

BME 6938 · ADVANCED BIOMEDICAL AI · SPRING 2027

LECTURE 1-1

Course Logistics

Welcome to Advanced Biomedical AI



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Why This Course?

Biomedical AI has moved from one model per task to large pretrained models adapted to many tasks.

Current research

Recent papers every week
Foundation and language models
Agents and generative AI

Critical reading

Present and critique papers
Separate what is shown
from what is claimed

Your own study

A research paper on an
open problem you choose
with a reproducible repository

Builds on BME 6938 Medical AI (Fundamentals of Biomedical AI) or an equivalent ML or deep learning course

Time and Location

Tuesday

1:55 to 2:45 PM

Period 7 · Lecture

Thursday

1:55 to 3:50 PM

Periods 7 and 8 · Two paper sessions

**Black Hall, room BLK 0315 · in person · laptop
required**

Spring break: March 13 to 20 · Last day of classes: April 21



Instructor



Dr. Parisa Rashidi

Biomedical Engineering

Email

parisa.rashidi@ufl.edu

Office hours

[By appointment on Zoom](#)

Research: multimodal AI, agentic systems, and clinical decision support

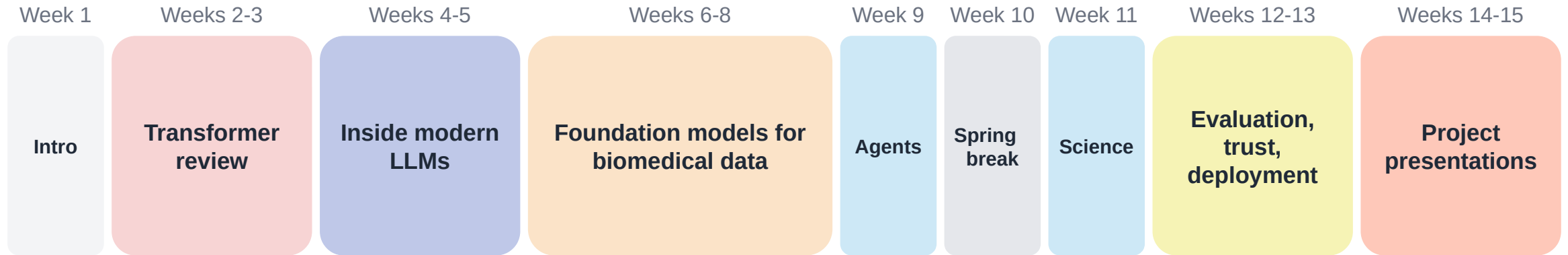
Course Objectives

By the end of the semester you should be able to:

- 1 Explain the principles behind current model architectures and training paradigms in biomedical AI.
- 2 Critically read, present, and critique current biomedical AI research papers.
- 3 Formulate a problem and select appropriate data, models, and methods to address it.
- 4 Evaluate biomedical AI models rigorously, beyond aggregate accuracy.
- 5 Identify the requirements for translating AI models into biomedical and clinical use.
- 6 Design, carry out, and report a research project in biomedical AI.

Course Map

Fifteen weeks. The last two weeks are reserved for project presentations.



2 Transformer review, Part 1

3 Transformer review, Part 2

4 Inside modern LLMs: 2026 architectures

5 Post-training, reasoning, and LoRA

6 Self-supervised learning and imaging FMs

7 Vision-language and multimodal models

8 EHR and physiological time series

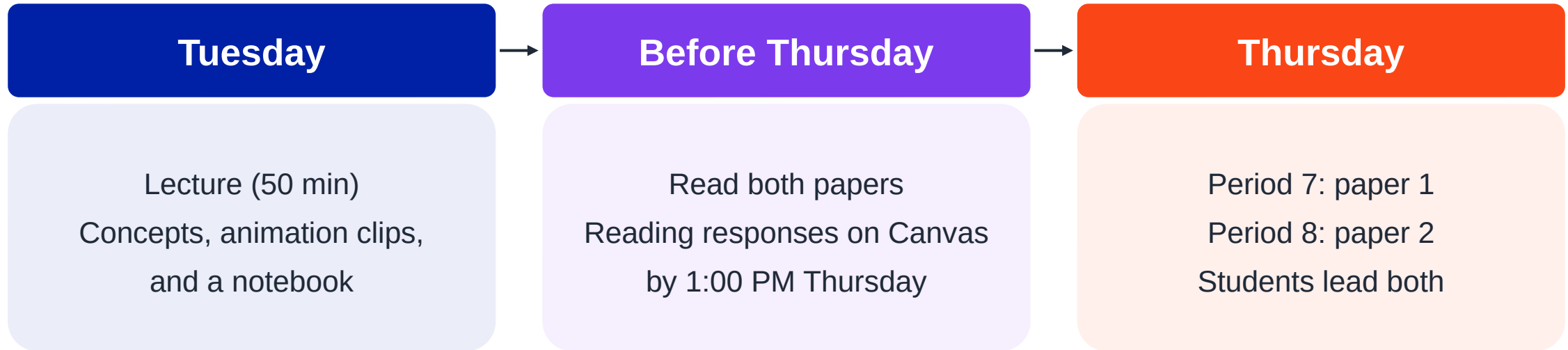
9 Retrieval, tools, and agents

11 Generative models and AI for science

12 Evaluation, robustness, and fairness

13 Deployment and human-AI teaming

A Typical Week



Each Thursday paper session (50 minutes)

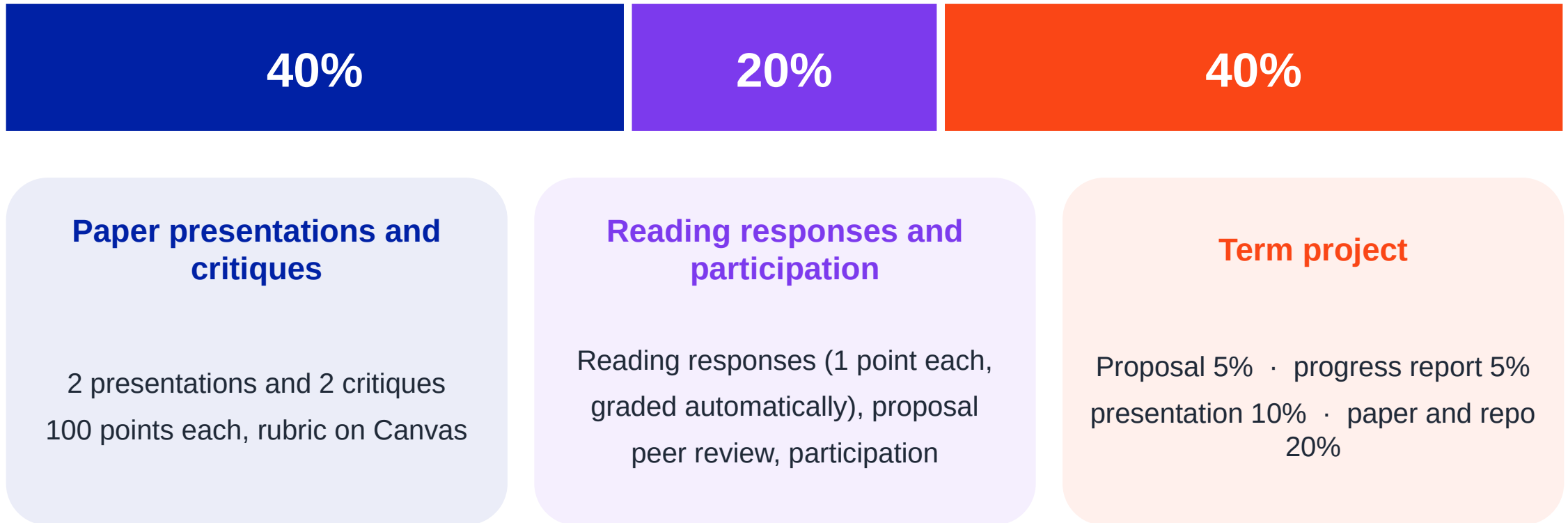




Grading and Assignments

Grading

1,000 points in three parts.



Late work: 5% deducted per late day unless the assignment states otherwise

Paper Sessions

Every student presents twice and critiques twice, in groups.

Presentation group · 20 min

Explain the problem and why it matters
Data, model, and key design choices
Results: what they demonstrate
Strengths relative to prior work
Clear slides, balanced speaking time

Critique group · 15 min

Restate the core claims accurately
Critique methods and validation
Do the results support the claims?
Limitations, biases, and ethics
Constructive suggestions

Both groups upload slides to Canvas by 12:00 PM · group members receive the group grade · assignments on Canvas by Jan 15

Reading Responses

For each Thursday paper you are not presenting or critiquing.

1

One paragraph (about 150 words): the main claim of the paper and whether the evidence supports it.

2

One discussion question you want the class to address.

1 point each, graded automatically on submission · locks at 1:00 PM Thursday · lowest two dropped



The Term Project

Term Project: A Research Paper

Teams of three choose an open problem, run an original study, and write it up as a paper.

A baseline

Compare against an appropriate, honest baseline

Rigorous evaluation

Beyond one aggregate metric: calibration, subgroups, or a shift or robustness test

Failure analysis

Where and why does the method fail?

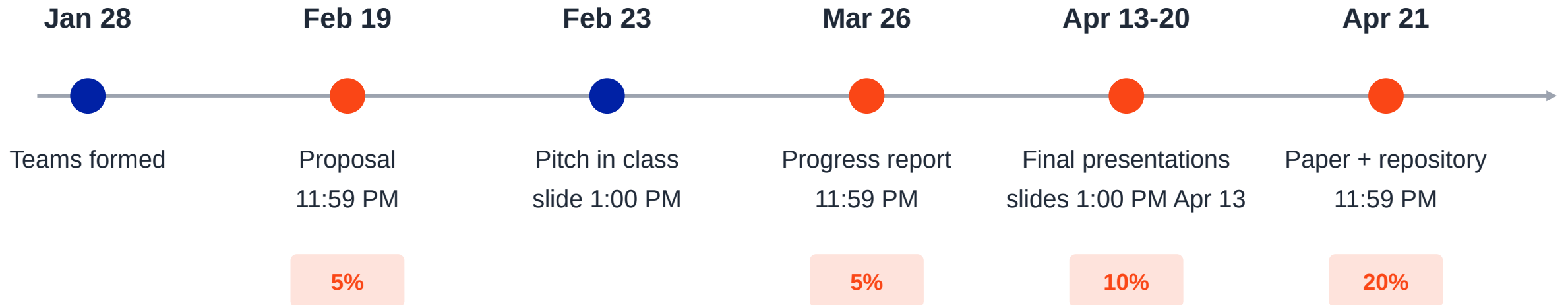
Reproducibility

4-page conference-style paper and a GitHub repository that runs from its README

No topic yet? Suggested problems with open datasets are listed on the course website.

Project Milestones

Written work is due at 11:59 PM; anything presented in class is due at 1:00 PM.



Final talk: 12 min + 4 min questions · every team's slides due 1:00 PM Tue, Apr 13

Written work is due 11:59 PM · anything presented in class is due 1:00 PM

Start Data Access Now

Credentialed clinical datasets take weeks to unlock.

Credentialed (start this week)

MIMIC-IV, MIMIC-CXR, eICU

CITI training + PhysioNet credentialing

Can take several weeks

Open (no credentialing)

PTB-XL (ECG)

MedMNIST (imaging)

TCGA (pathology, genomics)

MedQA, PubMedQA (text)

Never commit patient data to a repository or paste credentialed data into online AI services.



Resources and Policies

Where Things Are

Canvas

Announcements
Assignments and submissions
Grades
Paper assignments
Turn on notifications

Course GitHub repository

Slides and animation clips
Notebooks (Colab and HiPerGator)
Paper list and rubrics
Project templates

If Canvas and any other source disagree, Canvas is correct.

Computing

Every notebook runs on Google Colab and on HiPerGator.

Google Colab

Free GPU for lecture notebooks
Nothing to install
Session limits on the free tier

HiPerGator

UF's supercomputer
GPUs for project work
Course allocation (details on Canvas)

Software

Python, PyTorch,
Hugging Face, scikit-learn
GitHub for code

Lecture notebooks are ungraded reference code that follows each lecture step by step

Getting Help

Three steps, in order.

1

Try it yourself

Slides, notes, notebooks
Documentation and papers
AI tools, used responsibly

2

Ask your peers

Canvas discussion board
Say what you tried
Help others too

3

Contact the instructor

Email for a Zoom appointment
Include details and
what you already tried

Using AI Tools

This is an AI course: use AI tools, and use them well.

Encouraged

- Understanding papers and concepts
- Coding help and debugging
- Editing your own writing
- You own every claim and line of code

Not allowed

- Reading responses or critiques you did not write from your own reading
- Patient or credentialed data in online AI services
- Unverified citations

Project papers include a short statement of how AI tools were used.

Course Policies

Attendance

Required; paper sessions depend on everyone being there

Your own work

Write your own code and text; plagiarism is checked

Group work

Contribute equally; speaking time is shared

Late work

5% per late day unless stated otherwise

University policies

Linked in the syllabus: go.ufl.edu/syllabuspolicies

This Week

Thu, Jan 14

Read Moor et al., "Foundation models for generalist medical AI" (Nature 2023)

Fri, Jan 15

Paper and group assignments posted on Canvas

Tue, Jan 19

Transformer Review, Part 1 (notebook posted as reference code)

This week

Introduce yourself on the Canvas discussion board; start CITI training if you may use MIMIC

Deadlines: reading responses 1:00 PM Thursday · written work 11:59 PM · anything presented in class 1:00 PM

Introduce Yourself

On the Canvas discussion board, and briefly now.

Your name and program

Your research area

One biomedical AI problem you care about

What you want from this course