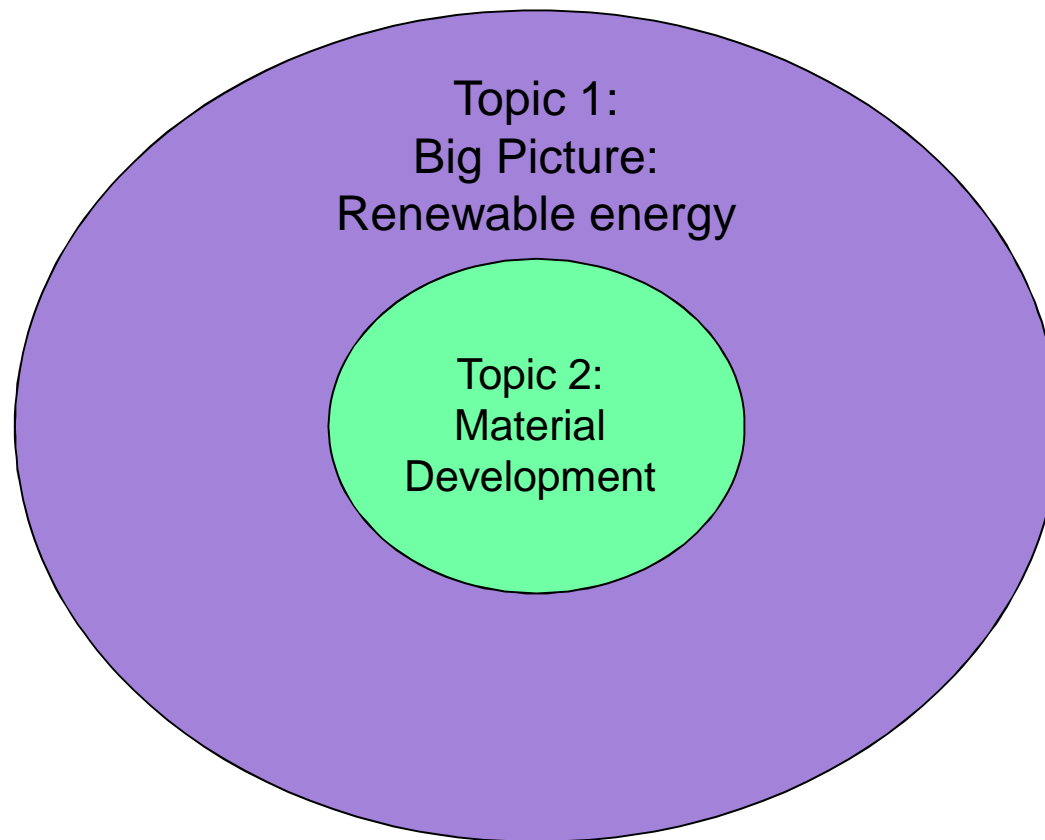


# CHEM-E5145

## Materials for Renewable Energy

Intro Lecture  
14.1.2015

Annukka Santasalo  
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MVT, room B365



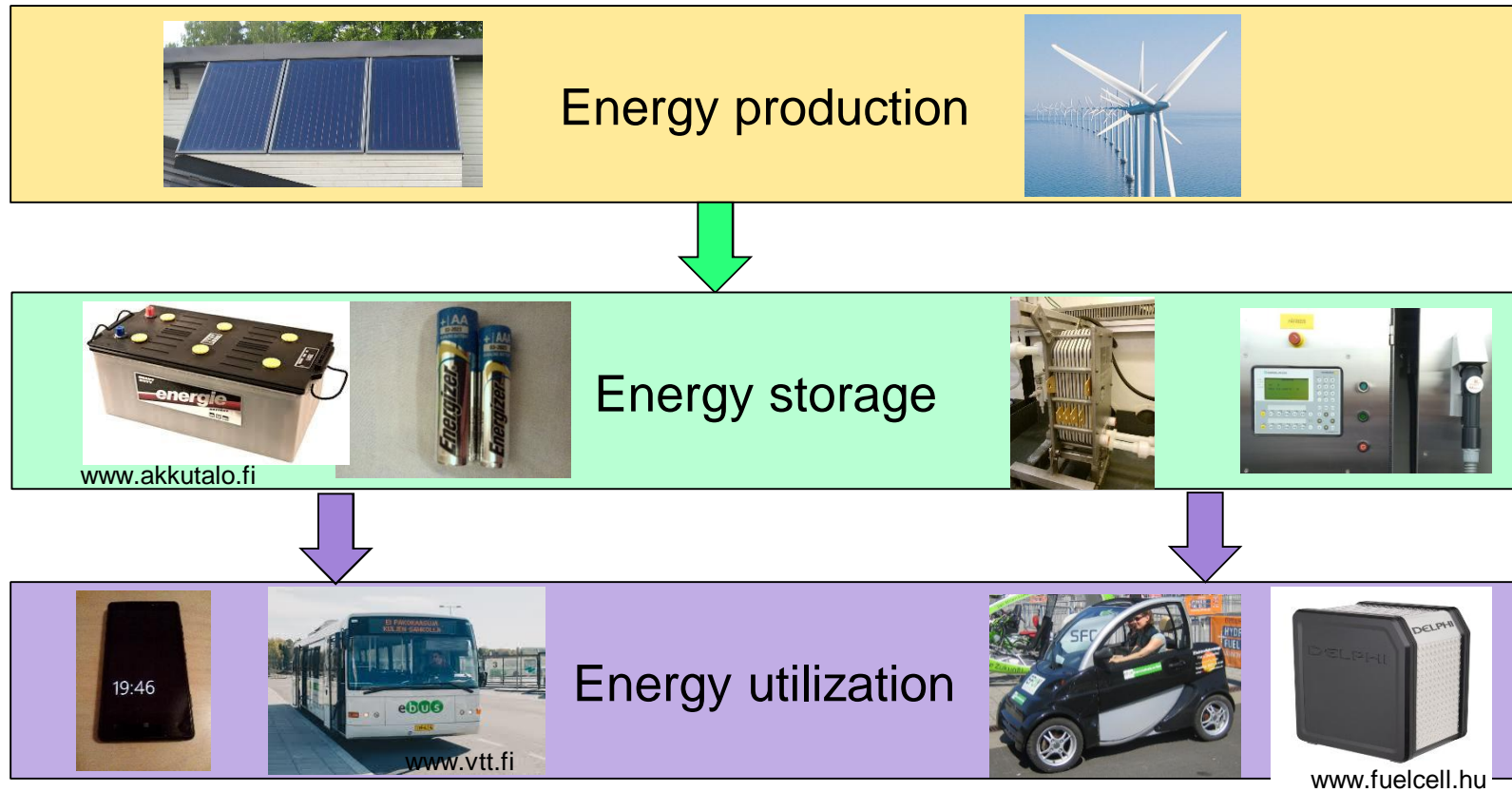
# Topic 1 – Big Picture

Energy production

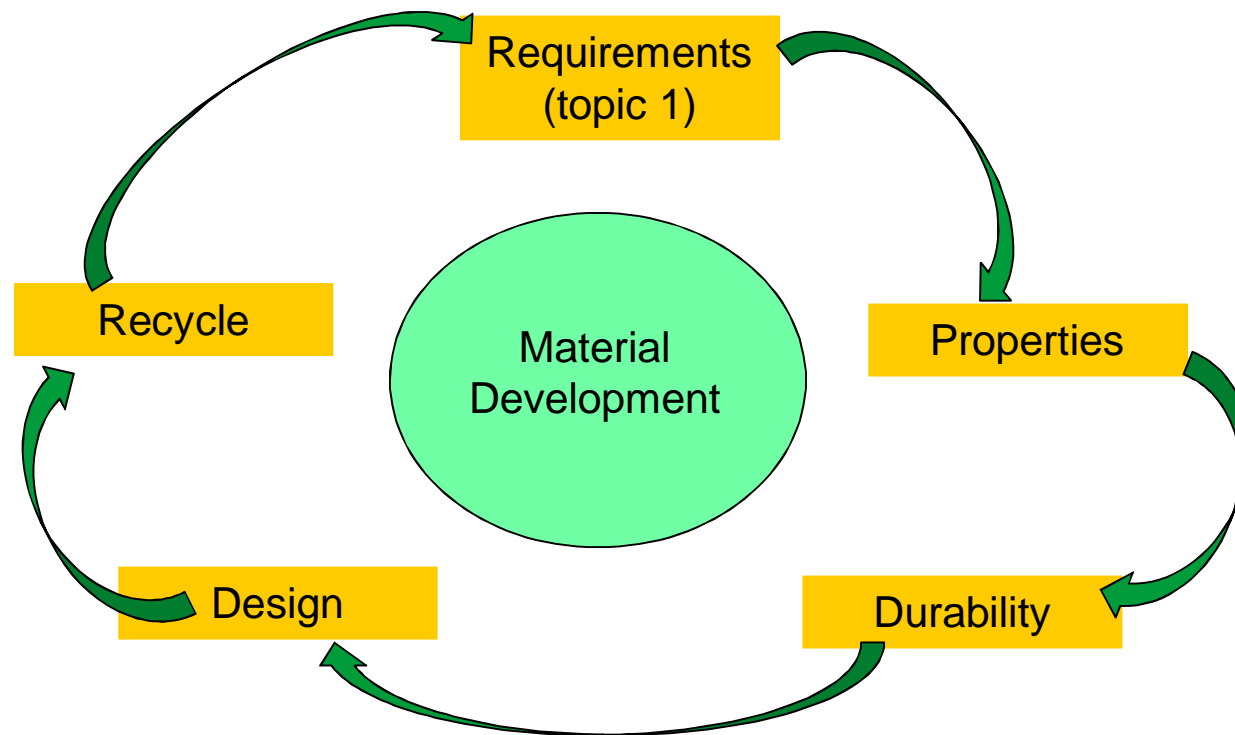
Energy storage

Energy utilization

# Topic 1 – Big Picture



# Topic 2 – Material development



# Energy courses at CHEM

- CHEM-E4255 Electrochemical Energy Conversion (Department of Chemistry), Period II
- CHEM-E5215 Materials for Nuclear Power Plants (Department of Material Science), Periods III and IV
- CHEM-E3xxx Biomass Refining major (Department of Biotechnology and Chemical Technology)

# Indented learning outcomes (ILO)

Recognize state-of-the-art materials currently used in renewable energy systems

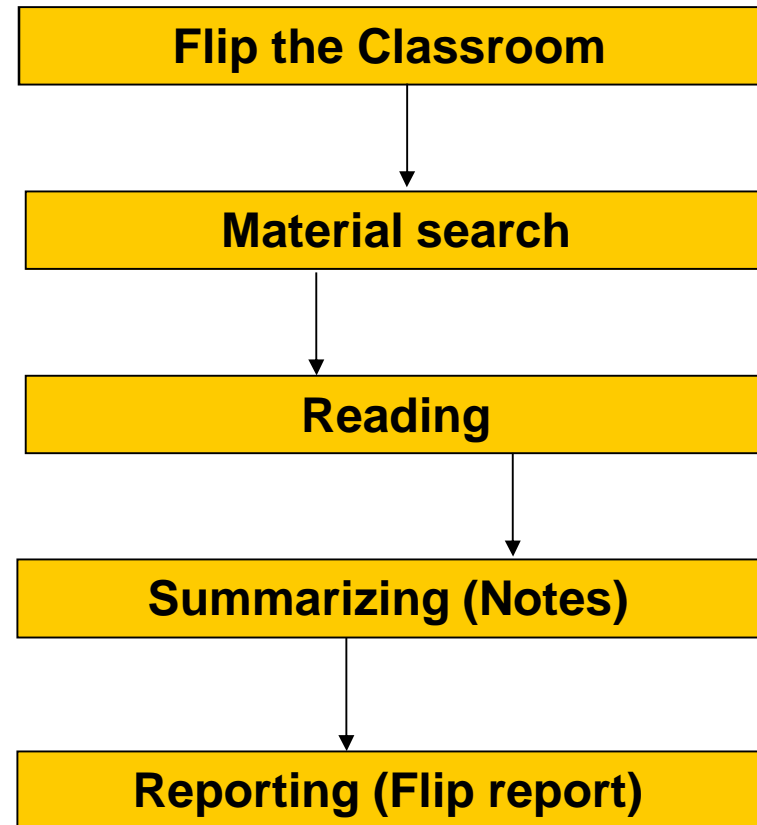
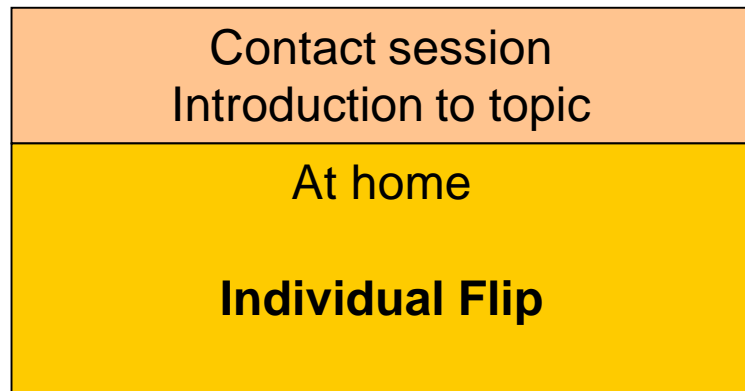
Identify common degradation and corrosion mechanisms in these applications

Relate new material solutions

Share the expertise of ones field in a heterogenius team

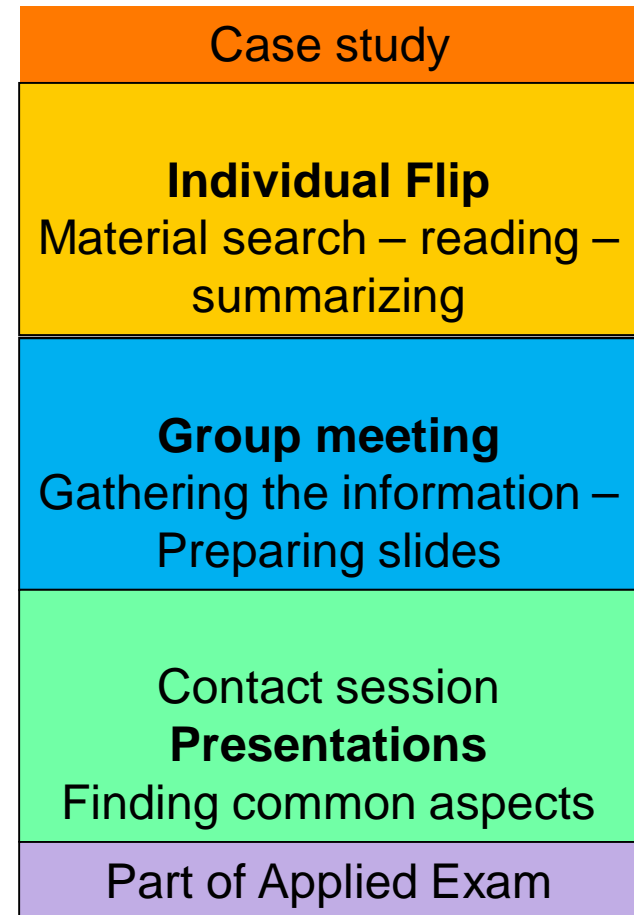
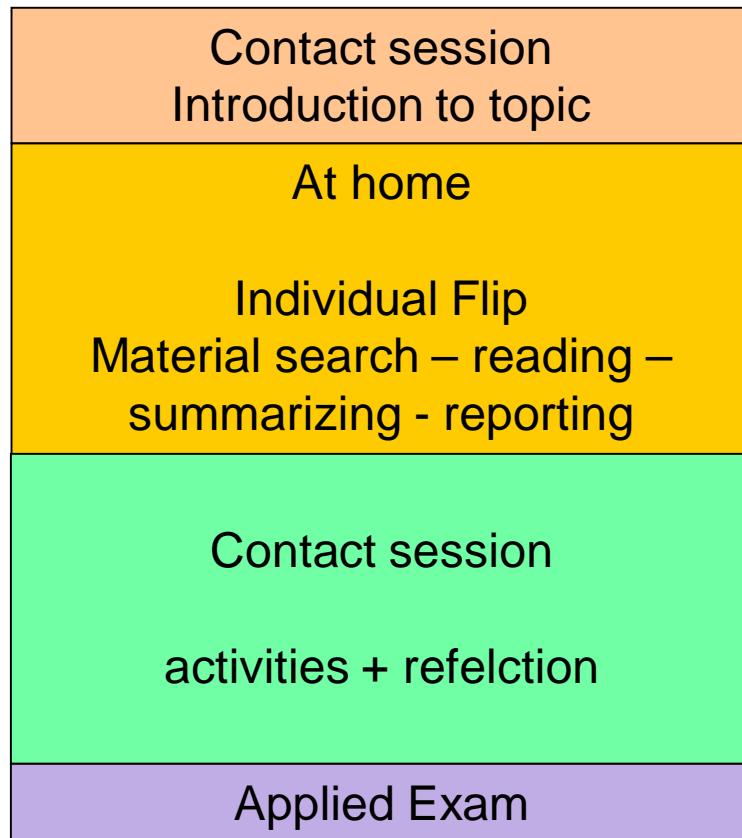
Justify material selection in front of an audience

# Teaching activities





# Teaching activities



# Teaching scedule – Periode III

Week	Home activity	Date	Time	Topic
2	-	14.1	10-12	Intro + Mindset
3	Flip I	21.1	10-12	Energy production
4	Flip II	28.1	10-12	Energy storage
5	Flip III	4.2	10-12	Transport
6	Prepare to Exam	11.2	10-13	Energy systems Exam I
7	-	-	-	No teaching

All the contact sessions will be held at  
Thursdays 10.15-12  
at Sulatto seminar room (Learning HUB).

# Teaching scedule – Periode IV

Week	Home activity	Date	Time	Topic
8	Reading	24.2	10-12	Material development
9	Flip IV (individual)	2 h		Group meeting (gather the infromation)
10	Group slides	10.3	12-14	Case studies
11	Flip V	17.3	12-14	Material properties and durability
12	Flip VI	24.3	12-14	Design and Recycling
13	Flip VII	31.3	12-14 14-16	High temperature materials Excursion
14	Excu. reflection	4.4 8.4	13-16 9-12	Exam II (group) Exam Back-up (Exam I or II)

# Assessment

## 1. Activities

Flip reports (7 x 3p.)	21
Discussion forum post	1
Group meeting report	2
Group presentation	5
Workshops (7 x 4 p.)	28
<u>Excursion report</u>	<u>3</u>
	60 p.

## 2. Exams

Mid exam	15
Final exam	24
<u>Course feedback</u>	<u>1</u>
	40 p.

# Assessment

Grade	Points
1	60-68
2	69-76
3	77-84
4	85-92
5	92-100

All points will be reported

MyCourses

"Grades"

# Material

All the course material will be at

**MyCourses**

Assignments will be also submitted

I will add the lecture slides **AFTER** the lectures  
As well as the material produced during lectures

# Flip the classroom

You read the material beforehand

We will process the material at the lectures

Reserve 4 h for the Flip assignment

Material available for all topics

**MyCourses – Material**

# Flip the classroom

You should at least have ([Mater's student](#)), 4 h

- 1 general reference (google ... Wikipedia...)
- 1 news paper clip (from your own country... Newspaper)
- 1 reference from the MyCourses (of your topic)
- 1 journal article (that you have found)



# Flip the classroom

You should at least have (PhD student), 4h

- 1 general reference (google ... Wikipedia...)
- 2 news paper clip (from your own country... Newspaper)
- 1 reference from the MyCourses (of your topic)
- 2 journal article (that you have found)

# Flip report

There is a template at [MyCourses – Assignments](#)

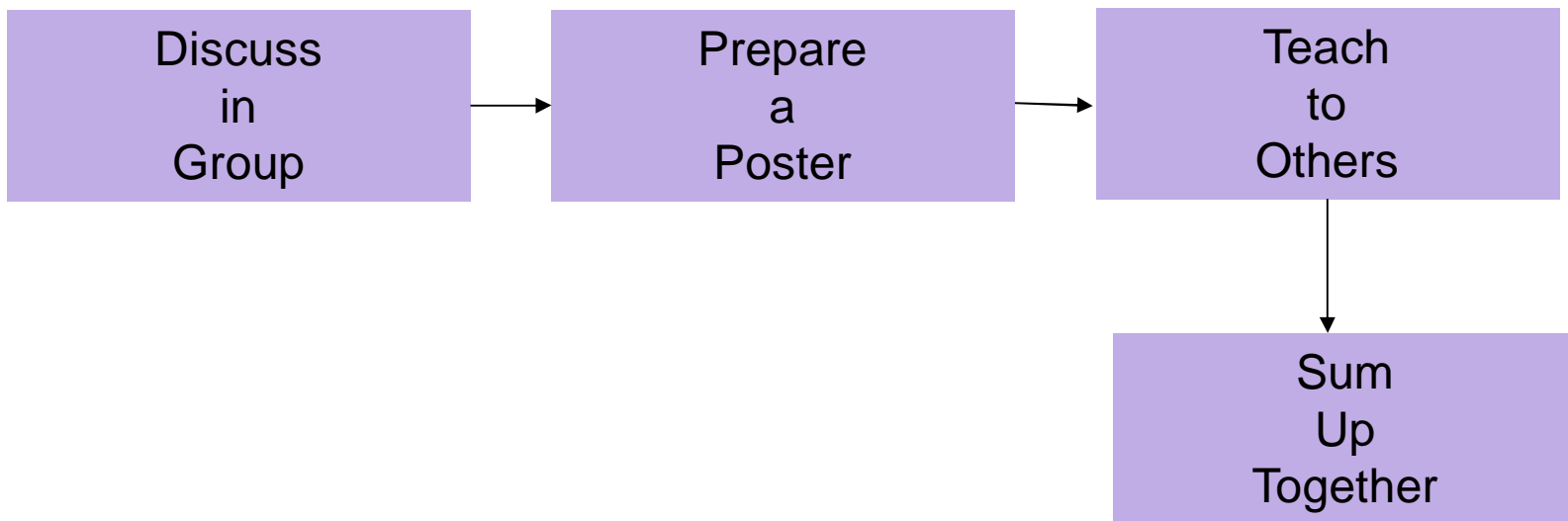
- Topic
- Reference information (+ link if a website)
- Short summary (why is it important for the course point of view, 2-3 sentences)
- An interesting piece of fact

Hand in 24 h before the lecture (next We before 10.15)

- > I will revise them before the class

# Flip the classroom at lecture

- Bring your notes and all the papers/material with you
- The papers can be in electronic/printed format



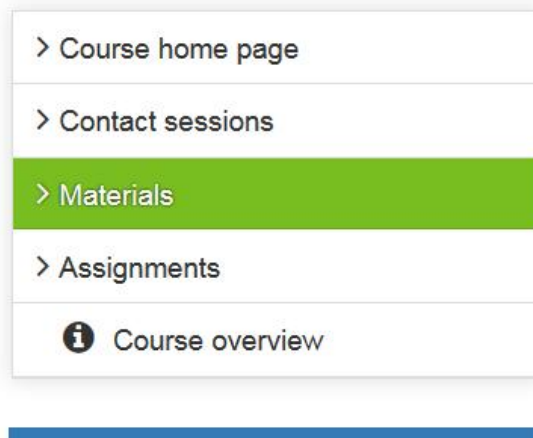
# Flip assessment

- Flip report (personal), max. 3 p.
  - 1 p. for filling up the minimum requirement
  - 2 p. good reporting
  - 3 p. providing additional interest
- Contact assignment (personal), max. 4 p.
  - 1 p. Participating (minimum effort)
  - 2 p. Participation and sharing ideas
  - 3 p. Actively participating, good presenter
  - 4 p. Advantage participation, really showing a lot of effort, showing high knowledge of the subject

# Lecture journal

- If you are not able to participate to class you can compensate max. 2 session by preparing a lecture journal
- You will go through the lecture slides and prepare answers to questions (1 paragraph/each question)
- In addition, you will go through all posters/or find material of the topics and write short overview of all studied topics (one paragraph each)
- This journal should have length min. 2 pages and will be assessed to give max. 4p. (replace workshop)

# References to Wiki



## Materials

 [Wiki: Additional reading](#)

 [Materials for Energy Production](#)

- **MyCourses** – Material – Wiki
  - When you find a good references you think your classmates would like to read – add it to the Wiki
  - During the first part! - > Valid for 1 p.
-

# References to Wiki

## Wiki: Additional reading

To this Wiki students can add good references they find during the first period of the course. For a Wiki post you can get 1 p.

You can clic the "Edit" button and add your reference here:

- 1) Topic of the reference
- 2) Full reference (link if available)
- 3) Short 2-3 sentence summary why you find the paper relevant for the course
- 4) Your name (for giving you the point)

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# Group works

- At the second part you will work with Case studies
- More information at lecture on week 8
- You will prepare in group one case study and present it

At 10.3

- Week 9 – No class, but group meeting (with report)
  - Flip IV DL at week 9
  - Continue with the same topic and same group through the second part (Exam II)
- 



<https://joshsherin.wordpress.com/tag/group-work/>