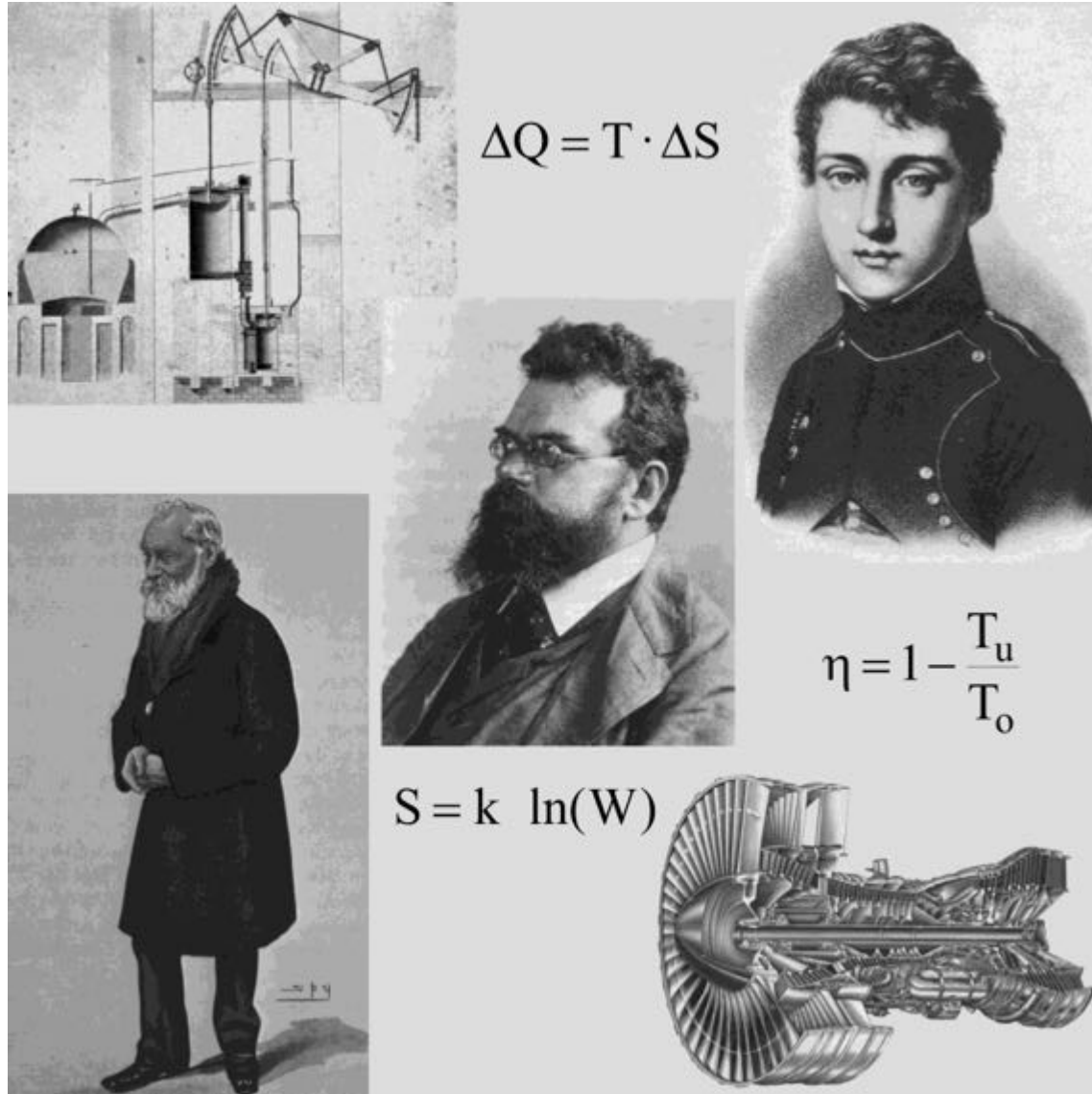


# Thermodynamics of Energy Conversion



# Thermodynamics of Energy Conversion

**PDFs are available on Moodle**

- 1) Introduction, Basics
- 2) Energy demand
- 3) Resources
- 4) Carnot Cycle & Steam engine
- 5) Piston engines
- 6) Turbines
- 7) Nuclear reactors
- 8) Renewable Energy, Solar thermal
- 9) Hydropower
- 10) Windpower
- 11) Photovoltaics
- 12) Geothermal power and Tidal power, Biomass
- 13) Thermoelectricity
- 14) Energy storage

# Thermodynamics of energy conversion

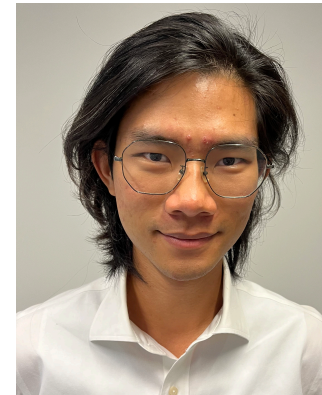
## Exercises

**Tuesday, 17:00 – 18:00, same room**

**Exercises at the end of the course**

**Solutions discussed during the exercise hour**

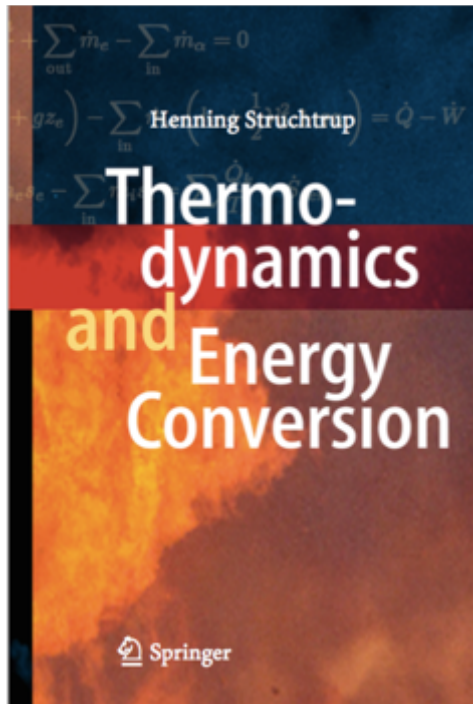
**Exercises close to real life questions, approximations, estimations, reasoning and calculations.**



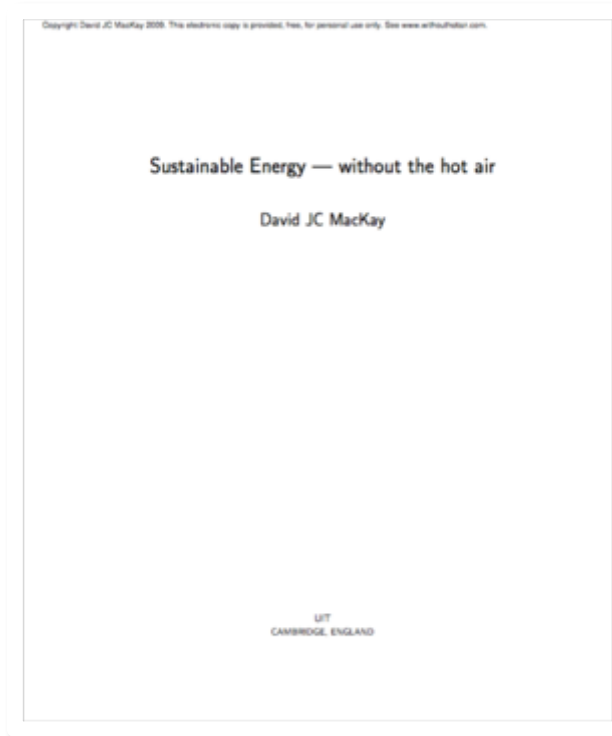
**Boyu Ouyang**

e: [boyu.ouyang@epfl.ch](mailto:boyu.ouyang@epfl.ch)

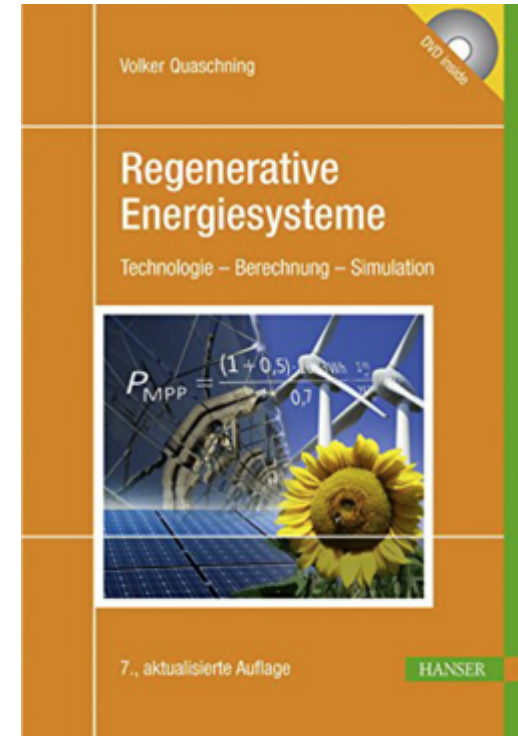
# LITERATURE



**PDF CHF 54.-**  
<http://www.hanser-elibrary.com/isbn/9783446427327>



**free**  
<https://www.withouthotair.com>



**PDF CHF 34.-**  
<https://www.lehmanns.de/shop/technik/32249702-9783446443334-regenerative-energiesysteme>

# LITERATURE (en francais)



**Les Energies  
Renouvelables Broché de  
Claude Acket (Auteur)**



**Physique de la conversion  
d'énergie Broché de Jean-  
Marcel Rax (Auteur)**



**Conversion d'énergie  
Broché de Rabah  
Touaibi (Auteur)**

# SUMMARY

The course is an introduction to the energy conversion. It focuses on the thermodynamics of the engines and systems for the conversion of energy from fossil fuels and renewable resources. The relevant aspects of modern energy conversion are treated and the potentials and limitations are estimated.

<https://moodle.epfl.ch/course/>

## Learning Outcomes

By the end of the course, the student must be able to:

- Work out / Determine the potential and limitations of the resources
- Describe the various energy conversion technologies
- Explain the thermodynamics of the energy conversion devices
- Analyze the relevant chemical reactions
- Compare technologies and estimate the potential
- Assess / Evaluate the performance of various energy conversion technologies

**Exercise solutions given the week after**



# The ROLE OF THE PROFESSOR

- ☐ Teaching a certain topic
- ☐ Guide the students in self learning
- ☐ Prepare the presentations and improve them continuously
- ☐ Give the students homework
- ☐ Test the students
- ☐ Supports the students if they are unable to find the answer to the question they may have

## THE ROLE OF THE STUDENT

- ☐ Following the lessons
- ☐ Work on the topic, read books and publications, learn and understand
- ☐ Prepare the lecture notes, solve the exercises
- ☐ Do the homework, solve the questions and exercises
- ☐ Prepare for the tests, work on your questions with other students
- ☐ If you can't find the answer to the question you may have, ask other students, ask the assistant.



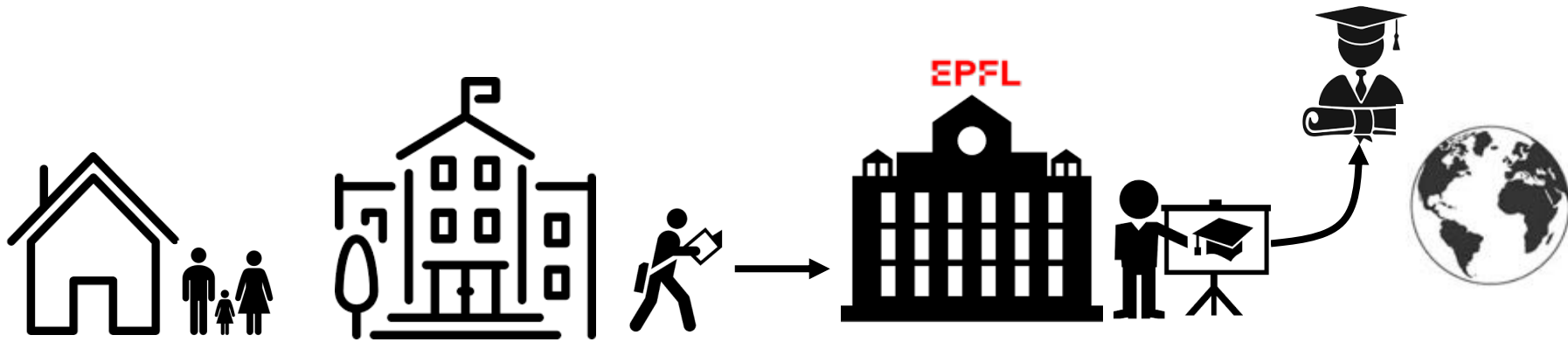
The professor guides you to the summit



The assistant helps you in difficult situation



You have to climb yourself!



## HIGH SCHOOL

- children, parents are responsible
- learning in classes
- homework well defined by teacher
- teaching material complete
- teacher reminds you about your responsibilities
- teacher helps to manage responsibility
- prepared for university
- goal is that everybody graduates
- school presence is mandatory

## UNIVERSITY

- student, adult
- learning yourself, research
- you define your homework
- Professor defines the framework
- balance your responsibilities yourself
- set your own priorities
- prepared for global competition
- 1/3 graduate, 50% dropout in 1<sup>st</sup> year
- university presence is up to you



# LEARNING METHODE

## Lecture 1

The Professor presents the chapter with slides  
Slides as PDF available on MOODLE.

## Lecture 2

## Exercises

The Assistant introduces the exercises and answers the questions of the students.

## Course

The student elaborates the context of the course and understands the principals.

## Exercises

The student solves the Exercises and learns the applications.



## Exam