

Data Sheet of International Undergraduate's Course, Tongji CAUP

同济大学建筑与城市规划学院本科生国际课程(英语)登记表

Course Code 课程编号	02040901	Department 所在系(✓)	A	P	L	D	院登记号 CAUP Code	
Instructor(Title) 主讲教师(职称)	Associate Prof. YANG Feng 杨峰 副教授	Other Teachers 合作教师	✓					
课程中文名	气候响应性设计概论							
Course Name (E)	INTRODUCTION TO CLIMATE-RESPONSIVE DESIGN METHOD							
Form of Teaching 教学形式(✓)	Lectures 讲课	Design Studio 设计课	Seminar 研讨课	Internship 实践课	Others 其他			
	✓							
Total Hours 总学时数	34	Hours per Week 周课时	2	Weeks 教学周数	17			
Semester 春季或秋季学期	Fall 秋季	Tongji Credits 同济 学分数	2					

Brief Course Description 课程简述 (中英文)

本课程旨在引导学生探寻相关的建筑学/建筑技术/城市气候学/生物学等多学科领域,了解气候响应性设计相关的基本理论,以及从生物气候学的角度进行技术决策支持、辅助设计和建设的策略和方法。课程主要内容包括气候响应性设计的多学科协同原理、建筑/城市气候学、人体热舒适理论、建筑设计中的气候响应策略和评价技术、社区和城市外部空间规划管理中的气候响应策略和评价技术、气候响应设计的经典理论和文献、研究分析方法、以及建成案例。

Climate-responsive design is multi-disciplinary in nature. It encompasses four subjects: Urban Climatology, Biology, Building technology and Architecture. It starts with an investigation on local- and micro-climate and its impact on human comfort and health; and by appropriate technology and materials, it aims to create an energy-efficient, low environmental-impact and healthy indoor and outdoor environment, and to inspire an environmental aesthetics beyond the physical domain. Students are expected to acquire a fundamental understanding on the relevant knowledge, know-how and issues, through a series of lectures, seminars and guided research design studio.

Brief Schedule and Topics 课程进度简表 (中英文)

第一周/Week 1

- 导论/Introduction to CRDM

第二周/Week 2

- 气候学和城市气候/Urban Climatology

第三周/Week 3

- 以人为本: 设计舒适/Design human comfort

第四周/Week 4

- 城市规划和设计中的气候响应设计/CRDM at the urban scale

第五周/Week 5

- 城市微气候设计策略和工具/Microclimate design: strategies & tools

第六周/Week 6

- 建筑设计的气候响应设计/CRDM at the building scale

第七周/Week 7

- 建筑气候响应设计策略和工具/Building climate design: strategies & tools

第八周/Week 8

- 课程总结/Course summary and students' work review

Course Syllabus 课程大纲 (中英文)

课程分为 8 个模块, 每模块 2 学时/周, 共 8 周。

Students are required to gain a basic albeit correct understanding on the concept of climate-responsive design, and on the key research, design and evaluation methods. Classic literature on climate-responsive design will be reviewed, and fundamental research and design methods introduced. Case study on the state-of-the-art design is also part of the course.

1. 导论/Introduction to CRDM (2 学时)

- 1) 气候变化和应对策略/Climate change and how to deal with it
- 2) 气候响应的视角/Scientific and humanistic perspective
- 3) 气候尺度和微气候/Scales in urban climatology and microclimate
- 4) 可持续性与气候响应设计的关系/CRDM and sustainability

- 5) 多媒体/Multimedia: An Inconvenient Truth, Two Degrees, etc.
2. 气候学和城市气候/Urban Climatology (2 学时)
 - 1) 城市气候的意义/Why architects need to know urban climate
 - 2) 微气候分析: 原则, 方法/Microclimate: principles and methods
 - 3) 设计城市微气候/Design (with) urban (micro) climate
3. 以人为本: 设计舒适/Design human comfort (2 学时)
 - 1) 人体热舒适和能量平衡/Energy balance and factors in human comfort
 - 2) 舒适度的评价: 室内还是室外/开窗还是空调? / Assessing thermal comfort: Indoor or Outdoor? Open or close your window?
 - 3) 设计热舒适: 原理, 方法, 工具/Design comfort: principles, methods & tools
4. 城市规划和设计中的气候响应设计/CRDM at the urban scale (2 学时)
 - 1) 城市形态与热岛的关系 / Built environment and Urban Heat Island (UHI)
 - 2) 城市形态与城市通风 / Urban wind field
5. 城市微气候设计策略和工具/Microclimate design: strategies & tools (2 学时)
 - 1) 太阳轨迹几何性质 / Solar geometry
 - 2) 时空热平衡与建筑群体布局/单体形态控制 / Built form control in response to temporal-spatial thermal balance
 - 3) 研究技术和工具综述/Overview on CRDM theories & methods: Olgyay, Knowles, Givon, Yeang, etc.
6. 建筑设计的气候响应设计/CRDM at the building scale (2 学时)
 - 1) 社区尺度: 建筑密度; 材料的物理热学性质; 群体布局; 建筑形体控制; 绿化水体配置/ Community scale: Building density and layout, thermal properties of materials, thermal mass control, vegetation and water bodies as heat sink
 - 2) 建筑单体: 选址; 朝向; 体形控制; 功能布局; 开口; 自然能控制: 太阳能, 自然通风 /Building scale: Site selection, orientation, volume control, openings for ventilation and solar control
7. 建筑气候响应设计策略和工具/Building climate design: strategies & tools(2 学时)
 - 1) 设计技术 / Technologies: 太阳能控制 (遮阳) / Solar control/shading 通风控制设计 / Natural ventilation design
 - 2) 评估手段: 实测; 数值模拟/ Assessment and evaluation: site measurement and numerical simulation
 - 3) 软件介绍 / Software

8. 课程总结/Course summary, student final presentation and review (2 学时)

Main Reference Books 主要参考书目

核心阅读 / Core reading:

1. Olgyay, V., Design with climate: bioclimatic approach to architectural regionalism. 1963, Princeton, NJ: Princeton University Press.
2. Lechner, N., Heating, cooling, lighting : sustainable design methods for architects. 2009, Hoboken, N. J. : John Wiley & Sons.
3. Errell, E., D. Pearlmutter, and T. Williamson, Urban Microclimate: Designing the spaces between buildings. 2011, London: Earthscan.
4. Kwok, A. and W. Grondzik, The Green Studio Handbook, Second Edition: Environmental Strategies for Schematic Design. 2011: Architectural Press.
5. Heschong, L., Thermal Delight in Architecture. 1979: MIT Press.

延伸阅读/ Further reading:

1. Oke, T.R., The Boundary Layer Climates (2nd edition) (Chapters 7&8 only). 1987, London and New York: Methuen.
2. Hawkes, D., The Environmental Imagination. 2007: Routledge.
3. Givoni, B., Climate considerations in building and urban design. 1998, New York: Van Nostrand Reinhold.
4. Robinson, D., ed. Computer Modelling for Sustainable Urban Design: Physical Principles, Methods and Applications. 2012, Earthscan.
5. Steemers, K. and M. A. Steane, eds. Environmental Diversity in Architecture. 2004, Spon Press: New York.
6. Ng, E., ed. Designing High-Density Cities: For Social and Environmental Sustainability 2009, Routledge.