



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2022/2023
MASTER'S DEGREE (MSC)	CIVIL ENGINEERING
SUBJECT	SMART ROAD, RAILWAYS AND AIRPORT
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50353-Ingegneria civile
CODE	22242
SCIENTIFIC SECTOR(S)	ICAR/04
HEAD PROFESSOR(S)	LO PRESTI DAVIDE Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	9
INDIVIDUAL STUDY (Hrs)	144
COURSE ACTIVITY (Hrs)	81
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	LO PRESTI DAVIDE Tuesday 12:00 13:00 Ufficio Docente - Laboratori Infrastrutture Viarie, Edificio 8, Dipartimento di Ingegneria

PREREQUISITES	Students should have already acquired basic knowledge and skills in road design and transport engineering.
LEARNING OUTCOMES	<p>Knowledge and understanding: the student, at the end of the course, will be able to:</p> <ul style="list-style-type: none"> i. Understanding the importance of road infrastructures in the social and economic development of a country and some solutions to engineer more sustainable infrastructures ii. Conceive and define the main visions and technologies related to Smart Roads iii. analyze the necessary requirements and the elements for the choice of the intersection scheme, however regulated, and for the insertion of the node in the road network; iv. dimension the elements making up the intersection scheme; v. analyze the necessary requirements for the location and correct sizing of the landside, airside and pavement spaces of an airport; vi. Possibly examine the aspects inherent to railway infrastructures vii. produce effective presentations of project results by gaining teamwork experience <p>Ability to apply knowledge and understanding: the student will be able to apply the knowledge and methodologies acquired during the course both for the focus of the territorial aspects aimed at the location of the intersection area, the choice of the type of intersection (level, traffic light or roundabout, at staggered levels), and to the connection of the node to the road network (existing or planned), both for the sizing of the geometric elements of the intersection scheme, compatibly with the constraints (architectural, topographical and regulatory) and in accordance with criteria based on the safety of circulation and the quality of the outflow. The student will also be able to apply the knowledge and methodologies acquired both for the focus of the territorial and environmental aspects aimed at the location of the airport area, on the basis of aircraft-airport compatibility criteria, and for the characterization physics of the movement and maneuvering areas of the airport and for the organization of the spaces of the terminal complex, as well as for the dimensioning of the elements that make up the plano-altimetric layout of the railways.</p> <p>Communication skills: the student will acquire the ability to illustrate with competence and properties of language, even in specialized contexts, issues related to the contents of the course. In addition, there will be lessons and exercises organized to improve exhibition and public speaking skills</p> <p>Learning skills: the student will be able to independently address the issues relating to the sustainability of road infrastructures but the course is also structured to provide learning moments using innovative teaching techniques (i.e. project-based learning)</p> <p>Communication skills: the student will acquire the ability to illustrate issues related to the course contents with competence and properties of language, even in specialized contexts. In addition, there will be lessons and exercises organized to improve exhibition and public speaking skills</p> <p>Learning skills: the student will be able to independently address the issues relating to the sustainability of road infrastructures but the course is also structured to provide learning moments using innovative teaching techniques (i.e. project-based learning)</p>
ASSESSMENT METHODS	<p>Oral exam. The presentation and discussion of the design themes assigned during the course is also provided.</p> <p>Evaluation criteria:</p> <ul style="list-style-type: none"> • Before the exams, the student must deliver the final versions of the exercises (including group) with related drawings, reports and / or presentations • The student will have to answer at least 4 oral questions, on all the topics of the program, also with reference to the recommended texts. • The final test for each student, questioned individually, aims to assess whether he has knowledge and understanding of the topics and if he has acquired interpretative competence and autonomy of judgment with reference to the exercises (design themes) assigned during the course (see "organization of teaching"). • The student must be able to present to the examiner and discuss the topics related to the exercises with competence. <p>The evaluation takes place in thirtieths; the range of grades of evaluation is between 18 and 30 cum laude, according to the following parameters:</p> <ul style="list-style-type: none"> • Excellent (30 - 30 cum laude): Excellent knowledge of the topics, excellent language properties, good analytical and interpretative skills; the student is fully

	<p>capable of applying the acquired knowledge and methods</p> <ul style="list-style-type: none"> •Very good (26-29): Good command of subjects, full ownership of language; the student is able to apply the acquired knowledge and methods •Good (24-25): Basic knowledge of the main topics, good language properties; the student shows a limited ability to use the acquired knowledge and methods •Satisfactory (21-23): Basic knowledge of some topics, satisfactory language properties; poor ability to autonomously apply the acquired knowledge and methods •Sufficient (18-20): Minimum knowledge of some topics related to the sustainability of road infrastructures; very little or no ability to autonomously apply the acquired knowledge and methods •Insufficient: The student does not have an acceptable knowledge of the topics covered in the course
EDUCATIONAL OBJECTIVES	<p>The objectives of the course are multiple and of equal importance:</p> <ul style="list-style-type: none"> •Deepen the visions and definitions of Smart Transport Infrastructure and then decline them to applications on roads, airports and railways, while providing new technical notions •Complement the technical knowledge provided in other courses. On the streets, the topics related to the functional verification of the geometric design of road intersections will be explored. No presentations relating to their planning, design and management will be presented for airports and railways •Provide specialist seminars and / or visits to provide appropriate and knowledge that will approach him to relate with the technicians of Bodies and / or Management Companies within which he will hopefully find himself working. •In order to understand the understanding of the topics covered in the frontal teaching phase, various exercises are carried out by the teacher, including those focused on frontal teaching cases. The student will be assigned project themes, to be developed possibly in a group and, in order to improve communication skills, to be developed also in oral form.
TEACHING METHODS	<p>In order to optimize the understanding of the covered topics, the teacher's lectures by will be accompanied by workshops focused on real cases together with lectures and / or specialist technical visits shared with experts and / or professionals of the sector. The course is therefore a mixture of:</p> <ol style="list-style-type: none"> 1)Frontal lessons; 2)Specialized seminars and possible technical visits 3)Workshops lead by the teacher; 4)Laboratory project assigned to the student to be carried out in groups and/or independently <p>Students will be encouraged to work in groups. Furthermore, in order to improve communication skills, during the course there will be moments dedicated to the presentation of the results of the design laboratory work.</p>
SUGGESTED BIBLIOGRAPHY	<ul style="list-style-type: none"> •Esposito T, Mauro R., 2001. Fondamenti di Infrastrutture Viarie 2: La progettazione funzionale delle strade. Hevelius Ed. •F.A. Santagata (a cura di), AAVV. Strade. Pearson, 2016. •Ranzo, A., 2007. Fondamenti di Ingegneria delle Infrastrutture Viarie, Ed. CompoMat, Configni (RI). •Appunti alle lezioni <p>Testi consigliati per gli approfondimenti:</p> <ul style="list-style-type: none"> •Benedetto, A. Strade, ferrovie Aeroporti. UTET, 2015. •Tesoriero, G., 1993. Strade, Ferrovie, Aeroporti, Infrastrutture aeroportuali Vol. III, UTET, Torino. •Horonjeff, R., McKelvet, F., 2010. Planning and design of airports, MacGraw-Hill, 5th Edition. •Dell'Acqua G., 2018. Il Building Information Modeling per le grandi opere lineari, EPC editore

SYLLABUS

Hrs	Frontal teaching
6	Introduction to the course and Smart Transport Infrastructure (SMARTI)

SYLLABUS

Hrs	Frontal teaching
18	<p>SMART ROADS and Intersections Towards Smart Roads Road intersections</p> <ul style="list-style-type: none"> •At-grade intersections (design and verification) oElements of Circulation (references to Transport Techniques) and Generalities on road intersections oSchemes and construction elements oWaiting phenomena and functional sizing oCapacity, delay and level of service for non-traffic light intersections; •Smartening intersections: oRoundabouts and/or traffic light intersections oIntersections at staggered levels oRoad signs
17	<p>AIRPORTS and smart solutions:</p> <p>Airport infrastructure</p> <ul style="list-style-type: none"> •General information and regulatory framework (aeronautical bodies and associations, airport management organization) •Airport geography: definitions and hints on aircrafts •Airports classification and freedoms of air <p>Airports Planning</p> <p>Airports Design</p> <ul style="list-style-type: none"> •Airport capacity and runway schemes •Classification, orientation and use of the slopes •Evaluation and Limitation of Obstacles <p>Airports Management</p> <ul style="list-style-type: none"> •Surface conditions and structural design of the runway •Airport signalling
4	<p>RAILWAYS and smart solutions:</p> <p>Generality, Planning, Design and Management of railways</p>
4	<p>SEMINARS and/or TECHNICAL VISITS: Possible Seminars and Technical Visits : lectures held by the teacher and industry professionals and colleagues from other universities or trade associations (in English and / or Italian). The topics will be defined during the course based on the events and the availability of specialists.</p> <ul style="list-style-type: none"> - The Road Infrastructures of the future - The financing possibilities for road infrastructures - BIM for Linear Infrastructures - Road and / or airport safety - Connected, Cooperative and Automated mobility - Innovation in railway infrastructures - Airport flooring design - Management of the airport infrastructure and its elements: - Communication skills for engineers
Hrs	Practice
12	<p>SMARTI WORKSHOPS:</p> <ul style="list-style-type: none"> - SMARTening transport infrastructure - The geometric-functional project of a level intersection and a sign level. - Design and / or Management of airport and / or railway infrastructure elements
Hrs	Workshops
20	<p>SMARTI LABS: Laboratory group projects on SMARTening transport infrastructure and Design and/or Management of roads/ airport/railway infrastructure elements</p>