UNIVERSIDADE FEDERAL DO PARANÁ
SETOR DE TECNOLOGIA
DEPARTAMENTO DE ENGENHARIA MECÂNICA

Title of Module:	**CONVECTIVE HEAT AND MASS TRANSFER**
Code:	**TME7066**
Total time:	60 hours
Credit points:	4
Level:	MSc and PhD
Prerequisite:	none
Co-requisite:	none

AIMS:
Enable the student to understand the phenomena, concepts, models and solution methods of problems related to heat and mass transfer through natural and forced convection, including in porous media. Study the condensation and boiling phase change mechanisms. Apply the concepts in sizing thermal systems components (e.g., heat exchangers, nozzles, evaporating coolers).

SYLLABUS:
Convection Fundamentals and Scale Analysis: development of conservation equations for fluid mechanics and heat transfer. External Forced Flows: scale analysis; laminar boundary layer. Internal Forced Flows: duct flow; entrance length. External and Internal Natural Convection: vertical wall; rectangular cavity, and Bénard convection. Internal, External and Free Turbulence: transition; wall; jets, and atmospheric dispersion. Phase Change Convection: condensation and boiling. Mass Transfer: species conservation;.boundary layer Convection in Porous Media: the Darcy, Brinkman and Forcheimer models.

BIBLIOGRAPHY:
- Bejan, A., Convection Heat Transfer, Wiley, New York, 1995.
- Bejan, A., Heat Transfer, Wiley, New York, 1993.
- Bird, R. B., Stewart, W. E., and Lightfoot, E. N., Transport Phenomena, 2nd Edition, Wiley, New York, 2006.
- Reddy, J. N. and Gartling, D. K., 1994, The Finite Element Method in Heat Transfer and Fluid Dynamics, CRC Press.

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