



# Introduction to the course

Advanced Research Methods 2018-2019

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# Agenda

1. Course overview
2. Course schedule
3. Passing the course
4. Website and material
5. Q&A
6. Scientific Research Methods: why and what?
  - Activity



## Appetizer

### Please provide positive feedback

- Content
- Other aspects



<https://www.youtube.com/watch?v=IMboI4cOAuQ>



# Lets be curious!

But... How to start?

What is a research project?

How to transform my desire (or need) to investigate something into a research problem?

How shall I start to do research?

What are the steps to follow from the problem investigation to the implementation of new solutions?

What about my master thesis?

...?





## Intuitive Research

Let's think together

Steps to provide solution to a problem

1. Investigate existing problem (curiosity!)
2. Design a solution
3. Evaluate if the solution is solving the problem
  1. Specify what I want to know
  2. Design evaluation protocol
  3. Check if the evaluation protocol is appropriate
  4. Execute the protocol
  5. Analyse the results

Check the book





## Learning Objectives

**ILO1:** Discuss prevalent (qualitative and quantitative) research methods in the field of information science, recognise its benefits and drawbacks, and identify ethical constraints.

**ILO2:** Write and present research papers describing interesting phenomena, providing the design of a comparative experiment to evaluate such phenomena in practice, and presenting the systematic application of design science and research protocols.

**ILO3:** Criticize and evaluate scientific papers for the improvement of related research

**ILO4:** Analyse interesting phenomena and provide strong founded evidence on that phenomena by making use of advanced statistical analysis

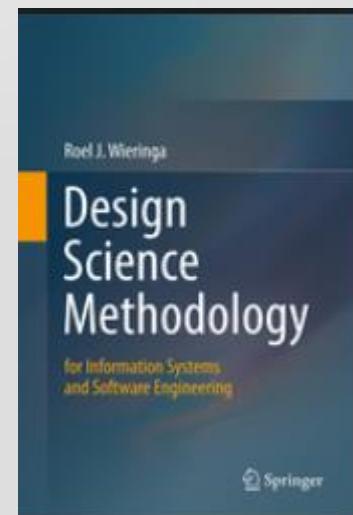
## Themes of the course

### Theme 1. Design Science

Design Science is the design and investigation of artefacts in context. Design Science describes a research method for in information systems and software engineering. It provides guidelines for how to structure research goals and analyse research problems into design goals and knowledge questions. For the ARM course, the students dive into the design or engineering and empirical cycles.

The contents for this theme are:

- A framework for Design Science
- The Design Cycle
- The Empirical Cycle

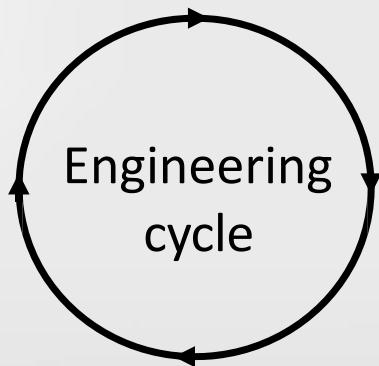


# Engineering cycle

Legend:  
? Knowledge questions  
! Tasks

## Design implementation

Choose a treatment!  
Transfer to practice!



## Implementation evaluation = Problem investigation

- Stakeholders? Goals?
- Phenomena? Causes, mechanisms, reasons?
- Effects? Contribution to Goals?

## Treatment validation

- Context & Artifact → Effects?
- Effects satisfy Requirements?
- Trade-offs for different artifacts?
- Sensitivity for different Contexts?

## Treatment design

- Specify requirements!
- Contribution to goals?
- Available treatments?
- Design new ones!

About 15 minutes

# Design cycle

Legend:  
? Knowledge questions  
! Tasks

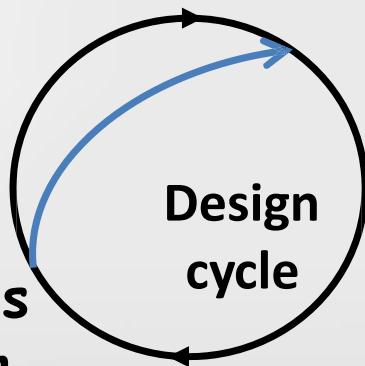
Design  
implementation

Choose a treatment!  
Transfer to practice!

**Real-world  
implementation is  
not part of your  
research project**

## Treatment validation

- Context & Artifact → Effects?
- Effects satisfy Requirements?
- Trade-offs for different artifacts?
- Sensitivity for different Contexts?



**Implementation evaluation =  
Problem investigation**

- Stakeholders? Goals?
- Phenomena? Causes, mechanisms, reasons?
- Effects? Contribution to Goals?

**Typically in a research  
project you iterate over  
design and validation many  
times**

## Treatment design

- Specify requirements!
- Contribution to goals?
- Available treatments?
- Design new ones!

About 15 minutes

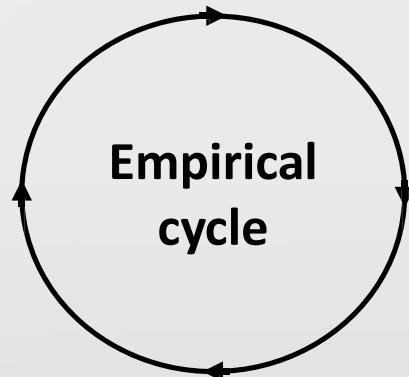
## Analysis of results

12. Data?
13. Observations?
14. Explanations?
15. Generalizations?
16. Answers?

New research problem

## Research execution

11. What happened?



## Research problem analysis

4. Conceptual framework?
5. Research questions?
6. Population?

## Research design validation

7. Object of study justification?
  8. Treatment specification justification?
  9. Measurement specification justification?
  10. Inference justification?
7. Object of study?
  8. Treatment specification?
  9. Measurement specification?
  10. Inference?



## Themes of the course

### Theme 2. Empirical research methods

For the ARM course, the students discuss a set of empirical research methods to support treatment validation tasks. The main focus of this theme is on sample-based experiments. In addition, the students are instructed on the main aspects of scientific integrity and research presentation.

- Ethics in research
- A road map of research methods: Experiments (sample-based and case-based), technical and canonical action research, observational case study research, Systematic Literature Review (SLR).
- Presentation and package

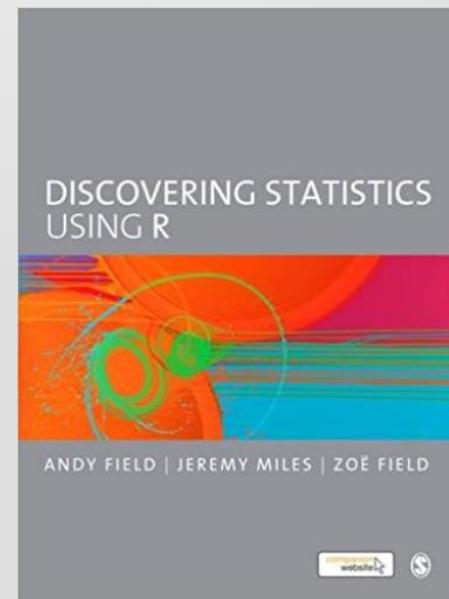


## Themes of the course

### Theme 3 Advanced statistics

For this theme, the students are instructed with advanced inferential statistics for the data analysis. The contents for this theme are:

- Statistics fundamentals
- Qualitative experiments
- Advanced statistical tests





## What is out of scope?

ARM is not a full course on

- Design of software products or IS artefacts
- Social science research
- Execution of empirical cycles
- Data collection
- Conducting a research project
  - PhD: 3-5 years
  - MSc: 8 months in UU
  - OZP: 20 weeks in UU
- Statistics
- R
- SPSS
- Scientific writing
- INFOWO II

For statistics courses, please refer to Data Science and Society, Data Analytics, and Big Data



## **What does the lecturer expect from you?**



- Active participation in the lectures and labs
- Positive attitude
- Professional behaviour
- Timely delivery of assignments
- Attendance of the activities
- Creativity and enthusiasm



## **What can you expect from the lecturer (Marcela Ruiz)?**

- Interactive teaching mode
- Fast response to questions (blackboard forum and meetings)
- As-objective-as-possible grading
- Knowledge of the field
- Enthusiasm to support research ideas
- Open mind to learn (*from you*) during the course
- Keep a calm environment in the classroom (ask noisy students to leave the classroom) -> Suggested by some students

What do you expect?



**The ARM team**

**Marcela Ruiz**  
**Pawel Wozniak**



**Teaching assistants**

**Thomas Alflen and Lars van den Bos**

**Communication**

- Blackboard: team<->teacher communication
- Questions about the content, exercises or research assignment:  
contact your teaching assistant (advisor)
- For important questions about the course: Email [m.ruiz@uu.nl](mailto:m.ruiz@uu.nl) (The main subject must start with '[ARM]')



## Lectures

I would like to make the lectures as interactive as possible, but I need your help!

Positive attitude and eagerness to learn

Bring your own devices

Software:

- Microsoft word, power point
- Acrobat / PDF reader
- SPSS software



## **Use of different terminology**

In the ARM course we make use of different terminology

- Text books, slides, papers, etc., make use of their own terminology
- You are master students, you are prepared to analyse the content and find relationship among different concepts
- Bring your questions to the lab sessions and tutorials

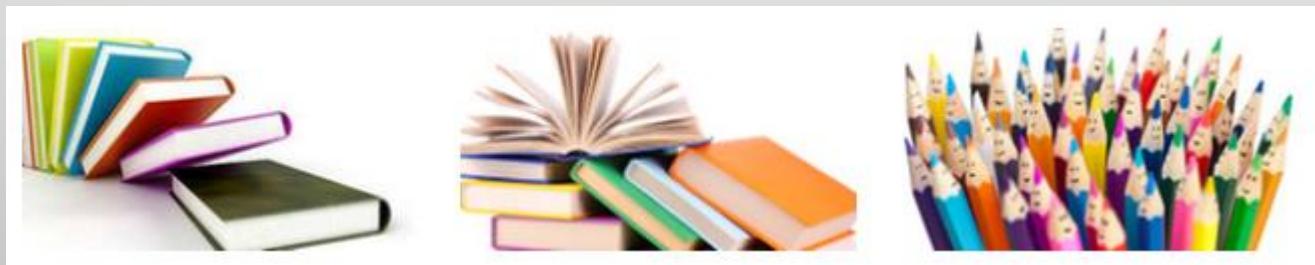


## **Use of LNCS template**

LNCS: Lecture Notes in Computer Science

Objective:

Show flexibility to adopt different kind of templates for writing scientific papers and reports





## Lab sessions

Great opportunity to practice, practice, and practice

No mandatory, but attendance is checked

- Bring your questions about the content, exercises, and assignments to the lab sessions. The TAs will manage all your questions.

Students who show great motivation and commitment will be granted with feedback and counselling opportunities. Pre-condition for the repair exam.



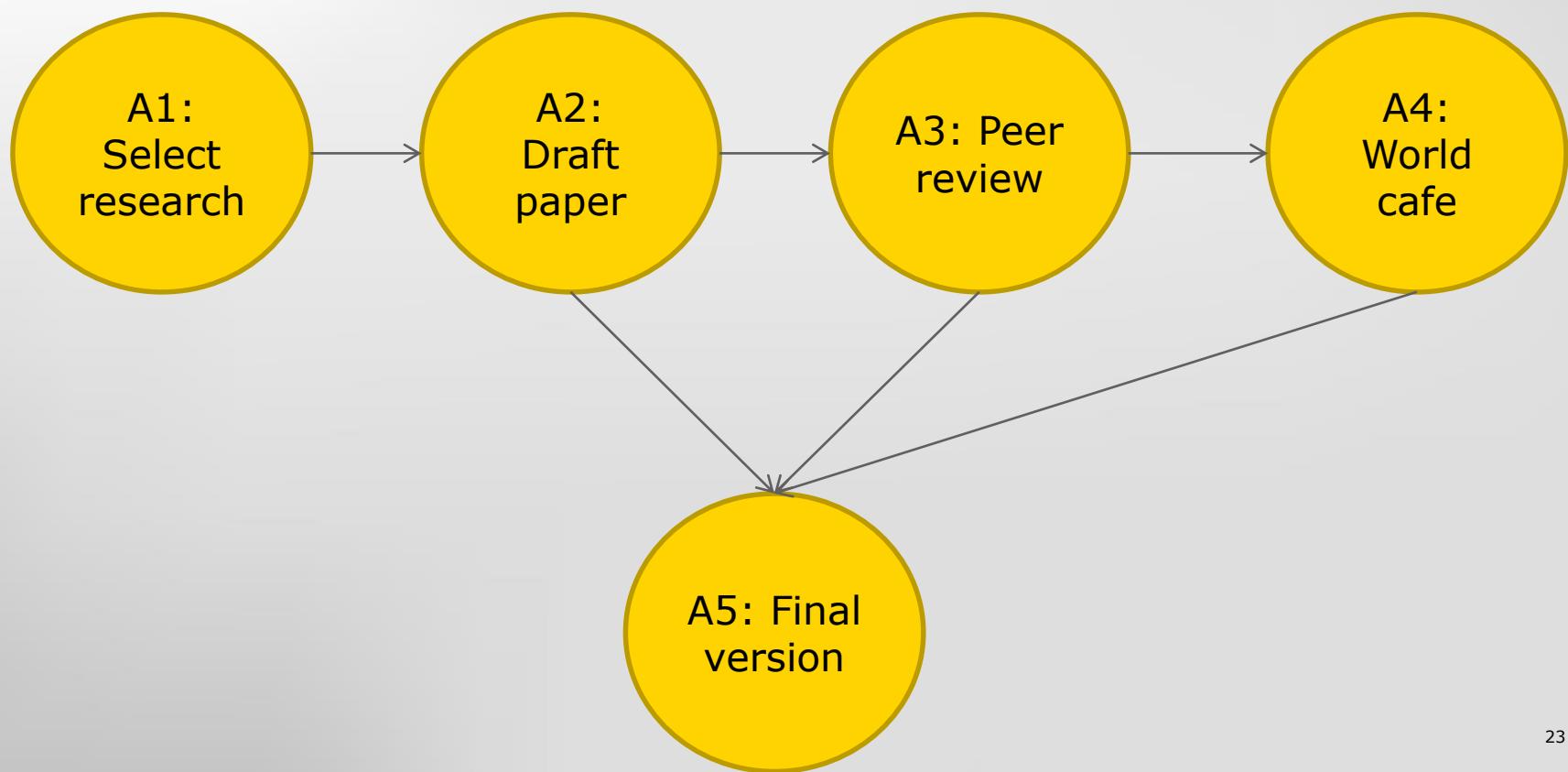


## Coaching sessions



- During the coaching sessions, **students can receive feedback** on the progress of the research paper.
- The coaching sessions are not mandatory, since they are intended to be a **space for lecturers and students to work together** on solving research challenges.
- Students are required to demonstrate an active participation in the lectures and lab sessions to be able to participate in the coaching sessions. For this, the students should attend the lab sessions and lectures, and bring the results of the labs to the coaching sessions.

## Research assignment





## Skills lab

The gateway to your academic development

**SKILLS LAB**

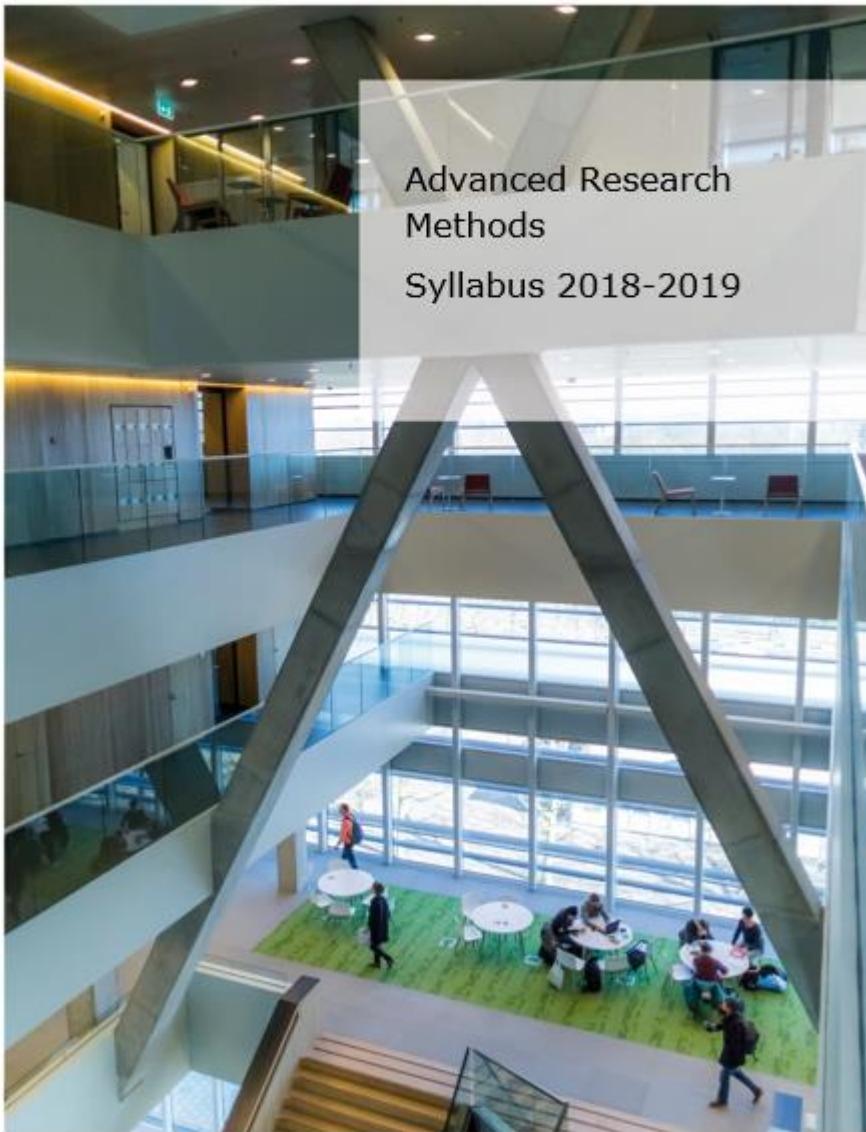
CONTACT: SKILLSLAB@UU.NL

<https://students.uu.nl/en/student-life-and-career-orientation/workshops>



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## Advanced Research Methods Syllabus 2018-2019



Department of Information and Computing Sciences

Departement Informatica Onderwijs

Bachelor Informatica Informatiekunde Kunstmatige intelligentie

Master Computing Science Game&Media Technology Artificial Intelligence Business Informatics

Onderwijs Informatica en Informatiekunde  
Advanced research methods

Educational page



Blackboard

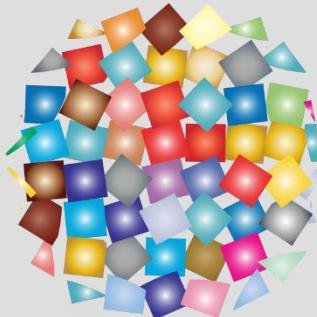


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## Questions & Answers





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## **Activity** **Warm up!**

Create teams for the research assignment and register your team on Blackboard



## The “angel” and “monster” post-it session

Which of the following aspects of the course cause you **excitement and/or insecurity?**

- Theory and skills
- Career development
- Master thesis
- Coaching
- Teamwork
- Time management
- Research topic
- Assignment
- Other topics

