Learning Analytics

Special Topics in Educational Technology
0858-723 Summer 2019
Graduate Program in Educational Technology • Adelphi University

> *"Learning analytics is the measurement, collection, analysis, and reporting of data about learners and their contexts, for the purposes of understanding and optimizing learning and the environments in which it occurs."*
>
> *— 1st International Conference on Learning Analytics*

Course Information

Instructors	Matt Curinga	Aaron Hung
Email	mcuringa@adelphi.edu	hung@adelphi.edu
Online Office Hours	*By appointment*	
Course website	https://moodle.adelphi.edu/course/view.php?id=114510	
Class meetings	Online (Tuesday - Tuesday)	

Course Description

In this course we study approaches to understanding data generated by and from learners, and methods for using this data to improve learning experiences and outcomes. We learn how to gather and mine educational data as well as tools and techniques for analyzing and visualizing this data.

Keywords: learning analytics, data science, educational data mining, edm, tableau software, data visualization

Course Communications

This is a *fully online course*. There is no set class time for video chat or live lectures. However, we will be following a weekly format. You are welcome to read and work ahead, but we are a learning community and will be discussing the course materials both formally (on Moodle) and informally each week. This course begins on Tuesday, May 28 and ends on Sunday, August 11. The course is organized into weekly modules that will run on a Tuesday-to-Monday schedule.

Participants in this course must actively participate in our suite of online communications tools, including Slack (https://auedtech.slack.com), Adelphi email, and the course website.

You *must* check your Adelphi email and the `#learninganalytics` channel on Slack **at least once a day.** It is highly recommended that you install the Slack mobile client and an email client on your mobile phone so that you receive "push notifications" of course announcements.

The best place to post general course questions and any content-related questions is the `#learninganalytics` Slack channel. The instructor and course assistant, as well as other students and alums monitor this channel and often provide immediate support. You are encouraged to contact the instructors at any time via email or direct message on Slack.

Online tools:

- **Moodle:** will be used to post the syllabus and links to weekly readings, videos, and discussions.
- **Slack:** will be our main channel for online communications. Please Join our Slack team with your Adelphi email. If you run into trouble or have a question, post it here to our channel, #learninganalytics, or send a message to `@mxc` or `@aaronhung`. During the weeks of the class, we recommend running the Slack app for you phone.
- **mail.adelphi.edu email:** we will use your official adelphi student email for class email communications as well as the associated google account for video/audio chats and calendar events. Please check this email regularly.

Course Goals

Students will be able to:

- explain the purpose, usage and limitations of learning analytics
- explain the ethical implications of using learning analytics
- explain different formats of raw data
- prepare raw data for analysis
- use data mining and business intelligent techniques to spot trends in data and implement continuous improvement
- use digital tools for visualizing and reporting numerical information

Required Texts, Materials, and Expenses

All course readings and videos will be made available on Moodle or are openly available online. We will be using a free academic version of Tableau software. There are no expected costs associated with this course.

Online Resources

There are many online resources for data analytics and working with Tableau Specifically. If you get stuck or want to dig deeper, you might want to start here.

- Required Texts, Materials, and Expense Lynda.com course, 2h 28m
- Tableau Learning Tableau's free online courses and videos

Class Schedule

Dates	Topic	Readings	Assignments
Week 1 May 28 to Jun 2	What is learning analytics?	Intro to Learning Analytics (Aaron & Matt, *TBD*) Siemens, G. (2013). Learning analytics: The emergence of a discipline. *American Behavioral Scientist*, *57*(10), 1380–1400. Intro to Big Data: Crash Course Statistics #38. [11:22]	Introductions VoiceThread
Week 2 Jun 3 to Jun 9	Data & Learning	Baker, R. S. (2016). Stupid Tutoring Systems, Intelligent Humans. International Journal of Artificial Intelligence in Education, 26(2), 600–614.	Article Review
Week 3 Jun 10 to Jun 16	Preparing Data	Bartimote, K., Pardo, A., & Reimann, P. (2019). The perspective realism brings to learning analytics in the classroom. In J. M. Lodge, J. C. Horvath, & L. Corrin (Eds.), *Learning analytics in the classroom: Translating learning analytics research for teachers* (pp. 22–42). New York, NY: Routledge. Slade, S., & Prinsloo, P. (2013). Learning analytics: Ethical issues and dilemmas. *American Behavioral Scientist*, *57*(10), 1510–1529.	Learning Analytics Exercise 1
Week 4 Jun 17 to Jun 23	Data and Ethics	O'Neill, C. [Talks at Google] (2016, November 22) Cathy O'Neil: "Weapons of Math Destruction"	Talks at Google. [58:22] Rushkoff, D. (2019, March 20). Ep. 124 "Don't Know Much About History" – Douglas Rushkoff with Roger McNamee. [podcast] [video] [1:21:28]	Ethics debate *teams*
Week 5 Jun 24 to Jun 30	Data and Ethics Debate		Ethics debate *due*
Week 6 Jul 1 to Jul 7	Exploring Data 1	Bakharia, A., Corrin, L., de Barba, P., Kennedy, G., Gašević, D., Mulder, R., … Lockyer, L. (2016). A conceptual framework linking learning design with learning analytics. In *Proceedings of the Sixth International Conference on Learning Analytics & Knowledge* (pp. 329–338). New York, NY: ACM Press. Tufte, E. R. (2006). The Fundamental Principles of Analytical Design. In *Beautiful Evidence*, pp. 122–139). Cheshire, Conn: Graphics Press.	Learning Analytics Exercise 2 VoiceThread

Week 7 Jul 8 to Jul 14	Exploring Data 2	Olney, T., Rienties, B., & Toetenel, L. (2019). Gathering, visualising and interpreting learning design analytics to inform classroom practice and curriculum design. In J. M. Lodge, J. C. Horvath, & L. Corrin (Eds.), *Learning analytics in the classroom: Translating learning analytics research for teachers* (pp. 71–92). New York, NY: Routledge.	Data Debate: Teams assigned
Week 8 Jul 15 to Jul 21	Telling Data Stories	Kozol, J. (2005). Still separate, still unequal. *Harpers*, 1864, 41. Shapiro, E. (2019, April 16). Facing Segregated Schools, Parents Took Integration Into Their Own Hands. It's Working. *The New York Times*.	Data Debate Due
Week 9 Jul 22 to Jul 28	Visualizing Data 1	Silverstein, L. (2018). The science of data visualization [54:54].*Tableau Conference 2018.* New Orleans, October 22-25, 2018.	Post project idea, identify data
Week 10 Jul 29 to Au 4	Visualizing Data 2	*Working on final projects*	Thesis, data analytics project
Week 11 Aug 5 to Aug 11	Final Project		Data Analytics Project Due

Grades

- **Participation** (15%)
- **Learning Analytics Exercises** (25%)
    - *Learning Analytics Exercise 1 (10%)*
    - *Learning Analytics Exercise 2 (15%)*
- **Debates** (25%)
    - *Debate 1: Ethics (10%)*
    - *Debate 2: School Segregation (15%)*
- **Data Analytics Project** (35%)

Participation Assignments

These assignments are not graded individually, but are part of the regular participation in this online class. As a whole, they will inform students' grades for participation.

Introductions
May 28 to Jun 2

Post a 90 second video to VoiceThread. In this video, please include:

- your name, what you're studying at adelphi, and your work
- your own (brief) definition of learning analytics
- what you hope to learn in the class

Time your video so that it is as close to 90 seconds as possible. You might want to practice what you're going to say a couple of times so that your introduction is clear and concise.

Article Review
Jun 3 to Jun 9

Ryan Baker's article "Stupid Tutoring Systems, Intelligent Humans," includes citations for many of the early and seminal work in using data in education. Choose one article that is cited by Ryan to review. Find this article through the AU libraries, web, or Google Scholar, read it (and take notes while you read).

Post a "review" of the article on Moodle by end of day on Friday. Your review should summarize the most important points of the article and include your critical insights. "Critical" doesn't mean that you are "criticizing" what's wrong with the article, rather that you are adding your own understanding of why it's important (or not) and how it fits into the larger picture of education, as you understand it. You may want to explore implications of the article, develop thought experiments if the articles position was adopted widely, discuss shortcomings of the article (not limited too, but possibly including bias or being grounded on shaky or unproven assumptions), point out sections or concepts that are unclear or require further elaboration, compare and synthesize it with other research and theories you're familiar with, or place it in the context of a specific practice that you're familiar with (from your work, teaching, experience as a student or researcher, etc).

Read the other reviews and comment on (at least) 2 others (and reply to comments on yours) by end-of-day on Monday.

Ethics debate teams
Jun 17 to Jun 23

The instructors will assign you to a team and tell you which "side" of the ethics debate your team will represent. Carefully read the instructions for the debate. Start planning with your team on how best to divide the work and share the responsibilities.

Data Debate: Teams assigned
Jul 8 to Jul 14

The instructors will assign you to a team and tell you which "side" of the school segregation debate your team will represent. Carefully read the instructions for the debate. Start planning with your team on how best to divide the work and share the responsibilities. By the end of this week you should have identified the major data sets you will and the types of calculations you will perform to support your team's position.

Post project idea, identify data
Jul 22 to Jul 28

Carefully read the instructions for your Data Analytics Project. Create a new post in the "Analytics Project" discussion forum, where you post:

- the title for your project (also your post title)
- an overview of the questions you're investigating

- where you are pulling the data for your project

By the end of the week, you should pull your initial data into Tableau so that you can start investigating and understanding it.

Thesis, data analytics project
Jul 29 to Aug 4

At the start of the week, you should have prepped your data and have begun to develop a sense for what questions this data can help you explore. By the end of the week, post a response to your initial post in the "Analytics Project" forum where you clearly state the hypotheses for your data analysis, or the questions that your data visualization will allow users to investigate.

Graded Assignments

Learning Analytics Exercise 1

In this exercise you will become familiar with Tableau Prep. You will take a “raw” data set of Moodle logs and work to prepare it for further analysis. The data set contains all course activity from a real class that was taught on Moodle. Take the log data and use Tableau Prep to prepare the data for analysis by:

1. Identifying the instructor data
2. Removing the instructor’s data
3. Anonymizing the students by giving them pseudonyms, using a second spreadsheet that links student name to pseudonym

After completing this, do a screencast of what you did and post it to a Q&A Forum on Moodle.

Related tutorials & docs:

- Getting Started with Tableau Prep Builder [video]
- The Cleaning Step [video]
- Filtering Data [video]
- The Join Step [video]
- Join or Union Data

Get the data: `logs_EDT 723 - Summer 2019 Sample Data A (Moodle).csv`

Learning Analytics Exercise 2

For the second Tableau exercise we continue working with the Moodle log data to bring it from Tableau Prep into Tableau Desktop.

For this exercise, you will create 3 “worksheets” and one “dashboard” in Tableau Desktop. You may need to do further work in Tableau Prep in order to complete your analysis. Create one worksheet for each of these topics:

1. Course activity by time and day
2. Course activity broken down by student

3. Course activity broken down by activity type

Combine the three worksheets into a single dashboard.

When you are done, export your project as a "Packaged Workbook" and upload it to the assignment page on the course website.

Debate 1: Ethics of Big Data & Education

Our first debate will focus on the dangers of big data in education. You will be assigned to either the **red team** or the **blue team**. The red team will be making the case against the use of big data in education. Specifically, they will present three **scenarios** where big data, machine learning, and analytics works against our larger educational goals. The blue team will respond to these scenarios with counter arguments showing the benefits of big data and how it can be used to further our goals.

The debate will proceed over the course of the week (beginning Tuesday), according to the following schedule:

- **Tuesday (openings).** Each team posts an opening statement: a 3 minute video delivered by one of the team members, where they make state their thesis and the main arguments they will make
- **Wednesday (red team scenarios).** On Wednesday, the red team posts their 3 scenarios as short (1-3 minute) videos. The scenario must: a) describe the case where big data works against our educational goals, b) describe how/why it happens, c) argue that this is the *likely* outcome of adopting a data-driven approach to education. The red team wants to find cases that cannot be easily ignored or refuted by the blue team. These are hypothetical cases, but should be written with specific details. For example:
    - **Too vague**: *"it's possible that big data reflects bias"*
    - **Better example**: "*Predictive data over-diagnoses poor and working class children with learning disabilities"*
- **Thursday (blue team rebuttal).** The blue team will respond specifically to each scenario. They will submit a short (1-3 minute) video response for each scenario. The response should refute the specific claims of the scenarios with logic and data.
- **Saturday (closings).** Each team will submit a 3 minute video with a closing statement. The closing should summarize their team's key theses and make the case of why their team forwarded the stronger argument.

The debate will be carried out in the **Ethics of Big Data & Education discussion forum** on Moodle. Opening statements will be posted as responses to the thread bearing the name of the debate step. Please upload your video to YouTube as an "unlisted" video and post the link to the forum.

Each "scenario" should be posted as a response to the separate threads. Blue team responses to the scenarios should be posted as responses to specific scenarios (one response per scenario post).

Closing videos, like the openings, should have links to "unlisted" YouTube videos.

Refrain from further discussion in this forum until after the closing videos are posted. However, after the debate "closes", you main comment on any of the threads, as needed, and you no longer need to adhere strictly to your team's assigned point of view.

Debate 2: School segregation in New York City

New York City public schools are segregated along racial lines. In this debate, the teams will argue whether segregation is a key factor in the achievement gap between Black and Latinx students (who are underachieving) and White and Asian students (who perform at the top of most measures).

Analyzing the myriad data published by the City of New York, the teams in this debate will use Tableau to analyze the data surrounding school segregation and performance. The **red team** will make the case that segregation has a strong negative effect on the academic performance of Black and Latinx students. The **blue team** will argue that segregation does not sufficiently explain the performance gap.

- **Tuesday (openings).** Each team posts an opening statement: a 3 minute video delivered by one of the team members, where they make state their thesis and the main arguments they will make
- **Wednesday (red team arguments).** The red team will present exactly 3 key findings that support the hypothesis that segregation is key to the performance gap. The arguments will be uploaded as 3 separate 3-minute videos (screencasts, narrated presentations, etc). The points must specifically refer to data and should present tables, sharts, and other data-driven analysis.
- **Thursday (blue team rebuttal).** The blue team will respond specifically to each of the arguments made by the red team with a 2-minute video. Like the red team, the response must rally specific quantitative arguments supported by the data.
- **Saturday (closings).** Each team will submit a 3 minute video with a closing statement. The closing should summarize their team's key theses and make the case of why their team forwarded the stronger argument.

You can bring in data from any source. Key data resources are located at:

- The NYC DOE Data Hub
- "Education" category of NYC Open Data
- New York State (NYSED) Education Data Site

The debate will be carried out in the **School segregation in New York City discussion forum** on Moodle. Opening statements will be posted as responses to the main topic. Please upload your video to YouTube as an "unlisted" video and post the link to the forum.

The red team arguments will be posted as 3 top-level posts that include unlisted YouTube videos. Please make sure that your videos are high definition (at least 720p 1080p is better). This is important for us to read text labels in your graphic and discern other fine-grained visual elements. The blue team rebuttal videos should be posted as responses to the initial arguments of the red team. Likewise, these should be HD videos.

Closing videos, like the openings, should be top-level posts with links to "unlisted" YouTube videos.

Refrain from further discussion in this forum until after the closing videos are posted. However, after the debate "closes", you main comment on any of the threads, as needed, and you no longer need to adhere strictly to your team's assigned point of view.

Data Analytics Project

Students identify a publicly available dataset and use it to do their own data analytics research. The dataset must be sufficiently complex for data analytics research. Students then have to clean up their data using Tableau Prep and identify questions they can ask about the data. Then they need to visualize it in an appropriate way that addresses their questions, and present their findings to the class. To turn in the assignment, the student will upload their packaged Tableau workbook and a narrated screencast where they detail the findings in their report.

Academic Assistance for Students with Disabilities

As the instructor of this course, I am responsible to do everything within reason to actively support a wide range of learning styles and abilities. This course has been designed according to principles of Universal Design for Learning. Feel free to discuss your progress in this course with me at any time.

If you have a disability that may significantly impact your ability to carry out assigned coursework, please contact the Student Access Office, (formerly the Office of Disability Support Services) located in Post Hall, First Floor, 516-877-3145, sao@adelphi.edu.

The staff will review your concerns and determine, with you, appropriate and necessary accommodations. When possible, please allow for a reasonable time frame for requesting ASL Interpreters or Transcription Services; a minimum of four (4) weeks prior to the start of the semester is required.

Writing Center https://writing.adelphi.edu/

The Writing Center is a free service available to all Adelphi University undergraduate and graduate students. We can assist students in all disciplines to become more effective and confident writers, and to hone the craft of critical thinking in approaching the writing process.

Learning Center https://learning.adelphi.edu/

The Learning Center promotes not only academic success, but also an enriched scholastic experience. We foster critical thinking and the development of creative strategies, and offer a springboard into the intellectual world beyond college.

University Statement on Academic Integrity

You are expected to behave with the highest level of academic integrity. Cheating and other forms of dishonesty will not be tolerated and will result in the proper disciplinary action from the university. Classroom behavior that interferes with the instructor's ability to conduct the class or ability of students to benefit from the instruction will not be tolerated. All beepers and cellular phones should be turned off while class is in session. You are expected to come to class prepared - this means having read and studied the assigned chapters before class. By having prepared in this manner, you will be able to maximize your time spent in class.

Adelphi University demands the highest standards of academic integrity. Proper conduct during examinations, the proper attribution of sources in preparation of written work, and complete honesty in

all academic endeavors is required. Submission of false data, falsification of grades or records, misconduct during examinations, and plagiarism are among the violations of academic integrity. Students who do not meet these standards are subject to dismissal from the University.

Use of Candidate Work

All teacher education programs in New York State undergo periodic reviews by accreditation agencies and the state education department. For these purposes samples of students' work are made available to those professionals conducting the review. Student anonymity is assured under these circumstances. If you do not wish to have your work made available for these purposes, please let the professor know before the start of the second class. Your cooperation is greatly appreciated.

Student Counseling Center

The Student Counseling Center (SCC) provides confidential and professional mental health counseling services, resources, and referrals to support the academic and personal success, health, and well-being of Adelphi students without additional charge. Counselors are available to help students cope with a variety of stressors and personal issues that may interfere with their academic and personal experiences. The Center also supports students who may be feeling suicidal or in crisis. To schedule an appointment, please call (516) 877-3646, email scc@adelphi.edu or stop by the SCC. If you need immediate assistance, walk-in services are available during the fall and spring semesters Monday-Thursday, 8:30am-7:00pm; Friday 8:30am-4:00pm. Additional information can also be found by visiting https://scc.adelphi.edu.

Need support when the SCC is not available? For 24/7 emergency counseling, referral, or assistance, please contact:

- Long Island Crisis Center (516) 679-1111
- National Suicide Prevention Lifeline (800) 273-TALK (8255)
- Crisis Text Line: Text 741741
- Adelphi Office of Public Safety:
    - Off campus: (516) 877-3511
    - On campus: Extension 5 on any campus phone
- 911 (for immediate health-related emergency)

ADELPHI
UNIVERSITY