [ ] Classification; Density estimation
- [ ] Classification; Density estimation
- [ ] Generative & discriminative models

Other Tasks

- [ ] Schedule your proctoring with ProctorU for your proctored exam(s), if you have not already done so. Note: Learners with exam accommodations through SAILS should not schedule exams until they receive an invitation specifically for them from ProctorU.
- [ ] Knowledge Check: Calculus, Set Theory, Linear Algebra
- [ ] Knowledge Check: Probability Space, Conditional Probability, and Bayes Rule
- [ ] Knowledge Check: Random Variables and Common Distributions and Densities
- [ ] Knowledge Check: Regression
- [ ] Knowledge Check: Density Estimation
- [ ] Knowledge Check: Generative and Discriminative Model

Graded Coursework

- [ ] Week 2 Graded Discussion
- [ ] Week 2 Graded Quiz
- [ ] Mini-assignment: Estimators

Week 3: Linear Machines and SVM (1/24 - 1/30)

Content

- [ ] Implement the fundamental learning algorithm Naive Bayes
- [ ] Implement the fundamental learning algorithm Logistic Regression
- [ ] Linear Machines: Basics
- [ ] The Concept of Margin

Other Tasks

- [ ] Knowledge Check: Naïve Bayes Model
- [ ] Knowledge Check: Logistic Regression
- [ ] Knowledge Check: Linear Machine Basics
- [ ] Knowledge Check: The Concept of Margin

Graded Coursework

- [ ] Week 3 Graded Discussion
- [ ] Week 3 Graded Quiz
- [ ] Project #1

Week 4: Graphical Models (1/31- 2/06)

Content

- [ ] SVM: Linearly-separable Case
- [ ] SVM: Non-linearly-separable Case
- [ ] Bayesian Networks
- [ ] Hidden Markov Models: Basics
- [ ] Hidden Markov Models: Learning & Inference

Other Tasks

- [ ] Prepare for the exam
- [ ] Schedule proctoring at least 72 hours prior to your exam date and within the availability
- [ ] window
- [ ] Knowledge Check: SVM for Linearly Separable Data
- [ ] Knowledge Check: SVM for Nonlinearly Separable Data
- [ ] Knowledge Check: Bayesian Network
- [ ] Knowledge Check: Hidden Markov Models

Graded Coursework

- [ ] Week 4 Graded Discussion
- [ ] Week 4 Graded Quiz
- [ ] Midterm Exam - Proctored (Available from Thursday, September 9, 2021 at 12:01 AM AZ
- [ ] Time - Wednesday, September 15, 2021 at 11:59 PM AZ time)
- [ ] Mini-assignment: SVMs-Part 1
- [ ] Mini-assignment: SVMs-Part 2

Midterm Exam (Feb 2nd - 8th)

Reminders

- [ ] Schedule your proctoring with ProctorU for your proctored exam(s), if you have not already done, *at least* 72 hours prior to your desired exam date and within the availability window
- [ ] Covers content from weeks 1, 2, 3 and 4. Note: The coverage is until Week 4, but only until the SVM lectures (i.e., the Graphical Models will NOT be included in the Midterm Exam).
- [ ] Review the details and allowances information for this exam
- [ ] Prepare for the exam and complete the practice exam

Week 5: Unsupervised Learning & Data Clustering (2/7-2/13)

Content

- [ ] Set-up of the unsupervised learning problem
- [ ] Gaussian Mixture Models & the EM Algorithm
- [ ] The k-means Algorithm
- [ ] Analyzing the k-means Algorithm
- [ ] The Basics of Spectral Clustering

Other Tasks

- [ ] Knowledge Check: Unsupervised Learning
- [ ] Knowledge Check: K-means Algorithm
- [ ] Knowledge Check: Analyzing the K-Means Algorithm
- [ ] Knowledge Check: Basics of Spectral Clustering

Graded Coursework

- [ ] Week 5 Graded Discussion
- [ ] Week 5 Graded Quiz

- [ ] Mini-assignment: K-Means
- [ ] Project #2

Week 6: Spectral Clustering and Dimensionality Reduction (2/14-2/20)

Content

- [ ] Graph Cut Formulation
- [ ] Going Beyond MinCut
- [ ] Practical Considerations in Implementation
- [ ] Introduction to the Problem of Dimensionality Reduction

Other Tasks

- [ ] Knowledge Check: Graph Cut Formulation
- [ ] Knowledge Check: Going Beyond MinCut
- [ ] Knowledge Check: Practical Considerations in Implementation
- [ ] Knowledge Check: Introduction to the Problem of Dimensionality Reduction
- [ ] Course Survey *(strongly encouraged, appreciated, and used by the course team)*

Graded Coursework

- [ ] Mini-assignment: Part 1
- [ ] Mini-assignment: Part 2
- [ ] Week 6 Graded Discussion
- [ ] Week 6 Graded Quiz

Week 7: Dimensional Reduction, Neural Networks, Deep Learning, and Exemplar Applications (2/21-2/27)

Content

- [ ] Principal Component Analysis: the Basic Idea
- [ ] PCA: the Algorithm & Further Discussion
- [ ] Introduction to neural networks & deep learning
- [ ] Key enabling techniques for deep learning
- [ ] Basic Deep Architectures
- [ ] Deep learning for image and video-based recognition
- [ ] GAN and its applications

Other Tasks

- [ ] Prepare for the exam
- [ ] Schedule proctoring at least 72 hours prior to your exam date and within the availability window
- [ ] Knowledge Check: PCA
- [ ] Knowledge Check: Introduction to Neural Networks and Deep Learning
- [ ] Knowledge Check: Key Enabling Techniques for Deep Learning
- [ ] Knowledge Check: Basic Deep Architecture
- [ ] Knowledge Check: Deep Learning for Image-Based Recognition
- [ ] Knowledge Check: Deep Learning for Video-Based Recognition
- [ ] Knowledge Check: Generative Adversarial Networks and their Applications
- [ ] Request for Faculty Review: MCS Project Portfolio Submission *(optional - for degree students wanting to use this course's projects as part of their portfolio degree requirement/specialization requirements)*
- [ ] Complete the course survey before your final exam (*strongly encouraged, appreciated, and used by the course team)*

Graded Coursework

- [ ] Mini-assignment
- [ ] Week 7 Graded Quiz Part 1
- [ ] Week 7 Graded Quiz Part 2
- [ ] Project #3

Week 8: Final Exam and Course Wrap-Up (02/27-03/02)

Content

- [ ] N/A

Other Tasks

- [ ] Request for Faculty Review: MCS Project Portfolio Submission (optional - for degree students wanting to use this course's projects as part of their portfolio degree requirement/specialization requirements)

Graded Coursework

- [ ] Final Exam - Proctored (Available from Wednesday, February 23rd, 2022 at 12:01 AM AZ Time - Tuesday, March 1st, 2022 at 11:59 PM AZ time)

Final Exam (02/23-03/01)

Reminders

- [ ] Complete the course survey before your final exam (*strongly encouraged, appreciated, and used by the course team)*
- [ ] Schedule your proctoring with ProctorU for your proctored exam(s), if you have not already done, *at least* 72 hours prior to your desired exam date and within the availability window
- [ ] Covers content from weeks 5, 6, and 7. This will cover only from Graphical Models week 4 to the end of the semester (Deep Learning Applications) week 7.
- [ ] Review the details and allowances information for this exam
- [ ] Prepare for the exam and complete the practice exam

Slack Channel

This course will have a unique Slack workspace where you can communicate with your classmates.

Note: You must join/access this workspace using your ASURITE credentials.

Slack is intended to provide a space to create community with your classmates. Please remember to follow the communication protocol pinned in your Slack channel to ensure that any questions or concerns you have are addressed in a timely manner. Also, please remember ASU's Academic Integrity policy, and please refrain from sharing assessment questions, answers or solutions.

Policies

All ASU and Coursera policies will be enforced during this course. For policy details, please consult the MCS Graduate Handbook and the MCS Onboarding Course.

Graded Quiz and Exam Policy

Each course in the MCS program is uniquely designed by expert faculty so that learners can best master the learning outcomes specific to each course. By design, course features and experiences are different across all MCS courses.

In the MCS program, we strive to provide learners with exercises and applied practice beyond quizzes and exams that align with the hands-on nature of the computer science industry. Ungraded practice opportunities *may* include, but are not limited to: in-video-questions (IVQs), knowledge check quizzes (KCs), weekly (i.e., unit) practice quizzes, practice exams, and other assignments or exercises. For all these learning activities, the questions and correct answers are provided to learners. When available, auto-generated typed feedback is built into the course to further help learners learn in real-time. Please thoroughly review your course to ensure that you are aware of the types of practice opportunities available to you.

For academic integrity purposes, once grades are made available, learners will see their overall total scores. Like other standardized tests, such as the GRE and SAT, learners will receive a singular grade for the graded quizzes and exams, but the questions, correct and incorrect answers, and feedback to each question will ***not*** be provided.

If learners desire 1:1 feedback for their questions on graded assessments, please submit questions to mcsonline@asu.edu. Rather than receiving the exact questions learners had correct and incorrect and the answers to those questions, learners will likely receive the concepts that were covered in the assessment questions so they will know what they need to review prior to other assessments and how to apply this information in their professional environments.

Absence Policies

There are no required or mandatory attendance events in this online course. Live Events, both Live Sessions hosted by the instructor and Virtual Office Hours hosted by the course team do not take attendance.

Learners are to complete all graded coursework (e.g., projects and exams). If exceptions for graded coursework deadlines need to be made for excused absences, please reach out to the course team by the end of the second week of the course using the mcsonline@asu.edu email address. Review the exam availability windows and schedule accordingly. The exam availability windows allow for your own flexibility and you are expected to plan ahead. Personal travel does not qualify as an excused absence and does not guarantee an exception.

Review the resources for what qualifies as an excused absence and review the late penalties in the Assignment Deadlines and Late Penalties section of the syllabus and the course:

a. Excused absences related to religious observances/practices that are in accord with ACD 304–04, “Accommodation for Religious Practices” (please see Religious Holidays and Observances)

b. Excused absences related to university sanctioned events/activities that are in accord with ACD 304–02, “Missed Classes Due to University-Sanctioned Activities”
c. Excused absences related to missed class due to military line-of-duty activities that are in accord with ACD 304–11, “Missed Class Due to Military Line-of-Duty Activities,” and SSM 201–18, “Accommodating Active Duty Military”

Live Event Expectations

The environment should remain professional at all times. Inappropriate content/visuals, language, tone, feedback, etc. will not be tolerated, reported and subject to disciplinary action. Review the Policy Regarding Expected Classroom Behavior section of the syllabus and the Student Code of Conduct for more detailed information.

Policy Regarding Expected Classroom Behavior

The aim of education is the intellectual, personal, social, and ethical development of the individual. The educational process is ideally conducted in an environment that encourages reasoned discourse, intellectual honesty, openness to constructive change, and respect for the rights of all individuals. Self-discipline and a respect for the rights of others in the university community are necessary for the fulfillment of such goals. An instructor may withdraw a student from a course with a mark of “W” or “E” or employ other interventions when the student’s behavior disrupts the educational process. For more information, review SSM 201–10.

If you identify something as unacceptable classroom behavior on the class platform (e.g., Coursera discussion forum) or communication channels (e.g., Zoom, virtual live session, virtual office hours, Slack, etc.), please notify the course team using the mcsonline@asu.edu email. In the discussion forums, you can also flag the post for our attention. For more specifics on appropriate participation, please review our Netiquette infographic.

Our classroom community rules are to:

- Be professional
- Be positive
- Be polite
- Be proactive

Academic Integrity

Students in this class must adhere to ASU’s academic integrity policy, which can be found at https://provost.asu.edu/academic-integrity/policy). Students are responsible for reviewing this policy and understanding each of the areas in which academic dishonesty can occur. In addition, all engineering students are expected to adhere to both the ASU Academic Integrity Honor Code and the Fulton Schools of Engineering Honor Code. All academic integrity violations will be reported to the Fulton Schools of Engineering Academic Integrity Office (AIO). The AIO maintains a record of all violations and has access to academic integrity violations committed in all other ASU colleges/schools.

Copyright

The contents of this course, including lectures (Zoom recorded lectures included) and other instructional materials, are copyrighted materials. Students may not share outside the class, including uploading, selling or distributing course content or notes taken during the conduct of the course. Any recording of class sessions is authorized only for the use of students enrolled in this course during their enrollment in this course. Recordings and excerpts of recordings may not be distributed to others. (see ACD 304–06, "Commercial Note Taking Services" and ABOR Policy 5-308 F.14 for more information).

You must refrain from uploading to any course shell, discussion board, or website used by the course instructor or other course forum, material that is not the student's/learner's original work, unless the student/learner first complies with all applicable copyright laws; faculty members reserve the right to delete materials on the grounds of suspected copyright infringement.

Policy Against Threatening Behavior, per the Student Services Manual, (SSM 104-02)

Students, faculty, staff, and other individuals do not have an unqualified right of access to university grounds, property, or services (see SSM 104-02). Interfering with the peaceful conduct of university-related business or activities or remaining on campus grounds after a request to leave may be considered a crime. All incidents and allegations of violent or threatening conduct by an ASU student (whether on- or off-campus) must be reported to the ASU Police Department (ASU PD) and the Office of the Dean of Students.

Disability Accommodations

Suitable accommodations will be made for students having disabilities. Students needing accommodations must register with ASU Student Accessibility and Inclusive Learning Services. Students should communicate the need for an accommodation at the beginning of each course so there is sufficient time for it to be properly arranged. These requests should be submitted through the online portal. See ACD 304-08 Classroom and Testing Accommodations for Students with Disabilities. ASU Student Accessibility and Inclusive Learning Services will send the instructor of record a notification of approved accommodations and students are copied on these letters. It is recommended that students reply to the faculty notification letters, introduce themselves to their instructor, and share anything they might want to disclose.

Harassment and Sexual Discrimination

Arizona State University is committed to providing an environment free of discrimination, harassment, or retaliation for the entire university community, including all students, faculty members, staff employees, and guests. ASU expressly prohibits discrimination, harassment, and retaliation by employees, students, contractors, or agents of the university based on any protected status: race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, and genetic information.

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education

program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at https://sexualviolenceprevention.asu.edu/faqs.

Mandated sexual harassment reporter: As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, https://eoss.asu.edu/counseling, is available if you wish to discuss any concerns confidentially and privately.

Disclaimer

The information in this syllabus may be subject to change without advance notice. Stay informed by checking course announcements and the syllabus section of your course.

Course Creator(s)

Jingrui He

Jingrui He is an associate professor in the School of Computing, Informatics, and Decision Systems Engineering at Arizona State University. She received her Ph.D. from Carnegie Mellon University. She joined ASU in 2014 and directs the Statistical Learning Lab (STAR Lab). Her research focuses on rare category analysis, heterogeneous machine learning, active learning and semi-supervised learning, with applications in social media analysis, healthcare, manufacturing process, etc.

Baoxin Li

Baoxin Li is currently a professor and the chair of the Computer Science & Engineering Program and a Graduate Faculty Endorsed to Chair in the Electrical Engineering and Computer Engineering programs. From 2000 to 2004, he was a Senior Researcher with SHARP Laboratories of America,

where he was the technical lead in developing SHARP's HiIMPACT Sports™ technologies. He was also an Adjunct Professor with the Portland State University from 2003 to 2004. His general research interests are on visual computing and machine learning, especially their application in the context of human-centered computing.

Hanghang Tong

Hanghang Tong is currently an associate professor at School of Computing, Informatics, and Decision Systems Engineering (CIDSE), Arizona State University since August 2014. Before that, he was an assistant professor at Computer Science Department, City College, City University of New York, a research staff member at IBM T.J. Watson Research Center and a Post-doctoral fellow in Carnegie Mellon University. His research interest is in large scale data mining for graphs and multimedia.