Syllabus

Urban Modelling and Interpretation

Course Name (Chinese)	城市模型与解释		
Course Name (English)	Urban Modelling and Interpretation		
Course Number	020581	Language	English
Credits	1	In-class Hours	17
Course Type	Elective Courses	Examination/Evaluation	Evaluation
Prerequisite Courses	N/A		
Availability of English courses	Yes		
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1. Course Orientation and Requirements

1. Course Orientation

Due to the current development of smart cities and digital twin technologies, quantitative analysis skills in urban and rural planning disciplines have become one of the essential qualities for future urban planning talents. As a fundamental area of quantitative research, the elements of the city are transformed into measurable, simulatable and evolvable urban models to serve high-quality development and refined governance. This course will introduce the most significant foundations of urban modelling since the quantitative revolution, the methods of construction, the conditions of applicability, the issues addressed, the application scenarios and other relevant contents. Students are expected to be familiar with the types and characteristics of urban models, the methods of interpretation, and to have the ability to apply and rationalise them initially.

2. Course Objectives

Course objective 1: Understand and become familiar with the theory, construction, operations, interpretation and limitations of the various major types of urban models.

Course objective 2: Learn and master the application and correct interpretation of the basic urban models of the city.

Course objective 3: Be able to refine the body of knowledge of traditional urban and rural planning students and to develop a cross-reference between qualitative laws and quantitative results.

Course objective 4: Be able to develop basic urban modelling, interpretation and evaluation

skills.

3. Indicators of Graduation Requirements Supported by the Course

Serial No.	Indicators of Graduation Requirements	Contents
1	Indicator 2-1	Develop the concept of lifelong learning and have strong lifelong learning ability.
2	Indicator 2-2	Acquire basic general category science, engineering and technology knowledge.
3	Indicator 2-3	Be able to think independently and have strong comprehensive, systematic, logical and critical thinking.
4	Indicator 2-4	Strong ability to relate theory to practice, good at problem identification, analysis and problem solving.
5	Indicator 3-1	Have a good planning professionalism and basic planning research ability.
6	Indicator 3-2	Master the necessary basic knowledge and skills of disciplines related to urban and rural planning.
7	Indicator 3-3	Master the basic theories of urban and rural development and planning, methods and skills of urban and rural planning investigation and analysis, and methods and skills of urban and rural planning design and expression.
8	Indicator 3-5	Understand the new directions and progress of urban and rural research and planning in China and abroad.

4. Correlations between Course Objectives and Graduation Requirements

Course Objectives / Graduation Requirements	Course objective 1	Course objective 2	Course objective 3	Course objective 4
Indicator 2-1	●	●	●	●
Indicator 2-2	●	●		
Indicator 2-3			●	●
Indicator 2-4	●	●	●	●
Indicator 3-1	●		●	●
Indicator 3-2	●	●	●	●
Indicator 3-3	●		●	
Indicator 3-5				●

2. Course Content, Teaching Requirements, Credit Hour Allocation, and Teaching Methods

No.	Knowledge Modules	No.	Knowledge/ Competency Points	Requirements	Supported cou	Teaching Met	In-class Hrs	Extracurricul
1	The Art of Urban Modelling	1	Course introduction and city model overview	Understanding the scientific background of urban modelling	Course objective 1、2、3、4	PPT	4	0
		2	Foundations for the generation, distribution and expression of urban spatial activity	Understand the basic elements, objects, definitions and connotations of urban modelling, and show how urban models, as a means of characterising the spatial distribution of urban activities, can be generalised and generated for various elements and subsystems				
2	Urban model analysis methods	1	The design of urban models: formulaic expressions as theory	Understand the basic design steps and methods of urban modelling, how to summarise urban problems and to fully summarise them into calculable formulas and to design the interrelationship of the different calculation elements and to necessarily simplify and optimise them	Course objective 2、3、4	PPT	6	0
		2	Parameter conditioning, model prediction and validation of results	Understanding how the various parameters in urban models are adjusted, how to design predictive models for immediate, medium and long-term objectives and how to validate different types of models				
		3	Uncertainty, sensitivity and robustness	Understand how to deal with various types of uncertainty in urban models, discuss how to test for sensitivity and robustness, and describe the mainstream approach to over-sensitive, unstable models				
3	Urban model application and	1	Dynamic simulation and emergence	Understanding the various approaches to hierarchical and dynamic modeling of cities and the interpretation of	Course objectiv	PPT	7	0

No.	Knowledge Modules	No.	Knowledge/ Competency Points	Requirements	Supported cou	Teaching Met	In-class Hrs	Extracurricul
	interpretation		of urban systems	different types of dynamical mechanisms	e 2、3、4			
		2	Application, interpretation and reflection of urban models	Understand the application of the main types of urban models in real-life planning and design practice, how to interpret the results, and develop critical reflections on the models in the light of their implementation to guide future applications				
		3	Advances in urban modelling	Understand the new urban models that are emerging as a result of data and algorithm development and the issues that need to be addressed in each type of urban computing model				

3. The connotation of "moral education" in the curriculum

The construction of smart cities has become one of the core strategies for urban development in China. The digitization and intelligence of urban planning has become an important development trend for future planning. However, there are various advantages and disadvantages of various urban models with problem-specific targeting. How to build the city of the future in a more scientific, pragmatic and realistic way by understanding urban models and planning them scientifically and rationally has become an important professional conduct and necessary skill for future planners.

4. Assessment, grading methods, and retake requirements

The course assessment takes the form of a combination of the usual grades (attendance + extra-curricular assignments) and a term essay examination, accounting for 50% and 50% of the total grade respectively (on a percentage basis).

In the premise of passing the usual grade re-take can be exempted from the examination; failing the usual grade need to repeat with the class.

Assessment method	Percentage	Supported course objectives	Notes
Course participation	20%	Course objective 1	100 points for full attendance, 10 points for absence from 1 class, and failure for absence from more than 4 classes.
		Course objective 2	

Assessment method	Percentage	Supported course objectives	Notes
		Course objective 3	
		Course objective 4	
Extracurricular assignment 1	10%	Course objective 2	Urban Model Analysis Assignment 1, which needs to be completed outside of class, independently on the computer, and the language of the assignment is English.
		Course objective 3	
		Course objective 4	
Extracurricular assignment 2	20%	Course objective 2	Urban Model Analysis Assignment 2, which needs to be completed outside of class, independently on the computer, and the language of the assignment is English.
		Course objective 3	
		Course objective 4	
Term essay	50%	Course objective 1	The term essay should be written in English, based on a self-drafted topic. Failure to use English, or the presence of plagiarism, will result in a reduction in marks depending on the severity.
		Course objective 2	
		Course objective 3	
		Course objective 4	

5. Evaluation criteria

1. Evaluation criteria for course participation

Supported course objectives	Evaluation details and score				
	100-90	89-80	79-70	69-60	59-0
Objectives 1-4	Full attendance; active participation in course quizzes and discussions; correct answers to questions.	1 absence; more active participation in course quizzes and discussions; answer at least 80% of questions correctly.	2 absences; participation in course quizzes and discussions; no less than 70% correct answers to questions.	3 absences; less participation in course quizzes and discussions; no less than 60% correct answers to questions.	4 or more absences; little participation in course quizzes and discussions; correct answers to questions below pass level.

2. Criteria for evaluating the usual assignments (including the final paper)

Supported course objectives	Evaluation details and score				
	100-90	89-80	79-70	69-60	59-0
Objectives 1-4	Turn in assignments on time; explain concepts clearly, analyse problems in a clear manner, calculate the process in a clear hierarchy, with a correct result rate above 90%; present reasonably and write in a standard way, etc.	Assignments are handed in on time; explanations of concepts, analysis of problems, calculation processes, etc. are relatively clear and results are at least 80% correct; presentation is more reasonable and writing is more standard, etc.	Assignments are handed in on time; explanations of concepts, analysis of problems, calculation processes, etc. are basically clear and the results are at least 70% correct; presentation is relatively reasonable and writing is basically standard, etc.	Short late submission of assignments; basic clarity in explanation of concepts, analysis of problems, calculation processes, etc., with no less than 60% of results correct; basic reasonableness in presentation, basic standardization in writing, etc.	Failure to submit or serious overtime late submission of assignments; unclear explanation of concepts, analysis of problems, calculation processes, etc., with correct results below pass level; unreasonable presentation, irregular writing, etc.

6. Textbooks and main reference books

Name of teaching book	Authors	Press	Edition	ISBN	Textbook situation	Textbook/Main reference books
The new science of cities	Michael Batty	MIT press	2013 (Ver.1)	9780262019521		Main reference book
Urban modelling	Michael Batty	Cambridge Univeristy Press	1976 (Ver.1)	9780521208116		Main reference book
Cities and complexity: understanding cities with cellular automata, agent-based models, and fractals	Michael Batty	The MIT Press	2005 (Ver.1)	9780262025836		Main reference book