



National University of Engineering (UNI)
School of Civil Engineering
Syllabus 2027-I

1. COURSE

CE3T5. Transportation Planning (Mandatory)

2. GENERAL INFORMATION

2.1 Course	: CE3T5. Transportation Planning
2.2 Semester	: 10 th Semester.
2.3 Credits	: 4
2.4 Hours	: 3 HT; 2 HP;
2.5 Duration of the period	: 16 weeks
2.6 Type of course	: Mandatory
2.7 Learning modality	: Face to face
2.8 Prerequisites	: CE3T4. Traffic Engineering and Urban Road Design. (9 th Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Transportation Planning is the planning- and economics-focused course of the Vialidad, Geomatica y Transporte track, building on the traffic engineering and urban road design foundations established in Traffic Engineering and Urban Road Design (CE3T4) to address how transportation systems are planned, financed, and managed at the network and regional scale. The course opens with a brief review of traffic operations and management – arterial signal coordination, freeway operations, traffic simulation, and roundabout design – bridging the facility-level analysis of CE3T4 with the systems-level perspective that follows. It then develops the transportation planning process and travel demand forecasting methods, including the four-step model, activity-based approaches, and economic evaluation of transportation investments. Building on this planning foundation, the course covers the economic appraisal and financing of transportation infrastructure, including benefit-cost analysis, public-private partnerships, and road pricing and funding mechanisms. The course continues with freight transportation and logistics, covering freight demand modeling, logistics network design, intermodal terminals, and urban freight distribution, and closes with public transit systems planning, covering transit route and network planning, mode selection and service design, fare policy integration, and transit accessibility – providing the planning and economic-analysis foundation required for professional practice in transportation systems planning.

5. GOALS

- Explain the transportation planning process, travel demand forecasting methods, and the institutional framework governing multimodal transportation systems.
- Apply economic appraisal methods (NPV, IRR, benefit-cost analysis) to evaluate transportation infrastructure investments, and recognize infrastructure financing, public-private partnerships, and road pricing mechanisms.
- Analyze traffic operations problems, including arterial signal coordination, freeway performance, traffic simulation, and roundabout design, building on the traffic engineering foundations of CE3T4.
- Model freight demand and design logistics networks for freight transportation systems, including intermodal terminals and urban freight distribution strategies.
- Plan and design public transit route networks, select appropriate transit modes and service characteristics, and design fare policy and accessibility strategies.
- Incorporate sustainability, equity, and public participation considerations into transportation planning and economic decision-making.

6. COMPETENCES

ABET-1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. (Usage)

ABET-2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. (Usage)

7. TOPICS

Unit 1: Traffic Operations and Management (5 hours)	
Competences Expected: ABET-1	
Topics	Learning Outcomes
• Arterial analysis and signal coordination • Freeway operations and bottleneck analysis • Traffic simulation and microsimulation modeling • Incident management and traffic management centers • Roundabout design and capacity analysis	• Develop coordinated signal systems for arterial corridors [Usage] • Evaluate freeway performance and identify operational bottlenecks [Assessment] • Utilize traffic simulation models for complex operational analysis [Usage] • Implement incident management strategies and traffic management operations [Assessment] • Design roundabouts and analyze their operational performance [Usage]
Readings : [Roess2011], [HCM2022]	

Unit 2: Transportation Planning and Economics (15 hours)	
Competences Expected: ABET-1,ABET-2	
Topics	Learning Outcomes
• Transportation planning process and institutional framework • Travel demand modeling and forecasting methods • Four-step travel demand model • Data collection methods for transportation planning • Economic evaluation and benefit-cost analysis • Activity-based modeling and advanced forecasting techniques • Multimodal transportation planning and integration • Sustainable transportation and environmental considerations • Public participation and stakeholder engagement • Performance measures and system monitoring	• Explain the transportation planning process and institutional relationships [Familiarity] • Apply travel demand forecasting methods to predict future travel patterns [Assessment] • Implement the four-step travel demand model for regional analysis [Usage] • Design data collection programs for transportation studies [Assessment] • Conduct benefit-cost analysis for transportation projects [Usage] • Utilize activity-based models for advanced travel demand analysis [Assessment] • Develop integrated multimodal transportation plans [Usage] • Incorporate sustainability principles into transportation planning [Assessment] • Facilitate public participation processes in transportation planning [Familiarity] • Establish performance measures and monitoring systems for transportation networks [Assessment]
Readings : [Meyer2001], [Ortuzar2011]	

Unit 3: Transportation Economics and Finance (15 hours)	
Competences Expected: ABET-1	
Topics	Learning Outcomes
• Economic appraisal methods for transportation projects (NPV, IRR, benefit-cost ratio) • Transportation infrastructure financing and public-private partnerships • Road pricing, congestion pricing, and value capture mechanisms • Transit subsidies and funding mechanisms	• Appraise a transportation project using NPV, IRR, and benefit-cost ratio methods [Usage] • Describe infrastructure financing mechanisms, including public-private partnerships [Familiarity] • Evaluate road pricing and value capture mechanisms for a transportation corridor [Assessment] • Explain transit subsidy structures and funding mechanisms [Familiarity]
Readings : [Boardman2018], [Button2010]	

Unit 4: Freight Transportation and Logistics (15 hours)	
Competences Expected: ABET-1,ABET-2	
Topics	Learning Outcomes
• Freight demand modeling and commodity flow analysis • Freight supply chain and logistics network design • Intermodal freight terminals and transfer facilities • Urban freight distribution and last-mile delivery	• Model freight demand and commodity flows for a region [Usage] • Design a logistics network for freight supply chains [Usage] • Describe the role of intermodal freight terminals in a logistics network [Familiarity] • Propose urban freight distribution strategies to reduce last-mile delivery impacts [Assessment]
Readings : [Ballou2004]	

Unit 5: Public Transit Systems Planning (20 hours)	
Competences Expected: ABET-2	
Topics	Learning Outcomes
• Public transit route and network planning • Transit mode selection (bus, BRT, light rail, metro) and service design • Fare policy and multimodal fare integration • Transit accessibility and first/last-mile connections	• Plan a transit route and network for a given service area [Usage] • Select an appropriate transit mode and design its service characteristics [Assessment] • Describe fare policy options and multimodal fare integration approaches [Familiarity] • Improve transit accessibility through first/last-mile connection strategies [Usage]
Readings : [Vuchic2007], [TCRP2013]	

8. WORKPLAN

8.1 Methodology

Individual and team participation is encouraged to present their ideas, motivating them with additional points in the different stages of the course evaluation.

8.2 Theory Sessions

The theory sessions are held in master classes with activities including active learning and roleplay to allow students to internalize the concepts.

8.3 Practical Sessions

The practical sessions are held in class where a series of exercises and/or practical concepts are developed through problem solving, problem solving, specific exercises and/or in application contexts.

9. EVALUATION SYSTEM

***** EVALUATION MISSING *****

10. BASIC BIBLIOGRAPHY