



ANNEX 2.1
DEGREE PROGRAM DIDACTIC REGULATIONS
INGEGNERIA STRUTTURALE E GEOTECNICA
(STRUCTURAL AND GEOTECHNICAL ENGINEERING)
CLASS LM-23

School: Polytechnic and Basic Sciences

Department: Structures for Engineering and Architecture

Didactic Regulations in force since the academic year 2024-2025

Course: Theory and Design of Bridges	Teaching Language: Italian
SSD (Subject Areas): ICAR/09	CREDITS: 9
Course year: II	Type of Educational Activity: TAF-B (Caratterizzanti la classe LM-23)
Teaching Methods: in-person	
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The course aim is to provide in-depth knowledge and advanced methodologies for bridge design and assessment. Bridge classification according to structural configuration and construction method is illustrated. Types of loads for design of bridge structures are classified. Girder type bridges are studied, considering both prestressed reinforced concrete and composite steel-concrete girder cross-sections. The design theory of composite cross sections and the role of construction stages on the performance of the bridge deck against SLS and ULS are explained. The role of the deck slab in the distribution of traffic loads, local effects induced by point loads and corresponding resisting mechanisms are introduced. The influence line theory and its application to road bridges, the classification of bridge decks depending on transverse load distribution and the role of transverse beams are taught. The fundamental principles of arch, cable-stayed and suspension bridges are explained. Structural dynamics of common bridge types is covered, along with novel technologies for seismic protection such as base isolation with supplemental damping. Fundamentals of bridge monitoring are explained including SHM, static and dynamic monitoring systems. Existing bridges are presented in terms of common degradation phenomena, safety assessment procedures and available retrofit solutions.	
Objectives: The course provides the basic knowledge of bridge structural behaviour. Students are supposed to be able to analyze and process relevant information on the effects of external actions, typically considered in bridge design, according to the semi-probabilistic limit states method. The aim of the course is to acquaint students with the basic methodology and tools for design of new bridges and assessment of existing ones. During the course reference is made to the most recent international building codes and to construction methods and techniques.	
Propaedeuticities: 1) Theory and design of R.C. structures and/or Theory and design of steel structures 2) Earthquake engineering and Structural Dynamics	
Is a propaedeuticity for:	
Types of examinations and other tests: During the course, practical design applications will be assigned regarding a girder type bridge. The final exam will be oral and will include the discussion of the assigned design applications.	

