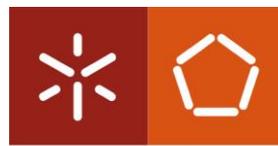


Universidade do Minho  
Escola de Engenharia

# Research Methods in Engineering

João Álvaro Carvalho

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# Research Methods in Engineering

What is it about?

science, technology

research, development,  
engineering, design, innovation

**science , technology**  
**research, development, engineering, design, innovation**

- Words that are often used in the academic discourse with different senses
- It is important to pay attention to their different uses and to distinguish the concepts they refer to

science, technology

research, development,  
engineering, design, innovation

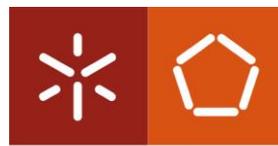
methodology, method,  
process, technique

**science , technology**

**research, development, engineering, design, innovation**

**methodology, method, process, technique**

- **Methods... for what?**



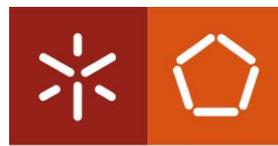
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# Research Methods in Engineering

## Purpose

# Purpose

- Lay out a general view of issues related to research, development, engineering, design, innovation
- Discuss the several facets of a research pursuit
- Provide basis for the analysis of research reports (mainly journal and conference articles)
- Draw students' attention to fundamental questions about research validity



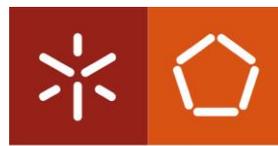
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# Research Methods in Engineering

Learning outcomes

# Learning outcomes

- On course completion students are expected to be able of:
  - explaining the differences between research activities and engineering activities
  - explaining the difference between different types of scientific knowledge
  - describing general research processes, enumerating and explaining rigor issues relevant to each phase of the process
  - commenting the research design of a research pursuit as described in a research article or in a doctoral thesis
  - explaining the differences between different research methods
  - commenting the research methods used in a research pursuit as described in a research article or in a doctoral thesis
  - commenting research articles addressing research issues such as: modes, approaches, processes, methods, techniques, ...



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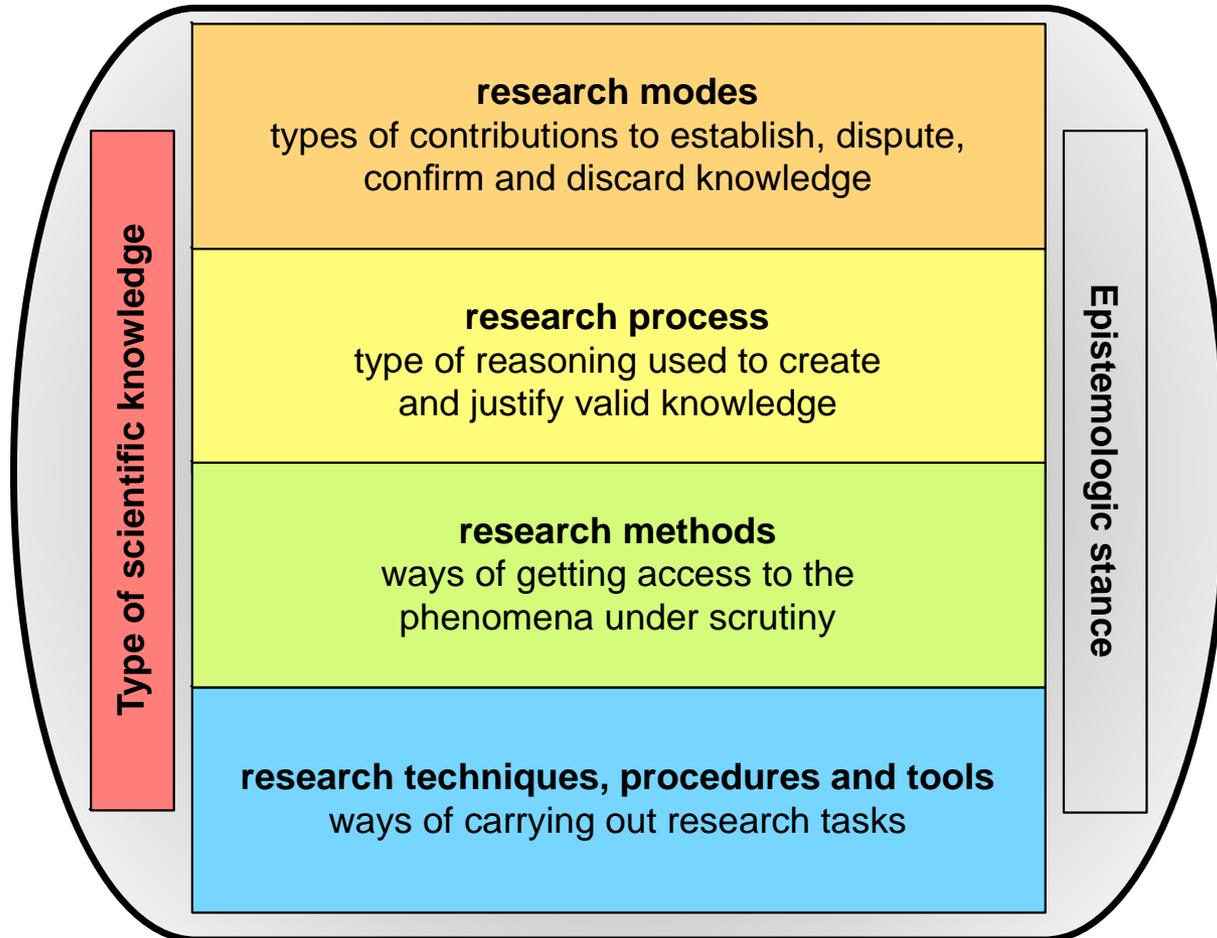
# Research Methods in Engineering

## Syllabus

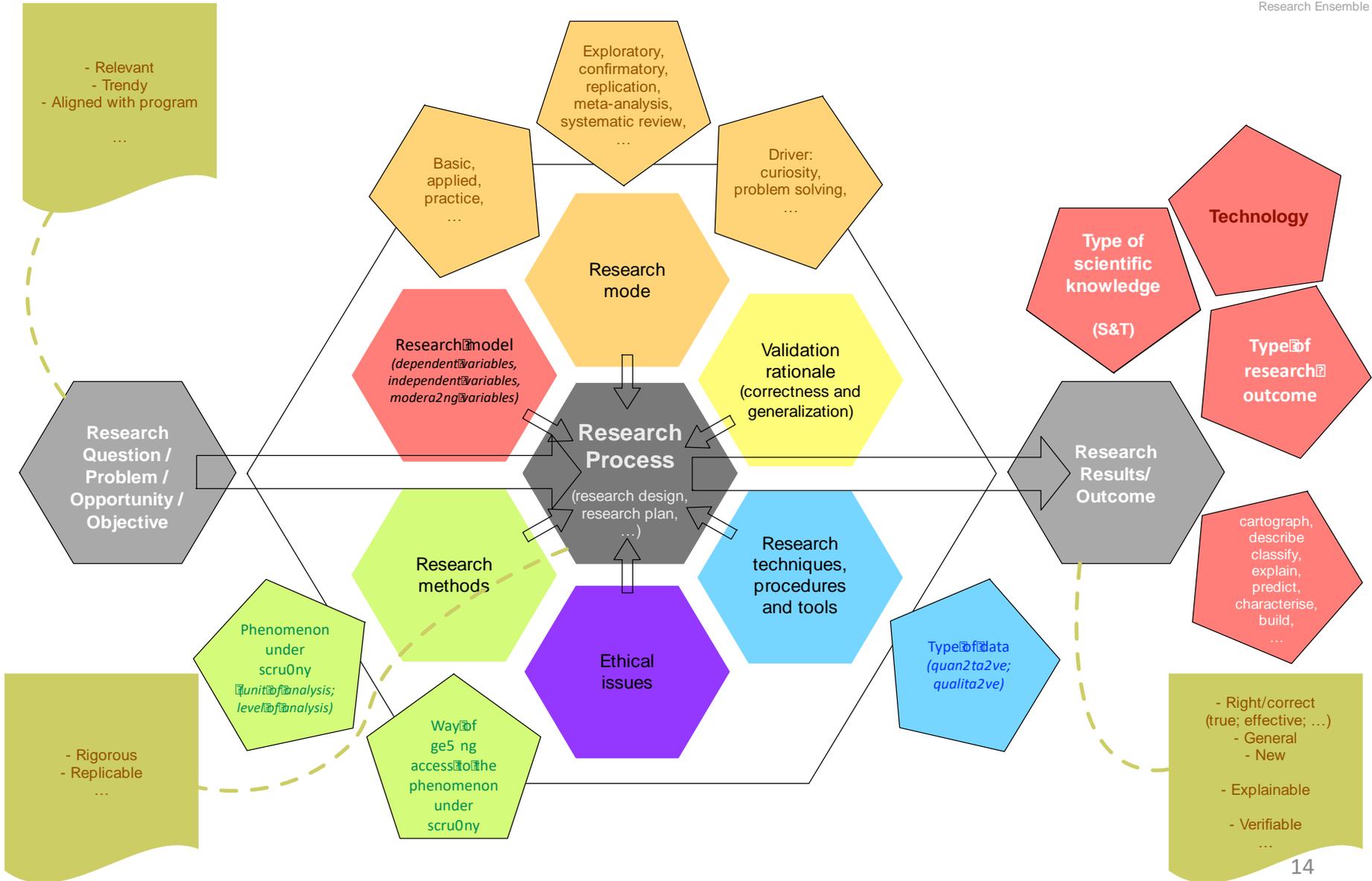
# Syllabus

- Science and technology;  
Research & Development activities and  
professional Engineering activities
- Research modes
- Research processes
- Research methods
- Research techniques, procedures and tools

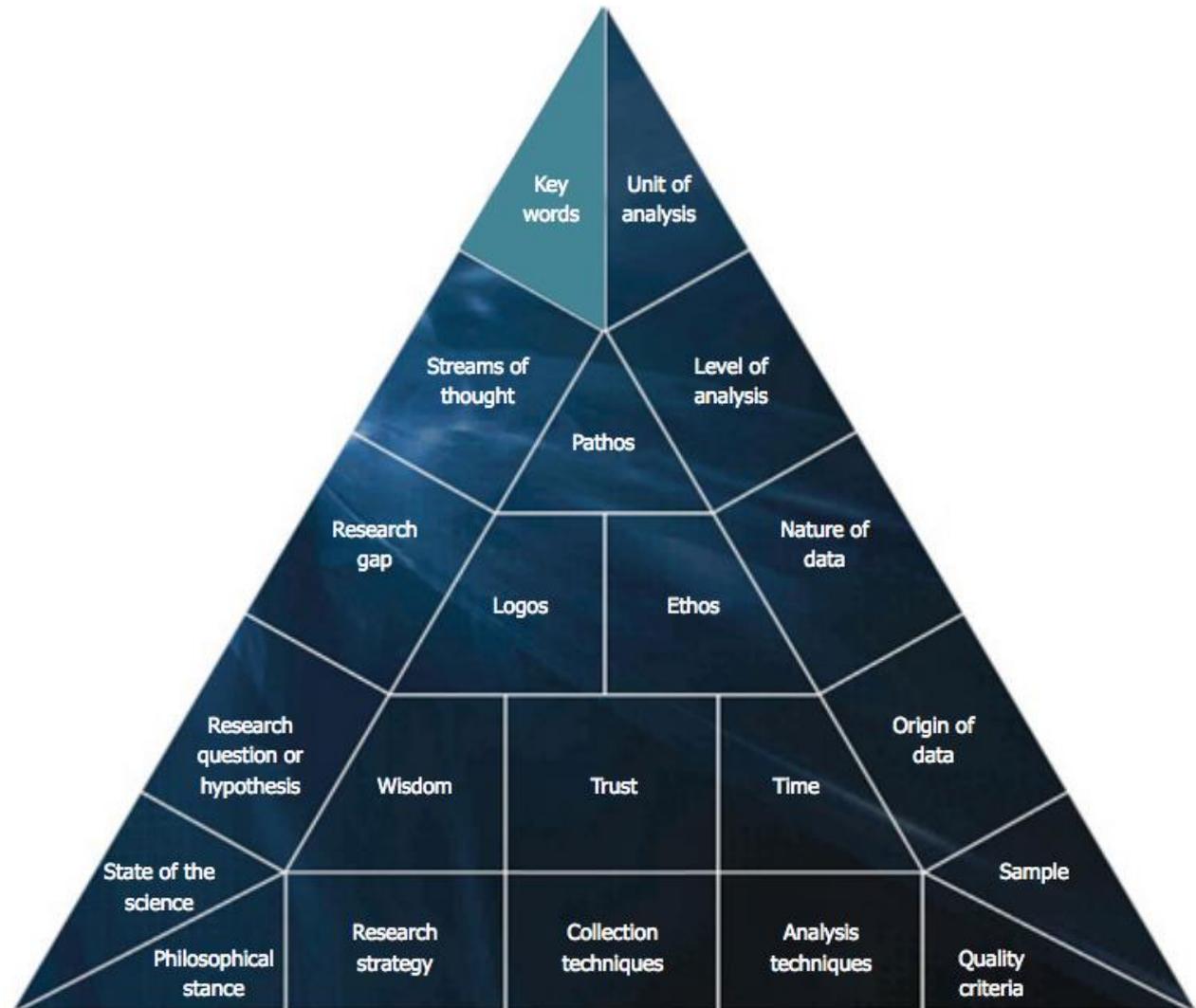
# Research



# A framework for the analysis of scientific reports

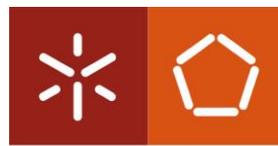


# Idea Puzzle



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- Seminar
- Sessions include
  - Presentations of themes, articles, homework requests
  - Presentations of research articles chosen by students
  - Group work for initial discussion of themes
  - Discussions within the whole class



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## Course Organization

# Course organization

- 5 credits (ECTS)
- 8 sessions with 4 hours of duration
- Assessment:
  - Active participation in seminar classes
    - Includes a presentation of one research article
  - Report
    - Research approaches and methods in the area of the student's doctoral work
      - comments on research issues on 2 research articles chosen by the student
      - Reflection on research issues in the student's own doctoral research project (using IdeaPuzzle)

# Classes

## 2017/2018 – 2<sup>nd</sup> Semester



(to be confirmed)

- Thursdays, 14h00 to 18h00  
Room 1.1.34, Azurém, Building 11, 1<sup>st</sup> floor (south wing), room 34 (Auditório do DSI)
- Calendar  
October: 4, 18, 25  
December: 6  
November: 8, 15, 22, 29  
Changes in the calendar might be necessary
- Class size  
25 students (first come, first served)
- Course availability  
The course is offered every semester
- Language  
English

n



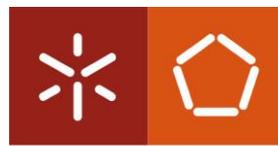
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# Research Methods in Engineering

## Signing up

# Signing up

- Send an e-mail to  
[jac@dsi.uminho.pt](mailto:jac@dsi.uminho.pt)
- Message subject - “RME - sign up request”
- Message content - include the following elements:
  - Full name
  - Student number
  - Doctoral program
  - Nationality
  - Semester you want to attend
    - 2018/2019
      - 1<sup>st</sup> Semester
      - 2<sup>nd</sup> Semester



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