

Physique du Bâtiment

Heat transfer

IDENTIFICATION

CODE : GCU-3-S1-EC-TC
ECTS : 2.0

HOURS

Lectures : 10.0 h
Seminars : 18.0 h
Laboratory : 0.0 h
Project : 0.0 h
Teacher-student
contact : 28.0 h
Personal work : 20.0 h
Total : 48.0 h

ASSESSMENT METHOD

Written exam

TEACHING AIDS

Written materials of the module
[lectures, exercises]

TEACHING LANGUAGE

French

CONTACT

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AIMS

This module is part of the course unit GCU-S5-Ph-Bat-1 Building Physics and contributes to:

Competences in Engineering Science:

- A1- Analyze a real or virtual system (or problem)
- A2- Operate a model of a real or virtual system
- A4- Design a system that meets specifications
- A6- Communicate a scientific analysis or approach

Competences in Humanities, Documentation and Physical and Sports Education:

- B2- Work, learn, progress autonomously
- B3- Interact with others, work as a team
- B4- Demonstrate creativity, innovate and undertake
- B5- Act responsibly in a complex world
- B6- Position oneself, work, evolve within a company or a socio-productive organization

Competences specific to the specialty:

- C15- Design and control good technical solutions for buildings in terms of thermal, airflow, acoustics
- C16- Assess the state of health of a building, thermal or acoustic performance of a building or equipment, define actions necessary to improve performance

Allowing the student to:

- Understand the heat transfer by conduction, convection and radiation
- Analyse the heat transfer phenomena in buildings
- Solve problems of coupled heat transfer in dynamic conditions
- Master appropriate analytical and numerical methods

CONTENT

- Steady-state and dynamic heat conduction
- Natural and forced convection
- Thermal radiation
- Black and grey body
- Radiation between grey surfaces separated by a transparent environment
- Coupled thermal exchange
- Analytical and numerical solution of coupled heat transfer

BIBLIOGRAPHY

- ASHRAE (2001). Heat transfer. Fundamentals. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. Atlanta, GA
- Degiovanni, A. (1999). Transmission de l'énergie thermique à Conduction. Technique de l'Ingénieur.
- Incropera, F. et al. (2007). Fundamentals of heat and mass transfer 6th edition. John Wiley & Sons.
- Lefebvre, G. (1994). Comportement thermique dynamique des bâtiments : simulation et analyse. Techniques de l'ingénieur. B2041.
- Jean-Francois Sacadura, coordonnateur (1993). Initiation aux transferts thermiques. Tec & Doc Lavoisier, Paris
- Strang, G. (1986). Introduction to applied mathematics. Welley-Cambridge Press

PRE-REQUISITE

Documentary research [PC-S1-DOC]

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Algorithms and computer programming (PC-S1-IF)
Algorithms and computer programming (PC-S2-IF)
Algorithms and computer programming (PC-S3-IF)
Algorithms and computer programming (PC-S4-IF)

Mathematics for applied sciences (PC-S1-OM)
Mathematics for applied sciences (PC-S1-OM-P)

Thermodynamics (PC-S2-TH)

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