ME-341

Heat and mass transfer

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Cursus	Sem.	Type
Life Sciences Engineering	BA6	Opt.
Mechanical engineering	BA6	Obl.
Space technologies minor	E	Opt.

Language of teaching	English
Credits	4
Session	Summer
Semester	Spring
Exam	Written
Workload	120h
Weeks	14
Hours	**4 weekly**
Courses	3 weekly
Exercises	1 weekly
Number of positions	

Summary

This course covers fundamentals of heat transfer and applications to practical problems. Emphasis will be on developing a physical and analytical understanding of conductive, convective, and radiative heat transfer.

Content

1. Introduction, to types of heat transfer. Conduction, radiation, convection.
2. One-dimensional, and two dimensional steady state, conductive heat transfer.
3. Transient conductive heat transfer.
4. Convective heat transfer for external flows.
5. Convective heat transfer for internal flows.
6. Natural convection.
7. Radiation: black bodies, grey bodies, form factors of surfaces, solar and infrared radiation.
8. Heat exchangers: Types of heat exchangers, efficiency, thermal design methods.

Keywords

Heat transfer, conduction, convection, thermal radiation

Learning Prerequisites

Recommended courses

- Incompressible fluid mechanics

Learning Outcomes

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

- Model fluid flows in energy conversion systems, compute pressure drops and heat losses and fluid structure interactions, E10
- Explain and apply the concepts of heat and mass transfer, E3
- Design and calculate heat exchangers, E15

Teaching methods

The course is organized with lectures and problem working sessions

Assessment methods

Written exam

Supervision

Assistants	Yes

Resources

Bibliography

Free net book "A Heat Transfer Textbook" : John H. Lienhard IV and John H. Lienhard V, http://web.mit.edu/lienhard/www/ahtt.html

Ressources en bibliothèque

- A Heat Transfer Textbook / Lienhard