

**Digital Learning Environments  
Fall 2018**

**University of California, Berkeley  
Graduate School of Education  
Policy, Organization, Measurement and Evaluation**

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**Zoom link to Classroom:** <https://berkeley.zoom.us/my/pardos>

**Course Website:** <http://dle.berkeley.edu/>

**Course Description**

Digital Learning Environments are taking residence in the educational experience of many, from replacing components of traditional classroom instruction to providing open platforms for life-long learning. In this class we will study the various forms and functions of a sampling of digital learning environments ranging from subject specific Intelligent Tutoring Systems in K-12 to domain neutral systems for post-secondary online learning. Guest lecturers from a variety of platforms that differ in grade level, curricular integration, and domain specificity, will present the principles behind their system and the work they are undertaking in the education technology space.

A weekly homework project will be assigned per digital learning environment focusing on one of the following aspects of the environment; pedagogical theory informing design, data analysis, and hands-on authoring of content in the system.

The objective of the course is for students to gain a level of familiarity with digital learning environments that will help them make informed decisions at the frontiers of digital-ed.

**Course Objectives**

- Understanding the role digital learning environments are playing across K-16

- Understand the pedagogical theory underlying the design of these platforms
- Hands-on experience with the platforms through authoring and analysis of data

## **Grading**

Participation: 15%

*Participation is counted as class attendance. Starting August 22nd, each class is worth one participation point. Each student starts with two extra participation points (two classes can be missed without a grade impact). Additional absences will be dealt with on a case-by-case basis.*

Midterm: 20%

Homework: 40%

*Homework will consist of weekly responses to selected readings, videos or other provided material submitted to Canvas. Group projects throughout the semester will also count towards students' final homework grade. Participation may also be counted through posting in different discussion threads.*

*If a submission is late within a week of a due date, 10% will be deducted from the score. If a submission is late by 1-2 weeks, 20% will be deducted from the score, etc. Extensions will be dealt with on a case-by-case basis.*

Final Project: 25%

*Students will work in groups to create their own digital learning environment. This project will incorporate every aspect of the course, as students will be asked to apply their knowledge regarding pedagogy and design, application and audience targets, as well as their selected forms of assessment features. They will compose a final paper, explaining the development and justifications for their selected features of their platform, as well as present to the rest of the class.*

### **Final Grades**

97%-100%	A+	86%-89%	B+	76%-79%	C+	66%-69%	D+
93%-95%	A	83%-86%	B	73%-76%	C	63%-66%	D
90%-92%	A-	80%-82%	B-	70%-72%	C-	60%-62%	D-

## **Texts**

There are no textbooks required for this course. All reading assignments will be posted on bCourses.

## **Special Needs/Accommodations**

Please see me as soon as possible if you need particular accommodations, and we will work out the necessary arrangements.

## **Course Schedule**

**Wednesday, August 22nd:** Introduction to Class, Review of Syllabus

### **Module 1: Intelligent Tutoring Systems** August 27th - September 8th

This week we will introduce the class, have a review of the syllabus and discuss Intelligent Tutoring Systems. We will read Bloom's paper and understand how its findings have inspired the one-on-one tutoring paradigm of Intellectual Tutoring Systems. We will also introduce the core principles of Intelligent Tutoring Systems, which laid the foundation for computer aided instruction over 30 years ago. This will include the fine grained atomic cognitive task analysis performed in many of these systems. We will also evaluate the use of ITS through the Rand article to discuss the implementation of Intelligent Tutoring Systems in the classroom from a cost-benefit analysis perspective.

#### **Assignments**

Due Week 2

Reading: Bloom, B. S. (1984). The 2 sigma problem: The search for methods of group instruction as effective as one-to-one tutoring. *Educational researcher*, 4-16.

Due Week 3

Reading: Corbett, A. T., Koedinger, K. R., & Anderson, J. R. (1997). Intelligent tutoring systems. *Handbook of human computer interaction*, 849-874.

Reading: Pane, J. F., Griffin, B. A., McCaffrey, D. F., Karam, R., Daugherty, L., & Phillips, A. (2013). Does an Algebra Course with Tutoring Software Improve Student Learning?. ([http://www.rand.org/pubs/research\\_briefs/RB9746.html](http://www.rand.org/pubs/research_briefs/RB9746.html))

### **Module 2: ASSISTments** September 9th - September 22nd

The amount of time needed to author content in ITS was one of the primary hindrances to its expansion to additional domains. We'll discuss the older authoring systems CTAT (Cognitive Tutor Authoring Tools) in comparison to more modern WYSIWYG (What You See Is What You Get) editors. We will also break down ASSISTments and compare and contrast the platform with traditional ITS. Students will also have the opportunity to build their own problems using ASSISTments.

## Assignments

### Due Week 4

Video: Watch video from a live Q&A session with Neil and Christina Heffernan on how to use will introduce their platform and how to author for it.

Reading: Razzaq, L., Heffernan, N., Feng, M., & Pardos, Z. (2007). Developing Fine-Grained Transfer Models in the ASSISTment System. *Journal of Technology, Instruction, Cognition, and Learning*, 5(3), 289-304.

### Due Week 5

Reading: Shrestha, P., Maharjan, A., Wei, X., Razzaq, L., Heffernan, N.T., Heffernan, C. (2009) Are Worked Examples an Effective Feedback Mechanism During Problem Solving? In N.A. Taatgen & H. van Rijn (Eds.), *Proceedings of the 31th Annual Conference of the Cognitive Science Society*. Cognitive Science Society.

## **Module 3: Online Courses and Higher Education** September 23rd - November 3rd

This week we will introduce the recent spate of free open online courses, or MOOCs. This module will introduce the current state of applying knowledge tracing techniques from ITS to MOOCs. Students will also have an introduction to analyzing a public MOOC dataset from Harvard & MIT. Students will also meet and present their L@S Papers to the other members of their group. We will also discuss the variety of partnering institutions of higher education with online platforms. We will become more familiar with the different interactions that formal institutions of education have with existing digital learning environments.

By October 24th, form groups and select an L@S papers on various MOOCs topics to present in the following week. Post the name of the L@S paper and group member names, make sure not to repeat papers.

## Assignments

### Due Week 6

Reading: Coursera Report (slides) on large scale user survey results

([https://d396qusza40orc.cloudfront.net/learninghubs/LOS\\_final%209-21.pdf](https://d396qusza40orc.cloudfront.net/learninghubs/LOS_final%209-21.pdf))

OR Data Analysis: Students will get an introduction to analyzing a public MOOC dataset from Harvard & MIT

Video: Watch video (~1hr) of ex-UC Berkeley Chancellor Dirks vs. Sebastian Thrun (Udacity founder).

Video: Please watch a live Q&A session with Christopher Parrish, a representative of 2U who works with the UC Berkeley School of Information in developing and implementing the online Masters in Data Science program and answer posted discussion questions.

Due Week 7

Reading: Johanes, Petr. (2017). Epistemic Cognition: A Promising and Necessary Construct for Enriching Large-scale Online Learning Analysis. 61-69. 10.1145/3051457.3051462.

Due Week 9 (after the midterm)

Group Project: Present L@S Papers to the other members of their group and upload them to the Asset Library.

### **Midterm Information**

Midterm Review video will be recorded one week before the midterm to be as current and relevant to topics as possible. It will outline the features of the test as well as previously covered material.

Midterm will be a take home exam, released at 8am on Tuesday, October 16th and due Sunday, October 21st at 11:59PM

### **Module 5: Social Learning** November 4th - November 10th

ITS systems were mostly built from a cognitive theory of knowledge acquisition that does not take into account social transmission and construction of knowledge. In this week we will briefly overview the alternative, socially oriented, theories of learning, including connectivism, common theory of reference from the learning analytics community.

#### Assignments

Due Week 10

Reading: Kop, R., & Hill, A. (2008). Connectivism: Learning theory of the future or vestige of the past?. The International Review of Research in Open and Distributed Learning, 9(3).

Reading: Siemens, G., Gasevic, D., Haythornthwaite, C., Dawson, S., Shum, S. B., Ferguson, R., ... & Baker, R. S. J. D. (2011). Open Learning Analytics: an integrated & modularized platform (Doctoral dissertation, Open University Press).

### **Module 6: Open Education Resources** November 11- November 17th

In this week we will talk about how students interact with numerous sources for Open Education Resources. The tradeoffs between a platform offering OER, such as Kahn Academy, and platforms that offer full courses and curriculum will be discussed.

### Assignments

Due Week 11

Video: Watch a video of a live Q&A of Dr. Prasad Ram from Gooru who will speak on building an OER, what a search engine for learning means to Gooru, and the philosophies of learning underpinning future projects.

Reading: Porcello, D., & Hsi, S. (2013). Crowdsourcing and curating online education resources. *Science*, 341(6143), 240-241.

## **Module 7: Data and Education** November 18th - November 24th

Numerous industries have benefitted from or been born out of data. Digital Learning Environments are producing data in unprecedented volumes. In this module we will cover ethical/privacy considerations for education data and ask what makes education different in the ethical and privacy considerations surrounding data and its uses?

Note: Wednesday, November 21, 2018 NO CLASS

### Assignments

Due Week 12

Reading: Pardos, Z.A. (2017) Big Data in Education and the Models that Love Them. *Current Opinion in Behavioral Sciences*. Vol 18, 107-113.

Video: Watch a video from Matthew Smith from Instructure who will speak about research within the Canvas LMS

Reading: Madda, Mary Jo. "Where InBloom Wilted - EdSurge News." *EdSurge*, EdSurge, 13 Mar. 2018, [www.edsurge.com/news/2014-02-05-where-inbloom-wilted](http://www.edsurge.com/news/2014-02-05-where-inbloom-wilted).

## **Module 8: Education Technologies** November 25th - November 30th

A number of interactive devices used in tandem with various educational technologies will be demoed. This is an "education gadgets" day!

### Assignments

Due Week 13

Reading: Szafir, D., & Mutlu, B. (2013, April). ARTFul: adaptive review technology for flipped learning. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (pp. 1001-1010). ACM.

Workshop Day for Final Projects

**Monday, December 3rd:** No Class, Reading Week

**Wednesday, December 5th:** No Class, Reading Week

**Monday, December 10th:** Final Project Presentations

**Wednesday, December 12th:** Final Project Presentations