October 25, 2016

**Leiden University | Political Science**

# Advanced Methodology

**Research Master in Political Science & Public Administration**
**Semester 1, Block 1, 5 ECTS, Level 600, Course Code: 6447RAM13**

**Tuesday, September 9 - October 25, 2016, 15:00-17:00**

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## Course Description

The aim of this course is to introduce students to advanced statistical techniques for the analysis of quantitative data that are frequently used in the literature of political science and public administration. The focus is specifically on explaining dynamic changes over time and how to account for contextual, macro-level effects on micro-level relationships. The techniques covered are aggregate and cross-sectional time series analysis and multilevel models.

## Method of Instruction

Lectures, discussion, and assignments.

**Video Lectures.** Lectures covering the topic(s) of a given week are available about one week in advance on Blackboard (as narrated PowerPoint presentation videos in mp4 format and printable PowerPoint lecture slides in pdf format). Students are expected to watch these lectures (and read the assigned readings) before class. Class time will primarily be used to discuss assignments, answer questions, demonstrate the techniques, and work on class assignments (using R).

## Readings

*Required:*

**Box-Steffensmeier, Janet M., John R. Freeman, Matthew P. Hitt, and Jon C. W. Pevehouse. 2014. *Time Series Analysis for the Social Sciences*. New York: Cambridge University Press.**

**Luke, Douglas A. 2004. *Multilevel Modeling*. Sage University Paper Series on Quantitative Applications in the Social Sciences, 07-143. Thousand Oaks, CA: Sage.**

*Recommended:*

**Box-Steffensmeier, Janet M., Henry E. Brady, and David Collier. 2008. *The Oxford Handbook of Political Methodology*. Oxford: Oxford University Press.**
(3 chapters required)

**Field, Andy, Jeremy Miles, and Zoë Field. 2012. *Discovering Statistics Using R.* London: Sage.**
(1 chapter required)

**Pickup, Mark. 2015. *Introduction to Time Series Analysis*. Sage University Paper Series on Quantitative Applications in the Social Sciences, 07-174. Thousand Oaks, CA: Sage.**

**Brandt, Patrick T., and John T. Williams. 2007. *Multiple Time Series Models*. Sage University Paper Series on Quantitative Applications in the Social Sciences, 07-148. Thousand Oaks, CA: Sage.**
[Note: Pickup and Brandt/Williams are together an alternative to Box-Steffensmeier et al.]

**Gelman, Andrew, and Jennifer Hill. 2007. *Data Analysis Using Regression and Multilevel/Hierarchical Models*. New York: Cambridge University Press.**
[Note: Classic, accessible, intuitive, and comprehensive statistics textbook that also covers Bayesian approaches; some R code is obsolete.]

**Finch, W. Holmes, Jocelyn E. Bolin, and Ken Kelley. 2014. *Multilevel Modeling Using R*. Boca Raton, FL: CRC Press.**
[Note: Comprehensive coverage of the 'nlme' and 'lme4' R libraries, essentially a detailed help file in book form, but short on assumptions and interpretation.]

Additional readings (listed in the course schedule below).

## Software

The course will utilize the software package R (current version: 3.3.1 "Bug in Your Hair", 2016-06-21), which is available at: http://cran.r-project.org/. The functions of the basic software package can be extended by downloading (once) and loading (always when needed) additional "libraries". An overview of important packages can be found under http://cran.r-project.org/web/views/. A word of caution: These packages are provided 'as is' without any quality control – some have been extensively tested, used, and reviewed in academic journals or textbooks but others might very well produce unreliable results. Very important: Keep them up-to-date (to avoid often obscure error messages)!

## Assignments, Research Paper, and Participation

The main focus of this course is on building practical statistical data analysis skills. For this reason, the workload consists of four shorter homework assignments and a final research paper. The final grade is based on the assignments (5%, 15%, 20%, 20%) and the final research paper (40%).

**Assignments.** The four individual homework assignments involve the application of specific statistical techniques/procedures covered in the course using either assigned data or data chosen by the student. The assignments have two components: (1) always a short written description, summary, and interpretation of the results (with the R script to replicate and re-produce the analyses included as appendix) and (2) a short PowerPoint presentation that summarizes the key findings for potential presentation in class. The written assignments need to be submitted electronically via *Turnitin* and as hardcopy in class at the beginning of the subsequent class meeting (unless a different date and time is given). The PowerPoint presentation should be submitted by Email to the instructor one hour before the class meeting. Late submissions are *not* accepted.* During the course, handouts with the specific requirements for each assignment will be available on Blackboard.

**Research Paper.** At the end of the course, students will write an individual research paper (ca. 3000 words) that uses either an aggregate time series analysis or a multilevel analysis to answer a scientific research question. The research paper should include a short literature review, postulate testable research hypotheses, and then use the appropriate data and statistical technique to test these hypotheses and report the results. A short single-page

proposal (hardcopy only) for the research paper is due October 18, 2016. The final research paper is due on Friday, November 4, 2016 (*Turnitin* and hardcopy). In both cases, late submissions are not accepted.*

***Deadlines**. Assignment and paper deadlines are final and late submissions are not accepted. Properly documented emergencies and *in advance* requested and permitted extensions are exempt from this rule.

**Attendance and Participation.** Class attendance is mandatory. Students who miss more than one class will automatically fail the course. Properly documented emergencies and in advance requested and permitted absences are exempt from this rule. While participation is not graded, the seminar nevertheless requires active and informed participation of the students in class discussions. Students are expected to read the assigned readings and to be prepared to present and discuss their homework assignments.

If you have a physical, psychological, medical, or learning disability that may impact on your ability to carry out the assigned course work, please contact the staff in the Institute of Political Science or Public Administration. All information and documentation of disability is confidential.

## Plagiarism

Plagiarism is understood as presenting, intentionally or otherwise, someone else's words, thoughts, analyses, argumentations, pictures, techniques, computer programs, etc., as your own work. Plagiarism is not allowed and has serious consequences. Students must be familiar with Leiden University's rules about plagiarism. They are available at:
http://www.regulations.leiden.edu/education-students/plagiarism.html

The departmental rules and procedures with regard to plagiarism can be found at:
http://www.socialsciences.leiden.edu/politicalscience/students/postgraduate/regulations/plagiarism.html

Important note: Plagiarism occurs in both of the following situations:

- Quoting work from other (and outside) sources without attribution;
- Copying the work of others when completing individual assignments.

## Course Schedule

**September 6, 2016 Course Intro & Time 1: Unit Roots & ARIMA Models [5A19]**

**Key Topics:** Trends & Drifts, Unit Roots, & ARIMA Models

**Literature:**

Box-Steffensmeier/Freeman/Hitt/Pevehouse (2014): Ch. 1 & 2 & 5.

**Further/Recommended Readings:**

Pevehouse, Jon C., and Jason D. Brozek. 2008. "Time-Series Analysis." In *The Oxford Handbook of Political Methodology*, eds. Janet M. Box-Steffensmeier, Henry E. Brady, and David Collier. Oxford: Oxford University Press. Pp. 456-474.

Coghlan, Avril. 2015. *A Little Book of R For Time Series*. Release 0.2. http://a-little-book-of-r-for-time-series.readthedocs.org/
[Note: Short introduction to R and ARIMA time series analysis. The sections 2.5 & 2.6.3 on forecasting are not important and can be skimmed.]

Shumway, Robert H., and David S. Stoffer. 2011. *Time Series Analysis and Its Applications. With R Examples*. 3rd ed. New York: Springer.
[Note: More information about book, either as full or 'easy' version, and the associated R library (astsa) and the online appendix with a good discussion and examples of R code is available at: http://www.stat.pitt.edu/stoffer/tsa3/. Highly recommended for serious ARIMA analyses!]

**Assignment 1: Plot Stimson's yearly and quarterly Public Mood series (available on Blackboard) and conduct and compare an ARIMA analysis of both series (due September 13; 5%).**

**September 13, 2016 Time 2: Intervention & VAR Models [5A19]**

**Key Topics:** Intervention Analysis, Granger Causality, VAR & ADL models

**Literature:**

Box-Steffensmeier/Freeman/Hitt/Pevehouse (2014): Ch. 3 & 4.
[Note: Skim the details of the SEQ approach and focus more on the ADL & VAR models.]

Vliegenthart, Rens, and Conny Roggeband. 2007. "Framing Immigration and Integration Relationships between Press and Parliament in the Netherlands." *International Communication Gazette* 69 (3): 295–319.

**Further/Recommended Readings:**

McLeod, A. Ian, Hao Yu and Esam Mahdi (2012). "Time Series Analysis with R." In *Handbook in Statistics*, Vol. 30 (Time Series Analysis: Methods and Applications, Chapter 23), eds. Tata Subba Rao, Suhasini Subba Rao, and C.R. Rao. Amsterdam: Elsevier. Pp. 661-712.
[Note: Available at: http://www.sciencedirect.com/science/handbooks/01697161. Preprint & Online Appendix: http://www.stats.uwo.ca/faculty/aim/tsar/. Overview of common time series methods and packages available in R, with short explanations and examples.]

Pfaff, Bernhard. 2008. "VAR, SVAR and SVEC Models: Implementation Within R Package vars." *Journal of Statistical Software* 27 (4): 1–32.
[Note: More detailed introduction and documentation of 'vars' library for R.]

**September 20, 2016 Time 3: Cointegration & ECM Models [5A19]**

**Key Topics:** Cointegration & ECMs

**Literature:**

Box-Steffensmeier/Freeman/Hitt/Pevehouse (2014): Ch. 6 (7 & 8 optional).

De Boef, Suzanna, and Luke Keele. 2008. "Taking Time Seriously." *American Journal of Political Science* 52 (1): 184-200.

Toshkov, Dimiter. 2011. "Public Opinion and Policy Output in the European Union: A Lost Relationship." *European Union Politics* 12 (2): 169-191.

**Further/Recommended Readings:**

Ostrom, Charles W., and Renée M. Smith. 1992. "Error Correction, Attitude Persistence, and Executive Rewards and Punishments: A Behavioral Theory of Presidential Approval." *Political Analysis* 4: 127–183.
[and]
Durr, Robert H. 1992. "An Essay on Cointegration and Error Correction Models." *Political Analysis* 4: 185–228.
[Note: Both texts are classic and very useful introductions to ECM analyses.]

**Assignment 2: Replicate Toshkov (2011) and compare the results of a VAR, ADL, and ECM time series analysis (due September 27; 15%)**

**September 27, 2016 MLM 1: Basic Logic [5A19]**

**Key Topics:** Contextual/Multilevel Effects, Inferential & Statistical Challenges

**Literature:**

Jones, Bradford. 2008. "Multilevel Models." In *The Oxford Handbook of Political Methodology*, eds. Janet M. Box-Steffensmeier, Henry E. Brady, and David Collier. Oxford: Oxford University Press. Pp. 605-623.

Luke (2004): Ch. 1

Field/Miles/Field (2012): Ch. 19.1-19.3

**Further/Recommended Readings:**

Gelman and Hill (2007): Ch. 1-4

Finch/Bolin/Kelley (2014): Ch. 1, 2, 6

**Assignment: Find a multilevel data set and operationalize a simple regression model (no submission required).**

**October 4, 2016 MLM 2: Basic Model (Random Intercepts & Slopes) [5A19]**

**Key Topics:** Model Specification, Interpretation & Diagnostics

**Literature:**

Luke (2004): Ch. 2.

Field/Miles/Field (2012): Ch. 19.4-19.6, 19.8

Steenbergen, Marco R., and Bradford S. Jones. 2002. "Modeling Multilevel Data Structures." *American Journal of Political Science* 46 (1): 218–237.

**Further/Recommended Readings:**

Bates, Douglas M. 2010. *lme4: Mixed-effects Modeling with R*. http://lme4.r-forge.r-project.org/book/ or http://lme4.r-forge.r-project.org/lMMwR/. Chapter 1 & 2.

Gelman and Hill (2007): Ch. 11 & 12

Finch/Bolin/Kelley (2014): Ch. 3

**Assignment 3: Conduct a MLM analysis with data or your own choice (random intercept model required, random slope model only if needed) (due October 11; 20%)**

**October 11, 2016 MLM 3: Higher-Level Predictors & Effect Simulations [5A19]**

**Key Topics:** Group-Level Predictors, Cross-Level Interactions, Non-Nested Models, Effect Simulations (*Zelig* library)

**Literature:**

Stegmueller, Daniel. 2013. "How Many Countries for Multilevel Modeling? A Comparison of Frequentist and Bayesian Approaches." *American Journal of Political Science* 57 (3): 748–761.

**Further/Recommended Readings:**

Bates, Douglas M. 2010. *lme4: Mixed-effects Modeling with R*. http://lme4.r-forge.r-project.org/book/ or http://lme4.r-forge.r-project.org/lMMwR/. Chapter 4.

Gelman and Hill (2007): Ch. 13 & 21

Finch/Bolin/Kelley (2014): Ch. 4

King, Gary, Michael Tomz, and Jason Wittenberg. 2000. "Making the Most of Statistical Analyses: Improving Interpretation and Presentation." *American Journal of Political Science* 44 (2): 347-361.

Hanmer, Michael J., and Kerem Ozan Kalkan. 2013. "Behind the Curve: Clarifying the Best Approach to Calculating Predicted Probabilities and Marginal Effects from Limited Dependent Variable Models." *American Journal of Political Science* 57(1): 263–277.

Imai, Kosuke, Gary King, and Olivia Lau. 2012. *Zelig: Everyone's Statistical Software*. Core Reference Manual. Available at: http://r.iq.harvard.edu/docs/zelig/4.1-3/zelig_core_reference.pdf

Zelig Project home page: http://zeligproject.org/
[Note: CRAN library and online documentation are for the new and revised version 5 which does not cover multilevel models yet. We use the old version 4; for the older documentation, see link above.]

**October 18, 2016 MLM 4: Dichotomous Outcomes [5A19]**

**>> Proposal for final research paper due**

**Key Topics:** Dichotomous DVs

**Literature:**

Luke (2004): Ch. 3 ("Using Generalized Multilevel Modeling", pp. 53-58).

**Further/Recommended Readings:**

Bates, Douglas M. 2010. *lme4: Mixed-effects Modeling with R*. http://lme4.r-forge.r-project.org/book/ or http://lme4.r-forge.r-project.org/lMMwR/. Chapter 6.

Gelman and Hill (2007): Ch. 5, 14

Finch/Bolin/Kelley (2014): Ch.7, 8

**Assignment 4: Conduct a MLM analysis (dichotomous DV, one random intercept & one group-level predictor required – random slopes & cross-level interactions if needed) (due October 25; 20%)**

**October 25, 2016 MLM 5/Time 4: Time-Series Cross-Section Models [5A19]**

**Key Topics:** Linear Time-Series Cross-Section Models for Panel and Cohort Data

**Literature:**

Luke (2004): Ch. 3 ("Longitudinal Data as Hierarchical", pp. 62-72).

Field/Miles/Field (2012): Ch. 19.7

Beck, Nathaniel. 2008. "Time-Series Cross-Section Methods" In *The Oxford Handbook of Political Methodology*, eds. Janet M. Box-Steffensmeier, Henry E. Brady, and David Collier. Oxford: Oxford University Press. Pp. 475-493.

***Or a more technical and detailed version:***

Beck, Nathaniel, and Jonathan N. Katz. 2011. "Modeling Dynamics in Time-Series–Cross-Section Political Economy Data." *Annual Review of Political Science* 14: 331–352.

Hooghe, Marc, and Anna Kern. 2015. "Party membership and closeness and the development of trust in political institutions: An analysis of the European Social Survey, 2002–2010." *Party Politics* 21 (6): 944–956.

**Further/Recommended Readings:**

Finch/Bolin/Kelley (2014): Ch. 5

Bates, Douglas M. 2010. *lme4: Mixed-effects Modeling with R*. http://lme4.r-forge.r-project.org/book/ or http://lme4.r-forge.r-project.org/lMMwR/. Chapter 3.

Worrall, John L., and Travis C. Pratt. 2004. “Estimation Issues Associated with Time-Series - Cross-Section Analysis in Criminology.” *Western Criminology Review* 5 (1): 35–49.

Beck, Nathaniel, and Jonathan N. Katz. 1995. “What To Do (and Not to Do) with Time-Series Cross-Section Data.” *American Political Science Review* 89 (3): 634–647.

Beck, Nathaniel, and Jonathan N. Katz. 1996. “Nuisance vs. Substance: Specifying and Estimating Time-Series-Cross-Section Models.” *Political Analysis* 6: 1–36.

Beck, Nathaniel, Jonathan N. Katz, and Richard Tucker. 1998. “Taking Time Seriously: Time-Series-Cross-Section Analysis with a Binary Dependent Variable.” *American Journal of Political Science* 42 (4): 1260–1288.

Bailey, Delia, and Jonathan N. Katz. 2011. “Implementing Panel-Corrected Standard Errors in R: The pcse Package.” *Journal of Statistical Software* 42: 1–11.

Fairbrother, Malcolm. 2014. “Two Multilevel Modeling Techniques for Analyzing Comparative Longitudinal Survey Datasets.” *Political Science Research and Methods* 2 (1): 119–140.

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**November 4, 2016 Research Paper due (40%)**

## Further Topics

### Time X: Event History/Survival Analysis

**Key Topics:** Cox Proportional Hazards Model

**Literature:**

Box-Steffensmeier, Janet M. 1996. “A Dynamic Analysis of The Role of War Chests in Campaign Strategy.” *American Journal of Political Science* 40 (2): 352–371.

Golub, Jonathan. 2008. “Survival Analysis.” In *The Oxford Handbook of Political Methodology*, eds. Janet M. Box-Steffensmeier, Henry E. Brady, and David Collier. Oxford: Oxford University Press. Pp. 530-546.

**Further/Recommended Readings:**

Allison, Paul D. 2014. *Event History and Survival Analysis*. Sage University Paper Series on Quantitative Applications in the Social Sciences, 07-46. Thousand Oaks, CA: Sage.
Note: Good general introduction; Ch. 4 on Cox Regression (pp. 33-51) most relevant.

Box-Steffensmeier, Janet M, and Bradford S Jones. 2004. *Event History Modeling: A Guide for Social Scientists*. New York: Cambridge University Press.
Note: Standard reference for event history models in political science, with detailed and fairly non-technical explanations.

Fox, John, and Sanford Weisberg. 2011. *Cox Proportional-Hazards Regression for Survival Data in R. An Appendix to An R Companion to Applied Regression, Second Edition*. Available at: http://socserv.mcmaster.ca/jfox/Books/Companion/appendix/Appendix-Cox-Regression.pdf. Good introduction to running Cox proportional-hazards regression in R.

# Data Sources

## Major Multi-Wave Comparative Survey Projects

**Comparative Study of Electoral Systems (CSES):** http://www.cses.org

- (CSES Module 4: 2011-2016 data collection in progress)
- CSES Module 3: 2006-2011
- CSES Module 2: 2001-2006
- CSES Module 1: 1996-2001

**European Election Studies (EES):** http://www.europeanelectionstudies.net

- EES 2014 (28 countries)
- EES 2009 (27 countries)
- EES 2004 (24 countries)
- EES 1999 (15 countries)
- Earlier years available (1989, 1994)

**European Social Survey (ESS):** http://www.europeansocialsurvey.org

- ESS Round 7 (2015; early release with 15 out of 22 countries)
- ESS Round 6 (2012)
- ESS Round 5 (2010)
- ESS Round 4 (2008)
- ESS Round 3 (2006)
- ESS Round 2 (2004)
- ESS Round 1 (2002)

**European Values Study (EVS):** http://www.europeanvaluesstudy.eu

- EVS wave 4 2008 (47 countries/regions)
- EVS wave 3 1999 (33 countries)
- EVS wave 2 1990 (29 countries)
- EVS wave 1 1981 (16 countries)

**World Values Survey (WVS):** http://www.worldvaluessurvey.org

- WVS Wave 2010-2014 (59 countries)
- WVS Wave 2005-2009 (58 countries)
- WVS Wave 1999-2004 (41 countries)
- WVS Wave 1995-1998 (56 countries)
- WVS Wave 1990-1994 (18 countries)
- WVS Wave 1981-1984 (10 countries)

‘Barometer’ Surveys from around the world:

**Eurobarometer** (http://ec.europa.eu/public_opinion/index_en.htm)
**Afrobarometer** (http://www.afrobarometer.org/)
**Asian Barometer** (http://www.asianbarometer.org)
**Latinobarómetro** (http://www.latinobarometro.org/)

## Country-Year Data

**The International Political Economy Data Resource** (Graham, Benjamin A.T., 2015): http://dx.doi.org/10.7910/DVN/28003