

COS-D409. Forecasting II: Applied Research Project

Lecturer: Christina Bohk-Ewald

– Week 1 – Monday –

University of Helsinki, Finland
15.03.2021–05.05.2021

Brief round of introduction

Who are you? What is your study background?

What are you most interested in with respect to conducting an applied research project in the field of demographic forecasting?

What experiences do you have in this topic and in programming with R?

Course outline

- Course timeline
- Course content: general purpose
- Course content: intended learning outcomes
- Course content by week
- Course concept and organization of weekly sessions on Monday and Wednesday
- What is expected of you
- Feedback, assessment, and grading
- Course learning material on GitHub

Course timeline by week

We go digital with this course using Zoom and meet twice a week:

Week 1	15.03.2021: 10:15–11:45	17.03.2021: 10:15–11:45	Zoom
Week 2	22.03.2021: 10:15–11:45	24.03.2021: 10:15–11:45	Zoom
Week 3	29.03.2021: 10:15–11:45	31.03.2021: 10:15–11:45	Zoom
Week 4	12.04.2021: 10:15–11:45	14.04.2021: 10:15–11:45	Zoom
Week 5	19.04.2021: 10:15–11:45	21.04.2021: 10:15–11:45	Zoom
Week 6	26.04.2021: 10:15–11:45	28.04.2021: 10:15–11:45	Zoom
Week 7	03.05.2021: 10:15–11:45	05.05.2021: 10:15–11:45	Zoom

→ Meeting-URLs and passwords have been sent to you by email

Course content in general

This course gives you the opportunity to carry out your own applied research project in the field of demographic forecasting.

You will work independently on your research project and thus learn different stages of the research process: for example, to develop a research question, to collect and synthesize related work, to design and conduct necessary analysis with real-world data—if applicable, in the statistical software R—, and to analyze, interpret, and report main results.

You will summarize your applied research project in a presentation to course participants and in an executive summary report.

Course content in general

Application-oriented basic course on developing and completing an applied research project in the field of demographic forecasting using real-world data.

The research questions could be linked to topics such as forecasting how long people are likely to live, how many children they are likely to bear, or how many people are likely to live in a country of interest; nowcasting the spread and mortality of the coronavirus pandemic; or also assessing the performance of official forecasts by means of forecast accuracy and bias.

Having some experience in programming with R would be an advantage, but it is generally best to learn something by just doing it.

Course content: intended learning outcomes

By the end of this course you will be able:

- to carry out a research project (under supervision) in the field of demographic forecasting
- to develop a research question
- to collect and synthesize related work
- to design and conduct necessary analysis with real-world data (if applicable) in the statistical software R
- to analyze, interpret, and report main results

Course content by week

- Week 1: Introduction to course content and concept & develop a research question & draft a tentative plan for your research project including weekly goals.
- Weeks 2-6: Work through the weekly steps of your research project plan and discuss progress, obstacles, and next steps in class.
- Week 7: Present your applied research project to the class and receive feedback for your final report.

Course concept

You will be learning about carrying out a research project from two positions or perspectives:

You will be the *project leader* of your own project and the *student reviewer* of another student's project.

Organization of Monday sessions each week

Sequence of interactive activities:

- 1 *Report of project leaders:* You briefly report in class on your progress made and obstacles encountered last week; you discuss how to perhaps overcome your last week's obstacles; and you explain next steps to be achieved this week.
- 2 *Receiving and providing feedback on projects:* There will be two feedback rounds in breakout rooms so that you will be in the role of the project leader receiving feedback and in the role of the student reviewer to provide feedback.
- 3 *Report in class the highlights of the previous feedback rounds.*

Organization of Wednesday sessions each week

Sequence of possible activities:

- *Work on your project:* You can use this class time to work on your project (conceptualizing, collecting and preparing data, reading, analysis, reporting) and to ask questions in class right ahead as they come up. This can be related to, e.g., programming, reading material, and writing.
- *Occasional mini lectures on demand:* If needed, there will be occasional mini lectures on particular topics to support you to achieve your weekly goals.
- *Opportunity to ask questions in open forum:* You can use this class time as an opportunity to discuss, e.g., encountered problems and ideas with the lecturer and course participants.

→ Up to 3 hours per week allow to flexibly organize course sessions and provide sufficient time for self-study

What you are encouraged to do

For the sake of a safe, respectful, and trustful learning course environment:

- Please show your video. All the time, but at least whenever you speak and also during discussions (exception: technical difficulties).
- What happens during this course, stays in this course. There will be no recordings of any course session.
- Please just ask questions / give comments during this course. Note that a speaker will have a hard time following the chat while speaking. That is why it is important that you just ask your question.
- Please ensure respectful interaction with each other.
- Please constructively criticize concepts, not people.
- Please make others feel welcome to speak their mind, also when it might be in disagreement with yours.

What is expected of you

Active participation in
the role as the project leader
and in
the role as the student reviewer.

Feedback, assessment, and grading

...are in alignment with key learning contents and learning activities:

- Receive and provide formative feedback during course to discover and close learning gaps
- Summative assessment to generate course grade
 - ▶ Actively participating as *project leader* and *student reviewer*; presenting and interactively discussing your own and other students' progress made, obstacles encountered, and next steps each week. (50%)
 - ▶ Report that summarizes your own applied research project. It should be approximately 2000 words long (not counting references, figures, tables, and R-code). You are supposed to write your report during this course, however, it will be due on May 12, 2021. (50%). → more information during the course

What is expected of you

If you cannot attend a course session, please give me a note by email.

Course learning materials

Course learning materials on GitHub:

<https://github.com/christina-bohk-ewald/2021-COS-D409-forecasting-II-applied-research-project>

Contact

Email: `christina.bohk-ewald@helsinki.fi`

Appointments: arrangement by email and personal communication

First week's Monday session

- What is science and how to produce valuable scientific outcome?
- How to plan an applied research project in general?

First week's Wednesday session

- We talk about possible research questions in the field of demographic forecasting to give you some inspiration
- You develop (or select) a research question for your own applied research project
- We choose *student reviewers* for projects
- You create a tentative plan for your applied research project and set and specify weekly goals

Central questions

What is (the purpose of) science?

How to produce valuable scientific outcome?

→ Addresses basic principles of science and its responsibility for societies

Central questions

Before we start:

What is your understanding of this matter?

What is (the purpose of) science?

What is (the purpose of) science?

Science is crucial for human development through generating knowledge in various areas / fields.

- Science (Latin word *scientia*) means knowledge.
- Science is about creating and organizing knowledge about the real world in a systematic manner.
- Science is about finding (testable) explanations and predictions for any kind of real world phenomenon with, e.g., openness, creativity, skepticism, and utter honesty.

→ Many different definitions of what science is

Sagan (1997)

What is (the purpose of) science?

- Scientific findings are testable in the way that they can be falsified. Anything that cannot be falsified belongs to the realm of beliefs and opinions (Karl Popper).
- Dynamic nature of science and scientific findings. Scientific hypotheses and models hold until they get replaced with hypotheses and models that have more explanatory or predictive power for particular real world phenomena.
- Science can also be regarded as being about finding the truth (if that is at all possible) and identifying (or distinguishing it from) *bullshit* (Harry Frankfurt).

Sagan (1997)

What is (the purpose of) science?

“Claims that cannot be tested,
assertions immune to disproof are veridically worthless,
whatever value they may have
in inspiring us or in exciting our sense of wonder.”

Carl Sagan (1997)

How to produce valuable scientific outcome?

- Scientific findings are well-documented in papers and also in various (social) media outlets and platforms.
- But less documented appears to be the scientific process (which often is a long and exhausting endeavor with many ups and downs) that scientists went through in order to generate these findings in the first place.
- And this can be a problem, because the scientific process is at least equally important as the scientific findings; also in order to assess the quality of these scientific findings.

Sagan (1997)

Feynman (1974)

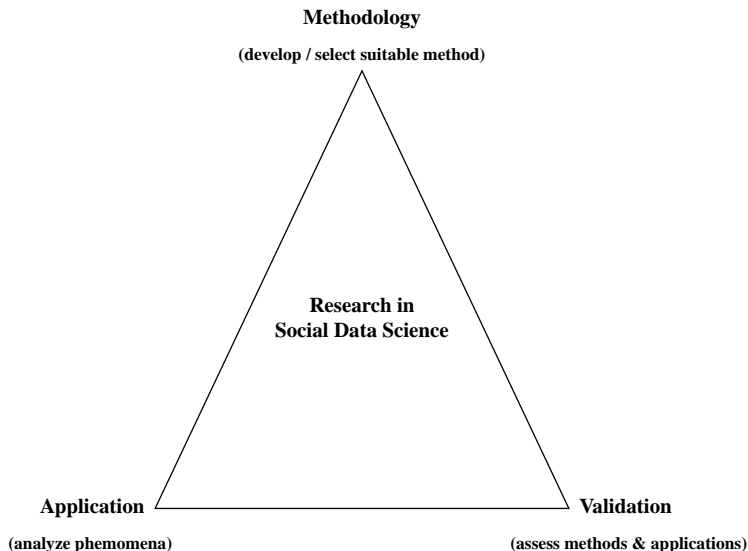
How to produce valuable scientific outcome?

Note that you will experience the adventure
of going through the scientific process
in your own applied research project
in the upcoming seven weeks :-)

How to produce valuable scientific outcome?

Interconnectedness of selecting suitable **methodology**,
its careful **validation**, and reasonable **application**
in order to produce (valuable) research within social (data) science

How to produce valuable scientific outcome?



Scientific work

Scientific work requires, e.g.,
openness towards (new) ideas & creativity,
reasonable & careful planning and conduct of analysis,
rigorous & enduring testing,
and inherent skepticism & integrity
in order to produce valid and reliable outcome.

Scientific work

The pleasure of finding things out.

Interview made for the BBC television program Horizon in 1981

Richard P Feynman (1981)

How to plan your applied research project

Major steps:

- Develop a research question
- Collect and synthesize related work
- Collect and prepare relevant real-world data
- Design and conduct necessary analysis with real-world data in the statistical software R
- Analyze and interpret main results
- Summarize and discuss main findings and their possible limitations and implications
- Report your results and how you have generated and validated them in a presentation and brief paper

How to plan your applied research project

Make a timetable stretching over 7 course weeks
including each of these major steps,

then prepare a plan detailing what it will take to achieve these weekly goals,

and finally revise or adjust your plan
while you are on your scientific adventure,
gather new information, and, perhaps, encounter unforeseen events.

How to plan your applied research project

Week	Major step	Details
Week 1	Develop research question and draft project plan	...
Week 2	Collect related work and relevant data	...
Week 3	Design and conduct data analysis	...
Week 4	Continue to conduct data analysis	...
Week 5	Analyze, interpret, and discuss results	...
Week 6	Summarize main findings and prepare presentation	...
Week 7	Present your project and complete your report	...

→ Please adjust and specify this timetable to your needs

How to plan your applied research project

However, note:
“Plans are nothing; planning is everything”
(Dwight D. Eisenhower).

So, your initial plan will need to be adjusted on the way.

And it is always a good idea to conduct a small-scale pilot study or test case in order to make sure that you will invest your energy and time wisely.

What you have learned today about the scientific method in general

- Describe the general purpose of science.
- Describe and explain what makes a scientific outcome valuable.
- Describe how to plan an applied research project.

Course learning materials

Course learning materials on GitHub:

<https://github.com/christina-bohk-ewald/2021-COS-D409-forecasting-II-applied-research-project>

Recommended learning material for today's class

- **Richard P Feynman (1981)**

The Pleasure of finding things out.

Interview made for the BBC television program Horizon in 1981.

- **Richard P Feynman (1974)**

Cargo Cult Science. Some remarks on science, pseudoscience, and learning how to not fool yourself.

Caltech's 1974 commencement address.

<http://calteches.library.caltech.edu/51/2/CargoCult.htm>

- **Carl Sagan (1997)**

The Demon-Haunted World: Science as a Candle in the Dark.
Ballantine Books.

Thank you for your attention!

`christina.bohk-ewald@helsinki.fi`

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