Course Syllabus of Architectural Programming

Chinese Course Name	AI+建筑策划		
English Course Name	AI &Architectural Programming		
Course Code	50001630105	Teaching Language	Chinese-English Bilingual
Credits	2	In-class Hours (including practical hours)	34
Course Type	Professional Elective Course	Assessment Mode	Non-examination Assessment
Prerequisites	None Required		
Full English Course	Bilingual	Course Coordinator	Tu Huijun
Teaching Team	Tu Huijun		

I. Course Position and Basic Requirements

1. Course Position

This course is designed for undergraduate students majoring in Architecture, Urban and Rural Planning, Landscape Architecture, Interior Design and other related programs, with no restriction on grade. Against the backdrop of the National AI Empowerment Initiative, architectural programming, as a key support for scientific decision-making in construction engineering, has been included in the examination scope for both American registered architects and Chinese registered architects. It serves as one of the core tools in the critical period of urban renewal, when China's large-scale incremental urban construction has shifted to quality improvement of stock construction. There is an urgent demand for architectural programming and design talents adapted to the needs of the new era. Faced with cutting-edge technologies such as artificial intelligence and complex urban renewal tasks, architectural professionals are required to integrate diverse knowledge, make scientific and rational decisions, and deliver major engineering practices, which sets higher requirements for the innovation of architectural talent training theories and systems.

On the basis of the original architectural programming course, this course introduces artificial intelligence to empower architectural programming and design, and realizes the tripartite integration of "Architecture - Urban and Rural Planning - Computer Science", promoting the transformation from "digital" architectural programming to "digital-intelligent" architectural programming and design. The course emphasizes the in-depth integration of theory and practice. Through intelligent tools such as natural language processing, image recognition and machine learning, it helps students realize intelligent data analysis, automated design task generation and

optimization in practical projects. It adopts the approach of multi-supervisor interdisciplinary training, research-education collaboration and in-depth industry-education integration to cultivate compound and innovative architectural talents.

2. Course Teaching Objectives

Course Teaching Objective 1: Understand the current status of theoretical and practical development of architectural programming at home and abroad, master the application scenarios and development trends of artificial intelligence technology in the field of architectural programming, and establish a basic cognitive framework for intelligent programming.

Course Teaching Objective 2: Comprehend the new features and new methods of core issues in architectural programming (programming content, subjects, decision-making methods and public participation) after the intervention of artificial intelligence technology, and master the technical principles and key application points of AI-assisted programming.

Course Teaching Objective 3: Master the whole-process method of AI-assisted architectural programming, be able to apply intelligent methods such as fine-tuned large language models, data analysis and mining, and generative design to complete programming work of specific construction projects, and apply relevant technologies properly in team collaboration.

Course Teaching Objective 4: Master the expression methods of intelligent programming deliverables, be able to use AI-enhanced technologies such as data visualization and generative presentation for professional reporting, and develop the ability to evaluate and optimize AI-generated content.

Course Teaching Objective 5: Cultivate interdisciplinary collaboration ability, understand the collaborative working mode of intelligent programming through joint practice of architecture and computer majors, and master the basic methods of communication and collaboration with technical personnel.

Course Teaching Objective 6: Establish critical thinking on AI technology application, recognize the ethical boundaries and technical limitations of intelligent programming, and foster the awareness of responsible technology application.

3. GenAI Usage Standards

The use of AI shall comply with the course task instructions (permitted in specific scenarios).

4. Graduation Requirement Indicators Supported by the Course

No.	Graduation Requirement Indicator	Content of Graduation Requirement Indicator
1	Graduation Requirement 1: Engineering Knowledge	Master the general procedures and methods of architectural design.

No.	Graduation Requirement Indicator	Content of Graduation Requirement Indicator
2	Graduation Requirement 2: Problem Analysis	Master the basic procedures and working methods of architectural and urban information collection and processing, analysis and research, intervention and design, feedback and improvement.
3	Graduation Requirement 3: Design/Development Solutions	Master the fundamentals of architectural design and related basic knowledge, as well as the basic theories and practical operation methods of architectural design.
4	Graduation Requirement 4:	Research Master the essence of architecture-related theories, criteria and regulations.
5	Graduation Requirement 5: Use of Modern Tools	Be able to express design intentions and deliverables through written, oral and model-based approaches.
6	Graduation Requirement 9: Individual and Team	Possess teamwork spirit or awareness.
7	Graduation Requirement 10: Communication	Be able to communicate and exchange effectively with industry peers and the public in design practice, including oral history investigation, report writing and design documents, statement delivery, clear expression or response to instructions.

5. Correspondence between Course Teaching Objectives and Graduation Requirements

Graduation Requirements \ Teaching Objectives	**Course Teaching Objective 1**	**Course Teaching Objective 2**	**Course Teaching Objective 3**	**Course Teaching Objective 4**	**Course Teaching Objective 5**	**Course Teaching Objective 6**	**Course Teaching Objective 7**
Indicator 1	●						
Indicator 2		●					●
Indicator 3			●				
Indicator 4	●						
Indicator 5		●		●			
Indicator 6				●	●		
Indicator 7			●				

II. Course Content, Teaching Requirements, Class Hour Allocation and Teaching Methods

No.	Knowledge Unit	No.	Knowledge Points / Competency Points	Requirements	Supporting Course Objectives	Teaching Methods	In-class Hours	Extracurricular	Thinking Training Points
1	Core Value of Architectural Programming	1.1	Comparison of basic theories of architectural programming at home and abroad	Master	Course Objective 1	Bilingual lecture	4	0	Cross-context theoretical comparison and systematic inductive thinking
		1.2	Development trajectory of architectural programming theories at home and abroad	Be familiar with					
		1.3	Value system of architectural programming	Understand					
		1.4	Policy orientation of architectural programming in various countries	Understand					
2	Development Trajectory of Intelligent Architectural Programming	2.1	Basic composition and principles of intelligent decision-making systems	Be familiar with	Course Objectives 1, 6	Bilingual lecture	4	0	Technology evolution tracing and critical judgment thinking, establishing rational cognition of AI technology application
		2.2	Typical AI application scenarios and cases in architectural decision-making (e.g., scheme optimization, cost prediction, demand analysis, performance evaluation, etc.)	Master					
		2.3	Development history of intelligent programming technology (evolution from computer-aided design to AI decision support)	Understand					
		2.4	Development trends and technical limitations of	Understand					

No.	Knowledge Unit	No.	Knowledge Points / Competency Points	Requirements	Supporting Course Objectives	Teaching Methods	In-class Hours	Extracurricular	Thinking Training Points
			intelligent architectural programming						
3	Connotation of Architectural Programming and Extension of Intelligent Architectural Programming	3.1	Core connotation of architectural programming: programming content, programming subjects, programming methods, etc.	Master	Course Objective 2	Bilingual lecture + simulation platform application	8	0	Core concept discrimination and method iterative thinking, understanding the new paradigm of digital-intelligent programming
		3.2	Classic architectural programming method: Problem Seeking	Be familiar with					
		3.3	Intellectualization of architectural programming content, e.g., automatic generation of architectural programming information matrix, data-driven space demand forecasting	Be familiar with					
		3.4	Expansion of architectural programming subjects, human-machine collaborative decision-making mode, application of multi-agent systems	Understand					
		3.5	Upgrading of architectural programming methods, comparison between traditional AHP method and machine learning prediction	Be familiar with					

No.	Knowledge Unit	No.	Knowledge Points / Competency Points	Requirements	Supporting Course Objectives	Teaching Methods	In-class Hours	Extracurricular	Thinking Training Points
			and regression models						
		3.6	Innovative methods of public participation, social media public opinion analysis tools, VR-based opinion collection platforms	Be familiar with					
4	Learning of Intelligent Decision-making Methods	4.1	Data collection and processing (structured data standards, unstructured data extraction tools)	Master	Course Objective 3	Bilingual lecture	6	0	Data-driven decision-making and human-machine collaborative thinking
		4.2	Large language model application (prompt engineering in demand analysis, low-code fine-tuning methods)	Be familiar with					
		4.3	Generative design process (constraint parameter setting, automatic compliance check of schemes)	Be familiar with					
5	Expression of Architectural Programming Deliverables	5.1	Data visualization of architectural programming matrix information	Master	Course Objective 4	Bilingual lecture	6	0	Visual information translation and multi-objective trade-off thinking
		5.2	Multi-objective optimization assisted scheme decision-making	Be familiar with					
		5.3	Leading practical cases of architectural programming	Be familiar with					

No.	Knowledge Unit	No.	Knowledge Points / Competency Points	Requirements	Supporting Course Objectives	Teaching Methods	In-class Hours	Extracurricular	Thinking Training Points
		5.4	Impact of intelligent architectural programming on the economic and social value of construction projects	Understand					
6	Completing Architectural Programming with AI through Team Collaboration	6.1	Field survey of real construction projects	Master	Course Objective 5,6	Programming presentation	6	0	Team collaborative practice and technical ethical reflection thinking
		6.2	Multi-stakeholder demand analysis of construction projects	Master					
		6.3	Graphical and data-driven presentation of programming deliverables (generative AI-assisted effect presentation, data analysis and visualization)	Master					
		6.4	Oral presentation of architectural programming deliverables	Master					

III. Moral Education Connotation of the Course

Rooted in the national AI empowerment initiative and urban renewal strategic needs, this course upholds the educational philosophy of "empowering through technology, leading by values, integrating knowledge with practice", and deeply integrates professional education of architectural programming with ideological and political education. Targeting undergraduate students of multiple architecture-related majors, the course cultivates compound talents with patriotism and innovative spirit through the "three-full education" system: in the knowledge dimension, it takes the examination requirements of registered architects as the benchmark, and constructs a three-dimensional knowledge system of "traditional programming theory + intelligent

decision-making technology + urban renewal practice"; in the ability dimension, through joint guidance by supervisors from three disciplines of architecture, planning and computer science, it strengthens students' ability to apply tools such as natural language processing and machine learning to address national strategic needs such as quality improvement of stock construction; in the value dimension, relying on major engineering practice cases, it cultivates students' "people-oriented" design ethics and "technology for good" technical ethical awareness, enabling them to master cutting-edge technologies such as generative design while adhering to the professional aspiration of "design for the people", and finally grow into new-era leading architectural talents with both integrity and ability, who can undertake the mission of national rejuvenation.

IV. Assessment, Grading Methods and Retake Requirements

Students shall select a theoretical or practical topic related to architectural programming in groups, deliver a 10-minute presentation, and submit electronic documents and printed PPT scripts as the assessment results.

Retake type: Retake by attending regular classes with the next cohort.

Assessment Method	Proportion	Supporting Course Objectives	Remarks
Attendance	20%	Course Objectives 1-6	Students absent for more than one-third of the classes shall retake the course.
Process Assessment	20%	Course Objectives 1-3	Content of project presentation
Process Assessment	10%	Course Objectives 1-4	Classroom questioning and answering performance, class participation in discussion
Final Assessment	50%	Course Objectives 1-6	Originality, systematicness, completeness and creativity of the research report

V. Evaluation Criteria

1. Class Performance Evaluation Criteria

Supporting Course Objectives	Evaluation Details and Score Ranges				
	100-90	89-80	79-70	69-60	59-0
1-3	Perfect attendance; actively	Absent for 1 time; relatively actively	Absent for 2 times; participate in	Absent for 3 times; rarely participate in	Absent for 4 times or more; seldom

Supporting Course Objectives	Evaluation Details and Score Ranges				
	100-90	89-80	79-70	69-60	59-0
	participate in Q&A and class discussions; answer questions correctly.	participate in Q&A and class discussions; answer questions with an accuracy rate of no less than 80%.	Q&A and class discussions; answer questions with an accuracy rate of no less than 70%.	Q&A and class discussions; answer questions with an accuracy rate of no less than 60%.	participate in Q&A and class discussions; answer questions with an accuracy rate below the passing level.

2. Research Report Evaluation Criteria

Supporting Course Objectives	Evaluation Details and Score Ranges				
	100-90	89-80	79-70	69-60	59-0
1-6 1-6	**Outstanding Performance** • Fully covers all core requirements of the 6 course objectives • Demonstrates in-depth understanding and innovative application of intelligent programming theories • Complete and standardized technical implementation (architectural	**Excellent Performance** • Covers core requirements of more than 5 course objectives • Demonstrates solid theoretical foundation and standardized technical application (AI tool accuracy rate 80-89%)	**Qualified Performance** • Meets basic requirements of 4 course objectives • Complete theoretical cognition but insufficient innovation, individual flaws in technical application (accuracy rate 70-79%) • Complete report content	**Basically Qualified** • Meets minimum requirements of 3 course objectives • Fragmented theoretical understanding, obvious defects in technical implementation (accuracy rate 60-69%) • Key links missing in report content,	**Unqualified** • Fails to meet basic requirements of 3 course objectives • Wrong theoretical cognition, completely invalid technical application (accuracy rate ＜ 60%) • Seriously missing report content or

Supporting Course Objectives	Evaluation Details and Score Ranges				
	100-90	89-80	79-70	69-60	59-0
	programming completion rate ≥ 90%) • Rigorous report logic, professional visual expression, reflecting interdisciplinary collaborative innovation	• Clear report structure, complete expression, orderly team collaboration	but average depth, collaboration process requires teacher guidance	low team cooperation degree	plagiarism • Academic misconduct or ethical violation

VI. Textbooks and Main Reference Books

Title	Author	Publisher	Edition	ISBN	Textbook Category	Textbook / Main Reference Book
Problem Seeking: An Architectural Programming Primer	William Pena，Steve Parshall	John wiley & Sons Inc	5th Edition		English Textbook	Textbook
Architectural Programming	Tu Huijun	China Architecture & Building Press	1th Edition	9787112201518	Recommended Textbook for Colleges and Universities	Textbook
Digital Textbook of Architectural Programming	Tu Huijun	China Architecture & Building Press	1th Edition	978-7-89578-147-4	Recommended Textbook for Colleges and Universities	Textbook