EDUC 545: Intelligent Tutoring Systems  
Fall 2020  
Professor Ryan Baker

SYLLABUS

Instructor Info
Email: rybaker@upenn.edu
Office hours: Wednesdays, 815am-9am
Course time: Friday, 715pm-815pm
Office hours and course location: https://bluejeans.com/rybaker/
Class discussion forum: piazza.com/upenn/fall2020/educ545

Required Texts:
• None

Information on how to obtain course readings will be provided on the course discussion forum.

Course Goals: More and more education takes place asynchronously and online (especially this semester), but relatively little asynchronous instruction takes advantage of the technological advancements that have taken place in recent decades, replicating traditional models for instruction online.

In this class, you will learn about the pedagogy and technology of intelligent tutoring systems (often referred to as adaptive learning systems), individualized and personalized technology that helps students construct understanding and develop skill.

We will read and reflect on both classic and recent papers on this technology, and study many of the successful examples of intelligent tutoring systems, both systems that have scaled and systems that have failed to scale. We will investigate key methods this type of learning leverages, and key pedagogies it affords.

This class will use a connectivist pedagogy, where you will teach and learn from your classmates, with heavy involvement from the professor as a participant in discussions.

Course Pre-requisites: None.

Assignments:

This course will be graded on the basis of three assignments:
1. Topical Review
2. System Review
3. Participation

For the topical review, every student will select a course topic and prepare a presentation of this topic, using an asynchronous learning or communication technology of your choice. For example, this assignment could be completed by creating slides with video and/or audio, a webpage, an intelligent tutoring system, or a game. This presentation should represent a comprehensive discussion of the topic, its history of research in the field, key findings, and key open questions or challenges. This assignment will be due according to the course syllabus – each topic will be due exactly five days before it is covered in synchronous class (i.e. exactly 120 hours before class starts). This assignment may be individual or
conducted in a group, depending on class size. After you post this presentation, your classmates (and I) will comment on your presentation and ask questions, and you will lead a discussion of the topic in the discussion forum.

For the system review, every student will select a notable intelligent tutoring system (from a list recommended by the professor, or your own choice approved by the professor). You will write a brief (5-8 page) paper describing the system, how it works, what pedagogies it supports, and how well it has worked with real learners. This assignment is due November 15.

Participation in asynchronous activities will also be part of the course grade. Students are expected to provide at least two substantive comments several lines long on at least 10 (out of 13) topical reviews, and to provide at least two substantive comments several lines long on at least six other students’ system reviews. In both cases, your comments should be targeted towards the content of the review (and the topic/system it describes) rather than on the presentation. To count towards your grade, your posts for topical reviews must be submitted within five days of the resource being posted, and your posts for system reviews must be submitted within 14 days of the resource being posted. Participation in the synchronous class will not be part of the course grade but is still encouraged.

Given the state of the world in 2020, extensions will be given on the system review as needed. However, please be reasonable. Turning in the topical review late will impact your classmates’ learning experiences, so any delay will result in a 20% penalty on the assignment, which will increase as the assignment gets later. You are strongly recommended to complete your topical review early so that disruptions in the world (which we can all expect) do not impact your classmates. This is not the sort of assignment that you should start two days before the due date.

No examinations will be given in this class.

Grading

- Topical Review 33.33%
- System Review 33.33%
- Participation 33.33%
Course Schedule
Intelligent Tutoring Systems
Professor Ryan S. Baker

Fri, Sep. 4
Introduction and Do These Things Work?

Readings


Fri, Sep. 11
Knowledge Communication, Knowledge Construction, or Procedural Skill Development: What’s the Point?

Readings


Fri, Sep. 18
Knowledge Tracing and Mastery Learning

Core Readings


Secondary Readings

Fri, Sep. 25

Knowledge Graphs and Prerequisite Tracing

Core Readings


Secondary Readings


Fri, Oct. 2

Memory Optimization and Spiraling Review

Core Readings


Secondary Readings

Fri, Oct. 9
Hints and Feedback

Core Readings


Secondary Readings


Fri, Oct. 16
Model Tracing, Constraint-Based Tutoring, and Canned Answers

Core Readings


Secondary Readings

Fri, Oct. 23

Assessing and Tutoring Complex Behavior

Core Readings


Secondary Readings


Fri, Oct. 30

Essay Writing and Automated Scoring

Core Readings


Secondary Readings


Fri, Nov. 6

Tutoring Metacognition and Self-Regulated Learning

Core Readings


Secondary Readings


Fri, Nov. 13

Supporting Affect and Engagement

Core Readings


Secondary Readings

Fri, Nov. 20
Dialogue Tutors

Core Readings


Secondary Readings


Wed, Nov. 25
*GSE HAS MOVED FRIDAY CLASSES TO WEDNESDAY FOR SHEER CONFUSINGNESS*
Embodied Agents

Core Readings

Secondary Readings


Fri, Dec. 4

Games and Gamification

Core Readings


Secondary Readings


**Fri, Dec. 11**

**A/B Testing and Iterative Refinement**

**Core Readings**


**Secondary Readings**


**Fri, Dec. 18**

**Intelligent Tutoring Systems in the Classroom**

**Core Readings**


**Secondary Readings**