



Appendix A-3: Course Design of Road Survey and Design Syllabus



Course Design of Road Survey and Design Syllabus

Course title	Course Design of Road Survey and Design				Course number	9032415010	
Applicable specialties	Civil Engineering (construction engineering direction <input type="checkbox"/> road and bridge engineering direction urban rail transit direction <input checked="" type="checkbox"/>)						
Nature of the course	General education courses <input type="checkbox"/> , subject foundation courses <input type="checkbox"/> professional core courses (elective <input type="checkbox"/> required <input type="checkbox"/>) independent development courses (required <input type="checkbox"/> , elective <input type="checkbox"/>), and concentrated practice courses <input checked="" type="checkbox"/>						
Unit offering the course	School of Civil Engineering						
total class hours	60	credit	2	Contact hours	32	Self-study hours	28
Prerequisite courses	Surveying, road surveying and design						
Textbooks and so on teaching materials	Course materials: Reference: Highway Engineering Technical Standard (JTG B01-2014) Highway Subgrade Design Code (JTG D30-2015) Highway Route Design Code (JTG D20-2017) Teaching website:						

1. Course Introduction

This course design is a specialized practical course for the road and bridge direction of Civil Engineering, serving as a practical component of "Road Surveying and Design." Its primary objective is to enable students to apply basic knowledge of road alignment design and relevant standards for route design, allowing them to conduct planar, longitudinal, and cross-sectional designs of roads. The course aims to develop students practical skills in selecting and setting out routes on large-scale topographic maps and their ability to draw construction plans. It lays a necessary foundation for future work involving complex terrain route design and research. Through this course design, students will acquire essential qualities and capabilities in general road alignment design, making it an applied and practical course that integrates mathematics, mechanics, and other knowledge.

2. The graduation requirements supported by this course and the path to achieve them



(1) The graduation requirements that this course can support

order number	Graduation requirement indicators	Specific content of graduation requirement indicators
1	Graduation requirement 3.1	Be able to complete the design of individual structures and components (nodes) that meet the specific requirements of civil engineering, fully consider social, health, safety, legal, cultural and environmental constraints in the design, and reflect innovative consciousness.
2	Graduation requirement 10.1	Understand the differences between communication with peers and the public, and be able to communicate and communicate effectively with peers and the public on complex civil engineering problems.

(2) The implementation path of graduation requirements indicators in this course

1 Course objectives

Through the teaching of this course, students will have basic design ability. The specific course objectives are as follows:

Course objective 1: It can determine the route scheme and plan the design parameters of the plan, cross and longitudinal sections according to the key points of wiring for different types of terrain and the general methods and requirements of road selection. In the design, it can fully consider the constraints such as social, health, safety, law, culture and environment, and reflect the innovative consciousness.

Course objective 2: For issues encountered during route selection, alignment determination, and design, one can draw plan design diagrams, longitudinal profile design diagrams, and cross-sectional design diagrams. Understanding the differences in communication between industry peers and the public, one can effectively communicate and interact with industry peers and the public regarding complex civil engineering problems.

2 The corresponding relationship between the teaching objectives of the course and the graduation requirements

Graduation requirement	Course teaching objectives
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indicators	
Graduation requirements 3.1	Course objective 1
Graduation requirements 10.1	Course objective 2

3. Intended learning outcomes

The expected learning outcomes of this course are as follows

blocks of knowledge	Ability items	Initial level	Degree of requirement	Intended learning outcomes	corresponding program objective
Route selection, route design and drawing	<ul style="list-style-type: none"> •Route scheme determined •Route parameter determination and design calculation •Consideration of social, health, safety, legal, cultural and environmental constraints 	L 2	L 4	<p>1.Route scheme comparison: can determine the route scheme according to the key points of wiring and the general methods and requirements of road selection according to different types of terrain; can fully consider the constraints such as social, health, safety, law, culture and environment in the route selection.</p> <p>2.Determination and design calculation of horizontal and vertical parameters: able to consult</p>	1



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blocks of knowledge	Ability items	Initial level	Degree of requirement	Intended learning outcomes	corresponding program objective
				specifications or communicate with others, determine the type of curve, calculate the elements of the horizontal curve; able to calculate the longitudinal slope and vertical curve; able to arrange the cross-section, able to calculate the value of over-height widening and the quantity of road earth and stone 3.Consideration of social, health, safety, legal, cultural and environmental constraints: Design can fully consider the impact of social, health, safety, legal, cultural and environmental constraints on the design	
	•Draw and communicate charts horizontally	L 2	L 3	4.Draw plan, cross and vertical charts: can	2



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blocks of knowledge	Ability items	Initial level	Degree of requirement	Intended learning outcomes	corresponding program objective
	and vertically			draw plan, cross and vertical charts, and communicate with teachers and classmates effectively through charts, annotations and other ways.	

4. Course assessment

(1) Course assessment structure

Examination items		Scale	Requirements
Results assessment	design book	50%	The assessment shall be carried out according to the requirements of the design specification.
	design chart	50%	Assessment shall be conducted according to the requirements of the design chart.

(2) Course assessment and evaluation standards

Assessment items: achievement assessment

Execution		grade
design book	design drawing	
① Able to independently complete the specification and data search; ② It can explain the impact of route scheme on engineering quantity, safety, natural and social environment; ③ It can select the relatively optimal route scheme and reasonably determine the design parameters of plane, vertical and	① Able to draw plan, longitudinal and transverse design drawings, drawing and marking specifications, clean drawings, few errors; ② Able to correctly complete the subgrade design table.	outstanding



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horizontal.		
<p>① Be able to independently complete the specification and data search;</p> <p>② It can better illustrate the impact of route scheme on engineering quantity, safety, natural and social environment;</p> <p>③ It can select the relatively optimal route scheme and reasonably determine the design parameters of plane, vertical and horizontal.</p>	<p>① It is more able to draw plan, longitudinal and transverse design drawings, with more standardized drawing and marking, cleaner drawings and less errors;</p> <p>② Can correctly complete the subgrade design table.</p>	good
<p>① Basically able to independently complete the specification and data search;</p> <p>② Basically explain the impact of route scheme on engineering quantity, safety, natural and social environment;</p> <p>③ It can basically select the relatively optimal route scheme and basically reasonably determine the design parameters of plane, longitudinal and transverse.</p>	<p>① Basically able to draw plan, longitudinal and transverse design drawings, drawing and marking are basically standardized, the drawing surface is basically clean, and the error is general;</p> <p>② Basically able to correctly complete the subgrade design table.</p>	secondary
<p>① Able to independently complete the specification and data search;</p> <p>② It can still explain the impact of route scheme on engineering quantity, safety, natural and social environment;</p> <p>③ It can still select the relatively optimal route scheme and reasonably determine the design parameters of plane, vertical and horizontal.</p>	<p>① It can still draw plan, longitudinal and transverse design drawings, the drawing and marking are still standard, the drawing is still clean, and there are still few errors;</p> <p>② Can correctly complete the subgrade design table.</p>	pass a test
<p>① Unable to independently complete the specification and data search;</p> <p>② It cannot explain the impact</p>	<p>① Can not draw plan, longitudinal and transverse design drawings, drawing and marking are not standardized, the drawing surface is</p>	fail



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of route scheme on engineering quantity, safety, natural and social environment; ③ It cannot select the relatively optimal route scheme, and cannot reasonably determine the design parameters of plane, vertical and horizontal ④ Copying or partial copying.	not clean, and there are many errors; ② The subgrade design table cannot be completed correctly. ③ Copying (copying) or partial copying (copying).	
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5. The task of cultivating the ability to solve complex engineering problems

The teaching focus of the road survey and design course is to guide students in independently designing road engineering alignments based on their prior knowledge of road survey and design. The teaching process primarily employs methods such as lectures, discussions, and case studies. By explaining concepts and methods, it helps students master the steps and parameter calculation methods for road alignment design, fostering their ability to analyze and solve problems. At the same time, students are encouraged to consult relevant standards, codes, and engineering drawing collections, developing their skills in literature review and independent knowledge acquisition.

6. Non-technical skills development and observation

Cultivation: Guide students to communicate fully with teachers and classmates, and on the basis of independently completing the selection and determination of lines on topographic maps and carrying out planar design, obtain the ability to effectively communicate and exchange with industry peers and the public through proficient use of drawings, tables, annotations and other written expression methods.

Observation: Comprehensive evaluation of the completion of students design drawings.

7. Course ideological and political design

(1) Ideological and political goals of the course

The essence of ideological and political education in courses is to cultivate virtue



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and nurture talent, with a broad context and profound implications. Cultivating virtue means prioritizing moral education, guiding, touching, and inspiring people through positive education; nurturing talent means putting people first, shaping, changing, and developing individuals through appropriate education. The main goals of ideological and political education in this course should focus on the following three aspects:

1. Love your job and be dedicated to it. Through your diligent teaching and tireless answering questions, students can feel the respect of teachers for their profession and their dedication to their career. Leading by example is more effective than mere verbal transmission.

2. Professionalism and craftsmanship. Engineering construction should be carried out in accordance with laws and regulations first of all. Only by doing so can we maintain normal order, ensure product quality and safeguard the rights and interests of the public; secondly, we should establish the spirit of craftsmanship, take our "work" seriously and establish the concept that design is art.

3. Sustainable Development Concept. It meets the needs of current road traffic without causing adverse effects on future generations due to current road construction. Therefore, in road design and construction, it is essential to achieve harmony between routes and nature, society, culture, and ecology. This ensures that the entire road design, including route planning, reaches a realm where roads wind through forests, streams flow by the roadside, people walk in scenic views, and vehicles cruise through picturesque landscapes.

(2) Implementation of ideological and political education in courses

1. The spirit of dedication to ones job and willingness to contribute should run through the whole process of course design teaching, including the design guidance and design answering links, combining personal efforts with verbal and practical teaching, and highlighting practical teaching.

2. Professional Integrity and Craftsmanship. For a country and its people to stand tall among the nations of the world, the cultivation of professional ethics and craftsmanship is indispensable. Specifically in the "Road Survey and Design Course,"



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this manifests as a steadfast commitment to professional conduct for engineering personnel, creative application of standards and regulations, profound understanding of fundamental knowledge, and relentless pursuit of excellence in planar and spatial line design.

3. Sustainable development is not only the acceptance of the concept, but more importantly, the implementation in learning and working. Specifically, in the course design of road survey and design, it is reflected in the scientific utilization of route corridor, the comprehensive and optimal selection of route scheme, the refinement of plan and vertical shape, and the reasonable layout of cross-section.

8. Course evaluation and continuous improvement mechanism

(1) Course evaluation

The course evaluation cycle is set once per semester.

1. The achievement of course objective 1 is assessed through the design specification;

2. The achievement of course objective 2 is assessed by designing charts.

The course evaluation is carried out as follows:

Program objective	Corresponding graduation requirements	Evaluation methodology	Remarks
Course Objective 1	3.1	The scoring method	design book
Course objective 2	10.1	The scoring method	design chart

(2) Continuous improvement mechanism

(a) Establish a continuous improvement system

① Establish a continuous improvement group for this course.

② The head of the course continuous improvement group is responsible for organizing, implementing and supervising the continuous improvement process.

③ Develop continuous improvement measures.

(b) Establish a continuous improvement group for this course



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Team leader: course leader. Team members: team members of the course

(c) Continuous improvement method of this course

① Achievement assessment mechanism: analyze the course design results, count the completion of each part in the design, use the statistical results to analyze the whole course, and make improvements for students who take the make-up exam and students in the next class.

(d) Continuous improvement measures of this course

① For the assessment of achievements, unified guidance and other measures are taken to improve the students who take the make-up exam according to the weak parts in the results submitted by students.

Formulator (signature):

Director (room) review (signature):

Professional person in charge of
review (seal):