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Course Description

MATH 4939: Statistical Data Analysis using SAS and R – Winter 2018

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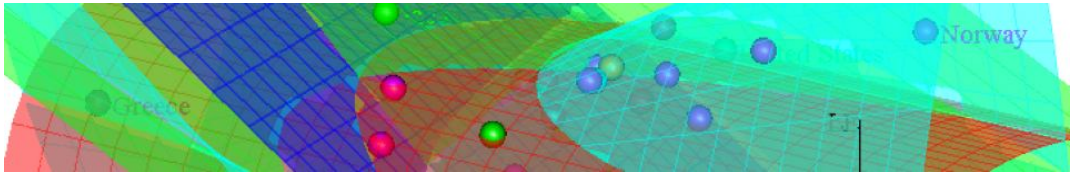

(Updated: January 04 2018 21:32)

> Doubt is not a pleasant condition, but certainty is absurd. — *Voltaire*

Course work and grades

- **Final exam: 20%** during the final exam period.
- **Midterm test: 20%** Wednesday, February 14. Note that there is no class on Friday, Feb. 16, the Friday before reading week.
  - **You must get a passing grade on the average of the exam and the midterm test in order to pass the course.**
- **Project: 30%**
  You will work on a team project in which you solve a real problem involving real data and prepare a report including analyses, graphical displays and a careful interpretation of your findings. The project has five components:
  1. An interim report on you progress submitted in early March, which your team will discuss with the instructor to get feedback.
  2. A '.R' script using Markdown that produces a detailed analysis and presentation of your work, including diagnostics, etc. This output can be quite detailed.
  3. A '.R' script using Markdown that produces an attractive and readable report with your main findings prepared in a way that would be suitable for a publication. You need to include all relevant references, data sources, etc. Aim for a maximum of 30 pages.
  4. Slides for a **10-minute** presentation discussed below. The slides can also be prepared with R-markdown using the ioslides format or other slide format. You will collaborate using R, R Studio, R Markdown, git and github. The grade is based on the overall quality of the project (10%) and on your personal contribution to it (10%) and on your understanding of the issues and concepts in the project as shown in the final presentation and in project meetings with instructor. (10%).

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5. You will prepare a brief summary of your project for a 10-minute presentation in late March. The 10-minute limit is strict. Be aware that it takes careful preparation and rehearsing to give a good presentation in such a short time. You must rehearse as a group ahead of time. The presentation will be followed by a 5-minute question and discussion period.

- **Activities: (5% for completion, 15% for semi-randomly selected activities that are also graded for content and quality)**
  - Assigned twice a week on average.
  - Some are team and some are individual activities.
  - Some activities are submitted on Piazza. Click on the corresponding `activity X` folder. When an activity is ready for grading, click on the `ready for grading` folder.
  - Some activities are meant to be done in class, like quizzes.
  - Some activities may have a higher weight than others.
- **Class and Piazza contributions: 10%** (possibility of bonus marks for outliers)
  - Contribute actively in class and on Piazza, contributing at least weekly comments_and_questions `about the course material. Click on the` comments_and_questions` folder when you submit the post.
  - Post a 'weekly link' each week: a link to something on the web that is interesting and relevant to statistics. Include a summary description and comment on the link. Click on the `weekly_link` folder when you submit the post.
  - Within three days after the last class, post a brief summary (500 words or less) of the contributions you want considered for participation including links to them.
- **Class attendance and punctuality are mandatory.** Every class missed beyond three classes results in losing 1 mark (out of 100) on the final grade and each class missed beyond six classes loses 2 marks. Also, if you miss more than six classes, you may be dropped from your team which will result in you having to complete further team work on your own.

Prerequisites

The prerequisites for taking this course are MATH 3330, MATH 3131 and MATH 4330, or their equivalent. If you have not already passed all three of these courses you must take MATH 4939 in a later year once you have completed the prerequisites.

Textbooks and Notes

- John Fox (2016) *Applied Regression Analysis and Generalized Linear Models, Third Edition*, Sage.
  - Web page (http://socserv.socsci.mcmaster.ca/jfox/Books/Applied-Regression-3E/index.html)
  - Online appendices (http://socserv.socsci.mcmaster.ca/jfox/Books/Applied-Regression-3E/Appendices.pdf)
  - Chapters 1 to 15 serve as a reference and review of linear and generalized linear models. This course focuses on the material in chapters 16 to 24 with a particular emphasis on chapters 23 and 24.

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- Hadley Wickham (2014) *Advanced R* (http://adv-r.had.co.nz/) Wickham (2014).
- Michael Evans and Jeffrey Rosenthal (2009) *Probability and Statistics – The Science of Uncertainty, 2nd ed.,* available online (http://www.utstat.toronto.edu/mikevans/jeffrosenthal/book.pdf)
- Notes on R (../../R_Notes): Some evolving notes on the use of R and RStudio.
- Additional notes will be posted as the course progresses.

Getting Help

- Post questions and comments about the course material on Piazza (https://piazza.com/class#winter2018/math4939). Post your questions to the entire class so everyone can benefit from the discussion and answer. I will monitor Piazza and participate if other students don't have an answer.
- If you have a personal question for the instructor, you can post it on Piazza as a private posting to the instructor. This should only be used for personal questions that are of no interest to the rest of the class.
- You can ask your teammates or other classmates directly.
- You can see the instructor during office hours or after class.

Teams

The project and many activities are done in semi-randomly assigned teams that will be assigned on Saturday, January 6, using the information you provide in the first class. The teams remain the same for the course. Why random teams? One reason is that in almost all job interviews, you are asked about your experience working with teams.

Working with a diverse team that you didn't select yourself gives you the opportunity to have experiences that will give you great anecdotes to use in your future job interviews.

When you land the job, you will be much more likely to show the kind of leadership in team work that is invaluable in the modern workplace.

General comments and details

When you join Piazza on Saturday, January 6, you will be able to communicate with your team by posting messages on Piazza and directing them to your team.

If not otherwise indicated, activities are due at 11:59 pm on the due date. For team activities, get a final draft ready at least one day before the deadline so everyone on the team can do a final check.

Include the names of all active participants on the first page of the activity. Everyone who participated actively gets the same grade. Those who didn't, get no grade. Note that some team members might not respond because they have dropped – or intend to drop – the course. If your team shrinks to 3 or fewer, let me know and I can merge your team with another small team. If some members of the team consistently do significantly less work than other members, please inform the instructor and grades will be adjusted accordingly.

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Half-way through the course and at the end of the course, you will prepare an assessment (../files/Peer_Evaluation.pdf) of your own and your team members' contributions. You will discuss the assessment with your team and hand it in to the instructor. The instructor will use the assessment to evaluate the progress of team work generally in the class and to identify and address potential issues. If some team members are low outliers in the assessment, the instructor will discuss the issue with the team and grades will be adjusted for team members who consistently contribute less than a reasonable share.

The more work you do on an assignment the better prepared you are to do well on the term test and on the final exam. But you shouldn't hog the work – let others do their part too. Everyone should make sure that they understand the whole assignment. Discuss the assignment with your team members to make sure everyone understands the key points and difficulties of each question.

Course policies

Missed deadlines

Late activities or projects are penalized 20% of the value of the activity for each day (or portion of a day) they are late. **Unless a different time is specified**, activities and projects are due at 11:59 pm on the due date. Teams should plan to have a 'final draft' of team assignments prepared at least one day before the deadline so every member of the team can review and okay the draft before submission.

Missed term test

If you miss the term test with a suitably documented medical or compassionate reason, your mark for the term test will be imputed from your mark on the final exam. Otherwise you receive a grade of zero for the term test.

Use of computers in class

You should bring your laptop to class **to use it for purposes directly related to the class** such as taking notes, annotating slides posted on the web or trying out commands in R. Be aware that some pedagogical research suggests that taking handwritten notes leads to deeper learning for most students. I don't think that this is true for all students and that is one reason why I would not consider requiring students for forego the use of computers.

It is natural to think that you do not affect anyone else if you are doing your own thing in class on your laptop, phone or tablet. This is unfortunately incorrect. People seated around you cannot help but be distracted. The instructor gets distracted when members of the class are clearly lost in a different dimension. Therefore, you are requested to not use your laptop to view unrelated materials because this creates distractions for other students and the instructor.

Academic honesty

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Familiarize yourself with the York University Senate Policy on Academic Honesty (http://www.yorku.ca/univsec/policies/document.php?document=69). Violations of academic honesty are treated very seriously in university. __Always cite your sources for any information you use. This can as simple as providing links to websites you have visited to get information.

References

Wickham, Hadley. 2014. *Advanced R*. CRC Press. http://adv-r.had.co.nz/ (http://adv-r.had.co.nz/).