

Quantitative Methods

Winter Term 2021

University of Waterloo,
Stratford School of Interaction
Design and Business**Course Description**

This course is designed to introduce quantitative data analysis, covering basic descriptive and inferential statistical techniques used in analyzing user experience (UX) research data. Students are not expected to be math wizards but instead will be walked through the basics of quantitative methods to become effective UX data analysts. As such, emphasis in this course will be placed on the logic of quantitative methods rather than the math behind the statistic.

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Course coordinator and Section 1 Instructor

Office Hours: TBA on LEARN

Teaching Assistant: Reyhaneh Zarezadeh, rzarezadeh@uwaterloo.caVivian Yang, vivyang@uwaterloo.ca

Section 2 Instructor

Office Hours: TBA on LEARN

Teaching Assistant: Ainsley Michelle Andres, amandres@uwaterloo.ca**Learning Objectives**

The learning objectives of this course are that students:

- develop quantitative data analysis skills as a user experience (UX) researcher
- identify the assumptions and limits of statistical tests
- understand which test is appropriate to answer a particular UX research question
- use Microsoft Excel software to perform descriptive and predictive statistical analysis
- communicate research results and translate statistical jargons into meaningful English

Required lectures and readings

Students are required to complete the assigned video lectures and readings from the online textbook.

Required Textbook (Available online)

Improving the User Experience through Practical Data Analytics, 2015, Paul D. Berger; Mike Fritz.

The lectures will closely follow the textbook. Students are expected to read all assigned material to do well in the course. You can access the textbook for free online from O'Reilly:

1. Go to <https://lib.uwaterloo.ca/web/research-databases/browse?&a=S>
2. Click on "Safari Tech Books Online (Now O'Reilly Online)"
3. Login using WatIAM credentials.
4. Search up the textbook name in the search bar "Improving the User Experience through Practical Data Analytics" by Paul D. Berger; Mike Fritz. It should appear as the first result.
5. Click on the search result to access the textbook.

If you prefer a hardcopy, the paperback is available from [Amazon](#) or [Elsevier](#).

Course Software

We will use Microsoft Excel Stats ToolPack as the statistic software for this class. University of Waterloo students have free [subscriptions of the latest version of Microsoft Office suite](#) of programs, including Excel. You will need to enable the Stats ToolPack in Excel. Please refer to LEARN for additional instructions.

Evaluations

All course deliverables will be assessed on an individual basis.

Data Analysis Project

Part 1: Video Proposal: 10%

Part 2: Data Analysis and Poster Report: 45%

Exercise 1: 15%

Exercise 2: 15%

Exercise 3: 15%

Extensions and Lateness Policy

Unless otherwise stated, **all course deliverables are due at 11:59 pm EST (Eastern Standard Time) on the due date as indicated below.**

Assignments: A 48-hours, no excuse-needed extension policy can be used for both the Data Analysis Video Proposal and Data Analysis Poster Report. After the extension, assignments handed in late will be penalized by a deduction of 10% per 24-hour period, or part thereof, out of the final mark received.

Exercises: No late exercises will be accepted unless there are exceptional circumstances, subject to the instructor's judgement. There will be sufficient time to finish.

Course deliverables

The two main types of deliverables for this course are the Data Analysis Project and Exercises.

Quantitative Data Analysis Project

The best way to understand something is to experience it for yourself, which is the purpose of this individual project. The project generally involves the following steps.

1. Choose your variable(s) and identify a research question
2. Devise a plan to collect your data
3. Submit a project video proposal on LEARN and obtain the instructor's approval **(Due by February 12, Friday)**
4. Once your research question and data collection plan are approved, carry out your research:
 - a) Collect and organize data
 - b) Conduct the appropriate analysis
 - c) Compile your results in a poster report
5. Submit your final project **(Due by April 14, Wednesday)**

All data should be collected online (e.g., online surveys, remote interviews, or from a reliable public data source such as Statistics Canada). For example, you could conduct a survey of

people's preference for online video streaming software. If you are a basketball fan, you could investigate how an external factor impacts the Raptors' performance. The objective of the project is to collect and analyze data as a UX researcher's professional skills development activity.

The only in-person data collection that will be accepted is data collected of yourself or from your immediate household. Some personal quantitative data collection ideas include but are not limited to your music listening habits, sleep patterns, daily calorie intake, daily exercise activity levels, and your pet's behaviour. For example, using the music listening topic, you could propose to investigate whether there is a correlation between the time spent using the computer to time spent listening to music over a week.

Some or all variables and the type of data you collect must be **quantitative** and analyzed statistically. Regardless of which methods you use, we highly recommend keeping your research question feasible and straightforward in light of the current restrictions.

Part 1: Video Proposal: Make a selfie video about a research question on some variables of interest and your data collection plans. Start with a brief self-introduction; tell us about yourself and why you are interested in your research question, leading to an explanation of the variables to be included in your analysis and how you are planning to collect the data.

The idea proposed in the video will form the basis of your **Quantitative Data Analysis Project**. The purpose of the video proposal is to receive early feedback from the instructor and TAs about the feasibility, scope, and merit of your research idea. You may propose more than one idea (and make a longer video) if you would like to receive feedback about which idea has more potential.

The proposal will be graded based on the merit of your proposed research idea and data collection plan using a simple three-point system: Pass, pass-with-minor-revisions, pass-with-major-revisions. Grading is at the discretion of the instructor and TAs.

Part 2: Quantitative Data Analysis and Poster Report: Continuing with the proposed project idea, collect, organize, and analyze your data. Summarize your methodology and findings in a research poster. The instructor will guide the poster content and format on LEARN.

Assignment Submissions

Follow the directives provided on your assignment outlines. Upload your assignment files to LEARN as a **single ZIP file**. Label the submission in the format: **firstname_lastname_assignment-name**

Exercises

Three exercises focus on the theoretical and application of stats concepts. The exercises are to be completed online using LEARN's Quiz feature. You will have plenty of time to complete the exercises asynchronously. There is **no deferred or make-up exercise**. If you miss the exercise due to illness and have valid medical documentation, the weight of the missed exercise will be shifted to the remaining exercises. Otherwise, a mark of zero will be given for the missed exercise.

Exercise 1 **(Due by February 12, Friday)**

Exercise 2 **(Due by March 12, Friday)**

Exercise 3 **(Due by April 1, Thursday)**

Tentative Course Schedule

This is a tentative timeline. The topics and order may change based on class progress.

| Week | Topics | Textbook Readings | Deliverables |
|--------------------------------|--|---|---|
| Jan 11 (Start of Winter Class) | Course overview; Synchronous meeting your profs | None | |
| Jan 18 | Experimental research and design | Readings will be posted on LEARN | |
| Jan 25 | Statistical fundamentals | Ch.1: Introduction to a variety of useful statistical ideas and techniques | |
| Feb 1 | Comparing Two Means | Ch.2: Comparing two designs using independent sample T-tests Ch.3: Comparing two designs using paired sample T-tests | |
| Feb 8 | Online assignment consultation and exercise help | None | 2/12/2021 DUE: Exercise 1 DUE: Video Project Proposal |
| Feb 15 | READING WEEK | None | |
| Feb 22 | Binomial data (i.e., two outcomes) | Ch.4: Binomial-related hypothesis testing and confidence intervals using independent samples Ch.5: Binomial-related hypothesis testing and confidence intervals using paired samples | |
| Mar 1 | Comparing more than two means | Ch.6: One factor ANOVA with independent samples. Ch.7: One factor ANOVA with a within-subject design Ch.8: Two factor ANOVA with independent samples: the important role of interaction | |
| Mar 8 | Online assignment consultation and exercise help | None | 3/12/2021 DUE: Exercise 2 |
| Mar 15 (No Classes) | Relationship between two variables | Ch.9: Correlation and simple linear regression | |

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| 15-16) | | Ch.10: Multiple linear regression and stepwise regression | |
| Mar 22 | Binary logistic regression | Ch.11: Logistic regression | |
| Mar 29 | Online assignment consultation and exercise help | None | 4/2/2021 DUE: Exercise 3 |
| Apr 5 (Apr 2 Good Friday, Apr 5 Easter Monday no classes) | Online assignment consultation | None | |
| Apr 12 (Classes end Apr 14) | Last week of class | None | 4/14/2021 DUE: Poster Report |

Notes on Avoidance of Academic Offenses

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect, and responsibility. Check www.uwaterloo.ca/academicintegrity for more information.

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4, www.adm.uwaterloo.ca/infosec/Policies/policy70.htm. When in doubt please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity (check www.uwaterloo.ca/academicintegrity) to avoid committing an academic offence, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate Associate Dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline, www.adm.uwaterloo.ca/infosec/Policies/policy71.htm. For typical penalties check Guidelines for the Assessment of Penalties, www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm.

Appeals: A decision made or penalty imposed under Policy 70 (Student Petitions and Grievances) (other than a petition) or Policy 71 (Student Discipline) may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72 (Student Appeals) www.adm.uwaterloo.ca/infosec/Policies/policy72.htm

A Note for Students with Disabilities

The Office for persons with Disabilities (OPD), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations, please register with the OPD at the beginning of each academic term.