

250409 - PLAGESTRTE - Planning and Management of Transportation

Coordinating unit:	250 - ETSECCPB - Barcelona School of Civil Engineering
Teaching unit:	751 - DECA - Department of Civil and Environmental Engineering
Academic year:	2015
Degree:	MASTER'S DEGREE IN CIVIL ENGINEERING (PROFESSIONAL TRACK) (Syllabus 2012). (Teaching unit Compulsory) MASTER'S DEGREE IN CIVIL ENGINEERING (PROFESSIONAL TRACK) (Syllabus 2012). (Teaching unit Compulsory) MASTER'S DEGREE IN CIVIL ENGINEERING (RESEARCH TRACK) (Syllabus 2007). (Teaching unit Optional) MASTER'S DEGREE IN CIVIL ENGINEERING (RESEARCH TRACK) (Syllabus 2009). (Teaching unit Optional) MASTER'S DEGREE IN SUPPLY CHAIN, TRANSPORT AND MOBILITY MANAGEMENT (Syllabus 2014). (Teaching unit Optional)
ECTS credits:	6
Teaching languages:	Spanish, English

Teaching staff

Coordinator:	FRANCESC ROBUSTÉ ANTÓN
Others:	HUGO BADIA RODRÍGUEZ, MIGUEL ANGEL ESTRADA ROMEU, FRANCESC MAGRINYA TORNER, FELIX-EDMUNDO PEREZ JIMENEZ, FRANCESC ROBUSTÉ ANTÓN, ELISABETH ROCA BOSCH, SERGI SAURI MARCHAN

Opening hours

Timetable:	Tuesday from 16h to 20h (previous appointment is recommended). Practical cases may be presented by other instructors, which may vary each year. The calendar specifies the cases, instructors and contact details for students.
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Degree competences to which the subject contributes

Specific:

8169. The ability to plan, manage and operate civil engineering infrastructure.

8208. The ability to analyse and interpret the regulation and impact of infrastructure and their repercussions for sustainable development, taking into account economic, environmental, social and cultural factors.

8234. Knowledge of transport engineering and planning, transport types and functions, urban transport, management of public transport services, demand, costs, logistics, and financing of transport infrastructure and services.

250409 - PLAGESTRTE - Planning and Management of Transportation

Teaching methodology

The course consists of 1,4 hours per week of classroom activity (large size group) and 0,7 hours weekly with half the students (medium size group).

The 1,4 hours in the large size groups are devoted to theoretical lectures, in which the teacher presents the basic concepts and topics of the subject, shows examples and solves exercises.

The 0,7 hours in the medium size groups is devoted to solving practical problems with greater interaction with the students. The objective of these practical exercises is to consolidate the general and specific learning objectives.

The rest of weekly hours devoted to laboratory practice.

Support material in the form of a detailed teaching plan is provided using the virtual campus ATENEA: content, program of learning and assessment activities conducted and literature.

Learning objectives of the subject

Students will acquire an understanding of the design and operation of modal interchange transport infrastructure, including ports, airports, rail terminals and logistics centres.

Upon completion of the course, students will be able to:

Conduct studies of transport engineering and planning, transport types and functions, urban transport, management of public services, demand, costs, logistics, and financing of transport infrastructure and services;
Analyse and interpret the regulation and impact of infrastructure and their repercussions for sustainable development, taking into account economic, environmental, social and cultural factors;
Plan, manage and operate civil engineering infrastructure.

Transport planning: Multi-modal transport and mobility; Transport systems and territorial impact; Hierarchy of transport systems; Physical limitations of transport systems: Capacity and performance; Impacts of transports systems: Environmental, physical, social, cultural, economic; Transport systems in urban areas; Localisation of economic activities; Infrastructure networks; Branch and mesh networks; Decision-making in transport and regional planning; Objectives, efficiency, sustainability, transport planning and urban planning; Journey time and short-term economic effects; Geographical information, characterisation of infrastructure and land use; Sampling and surveys; Demand modelling, econometric models; Public and private investment models, risk quantification, concessions, participating interests and management, shadow tolls; Tariff structure and profit; Management and operation of transport infrastructure and services; Private vehicles, parking, rates, service control, urban and inter-urban road infrastructure, control and ICTs; Road freight and logistics hubs; Maritime transport systems and port terminals; Air transport and airport terminals; Rail transport and rail terminals; Intermodal transport systems, international routes.



250409 - PLAGESTRTE - Planning and Management of Transportation

Study load

Total learning time: 150h	Theory classes:	25h 58,8m	17.32%
	Practical classes:	13h 01,2m	8.68%
	Laboratory classes:	13h 01,2m	8.68%
	Guided activities:	1h 58,8m	1.32%
	Self study:	96h	64.00%



250409 - PLAGESTRTE - Planning and Management of Transportation

Content



250409 - PLAGESTRTE - Planning and Management of Transportation

1. Territory and mobility	Learning time: 124h 48m Theory classes: 30h Practical classes: 10h Laboratory classes: 12h Self study : 72h 48m
Description:	

250409 - PLAGESTRTE - Planning and Management of Transportation

Territory and mobility. Planning physical, biological, economic and social. Descriptors of land and territory. Indicators. Integration of land use and transportation planning. Methodology for evaluating and measuring the urban structure, form and the "built environment". Environmental and social impact. Economic impact. Gains. Land prices and centrality.

Determinants of long-term planning. Energy crisis. Climate change. Water. Telecommuting. Security. Globalization. ICT.

Regional development. Basis of economic planning. Central place theory. Multipliers. Analysis of market potential. Bifurcations. Model of monopolistic competition (Dixit-Stiglitz). Center and periphery. Many regions and space continuum. Costs of trade. International trade. Industrial clustering. Concentration, dispersion, agglomeration. External trade and internal geography. Globalization and territory. Territorial competitiveness. Business competitiveness. Implications for welfare. Clustering of RDI. Regional strategic planning. Catalonia vs. logistics. Catalonia innovative. Governance.

Infrastructure and transport vehicles. Principles drawn linear infrastructure of transportation, earthmoving, slope, layout and description of surface conditions geotechnical, structural, and hydraulics. Layout rules (3.1 IC). Security at zero flow (static) visibility distances, braking, turning radius, etc.. Terminals: access, internal transfer system, platforms, waiting rooms, shops, services and amenities, capacity.

Vehicles: balance of forces, acceleration and braking, rolling resistance, aerodynamic to the advance, energy, engine efficiency. Dynamics of vehicles. Interaction. Flow of vehicles with security, heterogeneity. Road safety. Transport economics.

Microeconomics: production functions (axiomatic framework of Shephard),

Cost (total, unitary marginal externalities), demand, equilibrium, elasticity, road expansion, the concept of optimality (constrained optimization) utility. Market equilibrium. Pricing (pricing) infrastructure and services.

Macroeconomics: input-output tables, indirect and induced effects. Effects developing country, society. Union micro-macro (Weintraub).

Urban economy. Principles of agglomeration (or synergy), accessibility (or spatial competition), spatial interaction (or the demand for mobility), hierarchy (or the order of cities), competitiveness (or the basis of export). External economies of cities. Urban systems. Price of land. Single CBD. Multiple sub-centers. Spatial models of urban systems. Monocentric economy. Model von Thun. Emergence of new cities. Evolution of a hierarchical urban system. Size of cities. Terminals and transport hubs (ports, airports, interchanges, stations) and their location. Sustainable urban development.

City design. Origins of modern cities and theories about its shape and organization. Analysis of current problems related to the shape of the city in relation to the management, planning, social structure and physical design. Street network (mesh, radial, mixed). Orographic and geographic borders. Accessibility and barriers. Buildings density and height. Generated Mobility. Parking. Shared Services.

Sustainable transport system. Theories, components. Transport, Mobility and Logistics. Operations Research in Transportation. Analysis of traffic flow.

Sustainable mobility. Policy (Policy) Transport, environment and sustainability. Economic and political conflict between development and ecology, between transport and environmental friendliness. Government regulation and transport policy as a facilitator of economic development, trade. International policy, including government-business relations, the role of stakeholders, sustainable development, global warming, policy and risk factors for location, environmental protection, equity, etc.. Environmental sustaina

250409 - PLAGESTRTE - Planning and Management of Transportation

Qualification system

Structure: two parts, T (concepts) and C (cases). Part T takes 2/3 of the subject and includes the background, scientific issues and further readings. Part C includes professional cases, mainly related to Barcelona, trying to illustrate who the principles have (or have not) been in practice and the real life constraints that face implementations; in many cases, the classes will count with the participation of renowned professionals and experts.

Class structure:

- Subject (one or two classes)
- Objectives + References + Conclusions
- Background and description (PPT): main concepts, main formulas, tables, graphics, photos
- Professional case / application (simplified)
- Break
- Science and principles (blackboard or PPT)
- Homework / further readings / exercises / field work / data-info mining / self-evaluation mini-quiz / course notes

Evaluation: Part H is volunteer homework, readings, data gathering, quiz, course notes, etc., that will be defined every week. The final grade is computed as follows:

$$\text{Final grade} = \max\{ 0.75T+0.25C; 0.6T+0.2C+0.2H \}.$$

Teaching and learning methods, expected learning results, specific competences: See Camins OpenCourseWare.

Vertical contents: Transportation Planning and Management principles and applications. Transversal concepts: Economic and Social Territory, Sustainability, Environment, Energy, Accessibility, trade-off Supply vs Demand, trade-off Global vs Local, Functionality, TSM, etc.

Regulations for carrying out activities

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$$\text{Final grade} = \max\{ 0.75T+0.25C; 0.6T+0.2C+0.2H \}.$$

250409 - PLAGESTRTE - Planning and Management of Transportation

Bibliography

Basic:

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- Dupuy, G.,. El urbanismo de las redes. Oikos-Tau, 1996.
- Jara-Diaz, S.. Transport Economic Theory. Emerald, 2007.
- Meyer, M. & E. Miller. Urban Transportation Planning. Mc Graw Hill, 2001.
- Ortúzar, J.D.; Willumsen, L.G. Modelling transport. 4th ed. Chichester: John Wiley & Sons, 2011. ISBN 9780470760390.
- Sheffi, Y.. Urban transportation networks: Equilibrium analysis with mathematical programming methods. Prentice-Hall, 1984.

Complementary:

- de Neufville, R.. Applied Systems Analysis: Engineering Planning and Technology Management. Mc Graw-Hill, 1990.
- Gatti, S.. Project Finance in Theory and Practice. California: Academic Press, 2008.
- Gramlich, E. M.. Infrastructure Investment: A review essay. Journal of Economic Literature, 1994.
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- Manheim, M.. Fundamentals of Transportation Systems Analysis Vol 1. Basic Concepts. MIT Press, 1984.
- Nicholson, W.. Micro-economic theory: Basic principles and extesions. 3a. Dryden, 1985.
- Wood, P.R.. Project Finance, securisations subordinated debt. Second Edition. Londres: Sweet & Maxwell, 2007.