Advanced Quantitative Methods
7.5 hp/ECTS
Master Program in Peace and Conflict Studies
Course Guide Spring 2019

April 2, 2019

1 Teachers

Course convenor:

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2 Course description and objectives: Advanced Quantitative Methods (AQM), 7.5 hp/ECTS

Decisions and Guidelines:

The course plan was approved by the Board of the Department of Peace and Conflict Research on 2016-10-10 and is valid from that date.

After completion, the students are expected to:

- have expanded their familiarity with quantitative methods in peace and conflict research
- know how to specify complex Monte Carlo simulation models and use to evaluate specification problems

- have attained basic knowledge of programming and data-management techniques
- have attained comprehensive knowledge of the R statistical software package
- know how to specify, estimate, interpret generalised linear regression models such as:
  - panel models
  - binary, multinomial, and ordinal logit models
  - count models
- be familiar with techniques for simulating predictions, first differences, and other quantities of interests based on estimated models
- be familiar with simple cross-validation of predictive models
- independently write assignments within a given time frame

Focus will be on practical use in the form of specifying, estimating, interpreting, and evaluating models, and be able to identify what types of models are appropriate for different types of data-generating processes. The theoretical introduction to the models will involve basic mathematical notation. The introduction to R will place considerable emphasis on R's scripting language, and also introduce basic programming techniques required for efficient and transparent research procedures as well as for the application of Monte Carlo techniques.

3 Important dates, queries, and attendance

The Advanced Quantitative Methods course starts on March 25, 2019, and ends on May 3, 2019. The first lecture takes place at 8:15, March 25.

The deadlines for submitting assignments are given in section (5) below. Please consult the time edit calendar in the Student Portal for changes to the schedule – these may not necessarily be announced otherwise.

For any questions concerning the course please post your questions at our forum 'General AQM Forum' at the Student Portal. For issues of confidential nature, please contact the course convenor via e-mail for an appointment.

All mails concerning the course will be sent out via the Student Portal, i.e. to the mail address that you have registered there. Please make sure that forwarding to your private email account is functioning. Presence in all sessions is mandatory. Absence without legitimate cause will result in additional assignments. Please contact the course convener if you cannot attend a session.

4 Format

Lectures

There will be nine lectures and four seminars. The lectures will involve considerable practical work with the scripts, and students should bring their laptops.

Assignments

Master students will be expected to hand in four assignments that will be given and responded to throughout the course (approximately one every week). More details are given below.

Literature

The main texts for the course are Carsey and Harden (2014) and Gelman and Hill (2007). You are required to have access to copies of these books throughout the course period. The Carsey & Harden book is available from Amazon as paperback or e-book, and is accompanied by a website containing the code used in the book: `https://studysites.uk.sagepub.com/carsey/main.htm`.

For introductions to `R`, see Torfs and Brauer (2014) and Venables, Smith and the core R team (2016) (available for free online, see reference list for URLs), and Wickham and Grolemund (2017). Some pages from Witten, Frank and Hall (2011) will be made available as pdf from the student portal.

The course will also go through a number of applications that are available as journal articles through the university library system (`www.ub.uu.se`). For these, go to the library website, click on 'Journals A–Z', and search for the journal title. Once you have found it, click on the title of the journal and browse to the desired issue. From there you may view or download the article in pdf format. If the journal article is not available electronically it should be available in hard copy at the library.

`R` software is open source and available for download at `http://cran.r-project.org/`. For convenience, you should run `R` from the open-source RStudio desktop, available at `https://www.rstudio.com/products/RStudio/`.

5 Lectures, seminars, and readings

All readings referred to in the schedule below are required readings.

Lecture 1. 8.15–10.00, 25 March 2019
Programming in R (MC)

- Introduction: Carsey and Harden (2014, ch. 3-4)
- `R`: Torfs and Brauer (2014); Venables, Smith and the core R team (2016)
- Wickham and Grolemund (2017)

Lecture 2. 'Flipped classroom', made available 25 March 2019
Introduction to Monte Carlo simulation and OLS (HH)

- Carsey and Harden (2014, ch. 2, 4, 5)
- Gelman and Hill (2007, ch. 3, 4, 7)

Lecture 3. 10.15–12.00, 2 April 2019
OLS, the limits of hypothesis testing, cross-validation, and prediction as evaluation metric (DR)

- Carsey and Harden (2014, ch. 7, 9.3)
- Ward et al. (2013) (pp. 481–485 optional)
- Application: Ward, Greenhill and Bakke (2010)
- Shmueli (2010) (optional)

Seminar 1. 10.15–15.00, 3 April 2019
(DR/MC)

- Working with assignment 1 and 2

Lecture 4. 10.15–12.00, 4 April 2019
The binomial logistic regression model and evaluation of dichotomous prediction: PR, ROC, and contingency tables (HH)

- Carsey and Harden (2014, ch. 6)
- Gelman and Hill (2007, ch. 5)
- Witten, Frank and Hall (2011, pp. 159–177)
- Applications: Hegre et al. (2017); Ward and Beger (2017); Chiba and Gleditsch (2017); Hegre et al. (2019)

Assignment 1. Submission deadline: 5 April 17:00
Topic: Simple Monte Carlo analysis and some data prepping

Lecture 5. 10.15–12.00, 8 April 2019
Bootstrapping and simulating 'quantities of interest' (DR)

- Carsey and Harden (2014, ch. 8–9)
- Application: DeRouen and Sobek (2004); Østby, Nordås and Rød (2009)

Seminar 2. 10.15–15.00, 10 April 2019
(DR/MC)

- Working with assignment 2 and 3

Lecture 6. 10.15–12.00, 11 April 2019
Multinomial and ordinal logistic regression and count models (HH)

- Carsey and Harden (2014, ch. 6)
- Gelman and Hill (2007, ch. 6)
- Applications: DeRouen and Sobek (2004); Gohdes and Carey (2017)

Assignment 2. Submission deadline: 12 April 2019, 17:00
Topic: TBA

Lecture 7. 10.015–12.00, 15 April 2019
Panel structures and multi-level models (HH)

- Gelman and Hill (2007, ch. 11–12)
- Simulation: Carsey and Harden (2014, ch. 5)
- Application: Beck and Katz (1995)
- Application: Green, Kim and Yoon (2001)

Seminar 3. 10.15–15.00, 17 April 2019
(DR/MC)

- Working with assignment 3

Assignment 3. Submission deadline: 23 April 2019 08:00
Topic: TBA

Lecture 8. 10.15–12.00, 23 April 2019
Random forests (MC)
(Bagging, ensembles, ...)

- Hartshorn (2016)
- Application: Blair, Blattman and Hartman (2017)

Seminar 4. 10.15–15.00, 26 April 2019
(DR/MC)

- Working with assignment 4

Lecture 9. 10.15–12.00, 29 April 2019
Wrapping up, repetition

Assignment 4. Submission deadline: 3 May 2019 17:00
Topic: TBA

6 Course paper and assignments

Assignments

Master students will be expected to hand in four assignments (see schedule above). The assignments will have the form of:

1. A short motivation (max 1 page)
2. adaptations of `R` scripts discussed in the lectures and the textbook, attached as functioning and debugged scripts. Scripts that do not run will be returned to students for correction. Any ancillary files (e.g., data files) must be attached to the assignment. If multiple files are submitted they should be submitted as a zip file such that the code runs upon extraction.
3. a short text (max 1 page) explaining the procedure employed in the experiment
4. a short text (max 1 page) presenting the results from the experiments/adaptations

Submission of papers and assignments

The course paper and assignments should be uploaded to Studentportalen by dates given during the course. You should upload your paper in the Assignments folder. It is important that you submit your paper there and not anywhere else.

Failure to meet submission deadlines without legitimate cause will count negatively in the grading of the course.

Please raise any questions concerning the assignments (and course papers) during lectures or seminars. In addition, you can post questions to our forum at Studentportalen or come by during my office hours.

7 Examination and grading

Examination and final course grade is based on the evaluation of the following:

1. Four assignments (80%). Each assignment will consist of a short course paper and a working `R` script that produces the results in the paper. All assignments must be handed in.
2. Active participation during lectures (20%)

The following grades are used:

- Pass with distinction (VG)
- Pass (G)
- Fail (U)

8 Course evaluation

Toward the end of the course, students will be requested to answer a questionnaire to evaluate various aspects of the course.

9 Guidelines for students with disabilities

A coordinator with specific responsibility for disability issues is available at Uppsala University. Students with disabilities who have enrolled in higher education will, according to need, receive such forms of support as are directly related to their education. Applicants with disabilities are recommended to make contact with the university coordinator – Catrin Schultze – in order to discuss their need for support as soon as possible and no later than at the time of application. Among the forms of support which may be considered for students with disabilities, the following may be mentioned:

- Help with taking notes
- Course literature in alternative formats such as audio books
- Sign language interpreting (Swedish sign language)
- Mentorship
- Modification of exams, such as extended time for written exams

All cases of modification of exams are decided by the examiner of the course. Students are encouraged to contact course director and examiner at the earliest possible stage in such cases.

For further information, contact the Equality Officer, Ralph Sundberg (ralph.sundberg@pcr.uu.se), at the Department of Peace and Conflict Research.

You can also contact the disability coordinator at Uppsala University:
Catrin Schultze (samordnare@uadm.uu.se)
Visiting address: St Olofsgatan 10 B
Postal address: Studerandebyrn, Box 256, 751 05 Uppsala
Tel: 018-471 1877, Fax: 018-471 1642

10 Plagiarism

Cheating and plagiarism are considered major violations of Uppsala University's academic values and regulations. The Department of Peace and Conflict Research will always take disciplinary action against students in case of such violations, in accordance with guidelines from the National Higher Education Ordinance (1993:100) and Uppsala University. Students suspected of intentional cheating and plagiarizing may be liable to the principal/disciplinary committee, which may involve a hearing by the Disciplinary Board. A student who is found to violate these rules may either receive a warning or suspension from studies up to six months. For international students studying in Sweden, the home university will always be informed about the matter.

Cheating is defined as illicit actions or practices to mislead the examiner in an exam or study performance. Plagiarism is defined as the actions or practices of taking and using the words and ideas of another writer as your own. Any of the following practices constitute acts of cheating and plagiarism:

- If you cooperate with another student in a home assignment, or individual tasks which is part of an individual exam
- If you change an already corrected exam
- If you write from sources without correct use of references
- If you 'cut and paste' from the Internet without correct use of references
- If you use and develop ideas that appears in printed material or film without any reference to the author or the source

11 Equality work at the department

The Department of Peace and Conflict Research strives to provide equal opportunities and non-discrimination for all staff and students. Via the Equality Officer and the Equality Committee, the Department seeks to create structures and cultures that work against the ill-treatment of individuals on grounds such as gender, age, and sexual orientation. This work is partly done through education and preventative measures, partly through inquiring whether students or staff have experienced any negative treatment along the grounds for discrimination.

The Department's work is aimed against seven grounds for discrimination: gender, age, ethnicity, religious beliefs, sexual orientation, sexual identity, and functional impairment. Details regarding this work are available in the Department's Equality Plan (`http://www.pcr.uu.se/about/equality_work/?languageId=1`). In addition, all students are informed regarding the policies on these issues, and each and every course evaluation must inquire into whether or not students feel discriminated against or ill-treated on these grounds.

A student who feels negatively treated on any of these grounds has several options for reporting or discussing such events. The following people/institutions are available:

- The Equality Officer
- The Head of Department
- The Director of Studies
- The Students' Equality Group
- The University's Equality Officer (Annika Lindé)

Information on the Department's work on equality is available at:
`http://www.pcr.uu.se/about/equality_work/?languageId=1`

12 Reading list

References

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Ward, Michael D. and Andreas Beger. 2017. "Lessons from near real-time forecasting of irregular leadership changes." *Journal of Peace Research* 54(2):141–156.

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