



UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
PROGRAMA DE PÓS-GRADUAÇÃO EM ENGENHARIA CIVIL:
CONSTRUÇÃO E INFRAESTRUTURA

Code	PCI00
Título	ENERGY EFFICIENCY, THERMAL PERFORMANCE AND COMFORT IN THE BUILT ENVIRONMENT
Credits Number	3 (45 horas/aula)
Level:	(x) Master (x) PhD

Summary:

Analysis of the elements and systems that might influence energy consumption, resultant temperature, and thermal comfort in the built environment

Training Content

LIST OF SUBJECTS	Workload	
	Meeting	Cumulative hours
INTRODUCTION: Climate, Comfort conditions and requirements Comfort and climate, Comfort Legislation, , Comfort Evaluation Methods and its impacts on energy consumption.	1	2
Energy Efficiency and Building Regulations and Certifications Brazilian and international regulations and certifications: PBE Edifica, LEED, ASHRAE 90.1, AQUA and others. Analysis of main aspects.		4
Thermal Performance Thermodynamics of Buildings, Thermal performance of construction materials and building systems, NBR 15.220:2004, NBR 15.575:2013 – Analysis of the main aspects	2	8



Passive Climatization Solar Radiation, shading, natural ventilation, thermal inertia	4	16
Active Climatization Mechanical Climatization - air and water based, VRF, energy tariff, thermal storage and geothermal systems	5	20
Other Energy Consumption' Systems Lighting, elevators and motors	6	24
Energy Microgeneration Wind, fotovoltaic, and thermal energy energy	7	28
Guided tour	8	32
Building Control and Simulation Building automation aspects and computational simulation	9	36
Final exam	10	40
Paper presentation and discussion	11	45

Objectives:

This course aims to introduce essential issues regarding the interactive influence of the several elements and systems of the buildings and built environments on energy efficiency, thermal performance, and thermal comfort.

Evaluation:

The evaluation might be carried out through individual or collective tasks, reports, development of scientific papers, and partial or final exams.

Method (mains activities):

Lectures. Lectures with invited experts. Guided tour to a representative building. Analysis of research and discussion. Article development. Exam.

Basic References:

AQUA, PROCESSO ALTA QUALIDADE AMBIENTAL. Fundação Vanzolini. São Paulo, 2005. Disponível em < <https://vanzolini.org.br/aqua/>>. Acesso em 01/04/2019.

AMERICAN SOCIETY OF HEATING, REFRIGERATION AND AIR-CONDITIONING ENGINEERS. ASHRAE Standard 90.1: Energy Standard for Buildings Except Low-Rise Residential Buildings, 2016.

AMERICAN SOCIETY OF HEATING, REFRIGERATION AND AIR-CONDITIONING ENGINEERS. ASHRAE Standard 55: Thermal Environmental Conditions for Human Occupancy, 2017.

ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS. NBR 15575: edificações habitacionais: desempenho. Rio de Janeiro, 2013.

ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS. NBR 15220: desempenho térmico. Rio de Janeiro, 2005.



US GREEN BUILDING COUNCIL. LEED V4.1 – Leadership in Environmental and Energy Design. Disponível em: < <https://new.usgbc.org/> >. Acesso em 01/04/2019.

INSTITUTO NACIONAL DE METROLOGIA, NORMALIZAÇÃO E QUALIDADE INDUSTRIAL - INMETRO. Manual para a etiquetagem de edificações públicas – gestor público. 2014. Disponível em: <http://www.pbeedifica.com.br/sites/default/files/Manual_Etiquetagem_Edificacoes_Publicas.pdf>. Acesso em: 20/02/2018.

_____. **Manual para Aplicação do RTQ-C**. Versão 4, 2016. Disponível em: <http://www.pbeedifica.com.br/sites/default/files/Manual_20170411_Notas_T%C3%A9cnicas%2BCapa.pdf>. Acesso em: 20/02/2018.

_____. **Regulamento Técnico da Qualidade do Nível de Eficiência Energética para Edificações Comerciais, de Serviço e Públicas (RTQ-C)**. Publicado através da portaria nº 372, de 17 de setembro de 2010. Disponível em: <http://pbeedifica.com.br/sites/default/files/projetos/etiquetagem/comercial/downloads/Port372-2010_RTQ_Def_Edificacoes-C_rev01.pdf>. Acesso em: 20/02/2018.

SILVA, A. S. et al. Incerteza do método de simulação da NBR 15575-1 para a avaliação do desempenho térmico de habitações. **Ambiente Construído**, v. 14, n. 4, p. 103–117, 2015.