ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

REGOLAMENTO DIDATTICO DEL CORSO

# L-23 BUILDING CONSTRUCTION ENGINEEERING

Sede di Ravenna

**INDICE**

Qualora, unicamente a scopo di sintesi, nel presente regolamento sia usata la sola forma maschile, questa è da intendersi riferita in maniera inclusiva a tutte le persone che operano nell'ambito della comunità stessa.

## ART. 1 REQUISITI PER L'ACCESSO AL CORSO

**a. Conoscenze richieste per l'accesso**

Per essere ammessi al corso di laurea in Building Construction Engineering occorre essere in possesso di un diploma di scuola secondaria superiore o di altro titolo di studio conseguito all'estero, riconosciuto idoneo secondo la normativa vigente. Sono inoltre richieste le seguenti conoscenze e competenze di base:

- Buona conoscenza della matematica di base e della fisica di base
- Capacità di ragionamento logico
- Conoscenza della lingua inglese di livello almeno B2 del Quadro comune europeo di riferimento per la conoscenza delle lingue (QCER).

Per l'accesso al Corso è inoltre necessario possedere adeguate conoscenze nella lingua italiana. Gli studenti stranieri non in possesso di questo requisito dovranno inserire nel proprio piano di studi attività formative finalizzate al raggiungimento delle competenze richieste

Le modalità di verifica delle conoscenze richieste sono definite nel punto modalità di ammissione.

Se la verifica non è positiva vengono assegnati specifici obblighi formativi aggiuntivi (OFA), il cui assolvimento è oggetto di specifica verifica.
Gli studenti che non assolvano agli obblighi formativi aggiuntivi entro la data stabilita dagli Organi competenti e comunque entro il primo anno di corso devono ripetere l'iscrizione al medesimo anno.

**b. Modalità di ammissione**

Il corso di laurea è a numero programmato a livello locale, in relazione alle risorse disponibili.
Il numero di studenti iscrivibili e le modalità di svolgimento della selezione saranno resi pubblici ogni anno con il relativo bando di concorso.

La verifica delle conoscenze e competenze avviene mediante la definizione di una votazione minima nel test di accesso al corso a numero programmato stabilita nel relativo bando di concorso pubblicato sul Portale di Ateneo.

Agli studenti ammessi al corso con una votazione inferiore alla prefissata votazione minima, verrà assegnato un obbligo formativo aggiuntivo.

*Obblighi formativi aggiuntivi (OFA)*

L'obbligo formativo aggiuntivo consiste nella frequenza del corso di allineamento di matematica e di altre attività eventualmente attivate allo scopo.
L'obbligo formativo aggiuntivo assegnato si intende superato con il superamento della prova OFA di Mathematics entro i termini previsti dagli Organi Accademici.
Lo studente, al quale viene riconosciuto l'esame di Mathematical Analysis T1 è esonerato dalla verifica dell'assolvimento dell'OFA.

*Accertamento delle conoscenze e competenze linguistiche*

È richiesta la conoscenza della lingua inglese di livello almeno B2 del Quadro comune europeo di riferimento per la conoscenza delle lingue (QCER).
La competenza linguistica potrà essere accertata mediante la presentazione da parte del candidato di uno

dei certificati menzionati nel bando di concorso pubblicato sul Portale di Ateneo.

È richiesta inoltre, un'adeguata conoscenza della lingua italiana; pertanto, gli studenti stranieri privi della cittadinanza italiana dovranno obbligatoriamente sostenere un'attività formativa finalizzata al raggiungimento del livello richiesto.

Nel caso di mancato soddisfacimento dei requisiti di ammissione, è preclusa l'iscrizione al corso.

## ART. 2 PIANI DI STUDIO INDIVIDUALI

È prevista la possibilità di presentazione di piani di studio individuali con le modalità, i criteri e i termini resi noti tramite il Portale di Ateneo.

I piani di studio individuali, approvati dal Consiglio di corso di studio, non possono comunque prescindere dal rispetto dell'ordinamento didattico.

Qualora il piano di studio preveda la scelta di attività formative attivate presso corsi di studio a numero programmato, l'ammissione alle stesse deve essere previamente approvata anche dal Consiglio di corso di studio a numero programmato sulla base di criteri da questo preventivamente individuati.

## ART. 3 MODALITÀ DI SVOLGIMENTO DELLE ATTIVITÀ FORMATIVE E TIPOLOGIA DELLE FORME DIDATTICHE

Il piano didattico allegato indica le modalità di svolgimento delle attività formative e la relativa suddivisione in ore di didattica frontale, di esercitazioni pratiche, nonché la tipologia delle forme didattiche.
Eventuali ulteriori informazioni in merito saranno rese note annualmente sul Portale di Ateneo.

## ART. 4 FREQUENZA E PROPEDEUTICITÀ

La frequenza delle lezioni non è obbligatoria ma è fortemente consigliata.
Le eventuali propedeuticità delle singole attività formative sono stabilite annualmente dal Corso di Studio in sede di presentazione della programmazione didattica e rese note agli studenti prima dell'inizio delle lezioni, tramite il Portale di Ateneo.

## ART. 5 PERCORSO FLESSIBILE

Lo studente può optare per il percorso flessibile che consente di completare il corso di studio in un tempo superiore o inferiore alla durata normale secondo le modalità definite nel Regolamento Studenti.
Le attività formative previste dal percorso di studio, in caso di necessaria disattivazione, potranno essere sostituite, per garantire la qualità e la sostenibilità dell'offerta didattica.

## ART. 6 PROVE DI VERIFICA DELLE ATTIVITÀ FORMATIVE

Il piano didattico allegato prevede i casi in cui le attività formative si concludono con un esame con votazione in trentesimi oppure con un giudizio di idoneità.
Le modalità di svolgimento delle verifiche sono stabilite annualmente dal Consiglio di corso di studio in sede di presentazione della programmazione didattica e rese note agli studenti prima dell'inizio delle lezioni tramite il Portale di Ateneo.

## ART. 7 ATTIVITÀ FORMATIVE A SCELTA DALLO STUDENTE

Lo studente può scegliere tra le attività formative attivate in Ateneo purché coerenti con il percorso formativo.

Il corso di studio considera coerenti con il progetto formativo le attività formative che il Consiglio di corso di studio individua annualmente e rende note tramite il sito del Corso di Studio.

Se lo studente sceglie un'attività formativa diversa da quelle considerate coerenti, secondo i sopraindicati criteri predeterminati, deve fare richiesta al Consiglio di corso di studio nei termini previsti annualmente e resi noti tramite pubblicazione sul Portale di Ateneo.
Il Consiglio valuterà la coerenza della scelta con il percorso formativo dello studente.

## ART. 8 CRITERI DI RICONOSCIMENTO DEI CREDITI ACQUISITI IN CORSI DI STUDIO DELLA STESSA CLASSE

Il riconoscimento dei crediti acquisiti nei precedenti studi universitari è determinato, su istanza dello studente, dal Consiglio di corso di studio.

I crediti formativi universitari acquisiti sono riconosciuti per non meno della metà e fino a concorrenza dei crediti dello stesso settore scientifico disciplinare previsto dall'ordinamento didattico del corso di studio.

Qualora, effettuati i riconoscimenti in base alle norme del presente regolamento, residuino crediti non utilizzati, il Consiglio di corso di studio può riconoscerli valutando il caso concreto sulla base delle affinità didattiche e culturali.

## ART. 9 CRITERI DI RICONOSCIMENTO DEI CREDITI ACQUISITI IN CORSI DI STUDIO DI DIVERSA CLASSE, PRESSO UNIVERSITÀ TELEMATICHE E IN UNIVERSITÀ ESTERE

Il riconoscimento dei crediti acquisiti in precedenti studi universitari è determinato, su istanza dello studente, dal Consiglio di corso di studio.

I crediti formativi universitari acquisiti sono riconosciuti dal Consiglio di corso di studio sulla base dei seguenti criteri:

- numero di CFU o equivalenti (es. ECTS) o, in mancanza di essi, numero di ore complessive;
- analisi del programma svolto;
- valutazione della congruità dei settori scientifico disciplinari e dei contenuti delle attività formative in cui lo studente ha maturato i crediti con gli obiettivi formativi specifici del corso di studio e delle singole attività formative da riconoscere, perseguendo comunque la finalità di mobilità degli studenti.

Il riconoscimento è effettuato fino a concorrenza dei crediti formativi universitari previsti dall'ordinamento didattico del corso di studio.

Qualora, effettuati i riconoscimenti in base alle norme del presente regolamento, residuino crediti non utilizzati, il Consiglio di corso di studio può riconoscerli valutando il caso concreto sulla base delle affinità didattiche e culturali.

## ART. 10 CRITERI DI RICONOSCIMENTO DELLE CONOSCENZE E ABILITÀ EXTRAUNIVERSITARIE

Possono essere riconosciute conoscenze e abilità extrauniversitarie nei casi previsti dalla normativa vigente. La richiesta di riconoscimento sarà valutata dal Consiglio di corso di studio tenendo conto del numero massimo di crediti riconoscibili fissato nell'ordinamento didattico del corso.
Il riconoscimento potrà avvenire qualora l'attività sia ritenuta coerente con gli obiettivi formativi specifici del corso di studio.

## ART. 11 PROVA FINALE

**a. Caratteristiche della prova finale**

La prova finale di laurea consiste nella predisposizione di un elaborato scritto in lingua inglese su un argomento coerente con gli obiettivi del corso di studio. Lo studente dovrà dimostrare la capacità di applicare e comunicare le conoscenze acquisite nel Corso di Studio stesso.

**b. Modalità di svolgimento della prova finale**

È ammesso a sostenere la prova finale lo studente che abbia acquisito tutti i crediti previsti dal proprio piano di studio, ad eccezione di quelli relativi alla prova finale. La prova finale si svolge attraverso l'esposizione e la discussione davanti alla Commissione di Laurea di una relazione scritta il cui argomento, scelto dallo studente, sia coerente con gli obiettivi formativi del Corso di Studio.

L'elaborato deve essere discusso pubblicamente nel corso di una seduta della Commissione formata e nominata secondo quanto disposto dall'art. 19 del Regolamento Didattico d'Ateneo.
Nella discussione lo studente deve dimostrare la capacità di applicare e comunicare le conoscenze acquisite nel Corso di Studio stesso.

Il voto è espresso in centodecimi. Il Consiglio di Corso può prevedere l'attribuzione di punteggi bonus che saranno resi noti tramite il portale di Ateneo. Il conferimento della lode richiede il giudizio unanime della Commissione.

***

La Commissione Paritetica docenti-studenti ha espresso parere favorevole sulla coerenza dei crediti assegnati alle singole attività formative e gli specifici obiettivi formativi programmati previsti dal piano didattico, ai sensi dell'articolo 12 comma 3 del DM 270/04 e ss.mm.ii.

**Anno Accademico** **2025/2026**
**Scuola** **Ingegneria e Architettura**
**Classe** **L-23 R-SCIENZE E TECNICHE DELL'EDILIZIA**
**Corso** **6623-BUILDING CONSTRUCTION ENGINEERING**

## Primo Anno di Corso

**Gruppo: 1) Attività formative obbligatorie**

**TAF:** **Ambito:**

**Cfu min:** **Cfu max:**
Note:

| Attività formativa | TIP | SSD | TAF | CFU | ORE F/E/L/N | FREQ. | VER. |
|---|---|---|---|---|---|---|---|
| 6623 000 000 99620 - 0 - ANALYSIS OF URBAN AND TERRITORIAL SYSTEMS | | ICAR/20 | | 6 | 60/0/0/0 | No | Voto |

Ambito: 006 - Architettura e urbanistica B

Obiettivi: The course offers students an understanding of theories, methodologies and tools of urban and regional planning. It examines planning across diverse contexts and scales, and it focuses in particular on the analysis and planning in, and for, towns, cities, and urban regions in Italy. The course deepens methods for building the necessary knowledge of territorial systems and their functioning and consequently the contents of spatial plans, policies and projects, understanding the governance and actors involved, assessing the institutional conditions of spatial interventions and understanding spatial planning challenges in an international context.

Obiettivi inglese: The course offers students an understanding of theories, methodologies and tools of urban and regional planning. It examines planning across diverse contexts and scales, and it focuses in particular on the analysis and planning in, and for, towns, cities, and urban regions in Italy. The course deepens methods for building the necessary knowledge of territorial systems and their functioning and consequently the contents of spatial plans, policies and projects, understanding the governance and actors involved, assessing the institutional conditions of spatial interventions and understanding spatial planning challenges in an international context.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 6623 000 000 99658 - 0 - APPLIED ECONOMIC ANALYSIS I.C. | | | | 6 | | | Voto |
| Modulo integrato: 99618 - INTRODUCTION TO APPLIED ECONOMIC ANALYSIS AND INDUSTRY STUDIES | | SECS-P/06 | | 2 | 20/0/0/0 | No | |

Ambito: 2019 - Attività formative affini o integrative C

Obiettivi: Through this course, the student learns the basic elements of applied economic analysis, and the principles of business organization, management and strategies. Furthermore, the course introduces the student to the study of the construction industry from an economic perspective. At the end of the course, the student matures economic thinking, develops analytical skills and is able to handle economic and management theories, methods and tools (i.e., databases) to analyze autonomously selected industries and territories. Furthermore, the student achieves a working knowledge of the construction sectors in terms of key economic drivers, business organization and management, innovation performance, national policy and regulatory framework, as well as appraisal techniques.

Obiettivi inglese: Through this course, the student learns the basic elements of applied economic analysis, and the principles of business organization, management and strategies. Furthermore, the course introduces the student to the study of the construction industry from an economic perspective. At the end of the course, the student matures economic thinking, develops analytical skills and is able to handle economic and management theories, methods and tools (i.e., databases) to analyze autonomously selected industries and territories. Furthermore, the student achieves a working knowledge of the construction sectors in terms of key economic drivers, business organization and management, innovation performance, national policy and regulatory framework, as well as appraisal techniques.

Modulo integrato: 99619 - CONSTRUCTION INDUSTRY ECONOMICS AND MANAGEMENT | ICAR/22 | 4 | 40/0/0/0 | No

Ambito: 2019 - Attività formative affini o integrative C

Obiettivi: Through this course, the student learns the basic elements of applied economic analysis, and the principles of business organization, management and strategies. Furthermore, the course introduces the student to the study of the construction industry from an economic perspective. At the end of the course, the student matures economic thinking, develops analytical skills and is able to handle economic and management theories, methods and tools (i.e., databases) to analyze autonomously selected industries and territories. Furthermore, the student achieves a working knowledge of the construction sectors in terms of key economic drivers, business organization and management, innovation performance, national policy and regulatory framework, as well as appraisal techniques.

Obiettivi inglese: Through this course, the student learns the basic elements of applied economic analysis, and the principles of business organization, management and strategies. Furthermore, the course introduces the student to the study of the construction industry from an economic perspective. At the end of the course, the student matures economic thinking, develops analytical skills and is able to handle economic and management theories, methods and tools (i.e., databases) to analyze autonomously selected industries and territories. Furthermore, the student achieves a working knowledge of the construction sectors in terms of key economic drivers, business organization and management, innovation performance, national policy and regulatory framework, as well as appraisal techniques.

6623 000 000 99616 - 0 - APPLIED GEOLOGY | GEO/05 | 6 | 60/0/0/0 | No | Voto

Ambito: 190 - Formazione scientifica di base A

Obiettivi: The course is designed to instruct the students to recognize rock-forming minerals and rock textures in order to classify specimens and outcrops understanding their physico-chemical behaviour. Moreover, the course is designed to introduce the students to the natural hazards, focusing on geological hazards and geological risk. At the end of the course the students will be also able to read and understand geomorphological maps and documents needed for the design of buildings on the basis of general concepts of stratigraphy and structural geology. They will be also able to conduct geological surveys and select the most appropriate solution for geological risk mitigation and prevention.

Obiettivi inglese: The course is designed to instruct the students to recognize rock-forming minerals and rock textures in order to classify specimens and outcrops understanding their physico-chemical behaviour. Moreover, the course is designed to introduce the students to the natural hazards, focusing on geological hazards and geological risk. At the end of the course the students will be also able to read and understand geomorphological maps and documents needed for the design of buildings on the basis of general concepts of stratigraphy and structural geology. They will be also able to conduct geological surveys and select the most appropriate solution for geological risk mitigation and prevention.

6623 000 000 99615 - 0 - CHEMISTRY AND TECHNOLOGY OF MATERIALS | ING-IND/22 | 9 | 90/0/0/0 | No | Voto

Ambito: 2019 - Attività formative affini o integrative C

Obiettivi: During the course, the basic principles of chemistry and stoichiometry, the chemical and structural+ characteristics of matter and the energetic aspects of chemical transformations will be illustrated. Moreover, the course provides the tools for evaluating and selecting the materials to be used in buildings: students will learn the main chemical, physical and mechanical properties of most used building materials, as well as their technical characteristic and durability in different working environments.

Obiettivi inglese: During the course, the basic principles of chemistry and stoichiometry, the chemical and structural+ characteristics of matter and the energetic aspects of chemical transformations will be illustrated. Moreover, the course provides the tools for evaluating and selecting the materials to be used in buildings: students will learn the main chemical, physical and mechanical properties of most used building materials, as well as their technical characteristic and durability in different working environments.

6623 000 000 99622 - 0 - DRAWING AND CAD | ICAR/17 | 9 | 90/0/0/0 | No | Voto

Ambito: 2169 - Formazione nella storia e rappresentazione A

Obiettivi: The course aims to provide the theoretical knowledge and operational tools for the representation of architectural elements, both with traditional techniques and with CAD techniques. The aim is to achieve graphic maturity in the use of the language of drawing and technical representation, educating the student in the use of the appropriate graphic tools.

Obiettivi inglese: The course aims to provide the theoretical knowledge and operational tools for the representation of architectural elements, both with traditional techniques and with CAD techniques. The aim is to achieve graphic maturity in the use of the language of drawing and technical representation, educating the student in the use of the appropriate graphic tools.

6623 000 000 99623 - 0 - GENERAL PHYSICS | FIS/01 | 9 | 90/0/0/0 | No | Voto

Ambito: 190 - Formazione scientifica di base A

Obiettivi: Through this course the student learns the basic elements of Classical Mechanics: vectorial analysis, kinematics laws, dynamics both of point and of single body, work and energy concept. At the end of this course, students will learn: 1) to use mathematical models as a medium for quantitative reasoning and describing physical reality, 2) to apply the classical conservation laws as a basis of deriving and understanding physics principles, 3) to describe physics concepts verbally, graphically, and mathematically, 4) problem solving skills related to physics principles.

Obiettivi inglese: Through this course the student learns the basic elements of Classical Mechanics: vectorial analysis, kinematics laws, dynamics both of point and of single body, work and energy concept. At the end of this course, students will learn: 1) to use mathematical models as a medium for quantitative reasoning and describing physical reality, 2) to apply the classical conservation laws as a basis of deriving and understanding physics principles, 3) to describe physics concepts verbally, graphically, and mathematically, 4) problem solving skills related to physics principles.

| | | | | | |
|---|---|---|---|---|---|
| 6623 000 000 99614 - 0 - MATHEMATICAL ANALYSIS T-1 | MAT/05 | 9 | 90/0/0/0 | No | Voto |

Ambito: 190 - Formazione scientifica di base A

Obiettivi: During the course, the student learns the basic knowledge of Mathematical Analysis for functions in one real variable and some elementary tools of linear algebra. At the end of the course, He/She masters the notions of limit, continuity, differential calculus and integration of functions of one real variable as well as some basic results concerning the matrix calculus. The student can solve simple problems raising from pure and applied sciences.

Obiettivi inglese: During the course, the student learns the basic knowledge of Mathematical Analysis for functions in one real variable and some elementary tools of linear algebra. At the end of the course, He/She masters the notions of limit, continuity, differential calculus and integration of functions of one real variable as well as some basic results concerning the matrix calculus. The student can solve simple problems raising from pure and applied sciences.

| | | | | | |
|---|---|---|---|---|---|
| 6623 000 000 99621 - 0 - MATHEMATICAL ANALYSIS T-2 | MAT/05 | 6 | 60/0/0/0 | No | Voto |

Ambito: 190 - Formazione scientifica di base A

Obiettivi: Through the course the student learns the basic results as well as the basic tools of advanced calculus. At the end of the course, he/she masters the notions of partial derivatives, differentiability and integrability for functions of several real variables. He/She will be able to apply this knowledge to the study of many problems posed by pure and applied sciences.

Obiettivi inglese: Through the course the student learns the basic results as well as the basic tools of advanced calculus. At the end of the course, he/she masters the notions of partial derivatives, differentiability and integrability for functions of several real variables. He/She will be able to apply this knowledge to the study of many problems posed by pure and applied sciences.

## Secondo Anno di Corso

**Gruppo: 1) Attività formative obbligatorie**

**TAF: Ambito:**

**Cfu min: Cfu max:**

Note:

| Attività formativa | TIP | SSD | TAF | CFU | ORE F/E/L/N | FREQ. | VER. |
|---|---|---|---|---|---|---|---|
| 6623 000 000 99656 - 0 - ARCHITECTURAL TECHNOLOGY I.C. | | | | 12 | | | Voto |
| Modulo integrato: 99626 - FUNDAMENTALS OF ARCHITECTURAL TECHNOLOGY | | ICAR/10 | | 6 | 60/0/0/0 | No | |

Ambito: 006 - Architettura e urbanistica B

Obiettivi: Through this course, the student learns the basic elements of architectural technology and the
principles of construction project management. Furthermore, the course introduces the student to the study of buildings from the technical, functional, morphological and construction process point of view.
At the end of the course, students will be able to know the main construction principles of the buildings, split up the building system into technological units and technical elements, knowing the materials and the functions related to each of them, and understanding the basic methods and instruments of construction project management: time and cost planning, project control, job site optimisation and occupational health and safety.

Obiettivi inglese: Through this course, the student learns the basic elements of architectural technology and the
principles of construction project management. Furthermore, the course introduces the student to the study of buildings from the technical, functional, morphological and construction process point of view.
At the end of the course, students will be able to know the main construction principles of the buildings, split up the building system into technological units and technical elements, knowing the materials and the functions related to each of them, and understanding the basic methods and instruments of construction project management: time and cost planning, project control, job site optimisation and occupational health and safety.

Modulo integrato: 99627 - BUILDING SITES AND PRODUCTION | ICAR/11 | 6 | 60/0/0/0 | No

Ambito: 1197 - Ingegneria della sicurezza e protezione delle costruzioni edili B

Obiettivi: Through this course, the student learns the basic elements of architectural technology and the principles of construction project management. Furthermore, the course introduces the student to the study of buildings from the technical, functional, morphological and construction process point of view.
At the end of the course, students will be able to know the main construction principles of the buildings, split up the building system into technological units and technical elements, knowing the materials and the functions related to each of them, and understanding the basic methods and instruments of construction project management: time and cost planning, project control, job site optimisation and occupational health and safety.

Obiettivi inglese: Through this course, the student learns the basic elements of architectural technology and the principles of construction project management. Furthermore, the course introduces the student to the study of buildings from the technical, functional, morphological and construction process point of view.
At the end of the course, students will be able to know the main construction principles of the buildings, split up the building system into technological units and technical elements, knowing the materials and the functions related to each of them, and understanding the basic methods and instruments of construction project management: time and cost planning, project control, job site optimisation and occupational health and safety.

---

6623 000 000 99629 - 0 - BUILDING INFORMATION MODELING (BIM) | ICAR/17 | 6 | 60/0/0/0 | No | Voto

Ambito: 2169 - Formazione nella storia e rappresentazione A

Obiettivi: At the end of the course the student has developed an innovative approach to the AEC world, extended to the whole lifecycle of the building; critically knows the most widespread IT tools, the characteristic elements of integrated modeling (intelligent parametric objects), the principles of software interoperability and teamworking. In particular the student is able to effectively operate the interfacing between 2D and 3D and masters the working environment for data analysis and synthesis, variant and modification management.

Obiettivi inglese: At the end of the course the student has developed an innovative approach to the AEC world, extended to the whole lifecycle of the building; critically knows the most widespread IT tools, the characteristic elements of integrated modeling (intelligent parametric objects), the principles of software interoperability and teamworking. In particular the student is able to effectively operate the interfacing between 2D and 3D and masters the working environment for data analysis and synthesis, variant and modification management.

---

6623 000 000 99624 - 0 - BUILDING PHYSICS AND ENERGY EFFICIENT BUILDING DESIGN | ING-IND/11 | 12 | 120/0/0/0 | No | Voto

Ambito: 2019 - Attività formative affini o integrative C

Obiettivi: The course introduces students to building physics topics, HVAC principles, and energy-efficient building systems. It describes energy modelling techniques for analysing buildings as an integrated system of interacting components and processes leading to low energy consumption and satisfying occupant comfort. At the end of the course, the student will have acquired knowledge of the building system's thermal behaviour and design skills for different types of technological envelopes and HVAC devices for closed spaces.

Obiettivi inglese: The course introduces students to building physics topics, HVAC principles, and energy-efficient building systems. It describes energy modelling techniques for analysing buildings as an integrated system of interacting components and processes leading to low energy consumption and satisfying occupant comfort. At the end of the course, the student will have acquired knowledge of the building system's thermal behaviour and design skills for different types of technological envelopes and HVAC devices for closed spaces.

---

6623 000 000 99628 - 0 - CONSTRUCTION OF URBAN AND METROPOLITAN ROADS | ICAR/04 | 6 | 60/0/0/0 | No | Voto

Ambito: 168 - Edilizia e ambiente B

Obiettivi: The Construction of Urban and Metropolitan Roads Course considers the topic of the infrastructures for urban and metropolitan mobility. Starting from the evolution of road infrastructures, the student will learn the basic elements and fundamentals for the design of modern paved surfaces in urban areas, with a specific focus on those for vulnerable users. Aspects related to the organization, design and construction operations of spaces and road pavements in urban area will be discussed together with their maintenance strategies. At the end of the course, students will be able to know the main design and construction principles of urban road pavements, including novel technologies and sustainable materials. A specific focus will be given to systems, design solutions and applications to reduce the impacts and externalities of road pavements on the surrounding environment.

Obiettivi inglese: The Construction of Urban and Metropolitan Roads Course considers the topic of the infrastructures for urban and metropolitan mobility. Starting from the evolution of road infrastructures, the student will learn the basic elements and fundamentals for the design of modern paved surfaces in urban areas, with a specific focus on those for vulnerable users. Aspects related to the organization, design and construction operations of spaces and road pavements in urban area will be discussed together with their maintenance strategies. At the end of the course, students will be able to know the main design and construction principles of urban road pavements, including novel technologies and sustainable materials. A specific focus will be given to systems, design solutions and applications to reduce the impacts and externalities of road pavements on the surrounding environment.

6623 000 000 99630 - 0 - HYDRAULICS ICAR/01 6 60/0/0/0 No Voto

Ambito: 168 - Edilizia e ambiente B

Obiettivi: The course aims to offer the basic knowledge of fluid mechanics and hydraulics. Specifically, the student will be able to evaluate the hydrostatic and dynamic force on surfaces; to verify and design simples networks of pipelines and open channels. Such learning outcomes will be the basis for the analysis and design of water management systems, hydraulic networks, urban water systems, river flood protection.

Obiettivi inglese: The course aims to offer the basic knowledge of fluid mechanics and hydraulics. Specifically, the student will be able to evaluate the hydrostatic and dynamic force on surfaces; to verify and design simples networks of pipelines and open channels. Such learning outcomes will be the basis for the analysis and design of water management systems, hydraulic networks, urban water systems, river flood protection.

6623 000 000 99632 - 0 - PRINCIPLES OF STRUCTURAL MECHANICS ICAR/08 12 120/0/0/0 No Voto

Ambito: 168 - Edilizia e ambiente B

Obiettivi: The aim of the course is to equip students with the fundamental principles of solid and structural mechanics required to analyze stress and strain states in beams and frames under various loading conditions, including axial stress, bending moments, torsion, and shear. Additionally, the course provides foundational knowledge of the mechanical properties of materials, experimental techniques, and quality control procedures. Students will develop the skills necessary to solve statically determinate and indeterminate structures and perform structural safety assessments.

Obiettivi inglese: The aim of the course is to equip students with the fundamental principles of solid and structural mechanics required to analyze stress and strain states in beams and frames under various loading conditions, including axial stress, bending moments, torsion, and shear. Additionally, the course provides foundational knowledge of the mechanical properties of materials, experimental techniques, and quality control procedures. Students will develop the skills necessary to solve statically determinate and indeterminate structures and perform structural safety assessments.

6623 000 000 99655 - 0 - TYPOLOGICAL, MORPHOLOGICAL AND DISTRIBUTIVE CHARACTERS OF BUILDINGS LAB ICAR/14 6 60/0/0/0 No Voto

Ambito: 006 - Architettura e urbanistica B

Obiettivi: At the end of the course, the student possesses the basic knowledge of the association of elementary units of the building, through the analysis of the units themselves and their use in the architectural composition, addressing the "characters" not only from a distributive point of view but also from a typological, constructive and stylistic point of view. It also knows the correct cataloguing of the different types of buildings that have crossed the history of construction in Europe.

Obiettivi inglese: At the end of the course, the student possesses the basic knowledge of the association of elementary units of the building, through the analysis of the units themselves and their use in the architectural composition, addressing the "characters" not only from a distributive point of view but also from a typological, constructive and stylistic point of view. It also knows the correct cataloguing of the different types of buildings that have crossed the history of construction in Europe.

## Terzo Anno di Corso

**Gruppo: 1) Attività formative obbligatorie**

**TAF: Ambito:**

**Cfu min: Cfu max:**

Note:

| Attività formativa | TIP | SSD | TAF | CFU | ORE F/E/L/N | FREQ. | VER. |
|---|---|---|---|---|---|---|---|
| 6623 000 000 99646 - 0 - FINAL EXAMINATION | | | | 3 | 0/0/0/0 | No | |

Ambito: 1018 - Per la prova finale E

Obiettivi: Preparation for the final examination according to the provisions of the Teaching Regulation of the Program.

Obiettivi inglese: Preparation for the final examination according to the provisions of the Teaching Regulation of the Program.

6623 000 000 B8713 - 0 - BUILDING DESIGN RESEARCH LAB I.C. 9 Giudizio

Modulo integrato: B8714 - LABORATORY OF GEOTECHNICAL AND STRUCTURAL DESIGN 6 0/0/60/0 No

Ambito: 1147 - Altre conoscenze utili per l'inserimento nel mondo del lavoro F

Obiettivi: This course aims to provide students with practical and applied skills in the structural and geotechnical fields, connecting the theoretical concepts acquired in these disciplines. By the end of the course, students will have developed the following competencies: Modelling Skills - A. Perform load analysis and define resistance models for various limit states (Ultimate and Serviceability Limit States); B. Determine soil strength and compressibility parameters using experimental data; C. Conduct structural analyses through numerical models, validating them with simplified approaches; Design Skills - D. Design and verify structural elements, including floor slabs, beams, columns, shallow and deep foundations; E. Consider soil-structure interaction during the design process; Professional Skills - F. Prepare professional technical documentation, including detailed calculation reports and comprehensive structural and geotechnical drawings.

Obiettivi inglese: This course aims to provide students with practical and applied skills in the structural and geotechnical fields, connecting the theoretical concepts acquired in these disciplines. By the end of the course, students will have developed the following competencies: Modelling Skills - A. Perform load analysis and define resistance models for various limit states (Ultimate and Serviceability Limit States); B. Determine soil strength and compressibility parameters using experimental data; C. Conduct structural analyses through numerical models, validating them with simplified approaches; Design Skills - D. Design and verify structural elements, including floor slabs, beams, columns, shallow and deep foundations; E. Consider soil-structure interaction during the design process; Professional Skills - F. Prepare professional technical documentation, including detailed calculation reports and comprehensive structural and geotechnical drawings.

Modulo integrato: 01626 - ESERCITAZIONI PRATICHE 3 0/30/0/0 No

Ambito: 1147 - Altre conoscenze utili per l'inserimento nel mondo del lavoro F

Obiettivi: Questo corso offre agli studenti l'opportunità di acquisire competenze pratiche e applicative nei settori strutturale e geotecnico, consolidando i concetti teorici appresi. Le attività saranno organizzate attorno a un progetto pratico, attraverso il quale gli studenti svilupperanno capacità di modellazione, competenze di progettazione e abilità nella redazione di documentazione tecnica professionale.

Obiettivi inglese: This course offers students the opportunity to acquire practical and applied skills in the structural and geotechnical fields, reinforcing the theoretical concepts learned. Activities will be organized around a practical project, through which students will develop modelling skills, and proficiency in drafting professional technical documentation.

6623 000 000 99643 - 0 - GEOMATICS ENGINEERING ICAR/06 12 120/0/0/0 No Voto

Ambito: 168 - Edilizia e ambiente B

Obiettivi: Through this course the student learns the basic elements of Geomatics: Geodesy, modern surveying techniques, numerical cartography and Geographic Information Systems. At the end of the class, the student has acquired the skills in collecting, visualizing, managing and analysing geospatial data concerning objects, buildings, infrastructures, cities, land. He/she is able to project and perform surveying activities by means of topographic instrument, and to process the acquired data. Furthermore, the student is able to handle cartographic representations and to use GIS software for the visualization, management and processing of geospatial data.

Obiettivi inglese: Through this course the student learns the basic elements of Geomatics: Geodesy, modern surveying techniques, numerical cartography and Geographic Information Systems. At the end of the class, the student has acquired the skills in collecting, visualizing, managing and analysing geospatial data concerning objects, buildings, infrastructures, cities, land. He/she is able to project and perform surveying activities by means of topographic instrument, and to process the acquired data. Furthermore, the student is able to handle cartographic representations and to use GIS software for the visualization, management and processing of geospatial data.

6623 000 000 99640 - 0 - PRINCIPLES OF GEOTECHNICS ICAR/07 6 60/0/0/0 No Voto

Ambito: 168 - Edilizia e ambiente B

Obiettivi: The course aims at giving students the principles and the fundamental concepts of Soil Mechanics. At the end of the class, the students understand the behaviour of soils as engineering materials and the main experimental methodologies for the determination of their physical and mechanical parameters. The final goal is to provide a sound basic knowledge for solving simple geotechnical problems as well as for carrying out the subsequent work on Geotechnical Engineering.

Obiettivi inglese: The course aims at giving students the principles and the fundamental concepts of Soil Mechanics. At the end of the class, the students understand the behaviour of soils as engineering materials and the main experimental methodologies for the determination of their physical and mechanical parameters. The final goal is to provide a sound basic knowledge for solving simple geotechnical problems as well as for carrying out the subsequent work on Geotechnical Engineering.

| | | | | | |
|---|---|---|---|---|---|
| 6623 000 000 99641 - 0 - PRINCIPLES OF STRUCTURAL ENGINEERING | ICAR/09 | 12 | 120/0/0/0 | No | Voto |

Ambito: 168 - Edilizia e ambiente B

Obiettivi: Through this course the student learns the basic elements of Structural Engineering. At the end of the class, the student has acquired the skills in design of the structural systems aimed at the stability of buildings: evaluation of the structural safety through probabilistic approaches, construction materials, direct and indirect actions, structural modelling and analysis, verification of structural elements realized with reinforced concrete and structural steel, design and construction criteria, construction details, codes for structural design.

Obiettivi inglese: Through this course the student learns the basic elements of Structural Engineering. At the end of the class, the student has acquired the skills in design of the structural systems aimed at the stability of buildings: evaluation of the structural safety through probabilistic approaches, construction materials, direct and indirect actions, structural modelling and analysis, verification of structural elements realized with reinforced concrete and structural steel, design and construction criteria, construction details, codes for structural design.

| | | | | | |
|---|---|---|---|---|---|
| 6623 000 000 99642 - 0 - SUSTAINABLE BUILDING ASSESSMENT | ICAR/12 | 6 | 60/0/0/0 | No | Voto |

Ambito: 006 - Architettura e urbanistica B

Obiettivi: After providing students with an overview of the objectives, principles and basic tools for assessing the sustainability levels of a building, the course will illustrate the characteristics of both the Green Building Rating Systems (GBRS) schemes and the LCA approach. A guided application of both methods to a simple case study will allow the student to understand the latitude of the notion of building sustainability and the different means to measure it.

Obiettivi inglese: After providing students with an overview of the objectives, principles and basic tools for assessing the sustainability levels of a building, the course will illustrate the characteristics of both the Green Building Rating Systems (GBRS) schemes and the LCA approach. A guided application of both methods to a simple case study will allow the student to understand the latitude of the notion of building sustainability and the different means to measure it.

**Gruppo: 2) Attività formative a scelta libera consigliate**

**TAF: D Ambito: 1008 - A scelta dello studente**

**Cfu min: 12 Cfu max: 12** Num. Esami: 1 Num. Idoneità: 0
Il Dipartimento garantisce che, ai fini del rispetto del limite massimo di 20 esami/5 idoneità i CFU a scelta saranno acquisibili con 1 esami e 0 idoneità

Note: Scegli almeno 12 crediti tra tutte le attività formative dell'Ateneo. Il Corso di Studio considera coerenti con il percorso formativo le seguenti:

| Attività formativa | TIP | SSD | TAF | CFU | ORE F/E/L/N | FREQ. | VER. |
|---|---|---|---|---|---|---|---|
| 6623 000 000 99647 - 0 - CONSOLIDATION, IMPROVEMENT AND RESTORATION OF TRADITIONAL ARCHITECTURE | | ICAR/19 | D | 6 | 60/0/0/0 | No | Voto |

Ambito: 1008 - A scelta dello studente

Obiettivi: Starting from the necessity to prepare an in-depth analysis of historical buildings, the course aims at understanding historical construction techniques and the main damage phenomena and their occurrence. Will be suggested expeditious and detailed approaches for the interpretation of the construction, to be understood as tools for assessing the state of conservation and residual capacity, also in relation to phenomena such as climate change and seismic events. Finally, the techniques of consolidation and improvement of historical structures will be illustrated.

Obiettivi inglese: Starting from the necessity to prepare an in-depth analysis of historical buildings, the course aims at understanding historical construction techniques and the main damage phenomena and their occurrence. Will be suggested expeditious and detailed approaches for the interpretation of the construction, to be understood as tools for assessing the state of conservation and residual capacity, also in relation to phenomena such as climate change and seismic events. Finally, the techniques of consolidation and improvement of historical structures will be illustrated.

| | | | | | |
|---|---|---|---|---|---|
| 6623 000 000 72764 - 0 - NUMERICAL METHODS | MAT/08 | 12 | 96/0/0/0 | No | Voto |

Ambito: 1008 - A scelta dello studente D

Obiettivi: A successful learner from this course will be able to: a) deal with numerical analysis topics such as: accuracy, truncation and round-off errors, condition numbers, convergence, stability, curve-fitting, interpolation, numerical differentiation and integration, numerical linear algebra; b) deal with numerical methods for solving ordinary and partial differential equations, with finite difference and finite element methods for parabolic and elliptic partial differential equations, applications of computer programs to case studies derived from civil engineering practice.

Obiettivi inglese: A successful learner from this course will be able to: a) deal with numerical analysis topics such as: accuracy, truncation and round-off errors, condition numbers, convergence, stability, curve-fitting, interpolation, numerical differentiation and integration, numerical linear algebra; b) deal with numerical methods for solving ordinary and partial differential equations, with finite difference and finite element methods for parabolic and elliptic partial differential equations, applications of computer programs to case studies derived from civil engineering practice.

6623 000 000 72748 - 0 - SUSTAINABILITY IN CONSTRUCTION | ICAR/09 | 6 | 48/0/0/0 | No | Voto

Ambito: 1008 - A scelta dello studente D

Obiettivi: Course overview, introduction to sustainability. Definitions, trends, measurements. Aspects on sustainability (environmental, economic, social). Environmental footprint of engineered systems, with emphasis on civil engineering (energy consumptions, CO2 emissions, etc).
Performance-based design and life-cycle planning. The various aspects to be considered for sustainability in construction: material's production and transformation, management of construction process, occupancy (use costs energy and cost consumptions), occupancy (maintenance and durability issues), end-of-life costs, reuse/recycling. Life-cycle analysis (LCA): Cradle-to-grave analysis, LCA as a min-max problem. Mathematical tools required (Optimization techniques, multi-criteria decision making methods, simulation methods, statistics). Social Life Cycle Assessment (S-LCA) and Ecologically based LCA (Eco-LCA). Safety as a prerequisite. Energy efficiency in buildings. Renewable energy with emphasis to building applications (solar thermal and photovoltaic energy, geothermal energy). Protocols for rating systems for the design, construction and operation of high performance green buildings (LEED system, Ithaca).

Obiettivi inglese: Course overview, introduction to sustainability. Definitions, trends, measurements. Aspects on sustainability (environmental, economic, social). Environmental footprint of engineered systems, with emphasis on civil engineering (energy consumptions, CO2 emissions, etc).
Performance-based design and life-cycle planning. The various aspects to be considered for sustainability in construction: material's production and transformation, management of construction process, occupancy (use costs energy and cost consumptions), occupancy (maintenance and durability issues), end-of-life costs, reuse/recycling. Life-cycle analysis (LCA): Cradle-to-grave analysis, LCA as a min-max problem. Mathematical tools required (Optimization techniques, multi-criteria decision making methods, simulation methods, statistics). Social Life Cycle Assessment (S-LCA) and Ecologically based LCA (Eco-LCA). Safety as a prerequisite. Energy efficiency in buildings. Renewable energy with emphasis to building applications (solar thermal and photovoltaic energy, geothermal energy). Protocols for rating systems for the design, construction and operation of high performance green buildings (LEED system, Ithaca).

6623 000 000 93724 - 0 - SUSTAINABLE URBAN DESIGN AND PLANNING WORKSHOP I.C. | 12 | Voto

Modulo integrato: 93722 - PLANNING IN A CHANGING SOCIETY | ICAR/20 | 8 | 0/0/80/0 | No

Ambito: 1008 - A scelta dello studente D

Obiettivi: At the end of the course the student will know how to intepret the characterisitcs of the contemporary city, with particiular reference to the new challenges of urban and rural contexts. The student will know the main available tools and methods to understand, plan and desing the urban and rural areas, aiming at improving the quality of life and the wellbeing of the citizens both in urban and rural areas.

Obiettivi inglese: At the end of the course the student will know how to intepret the characterisitcs of the contemporary city, with particiular reference to the new challenges of urban and rural contexts. The student will know the main available tools and methods to understand, plan and desing the urban and rural areas, aiming at improving the quality of life and the wellbeing of the citizens both in urban and rural areas.

Modulo integrato: 93723 - PLANNING IN A CHANGING CLIMATE | ICAR/20 | 4 | 0/0/40/0 | No

Ambito: 1008 - A scelta dello studente D

Obiettivi: At the end of the course the student will know how to intepret the characterisitcs of the contemporary city, with particiular reference to the new challenges of urban and rural contexts. The student will know the main available tools and methods to understand, plan and desing the urban and rural areas, aiming at improving the quality of life and the wellbeing of the citizens both in urban and rural areas.

Obiettivi inglese: At the end of the course the student will know how to intepret the characterisitcs of the contemporary city, with particiular reference to the new challenges of urban and rural contexts. The student will know the main available tools and methods to understand, plan and desing the urban and rural areas, aiming at improving the quality of life and the wellbeing of the citizens both in urban and rural areas.

6623 000 000 99648 - 0 - THE HUMAN SETTLEMENTS THROUGHT HISTORY: CONSTRUCTION , MATERIALS AND THEORIES | ICAR/18 | 6 | 60/0/0/0 | No | Voto

Ambito: 1008 - A scelta dello studente D

Obiettivi: At the end of the course, the student will have acquired in-depth knowledge of historical techniques and building characters. The understanding derived from laboratory activities will also refer to the laws regulating the structural reasons and the constructive feasibility of the technical solutions within the frame of a broader knowledge in the history of construction.

Obiettivi inglese: At the end of the course, the student will have acquired in-depth knowledge of historical techniques and building characters. The understanding derived from laboratory activities will also refer to the laws regulating the structural reasons and the constructive feasibility of the technical solutions within the frame of a broader knowledge in the history of construction.

6623 000 000 99649 - 0 - URBAN WATER SUPPLY AND DRAINAGE NETWORKS | ICAR/02 | 6 | 60/0/0/0 | No | Voto

Ambito: 1008 - A scelta dello studente D

Obiettivi: At the end of the course, the student owns the basic knowledge and principles for the design and management of hydraulic structures relative to water supply and drainage collection systems in an urban context. Upon completion of the course, the student is capable to identify and quantify the main variables for a critical analysis of urban hydrology problems and knows the basic criteria for the design and verification of urban drainage and water supply networks, as well as for the definition and design of water delivery and collection system within civil buildings.

Obiettivi inglese: At the end of the course, the student owns the basic knowledge and principles for the design and management of hydraulic structures relative to water supply and drainage collection systems in an urban context. Upon completion of the course, the student is capable to identify and quantify the main variables for a critical analysis of urban hydrology problems and knows the basic criteria for the design and verification of urban drainage and water supply networks, as well as for the definition and design of water delivery and collection system within civil buildings.

**Legenda:**

CFU: crediti formativi universitari
TAF: tipologia attività formativa (A-di base; B-caratterizzanti; C-affini o integrative; F-ulteriori attività formative; D-a scelta autonoma dello studente; S- stages e tirocini presso imprese, enti pubblici o privati, ordini professionali; E-per la prova finale)
SSD: settore scientifico disciplinare
F/E/L/N: indica le ore Frontali/Esercitazioni/Laboratori/Ore di esercitazione e/o laboratorio tenute da non docenti
Freq.: segnala l'esistenza di un obbligo di frequenza
Ver.: indica la modalità di verifica del profitto finale
TIP.: indica la tipologia delle forme didattiche. Queste possono essere CON: convenzionali, E-L: in e-learning, MIX: miste, C/E: convenzionali e/o e-learning. Il corso di studio può definire annualmente una delle modalità.