Syllabus: Introduction to Climate-Responsive Design Method (CRDM)

Course Code：020522　　Credits：2　　Total Hours：34
Instructor：Yang Feng　　Examiner：

1. Characteristics and Objective

Climate-responsive design is multi-disciplinary in nature. It encompasses four subjects: Urban Climatology, Biology, 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 issues, knowledge and technical know-how, through a series of lectures, seminars and guided research design studio.

2. Basic Requirement

Students are required to:

1) gain a basic albeit correct understanding on the concept of climate- responsive design, and on the key research, design and evaluation methods;
2) review classic literature on climate-responsive design method, passive and low-energy architecture and sustainable environmental design method;
3) grasp main-stream research and design supporting tools;
4) investigate vernacular and innovative design through case study; and
5) develop a design research project, using the knowledge and skills acquired from the course.

3. Basic Content

1. Urban climatology（4 hours）
2. Human thermal comfort（6 hours）
3. Fundamental CRDM (10 hours）
4. Passive CRDM（6 hours）
5. Active CRDM (6 hours）
6. Design integration research（2 hours）

4. Experiment or Computer Operation

Computer programs and software will be introduced to the class. Students are required to bring their own laptops to the course meeting. There will be at least one field trip to visit demonstration building and neighborhood projects.

5. Ability and Personality Cultivation

Students are expected to develop self-learning and group-working abilities.

6. Preparatory Course Requirement

020437 Building physics (thermal environment)

7. Teaching Methodology

Lectures, seminar, hand-on software workshop, field trip, and design crit.

8. Assessment and Examination

Academic assessment will be based on course participation, course assignments and quality of final design project

9. Continuous Improvements

The content of the course may be subject to continuous review and revision based on regular interview with students and discussion with colleagues that take/audit the course.

10. Hours Distribution

NO.	Content	Hours				Sub-total
		Theoretic Teaching	Experiment	Exercise	Computer Operation	
1	Urban Climatology	4				4
2	Design human comfort	4			2	6
3	Fundamental CRDM	4	2	2	2	10
4	Passive CRDM	4		2		6
5	Active CRDM	2	2		2	6
6	Design integration			2		2
Total		18	4	6	6	34

Note: the outside-class hours (student self-learning and practice) is approx. 1.5 times the in-class hours.

11. Textbooks and Main Reference Books

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. Erell, E., D. Pearlmutter, and T. Williamson, Urban Microclmate: 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.

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.