COSC 4368 (Spring 2024)

Review List Final Exam on Monday, May 6, 2p

The 4368 final exam will take 105 minutes and is open-books and notes and takes place in **F 160.**

The final exam will be similar to the midterm exam. However, in the final exam you might be asked to write an essay! Moreover, there is more additional reading material, as in the second half of the semester there was less coverage of the course textbook!

Relevant slide shows, articles and videos, pasted from the COSC 4368 Website which are relevant for the final exam; the number of \*’s approximates how much the topic will be covered in the exam.

2024 Machine Learning Transparencies:

* \*\*\*\* Reinforcement Learning: [RL1](http://www2.cs.uh.edu/~ceick/ai/RL1.pptx) (Introduction to Reinforcement Learning), Remark: Final exam will not cover Bellman Equations and TD-Learning, as these topics were covered in the midterm exam. Deep Reinforcement Learning: Watch first six minutes of <https://www.youtube.com/watch?v=IUiKAD6cuTA> (will only ask very basic questions about this topic); for reading reading material for deep learning see below.
* [Introduction to Supervised Learning](http://www2.cs.uh.edu/~ceick/ai/Eick_SL.pptx) (also called "Learning from Examples")
* Neural Networks: [Introduction to Neural Networks](https://www2.cs.uh.edu/~ceick/ai/NN2024.pptx) (covered on March 18, 2024), [NN1](https://www.bing.com/videos/search?q=neural+network+video&view=detail&mid=54402D363ABB8903202F54402D363ABB8903202F&FORM=VIRE) ([3blue1brown](https://www.3blue1brown.com/): *What is a Neural Network?* (suggest you watch this video, if you did not have any exposure to NN before)),

2024 Deep Learning Coverage: [Introduction to Generative AI](https://www2.cs.uh.edu/~ceick/ai/Gen_AI.pdf) (Google DeepMind Lecture by Ruiqi Gao); [Neural Network Basics and Short Introduction to Deep Learning](https://www2.cs.uh.edu/~ceick/ai/IntroDL.pptx); AutoEncoders ([Mahin's March 27, 2024 AutoEncoder Lecture](https://www2.cs.uh.edu/~ceick/ai/Autoencoders.pptx), [Mahin's Autoencoder Notebook](https://www2.cs.uh.edu/~ceick/ai/IntroductionToDeepLearning.ipynb)); Diffusion Models ([Lecture](https://www2.cs.uh.edu/~ceick/ai/DiModel.pptx)(the first 35 slides were covered in the lecture), [Demo](https://www2.cs.uh.edu/~ceick/ai/DiModelDemo.pdf), [ipynb File](https://www2.cs.uh.edu/~ceick/ai/DiModel.ipynb)); [Mahin's April 22, 2024 Language Model lecture](https://www2.cs.uh.edu/~ceick/ai/LM.pptx).

\*\*\*\* 2023 Societal and Ethical Issues of AI and AI Politics

* [Human Do not Need to Apply](https://www.youtube.com/watch?v=7Pq-S557XQU&feature=youtu.be) (a video that analyzes the influence of AI on jobs)
* [AI's Impact on Society](https://www.bing.com/videos/search?q=Artificial+Intelligence+and+Society+videos&&view=detail&mid=7E16A38F386DE9777AF67E16A38F386DE9777AF6&&FORM=VRDGAR&ru=%2Fvideos%2Fsearch%3Fq%3DArtificial%2520Intelligence%2520and%2520Society%2520videos%26qs%3Dn%26form%3DQBVR%26sp%3D-1%26pq%3Dartificial%2520intelligence%2520and%2520society%2520videos%26sc%3D0-42%26sk%3D%26cvid%3D3717327387ED4998B76CFD197058097B) (watch starting 12:19 centering on fake news and then skip to 28:00 Chinese AI )
* [Organization of this Part of the Course and Discussion Questions about some of the Videos Listed Below](https://www2.cs.uh.edu/~ceick/ai/Ethics%20for%20AI.pptx) (will be discussed in class!

2024 Reasoning in Uncertain Environments Transparencies

* [Review Probability Theory](http://www2.cs.uh.edu/~ceick/ai/Probability-Review.pptx)
* Naive Bayesian Approaches: [Bayes' Theorem"](http://www2.cs.uh.edu/~ceick/ai/bayes.pdf)
* Belief Networks: Dr. Eick's [Computations in Belief Networks](http://www2.cs.uh.edu/~ceick/ai/Bbn.pptx) (to be covered in the lecture) Transparencies;
* Hidden Markov Models:  [Daphne Koller's Introduction to Hidden Markov Models Video](https://www.youtube.com/watch?v=mNSQ-prhgsw) covered in 2024, [Dr. Eick's Hidden Markov Model Slides](http://www2.cs.uh.edu/~ceick/ai/SHMM.pptx) only partially covered in 2024,  (only slides 1-15 that were used in the lecture) Wikipedia HMM article. Remark: The final exam will not ask any deep technical questions about HMM; however, you should know what HMM mathematically are, what can be done with them, and what the major applications are which use HMM.

**Additional Reading Material** (please read!)**:**

Autoencoders: <https://towardsdatascience.com/understanding-variational-autoencoders-vaes-f70510919f73>

Language Model: <https://www.altexsoft.com/blog/language-models-gpt/>

Diffusion Models: [DF\_Reading.pdf (uh.edu)](https://www2.cs.uh.edu/~ceick/ai/DF_Reading.pdf)

<https://en.wikipedia.org/wiki/Hidden_Markov_model>

(Wikipedia HMM page; might use the weather/activity HMM in the final exam)

AI Arms Races: [The Global Race for AI Dominance: Can the US Maintain Its Edge? (newsweek.com)](https://www.newsweek.com/global-race-ai-dominance-can-us-maintain-its-edge-1828232)

Relevant material from the Russel textbook (Fourth Edition)

Chapter 12: 397-402

Chapter 13: 412-416

Chapter 19: 665-669

Chapter 21: 750-756, 778

Chapter 22: 789-803