Course Number	CS 537	Course Title	Advanced Topics in Expert Systems
Semester Hours	3	Course Coordinator FA20	Henry Hexmoor
Catalog Description	Foundation models are a recent class of AI models that are large-scale in terms of number of parameters and are trained on broad data. This course will outline the fundamental concepts of foundation models including the capabilities of pre-trained models for AI-powered applications. Topics covered include Transformers, Large Language Models such as GPT-4, Diffusion models, generative modeling, and multi-modal foundation models. There is no required textbook, and we will be mostly reading publicly available research papers. The papers will be mostly from major conferences.		

Textbooks

N/A

References

Will be provided

Course Learning Outcomes

- Understanding the science of foundation models

Assessment of the Contribution to Student Outcomes

Outcome →	1	2	3	4	5	6	7
Assessed →	X		X	X	X		X

Prerequisites by Topic

CS 330 or consent of instructor.

Major Topics Covered in the Course

1. **Introduction and Transformers**
2. **Optimization, Backpropagation, and Training**
3. **Word Embeddings**
4. **Transformers**
5. **Transfer Learning**
6. **Scaling laws and GPT-3**
7. **Prompting**
8. **Class Project**

Major Lab Assignments and Projects

TBD

Assessment Plan for the Course

Tool 1. Assignments:

PO 1,2, 5

Tool 2. Midsem:

PO 1, 4

Tool 3. Project:

PO 5, 7