

LAPS-5320-001
Experimental Design and Research Methodology
Summer 2022

Instructor Information

Instructor(s)

George Siemens, PhD

Email Address

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Faculty Profile

Information about me can be found here: <https://mentis.uta.edu/explore/profile/george-siemens>

Office Hours

Given the global nature of the MS LA program, I haven't set regularly scheduled office hours. I am willing to meet with you at flexible times and as frequently as is needed. Please email me or message me in Canvas and I'll confirm within 24 hours.

Course Information

Time and Place of Class Meetings

This course, and the entire MS LA, is exclusively online. All lectures will be recorded and learning materials for the coming week will be released Sunday evening. Live sessions are planned on an alternating weekly basis (between this course and 5320) and will be set within the first week of the course to accommodate learner's existing schedules.

Weekly (roughly every 7-10 days as we alternate weekday/weekend) "pub chats" will be held for flexible discussions about anything related to learning analytics. I **strongly encourage** you to attend these sessions as they put you in touch with peers and cover wide ranging review of LA topics and concepts.

Learning online is a unique experience and requires different forms of engagement. Primary is regular (daily) engagement with course materials. Suggestions on "how to succeed" online will be provided and shared throughout the program. The MSLA course hub in Canvas will also provide ongoing resources and assistance in planning and engaging in online learning.

Description of Course Content

Learning Analytics (LA) as a field has a short history, having only formally been established in 2011 with the launch of the Learning Analytics and Knowledge conference. During this short timeframe, substantial research has been undertaken. Researchers have generally adopted methods from data science domains. This has produced valuable insights into learning, often based on large scale data sets drawn from digital learning environments. Missing from this research is the evaluation of cognitive constructs, social learning, and affective dimensions of learning experiences.

This course addresses both the data science approaches to understanding learning as well as the psychological aspects that influence human learning. The course offers an advanced survey of research methodology in psychology, including recent challenges and responses by the scientific community.

Topics covered include: prominent methodologies including experimental, quasi-experimental, and field designs, data science approaches, modeling and simulation, among others. Important design issues such as validity, generalizability, and ethics will be addressed. Newer approaches, such as “big data” and open science will be introduced and considered in the broader context of traditional research methods. Upon completion of the course, students will be able to describe the strengths and weaknesses of various research approaches, the knowledge necessary to evaluate the effectiveness of research programs, and an appreciation for the intricacies involved in complex, dynamic research settings. Students will be able to detail why problems arise in learning analytics research, the relationship of LA to existing psychology research and the approaches that researchers have adopted to ensure greater rigor, replication, and overall quality of studies. We will also address the research and report writing processes. A critical aspect of LA is to communicate outputs to a range of stakeholders, including formal academic outputs, policy reports, and summary reports for sponsors of learning analytics projects.

Student Learning Outcomes

By the end of the course, students will be able to:

1. Articulate various research frameworks (quantitative, qualitative, mixed, data-centric), their unique attributes, and the situations under which each is most appropriate.
2. Understand and apply the scientific method in solving problems in LA and define its role in modern social sciences research, and the emerging influence of data science methodologies.
3. Describe experimental and descriptive methods, including survey design, complex designs, repeated measures designs, etc., and the conditions under which different methods are most appropriate.
4. Design a research study, including defining research questions, positioning the study in existing literature, articulation of methodology and motivations for selecting them, and plans for analyzing data.
5. Assess and critique a research paper’s methodology and research questions, quality of data collected, appropriateness of conclusions, and suitability of ethical considerations.
6. Detail how psychological research has been impacted by the replication crisis and the approaches initiated by the community in response.
7. Summarize the contributions that “big data” makes to psychology research, including prominent technologies, how it advances new research opportunities, and concerns it presents to research going forward.
8. Prepare LA research reports (academic and informal) for multiple stakeholders and report sponsors
9. Engage in team-based sensemaking of complex research challenges, including assessing, critiquing, and improving the planned LA research and writing of peers.

Required Textbooks and Other Course Materials

The Handbook of Learning Analytics is a useful (free) resource that can be accessed here:

<https://www.solaresearch.org/publications/hla-17/>

During the course, articles will be provided in the weekly modules. Lectures and online resources will also be freely accessible.

Many of the resources and readings will be digital. However, two textbooks have been selected for this course:

1. Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.

2. Booth, W. C., Booth, W. C., Colomb, G. G., Colomb, G. G., Williams, J. M., & Williams, J. M. (2016). *The craft of research, 4th Edition*. University of Chicago Press.

The paperback version of these books are in the price range of ~\$22-30 each. Digital versions are often cheaper. Copies of these text may also be available in UTA or local libraries.

Descriptions of major assignments and examinations

Assignments

This course has one primary output, completed over four stages – each graded individually – and a review of a peer’s research report. There is an expectation of ongoing engagement in discussion forums (summer courses have low enrolment so forums may be more self-reflection at times)

Learning Analytics Research Report (combined 90%):

1. Select topic and research questions (RQs), including justification for importance (10%). ~1 page
2. Situate and identify RQs in existing LA literature, providing support references (20%). ~3 pages
3. Detail research methods that you would deploy to answer RQs (30%). ~4 pages
4. Describe methodological constraints and ways to ensure validity and reliability (10%) ~1 page.
5. Review and advise on a peer’s proposal (20%) ~ 1 ½ pages.

Discussion Forum Contributions (10%)

There are several discussion forum contributions throughout the course. These are primarily intended for developmental reasons – i.e. a chance to right/think and share your ideas.

Technology Requirements

This course will primarily take place in Canvas, with some office hours in Zoom or MS Teams.

Other Requirements

Given the distributed and global nature of the course, interaction with course instructors will be held online in Canvas.

You will also be invited to attend online webinars and conference during the duration of the course, and the MS LA program in general. These events may require additional technologies not detailed above.

You will explore additional technologies as you do your group work and methodologies. These tools will be decided by your group members, but none will be required or mandated.

Grading Information

Grading

Grades will be posted on Canvas following three days after each assignment has been submitted. The grade scale is as follows:

| | |
|---------------|---|
| 90-100 points | A |
| 80-89 points | B |
| 70-79 points | C |
| 60-69 points | D |

| | |
|------|---|
| < 60 | F |
|------|---|

There is no extra credit. The best predictor of a good grade is regular engagement with the course and reading of the assigned material within the assigned week.

Expectations for Out-of-Class Study

Beyond the time required to view each online lecture, students should expect to spend at least an additional 5-7 hours per week in course-related activities, including reading required materials, engaging with peers, and completing assignments.

Grade Grievances

Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current University Catalog.

Course Schedule

As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. This may include the addition of a guest speaker or changes to the course material covered during the weeks detailed below.

| Week | Dates | Topic | Assessment Details | Comment |
|------|-------------------------|--------------------------------------------------------------------------------------|---------------------|---------------------------------------------|
| W1 | June 6 – June 12 | Orientation & Course Overview: Philosophy of Science, Scientific method, ethics, RQs | | Course overview, assignments, expectations. |
| W2 | June 13 – June 19 | Research frameworks: Quantitative, qualitative, Mixed, Data-centric | RQ submitted | |
| W3 | June 20 – June 26 | Theory and testing claims, IRB Process | Discussion Question | |
| W4 | June 27 – July 3 | Literature review | Literature Review | |
| W5 | July 4 – July 10 | Qualitative methods and survey research | | |
| W6 | July 11 – July 17 | Experimental Design I & II | Discussion Question | |
| W7 | July 18 – July 24 | Experimental Design III | Research Methods | |
| W8 | July 25 – July 31 | Applied Research | Discussion Question | |
| W9 | Aug 1 – Aug 7 | Mixed Methods (MM LA). Writing your research | Peer Review | Comment on the paper produced by peers |
| W10 | Aug 8 – Aug 10 | Presenting your research | Discussion | |

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|-----|-----------------------|------------------------|-----------------|
| W11 | Aug 11 – Aug 12 | Exam Week (well, days) | Full submission |
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Institutional Information

UTA students are encouraged to review the following institutional policies and informational sections and reach out to the specific office with any questions. To view this institutional information, please visit the [Institutional Information](https://resources.uta.edu/provost/course-related-info/institutional-policies.php) page (<https://resources.uta.edu/provost/course-related-info/institutional-policies.php>) which includes the following policies among others:

- Drop Policy
- Disability Accommodations
- Title IX Policy
- Academic Integrity
- Student Feedback Survey
- Final Exam Schedule

Additional Information

Master of Science in Learning Analytics Orientation and Resource Hub

This [Orientation and Resource Hub](#) is a central resource for students in the master's program. It has all critical information related to the program, any events, UTA resources, and training for new students.

Departmental and Program Assistance

If you have any questions about the MSLA program, please contact Justin T. Dellinger, Ph.D. at jdelling@uta.edu.

Attendance

At the University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator of student success. Each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. Since the MS LA is fully online, attendance is less consequential than engagement. As the instructor of this course, I will encourage you to log on daily and be active in readings and discussions.

While UT Arlington does not require instructors to take attendance in their courses, the U.S. Department of Education requires that the University have a mechanism in place to mark when Federal Student Aid recipients "begin attendance in a course." UT Arlington instructors will report when students begin attendance in a course as part of the final grading process. Specifically, when assigning a student a grade of F, faculty report must the last date a student attended their class based on evidence such as a test, participation in a class project or presentation, or an engagement online via Canvas. This date is reported to the Department of Education for federal financial aid recipients.

Academic Success Center

The Academic Success Center (ASC) includes a variety of resources and services to help you maximize your learning and succeed as a student at the University of Texas at Arlington. ASC services include supplemental instruction, peer-led team learning, tutoring, mentoring and TRIO SSS. Academic Success Center services are provided at no additional cost to UTA students. For

additional information visit: [Academic Success Center](#). To request disability accommodations for tutoring, please complete this [form](#).

The English Writing Center

The Writing Center offers **FREE** tutoring in 15-, 30-, 45-, and 60-minute face-to-face and online sessions to all UTA students on any phase of their UTA coursework. Register and make appointments online at the [Writing Center](https://uta.mywconline.com) (<https://uta.mywconline.com>). Classroom visits, workshops, and specialized services for graduate students and faculty are also available. Please see [Writing Center: OWL](#) for detailed information on all our programs and services.

Library Information

Each academic unit has access to [Librarians by Academic Subject](#) that can assist students with research projects, tutorials on plagiarism and citation references as well as support with databases and course reserves.

Research or General Library Help

Ask for Help

- [Academic Plaza Consultation Services](#) (library.uta.edu/academic-plaza)
- [Ask Us](#) (ask.uta.edu/)
- [Research Coaches](#) (<http://libguides.uta.edu/researchcoach>)

Resources

- [Library Tutorials](#) (library.uta.edu/how-to)
- [Subject and Course Research Guides](#) (libguides.uta.edu)
- [Librarians by Subject](#) (library.uta.edu/subject-librarians)
- [A to Z List of Library Databases](#) (libguides.uta.edu/az.php)
- [Course Reserves](#) (https://uta.summon.serialssolutions.com/#!/course_reserves)
- [Study Room Reservations](#) (openroom.uta.edu/)