**Syllabus**

**Course title ECBS 6233 – Empirical Research Methods**

**Instructor** Miklós Koren

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Office QS B510 (Vienna) by appointment

**Credits**  1 US credits (2 ECTS credits)

**Module** None

**Term**  Fall 2020-2021

**Course level** PhD

**Prerequisites** At least one PhD-level applied microeconomics course. Can be take concurrently with this course.

**Course drop**

**1. Course Description**

**Content.** The course introduces tools for reproducible research computing and efficient collaboration. We will learn to use plain text and the command line, version control, write modular and readable code.

**Relevance.** All empirical work involves significant amounts of computer coding. The time invested in coding is best leveraged if the code can be reused by coauthors, by our future selves and future readers. .

**2. Learning Outcomes**

**Key outcomes.** By the end of the course, students will be able to

- Understand folder structure. Perform operations in the command line on files in different folders.

- Use a modular folder and file structure for empirical projects.

- Automate repeating tasks with Stata scripts, using for loops and programs.

- Read and write data in various formats in Stata. Explore data and fix common data quality errors.

- Filter, aggregate, reshape, and combine data for analysis.

- Automate and parametrize model estimation.

- Combine different data cleaning and estimation tasks using Makefiles.

**Other outcomes.** The course will also help develop skills in the following areas.

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| **Learning Area** | **Learning Outcome** |
| Critical thinking | Evaluate and compare different computing tools and methods. |
| Quantitative reasoning | Explore and analyze a large number of observations from potentially many different sources. |
| Technology skills | Write short programs in shell, make and Stata.  Install and use packages in Stata.  Use key programming tools in Stata: programs, loops. |
| Interpersonal communication skills | Convey technical concepts verbally.  Collaborate with others on technical tasks. |
| Management knowledge and skills | Create software with many components.  Organize work components effectively.  Meet deadlines. |
| Cultural sensitivity and diversity | Work together with students of different backgrounds. |
| Ethics and social responsibility | Understand ethical and legal constraints of acquiring data.  Apply good practices of data protection. |

**3. Reading List**

**Required**

Paarsch and Golyaev, 2016. A Gentle Introduction to Effective Computing in Quantitative Research: What Every Research Assistant Should Know. MIT Press. (PG henceforth)

Koren, Miklós, Arieda Muço and András Vereckei, 2019a. “Introduction to the Command Line for Economics [website].” The Carpentries. https://datacarpentry.org/shell-economics/ (KMV\_shell henceforth)

Koren, Miklós, Arieda Muço and András Vereckei, 2019a. “Economics with Stata [website].” The Carpentries. https://datacarpentry.org/stata-economics/ (KMV\_Stata henceforth)

**Recommended**

Sargent, Thomas J. and John Stachurski. 2020. Python Programming for Economics and Finance [website], https://python-programming.quantecon.org/index\_toc.html

Gentzkow, Matthew and Jesse M. Shapiro. 2014. Code and Data for the Social Sciences. https://web.stanford.edu/~gentzkow/research/CodeAndData.pdf

**4. Teaching Method and Learning Activities**

Learning objectives will be achieved through

- This is a participatory, experiential course. Students participate in live coding together with the instructor. This format facilitates quick and frequent feedback and enables students to achieve mastery in their computing skills.

**5. Assessment**

Grading will be based on the total score out of 100, in line with CEU’s standard grading guidelines.

- Class participation (40 percent)

- Take-home coding assignment (60 percent)

**6. Technical requirements**

- Personal laptop computer with administrative privileges to install open source software.

- Operating system: Windows 10+ or Mac OS X 10.8+, or Linux 2.6.18+

- git bash (Windows only), https://gitforwindows.org/

- Stata 16, free teaching licenses available upon request.

- Internet access.

**7. Topic Outline and Schedule**

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| **Session** | **Topics** | **Readings** |
| 1 | Introduction to the command line | PG 2.1-2.3, KMV\_shell, Episodes 1-3. |
| 2 | Reading and writing files in different formats, Data cleaning in Stata | PG 4.8, KMV\_Stata, Episodes 1-2 |
| 3 | Save and Reuse your Work in .do Files | KMV\_Stata, Episode 5 |
| 4 | Repeat tasks with for loops | KMV\_Stata, Episode 6 |
| 5 | Finding and installing user-written Stata packages |  |
| 6 | Writing your own Stata packages |  |

**8. Short Bio of the Instructor**

Miklós Koren is professor of economics at CEU, senior research fellow at the Institute of Economics, and research fellow of the Centre for Economic Policy Research. His research focuses on how talent and technology jointly determine business success. Professor Koren has more than two decades of experience with microeconometrics and quantitative macro modeling. He is a certified Carpentries Instructor.