Empirical Quantitative Methods in Computer Science — 2026

Instructor: Chat Wacharamanotham (to email, see OLAT) Office hours: https://chatw.ch/h
Course format: Lecture with in-class exercises

COURSE DESCRIPTION

This course introduces students to the following topics in empirical quantitative research:

- Controlled experiments
- Survey research
- Data visualization for statistical analysis
- Exploratory and inferential statistical analysis
- Research transparency

Students will learn these methods hands-on through assignments and project work.

INTENDED LEARNING OUTCOMES

1. Students can explain the properties of measurements and can choose appropriate measurements for their research.
2. Students understand types of validity in quantitative research.
3. Students can design and conduct controlled experiments.
4. Students can design and conduct survey studies.
5. Students can visualize data from their experiments for exploratory analysis.
6. Students can explain types of missing data and can choose appropriate techniques to address them.
7. Students know how to perform inferential statistics by choosing correct procedures and checking statistical assumptions.
8. Students can organize their research materials and prepare them for sharing in a transparent manner.

PRIOR KNOWLEDGE

Knowledge and experience in the following topics can be beneficial but not required:

- Probability and statistics
- Designing and conducting experimental or survey research projects
- Knowledge in R programming language. The mastery of the language syntax is not expected. Most of the relevant code will be provided.

WORKLOAD

6 ECTS = ~180 hours of work

LEARNING RESOURCES

Reading materials will be made available on OLAT[1]. We will use content from multiple textbooks and scientific articles. You will also read some chapters of these books as reading assignments:

- Gelman, A., Hill, J., & Vehtari, A. (2021). Regression and other stories. Cambridge University Press.
- Cumming and & Calin-Jageman (2016). Introduction to the New Statistics: Estimation, Open Science, and Beyond. Taylor & Francis.
- Gravetter, F. J., Forzano, L. A. B., & Rakow, T. (2009). Research methods for the behavioral sciences (p. 656). Belmont, CA: Wadsworth Cengage Learning.

[1] https://lms.uzh.ch/auth/RepositoryEntry/17846829894

SEMESTER PLAN

Lectures are on Tuesdays 14:00–15:45 ands Thursdays 16:15–18:00 at room BIN 2.A.01.

		Content	Activities
Tue.	**Feb 17**	Introduction, measurements	
Thu.	**Feb 19**	Self study at home: Prerequisites	
Tue.	**Feb 24**	Prerequisites, measurement qualities	
Thu.	**Feb 26**	STAT: Comparisons	
Tue.	**Mar 3**	Controlled experiments	
Thu.	**Mar 5**	STAT: Hypothesis testing	
Tue.	**Mar 10**	Experimental designs	Start forming teams
Thu.	**Mar 12**	STAT: Effect sizes	
Tue.	**Mar 17**	Interpretation and reporting	
Thu.	**Mar 19**	STAT: Statistical graphics	Teaming complete
Tue.	**Mar 24**	Working with human subjects	
Thu.	**Mar 26**	STAT:: Statistical assumptions	
Tue.	**Mar 31**	(Back up slot)	
Thu.	**Apr 2**	No class — UZH Spring break	Topic proposals
Tue.	**Apr 7**	No class — UZH Spring break	
Thu.	**Apr 9**	No class — UZH Spring break	
Tue.	**Apr 14**	No class —prepare for the exam	
Thu.	**Apr 16**	No class —prepare for the exam	
Tue.	**Apr 21**	Repeat lecture + exam system test	
Thu.	**Apr 23**	Exam	
Tue.	**Apr 28**	STAT: Data simulation	
Thu.	**Apr 30**	STAT: Linear models 1	
Tue.	**May 5**	STAT: Linear models 2	
Thu.	**May 7**	STAT: Linear models 3	
Tue.	**May 12**	Project feedback slot	
Thu.	**May 14**	No class — Public holiday	
Tue.	**May 19**	Research transparency	
Thu.	**May 21**	(Back up slot)	Report + code
Tue.	**May 26**	Project presentation Each team will be allocated one presentation slot. Attendance at another slot is optional.	• Slides • Rating member contribution
Thu.	**May 28**		

STAT: Bring your laptop for these classes

ASSESSMENTS

50% Team project
50% Midterm exam — Passing the exam is required to pass the course.

The project will be in teams[2]. The deliverables are a report, code, and a presentation. Due dates are listed in the semester plan. Each team will receive a team grade from the instructor, and it will be adjusted based on how team members rate each other's contributions[3]. In the project, you will design an experiment, collect pilot data, write code to simulate the data and perform statistical analyses, and write a brief report.

The midterm exam will be on 23 April 2026, 16:15-18:00. The location will be announced on OLAT and in class a few weeks before the exam. The exam will be in two parts:

1. Pen-and-paper exam, and no aids are allowed. It will be a mix of single-choice questions and open questions. The exam's content is sampled from all lecture slides (except slides marked explicitly as not in the exam) and all reading homework. Use the Intended Learning Outcomes to guide your preparation.
2. Bring your own device (BYOD) online exam. You will be analyzing a given dataset and draft a brief report

POLICIES

- **Participation and attendance:** Catching up with materials and announcements in class is students' responsibility.We will not check your attendance. Students who regularly participate and attend the class tend to be more successful in finding teams for assignments and projects, and perform better in the exam.
- **Communication:** Please ask questions that do not contain sensitive information on the OLAT forum "Course Q&A". For questions that can be resolved quickly in a conversation, please visit the office hours (https://chatw.ch/h). If you need to email, use the OLAT "Email instructor" to ensure you provide complete information. We will prioritize answering questions on the forum; emails will be processed later.
- **Notification:** We expect you to receive notifications from the course OLAT's "Notifications" page. Please click the bell icon and choose "Subscribe". This action will send you emails of each notification. You can adjust email frequency by clicking on your profile icon at the top-right and choosing "System settings".
- **Feedback vs. assessment:** Before you hand in your work for grading, we organize various occasions for you to receive formative feedback from classmates and the instructor. After the grading, you will receive an assessment based on a set of criteria. This criteria-based feedback is likely to be less rich than the formative feedback.
- **Assignment hand-ins** are on OLAT under the "Hand-in" section. When the feedback is released, it will be in the "Feedback" section, and you will receive a notification on OLAT.
- **Late hand-in:** If you missed the deadline, you may upload your work after the deadline within 12 hours. Please email Chat after you upload. Late hand-in receives a penalty of 20% of the score. After 12 hours, we will receive no hand-in afterward, and you will receive the the score of zero for that work.
- **Re-grading:** Within one week after you receive the assessment, you may file a written appeal on this page[4]. Your appeal will be processed at the end of the semester, and you will receive the results together with the final grade of the course.
- Work containing **plagiarism** will result in a grade of 1.0. Please read the plagiarism fact sheet[5].

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[2] The number of members will be between 4–7. The exact limit will be based on the number of students in the course and will be announced on March 10.
[3] For explanation on contribution rating, see https://chatw.ch/files/grading_teamwork_example.html.
[4] https://uzhwwf.qualtrics.com/jfe/form/SV_b9Dzs7f5A4J2hTM
[5] https://www.ifi.uzh.ch/dam/jcr:1b564225-e6bd-437c-9e20-a07bca1c4df2/Merkblatt-Plagiate_en.pdf

- **Learning accommodations** with respect to disability: see information from the faculty[6]
- **Rules for AI tools:** Students may use any AI tools. However, they are responsible for the work.
- **Citation policy:** If your work refers to papers that do not exist, or citing papers that are not relevant to your argument. You will receive a penalty of 30% of the score of the entire work.
- **Grading scale interpretation:**

  6.00 Excellent
  5.75 – 5.50 Very good
  5.25 – 5.00 Good
  4.75 – 4.50 Satisfactory
  4.25 – 4.00 Sufficient
  3.75 – 3.50 Insufficient
  3.25 – 3.00 Poor
  2.75 – 2.00 Very poor
  1.00 Did not hand in
  In the previous semester 62% of students received a grade 5.00 and above

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CHANGE LOG

17.02.26
- First version

[6] https://oec.uzh.ch/en/studies/petitions/disability.html