



COURSE: Design of Roads, Railways And Airports included in: <i>Materials for Roads, Railways and Airports + Design of Roads, Railways and Airports</i> (12ETCS)			
ACADEMIC YEAR: 2019-2020			
TYPE OF EDUCATIONAL ACTIVITY: (C) Affine			
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Language: Italian			
ECTS: 3	hours: 27 of which: - n.16 Lessons - n.11 Tutorials/Practice	Campus: Potenza School of Engineering Program: Master's degree in Civil Engineering (LM23)	Semester: Annual

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

Acquire the theoretical tools and techniques addressed in the design and the advanced design of road and rail infrastructures with care to the environmental impact.

The main knowledge provided are:

- Advanced geometric design;
- Road safety;
- Rockfall protection of road infrastructure;
- The thermal analysis of the rail track;
- The retaining structures in reinforced earth, gabionade, cribb wall, etc.;

The main skills transferred are:

- Road pavements design with specific software;
- Design of specialized road lanes (advanced geometry);
- The study and design of rockfall protection structures;
- Design of road barriers;
- Road safety management.

In the specific, teaching contributes to the following learning outcomes:

- *Knowledge and ability of comprehension*: the student must demonstrate of knowing and being able to understand both the problems relative to the advanced geometric design of Road Infrastructures and the selection and dimensioning of accessories elements (retaining structures, road barriers, etc.).
- *Ability to apply knowledge and comprehension*: the student must demonstrate that he is able to use the theoretical tools acquired to solve engineering problems with particular reference to the road infrastructures.
- *Autonomy of judgment*: the student must be able to deepen in an independent way what he has learned. It must develop an appropriate synthesis capacity and must be able to solve specific problems in the fields of road and railway infrastructures.
- *Communication ability*: the student must be able to communicate and explain clearly the acquired knowledge, even to people who are not experts. It must also be able to use the technical-scientific language properly. The correct, clear and concise expression, therefore, constitutes an element of primary judgment.
- *Learning Ability*: The student must progressively become independent from the teacher. It must be able to update itself by consulting texts and scientific publications.

PRE-REQUIREMENTS

It is suggested to pass previously the exam of "*Basics of Roads, Railways and Airports*".



SYLLABUS

Rational calculation of road pavements: elastic multilayer method (KENPAVE). Advanced geometry of road axis: multi-parameter clothoids (Cornù spiral), braking curves, ideal braking curve (Nemesdy), clothoids at decreasing parameter (Blaschke), bi-parametric curve (Bloss curve). Dynamic response of pavements and design in seismic area: general information, stress-strain analysis and response verifications, dynamic actions performance of different types of pavements, parametric analysis. Reinforcement of pavements: with welded mesh panel, with geogrids and with double twist steel wire mesh. Temporary and MAC pavements. Reinforced earth structures, cribb-walls, gabion-welded and sheet pile: reinforced earth with geosynthetics, reinforced earth with steel elements, cellular walls - cribb-walls, gabion-welded with double twist steel wire mesh and sheet pile. Naturalistic engineering: naturalistic interference, environmental interventions, types of interventions and measures for wildlife. Rockfall protection structures: the problem, the regulatory framework, forecasting models, typological classification of defense works and design of rockfall works. Environmental impact assessment: the rules of VIA (Environmental Impact Assessment) for transport infrastructures, the SIA (Environmental Impact Study) and the planning and the environment frameworks. Road retains system: legislation, choice of the retaining devices, indexes of severity, types of barriers, crash tests and FEM simulation. The road safety: accidents statistical data, the active and passive safety, regulatory framework, the Safety Audit in the design phase, the Safety Review in the control phase of the existing roads. The BIM in support of road design.

TEACHING METHODS

The didactic organization provides for 27 total hours of which 16 hours of lecture and 11 of practice. The course includes a design exercise (road intersection). The design exercise will be developed into groups of three students.

EVALUATION METHODS

Oral examination during which to ensure the knowledge and skills of the candidate. The questions are designed to check the clear understanding, by the candidate, of the phenomena and of the quantitative tools available to conduct the necessary analysis. The positive evaluation of guided exercises developed during the course represents a prerequisite to access to the oral examination. The overall evaluation will take into account the level of maturity reached in the exercises.



TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

- YANG H. HUANG, *Pavement Analysis and Design*, 2nd editions, 2004, Pearson Prentice Hall.
- A. KOBRYŃ, 2017. *Transition Curves for Highway Geometric Design*, Springer Tracts on Transportation and Traffic, ISBN 978-3-319-53726-9.
- M. AGOSTINACCHIO, D. CIAMPA, S. OLITA, 2010. *Strade ferrovie aeroporti – La progettazione geometrica in sicurezza*, III Edizione, EPC libri, ISBN 978-88-6310-223-9.
- M. AGOSTINACCHIO, D. CIAMPA, S. OLITA, 2012. *Movimento terra e macchine per lavori stradali – Problematiche, metodologie e soluzioni operative*, EPC s.r.l., ISBN 978-88-6310-387-8.
- M. AGOSTINACCHIO, D. CIAMPA, S. OLITA, 2011. *La progettazione delle strade – Guida alla corretta applicazione dei Decreti Ministeriali 5/11/2001, 22/04/04 e 19/04/06*, II Edizione, EPC libri, ISBN 978-88-6310-326-7.
- M. AGOSTINACCHIO, S. OLITA, 2002. *Elementi di ritenuta paramassi*, EPC Libri, Roma.
- F. GIANNINI, F. LA CAMERA, A. MARCHIONNA, 1993, *Appunti di Costruzione di Strade Ferrovie ed Aeroporti*, Masson ed. ESA.
- F. LA CAMERA, 1992, *Il calcolo del progetto stradale la planimetria*, Masson ed. ESA.
- Educational material online at URL: <https://sites.google.com/view/olita/home>
- Course notes provided by the professor and available in electronic format.

INTERACTION WITH STUDENTS

At the beginning of the course, after describing the objectives, program and verification methods, the teacher describes instruments and method of didactic material sharing (google drive shared folders, website, Telegram, etc.).

At the same time collects the list of students who wish to enroll in the course.

Reception hours: Tuesday from 9.30 to 11.30 at his own studio: School of Engineering (IV floor, room 56). In addition to the reception hours weekly, the teacher is always available immediately after each lesson and for urgent matters through its institutional e-mail.

EXAMINATION SESSIONS (FORECAST)¹

12/02/2020, 11/03/2020, 10/04/2020, 15/05/2020, 13/06/2020, 17/07/2020, 16/09/2020, 14/10/2020, 18/11/2020, 16/12/2020.

SEMINARS BY EXTERNAL EXPERTS YES NO

FURTHER INFORMATION

The attendance of didactic activities is automatically satisfied at the end of the semester in which they are located.

¹ Subject to possible changes: check the web site of the Teacher or the Department/School for updates.