



## ANNEX 1.2

### DEGREE PROGRAM DIDACTIC REGULATIONS

#### CIVIL ENGINEERING FOR HYDRAULICS AND TRANSPORTATION

#### CLASS LM-23

**School:** Politecnica e delle Science di Base

**Department:** Ingegneria Civile, Edile e Ambientale (DICEA)

**Didactic Regulation in force since the academic year 2025-2026**

### PIANO DEGLI STUDI

#### KEY

#### Type of Educational Activity (TAF):

**B** = Characterising

**C** = Related or Supplementary

**D** = At the student's choice

**E** = Final examination and language knowledge

**F** = Further training activities

#### Year I

#### Common training pathway

| Year I                                      |                      |                                          |         |       |                                                |                                               |     |                   |                      |
|---------------------------------------------|----------------------|------------------------------------------|---------|-------|------------------------------------------------|-----------------------------------------------|-----|-------------------|----------------------|
| Common training pathway                     |                      |                                          |         |       |                                                |                                               |     |                   |                      |
| Title Course                                | SSD                  | Module                                   | CREDITS | Hours | Type Activities<br>(lectures, workshops, etc.) | Course Modalities<br>(in-person, by distance) | TAF | Disciplinary area | Mandatory/optional   |
| Advanced hydraulics                         | CEAR-01/A ex ICAR/01 | Single                                   | 9       | 72    | Frontal lesson                                 | In-person                                     | B   | Civil engineering | Mandatory            |
| Transportation system theory                | CEAR-03/B ex ICAR/05 | Single                                   | 9       | 72    | Frontal lesson                                 | In-person                                     | B   | Civil engineering | Mandatory            |
| Models, data and coding for civil engineers | CEAR-01/B ex ICAR/02 | Hydraulic Modeling for Civil Engineering | 5       | 40    | Frontal lesson                                 | In-person                                     | B   | Civil engineering | Mandatory            |
|                                             | CEAR-03/B ex ICAR/05 | Coding for civil engineers               | 5       | 40    |                                                | In-person                                     | B   |                   |                      |
| Maritime constructions                      | CEAR-01/B ex ICAR/02 | Single                                   | 9       | 72    | Frontal lesson                                 | In-person                                     | B   | Civil engineering | 9 CFU of your choice |
| Hydrology                                   | CEAR-01/B ex ICAR/02 | Single                                   | 9       | 72    | Frontal lesson                                 | In-person                                     | B   | Civil engineering |                      |
| Road design                                 | CEAR-03/A ex ICAR/04 | Single                                   | 9       | 72    | Frontal lesson                                 | In-person                                     | B   | Civil engineering | Mandatory            |

|                              |  |  |    |    |  |  |   |                                              |                       |
|------------------------------|--|--|----|----|--|--|---|----------------------------------------------|-----------------------|
| See training pathway tables* |  |  | 9* | 72 |  |  | C | Related or complementary training activities | By curricular choice* |
|------------------------------|--|--|----|----|--|--|---|----------------------------------------------|-----------------------|

\* 9 CFU from Table 1 in the case of Water training pathway; 9 CFU from Table 2 in the case of Transportation training pathway; 9 CFU from Table 3 in the case of Construction training pathway.

|                                | Year I                  |        |         |       |                                                |                                               |     |                                              |                         |
|--------------------------------|-------------------------|--------|---------|-------|------------------------------------------------|-----------------------------------------------|-----|----------------------------------------------|-------------------------|
|                                | Common training pathway |        |         |       |                                                |                                               |     |                                              |                         |
| Title Course                   | SSD                     | Module | CREDITS | Hours | Type Activities<br>(lectures, workshops, etc.) | Course Modalities<br>(in-person, by distance) | TAF | Disciplinary area                            | Mandatory/ optional     |
| See training pathway tables ** |                         |        | 27**    | 216   |                                                |                                               | C   | Related or complementary training activities | By curricular choice ** |
| See Table 4                    |                         |        | 18      | 144   |                                                |                                               | D   | At the student’s choice                      | At the student’s choice |
| Internship/ laboratory         | —                       | —      | 5       | 125   | Internship / laboratory                        | In-person                                     | F   | Further training activities                  | Mandatory               |
| Final test                     | —                       | —      | 15      | —     | —                                              |                                               | E   | —                                            | Mandatory               |

\*\* 27 CFU from Table 1 in the case of Water training pathway; 27 CFU from Table 2 in the case of Transportation training pathway; 18 CFU from Table 3 and 9 CFU from Table 1 or Table 2 in the case of Construction training pathway.

|                                                   | TABLE 1: Water training pathway |        |         |       |                                                |                                               |     |                                              |                                       |
|---------------------------------------------------|---------------------------------|--------|---------|-------|------------------------------------------------|-----------------------------------------------|-----|----------------------------------------------|---------------------------------------|
| Title Course                                      | SSD                             | Module | CREDITS | Hours | Type Activities<br>(lectures, workshops, etc.) | Course Modalities<br>(in-person, by distance) | TAF | Disciplinary area                            | Mandatory or optional                 |
| Hydraulic measurements and models                 | CEAR-01/A ex ICAR/01            | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | C   | Related or complementary training activities | 9 CFU of your choice during Year 1    |
| Mud and Debris flows: propagation and modelling   | CEAR-01/A ex ICAR/01            | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | C   | Related or complementary training activities |                                       |
| Theory and technique of free surface flows        | CEAR-01/A ex ICAR/01            | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | C   | Related or complementary training activities |                                       |
| Waterworks and sewerages                          | CEAR-01/B ex ICAR/02            | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | C   | Related or complementary training activities |                                       |
| Maritime constructions                            | CEAR-01/B ex ICAR/02            | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | C   | Related or complementary training activities |                                       |
| Hydrology                                         | CEAR-01/B ex ICAR/02            | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | C   | Related or complementary training activities |                                       |
| Costal engineering                                | CEAR-01/B ex ICAR/02            | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | C   | Related or complementary training activities |                                       |
| Flood defense measures and irrigation systems     | CEAR-01/B ex ICAR/02            | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | C   | Related or complementary training activities |                                       |
| Design and management of hydraulic systems        | CEAR-01/B ex ICAR/02            | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | C   | Related or complementary training activities |                                       |
| Wastewater treatment and valorisation             | CEAR-02/A ex ICAR/03            | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | C   | Related or complementary training activities |                                       |
| Environmental assessments and authorizations      | CEAR-02/A ex ICAR/03            | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | C   | Related or complementary training activities | 27 CFU** of your choice during Year 2 |
| Environment fluid dynamics and hydraulics         | CEAR-01/A ex ICAR/01            | Single | 6       | 48    | Frontal lesson                                 | In-person                                     | C   | Related or complementary training activities |                                       |
| Advanced technologies for hydrological monitoring | CEAR-01/B ex ICAR/02            | Single | 6       | 48    | Frontal lesson                                 | In-person                                     | C   | Related or complementary training activities |                                       |
| Resilience of hydraulic systems                   | CEAR-01/A ex ICAR/01            | Single | 6       | 48    | Frontal lesson                                 | In-person                                     | C   | Related or complementary training activities |                                       |
| Coastal Protection and Power Supply               | CEAR-01/B ex ICAR/02            | Single | 6       | 48    | Frontal lesson                                 | In-person                                     | C   | Related or complementary training activities |                                       |

\*\*\* The student can choose three courses of 9 CFU or four courses of which three of 6 CFU and one of 9 CFU

#### List of propaedeuticities:

- Hydrology, for Flood defense measures and irrigation systems
- Advanced hydraulics, for Mud and Debris flows: propagation and modelling
- Maritime constructions, for Costal engineering

**TABLE 2: Transportation training pathway**

| <b>Title Course</b>                                    | <b>SSD</b>           | <b>Module</b> | <b>CREDITS</b> | <b>Hours</b> | <b>Type Activities<br/>(lectures, workshops, etc.)</b> | <b>Course Modalities<br/>(in-person, by distance)</b> | <b>TAF</b> | <b>Disciplinary area</b>                     | <b>Mandatory/ optional</b>              |
|--------------------------------------------------------|----------------------|---------------|----------------|--------------|--------------------------------------------------------|-------------------------------------------------------|------------|----------------------------------------------|-----------------------------------------|
| Infrastructure - Building Information Modeling (I-BIM) | CEAR-03/A ex ICAR/04 | Single        | 9              | 72           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities | 9 CFU of your choice during Year I      |
| Road safety laboratory                                 | CEAR-03/A ex ICAR/04 | Single        | 9              | 72           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities |                                         |
| Road safety                                            | CEAR-03/A ex ICAR/04 | Single        | 9              | 72           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities |                                         |
| Road, railway and airport pavements                    | CEAR-03/A ex ICAR/04 | Single        | 9              | 72           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities |                                         |
| Road and railway traffic control                       | CEAR 03/B ex ICAR/05 | Single        | 9              | 72           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities |                                         |
| Transportation system planning                         | CEAR 03/B ex ICAR/05 | Single        | 9              | 72           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities |                                         |
| Transportation system design                           | CEAR 03/B ex ICAR/05 | Single        | 9              | 72           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities |                                         |
| Intelligent transportation systems                     | CEAR 03/B ex ICAR/05 | Single        | 9              | 72           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities |                                         |
| Urban and metropolitan transport                       | CEAR 03/B ex ICAR/05 | Single        | 9              | 72           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities |                                         |
| Freight systems                                        | CEAR 03/B ex ICAR/05 | Single        | 9              | 72           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities | 27 CFU*** of your choice during Year II |
| Laboratory of Road Safety                              | CEAR-03/A ex ICAR/04 | Single        | 6              | 48           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities |                                         |
| Resilience of Transportation Systems                   | CEAR 03/B ex ICAR/05 | Single        | 6              | 48           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities |                                         |
| Smart and electric mobility                            | CEAR 03/B ex ICAR/05 | Single        | 6              | 48           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities |                                         |
| Smart roads and cooperative driving                    | CEAR 03/B ex ICAR/05 | Single        | 6              | 48           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities |                                         |

\*\*\* The student can choose three courses of 9 CFU or four courses of which three of 6 CFU and one of 9 CFU

**List of propaedeutics: None**

**TABLE 3: Construction training pathway**

| <b>Title Course</b>                                        | <b>SSD</b>                    | <b>Module</b> | <b>CREDITS</b> | <b>Hours</b> | <b>Type Activities<br/>(lectures, workshops, etc.)</b> | <b>Course Modalities<br/>(in-person, by distance)</b> | <b>TAF</b> | <b>Disciplinary area</b>                     | <b>Mandatory/ optional</b>                 |
|------------------------------------------------------------|-------------------------------|---------------|----------------|--------------|--------------------------------------------------------|-------------------------------------------------------|------------|----------------------------------------------|--------------------------------------------|
| Foundations                                                | CEAR 05/A<br>ex ICAR/07       | Single        | 9              | 72           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities | 9 CFU<br>of your choice<br>during Year I   |
| Geotechnics for infrastructures                            | CEAR 05/A<br>ex ICAR/07       | Single        | 9              | 72           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities |                                            |
| Support works                                              | CEAR 05/A<br>ex ICAR/07       | Single        | 9              | 72           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities |                                            |
| Tunnels and Underground structures                         | CEAR 05/A<br>ex ICAR/07       | Single        | 9              | 72           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities |                                            |
| Geological risks in the project of civil engineering works | GEOS-03/B<br>ex GEO/05        | Single        | 9              | 72           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities |                                            |
| Structures for hydraulics and transportation               | CEAR 07/A<br>ex ICAR/09       | Single        | 9              | 72           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities | 18 CFU<br>of your choice<br>during Year II |
| Theory and design of steel construction                    | CEAR 07/A<br>ex ICAR/09       | Single        | 9              | 72           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities |                                            |
| Theory and design of bridges                               | CEAR 07/A<br>ex ICAR/09       | Single        | 9              | 72           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities |                                            |
| Sustainable Road Materials                                 | CEAR-03/A<br>ex ICAR/04       | Single        | 9              | 72           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities |                                            |
| Project management for civil works                         | IEGE-01/A<br>ex<br>ING-IND/35 | Single        | 9              | 72           | Frontal lesson                                         | In-person                                             | C          | Related or complementary training activities |                                            |

**List of propaedeutics: None**

|                                                                     | TABLE 4: At student's choice exams (common for all training pathways) |        |         |       |                                                |                                               |     |                         |                          |
|---------------------------------------------------------------------|-----------------------------------------------------------------------|--------|---------|-------|------------------------------------------------|-----------------------------------------------|-----|-------------------------|--------------------------|
| Title Course                                                        | SSD                                                                   | Module | CREDITS | Hours | Type Activities<br>(lectures, workshops, etc.) | Course Modalities<br>(in-person, by distance) | TAF | Disciplinary area       | Mandatory/optional       |
| Hydraulic measurements and models <sup>1</sup>                      | CEAR-01/A ex ICAR/01                                                  | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice | 18 CFU*** of your choice |
| Mud and Debris flows: propagation and modelling <sup>1</sup>        | CEAR-01/A ex ICAR/01                                                  | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Theory and technique of free surface flows <sup>1</sup>             | CEAR-01/A ex ICAR/01                                                  | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Waterworks and sewerages <sup>1</sup>                               | CEAR-01/B ex ICAR/02                                                  | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Maritime constructions <sup>1</sup>                                 | CEAR-01/B ex ICAR/02                                                  | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Hydrology <sup>1</sup>                                              | CEAR-01/B ex ICAR/02                                                  | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Costal engineering <sup>1</sup>                                     | CEAR-01/B ex ICAR/02                                                  | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Flood defense measures and irrigation systems <sup>1</sup>          | CEAR-01/B ex ICAR/02                                                  | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Design and management of hydraulic systems <sup>1</sup>             | CEAR-01/B ex ICAR/02                                                  | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Wastewater treatment and valorisation <sup>1</sup>                  | CEAR-02/A ex ICAR/03                                                  | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Environment fluid dynamics and hydraulics <sup>1</sup>              | CEAR-01/A ex ICAR/01                                                  | Single | 6       | 48    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Advanced technologies for hydrological monitoring <sup>1</sup>      | CEAR-01/B ex ICAR/02                                                  | Single | 6       | 48    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Resilience of hydraulic systems <sup>1</sup>                        | CEAR-01/A ex ICAR/01                                                  | Single | 6       | 48    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Coastal Protection and Power Supply <sup>1</sup>                    | CEAR-01/B ex ICAR/02                                                  | Single | 6       | 48    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Infrastructure - Building Information Modeling (I-BIM) <sup>2</sup> | CEAR-03/A ex ICAR/04                                                  | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Road safety laboratory <sup>2</sup>                                 | CEAR-03/A ex ICAR/04                                                  | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Road safety <sup>2</sup>                                            | CEAR-03/A ex ICAR/04                                                  | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Road, railway and airport pavements <sup>2</sup>                    | CEAR-03/A ex ICAR/04                                                  | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Road and railway traffic control <sup>2</sup>                       | CEAR 03/B ex ICAR/05                                                  | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Transportation system planning <sup>2</sup>                         | CEAR 03/B ex ICAR/05                                                  | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Transportation system design <sup>2</sup>                           | CEAR 03/B ex ICAR/05                                                  | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Intelligent transportation systems <sup>2</sup>                     | CEAR 03/B ex ICAR/05                                                  | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Urban and metropolitan transport <sup>2</sup>                       | CEAR 03/B ex ICAR/05                                                  | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Freight systems <sup>2</sup>                                        | CEAR 03/B ex ICAR/05                                                  | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Laboratory of Road Safety <sup>2</sup>                              | CEAR-03/A ex ICAR/04                                                  | Single | 6       | 48    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |
| Resilience of Transportation Systems <sup>2</sup>                   | CEAR 03/B ex ICAR/05                                                  | Single | 6       | 48    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                          |

**TABELLA 4: At student's choice exams (common for all training pathways) – (continue)**

| Title Course                                                            | SSD                     | Module | CREDITS | Hours | Type Activities<br>(lectures, workshops, etc.) | Course Modalities<br>(in-person, by distance) | TAF | Disciplinary area       | Mandatory/ optional |
|-------------------------------------------------------------------------|-------------------------|--------|---------|-------|------------------------------------------------|-----------------------------------------------|-----|-------------------------|---------------------|
| Smart and electric mobility <sup>2</sup>                                | CEAR 03/B ex ICAR/05    | Single | 6       | 48    | Frontal lesson                                 | In-person                                     | D   | At the student's choice | See previous page   |
| Smart roads and cooperative driving <sup>2</sup>                        | CEAR 03/B ex ICAR/05    | Single | 6       | 48    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                     |
| Foundations <sup>3</sup>                                                | CEAR 05/A ex ICAR/07    | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                     |
| Geotechnics for infrastructures <sup>3</sup>                            | CEAR 05/A ex ICAR/07    | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                     |
| Support works <sup>3</sup>                                              | CEAR 05/A ex ICAR/07    | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                     |
| Tunnels and Underground structures <sup>3</sup>                         | CEAR 05/A ex ICAR/07    | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                     |
| Geological risks in the project of civil engineering works <sup>3</sup> | GEOS-03/B ex GEO/05     | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                     |
| Structures for hydraulics and transportation <sup>3</sup>               | CEAR 07/A ex ICAR/09    | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                     |
| Theory and design of steel construction <sup>3</sup>                    | CEAR 07/A ex ICAR/09    | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                     |
| Theory and design of bridges <sup>3</sup>                               | CEAR 07/A ex ICAR/09    | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                     |
| Sustainable Road Material <sup>3</sup> s                                | CEAR-03/A ex ICAR/04    | Single | 6       | 48    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                     |
| Project management for civil works <sup>3</sup> i                       | IEGE-01/A ex ING-IND/35 | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                     |
| Economics ed organisation                                               | IEGE-01/A ex ING-IND/35 | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                     |
| Economics and organization of enterprises ii                            | IEGE-01/A ex ING-IND/35 | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                     |
| Fundamentals of law for the engineer                                    | GIUR-02/A ex IUS/04     | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                     |
| Economy and real estate appraisals                                      | CEAR-03/C ex ICAR/22    | Single | 9       | 72    | Frontal lesson                                 | In-person                                     | D   | At the student's choice |                     |

\*\*\* The student can choose two courses of 9 CFU or three courses of 6 CFU

<sup>1</sup> Exams from Water training pathway or common training pathway

<sup>2</sup> Exams from Transportation training pathway

<sup>3</sup> Exams from Construction training pathway

#### List of propaedeuticities:

- Hydrology, for Flood defense measures and irrigation systems
- Advanced hydraulics, for Mud and Debris flows: propagation and modelling

- **Maritime constructions, for Costal engineering**

## MINOR IT – INFRASTRUTTURE SMART

FURTHER COURSES THAT CAN BE INCLUDED IN THE STUDY PLAN, ALSO FOR THE PURPOSE OF ACHIEVING THE “MINOR IT – INFRASTRUTTURE SMART”, INCLUDING THOSE WHICH REFER, IN PARTICULAR, TO THE ELECTRICAL AND INFORMATICS AREAS (SEE TABLES A, B, C E D)

**Table A of “Minor IT – Infrastrutture Smart”**

**activated in the University as part of the inter-university guiding project “Transition Engineering”:**

**Cross-disciplinary training activities in the technical-scientific area specifically developed for the Minor.**

| LM of reference context |                                                 | Exam                                                                 | CFU | SSD                        | Semester |
|-------------------------|-------------------------------------------------|----------------------------------------------------------------------|-----|----------------------------|----------|
|                         |                                                 | Unmanned Aircraft Systems for civil infrastructures                  | 3   | IIND-01/E<br>ex ING-IND/05 | 2        |
|                         |                                                 | Laboratorio di Simulazione Multi-Metodo nella Produzione Industriale | 6   | IIND-05/A<br>ex ING-IND/17 | 2        |
|                         |                                                 | Energy efficiency for smart infrastructures                          | 9   | IIND-07/A<br>ex ING-IND/10 | 2        |
| LM 28                   | Ingegneria Elettrica                            | Smart Production Systems                                             | 9   | IIND-05/A<br>ex ING-IND/17 | 2        |
| LM 28                   | Ingegneria Elettrica                            | Electrical Technologies for Smart Infrastructures                    | 6   | IMS-01/B<br>ex ING-INF/07  | 2        |
| LM 23                   | Transportation Engineering and Mobility         | Smart roads and cooperative driving                                  | 6   | CEAR-03/B<br>ex ICAR/05    | 2        |
| LM 23                   | Transportation Engineering and Mobility         | Digital Maps and geological 3D models                                | 9   | GEOS-03/B<br>ex GEO/05     | 1        |
| LM 23                   | Ingegneria Civile per l'Idraulica e i Trasporti | Coastal protection and power supply                                  | 6   | CEAR-01/B<br>ex ICAR/02    | 2        |
| LM 23                   | Ingegneria Civile per l'Idraulica e i Trasporti | Infrastructure-Building Information Modeling (I-BIM)                 | 9   | CEAR-03/A<br>ex ICAR/04    | 2        |
| LM 23                   | Ingegneria Strutturale e Geotecnica             | Metodi computazionali in dinamica non lineare                        | 9   | CEAR-06A<br>ex ICAR/08     | 2        |
| LM 23                   | Ingegneria Strutturale e Geotecnica             | Valutazione e monitoraggio delle strutture                           | 9   | CEAR-07/A<br>ex ICAR/09    | 2        |

**Table B of “Minor IT – Infrastrutture Smart”  
activated in the University as part of the inter-university guiding project “Transition Engineering”:**

**Cross-disciplinary training activities in the technical-scientific area borrowed from the disciplinary training offer of the Study Courses**

| LM of reference context |                                                   | Exam                                                      | CFU | SSD                     | Semester |
|-------------------------|---------------------------------------------------|-----------------------------------------------------------|-----|-------------------------|----------|
| LM23                    | Ingegneria Civile per l'Idraulica e i Trasporti   | Misure e modelli idraulici                                | 9   | CEAR-01/A ex ICAR/01    | 2        |
| LM23                    | Ingegneria Civile per l'Idraulica e i Trasporti   | Interventi di difesa dalle piene e sistemi di irrigazione | 9   | CEAR-01/B ex ICAR/02    | 2        |
| LM23                    | Transportation Engineering and Mobility           | Road safety                                               | 9   | CEAR-03/A ex ICAR/04    | 2        |
| LM23                    | Transportation Engineering and Mobility           | Sustainable road materials                                | 9   | CEAR-03/A ex ICAR/04    | 2        |
| LM23                    | Transportation Engineering and Mobility           | Intelligent transportation systems                        | 9   | CEAR 03/B ex ICAR/05    | 2        |
| LM23                    | Ingegneria Civile per l'Idraulica e i Trasporti   | Pianificazione dei sistemi di trasporto                   | 9   | CEAR 03/B ex ICAR/05    | 2        |
| LM23                    | Transportation Engineering and Mobility           | Positioning and location-based services                   | 9   | CEAR-04/A ex ICAR/06    | 1        |
| LM23                    | Ingegneria Civile per l'Idraulica e i Trasporti   | Geotecnica delle infrastrutture                           | 9   | CEAR 05/A ex ICAR/07    | 2        |
| LM23                    | Transportation Engineering and Mobility           | Resilience of geotechnical systems                        | 6   | CEAR 05/A ex ICAR/07    | 2        |
| LM23                    | Ing. Strutturale e Geotecnica                     | Tunnels and underground structures                        | 9   | CEAR 05/A ex ICAR/07    | 2        |
| LM23                    | Ing. Strutturale e Geotecnica                     | Analisi strutturale con gli elementi finiti               | 9   | CEAR-06/A ex ICAR/08    | 2        |
| LM23                    | Ing. Strutturale e Geotecnica                     | Modellazione strutturale                                  | 9   | CEAR-06/A ex ICAR/08    | 2        |
| LM23                    | Ing. Strutturale e Geotecnica                     | Sistemi informativi per le costruzioni                    | 9   | CEAR 07/A ex ICAR/09    | 2        |
| LM23                    | Transportation Engineering and Mobility           | Structural health monitoring for infrastructures          | 9   | CEAR 07/A ex ICAR/09    | 1        |
| LM23                    | Ing. Strutturale e Geotecnica                     | Teoria e progetto di ponti                                | 9   | CEAR 07/A ex ICAR/09    | 1        |
| LM23                    | Ingegneria Civile per l'Idraulica e i Trasporti   | Architettura tecnica                                      | 9   | CEAR-08/A ex ICAR/10    | 2        |
| LM34                    | Ing. Navale                                       | Progettazione per l'additive manufacturing                | 6   | IIND 03/B ex ING-IND/15 | 2        |
| LM33                    | Ing. Meccanica per la Progettazione e Produzione  | Project management nella produzione industriale           | 9   | IIND-05/A ex ING-IND/17 | 1        |
| LM33                    | Ing. Meccanica per la Progettazione e Produzione  | Sicurezza e Manutenzione degli Impianti Industriali       | 9   | IIND-05/A ex ING-IND/17 | 2        |
| LM28                    | Ing. Elettrica                                    | Pianificazione e gestione dei sistemi elettrici           | 9   | IIND 08/B ex ING-IND/33 | 2        |
| LM23                    | Ingegneria Civile per l'Idraulica e i Trasporti   | Project management per le opere civili                    | 9   | IEGE-01/A ex ING-IND/35 | 2        |
| LM29                    | Ing. Elettronica                                  | Design of electronic circuits and systems                 | 9   | IINF-01/A ex ING-INF/01 | 2        |
| LM27                    | Ing. delle Telecomunicazioni e dei Media Digitali | Sistemi ad alta frequenza per la sicurezza e il 5G        | 9   | IINF-02/A ex ING-INF/02 | 2        |
| LM27                    | Ing. delle Telecomunicazioni e dei Media Digitali | Reti wireless                                             | 9   | IINF-03/A ex ING-INF/03 | 2        |
| LM27                    | Ing. delle Telecomunicazioni e dei Media Digitali | Sistemi di telecomunicazione                              | 9   | IINF-03/A ex ING-INF/03 | 2        |
| LM23                    | Transportation Engineering and Mobility           | Systems and control fundamentals                          | 9   | IINF-04/A ex ING-INF/04 | 1        |
| LM23                    | Transportation Engineering and Mobility           | Measurement sensors and transducers                       | 9   | IMS-01/B ex ING-INF/07  | 1        |
| LM27                    | Ing. delle Telecomunicazioni e dei Media Digitali | Instrumentation and measurements for smart industry       | 9   | IMS-01/B ex ING-INF/07  | 2        |
| LM23                    | Transportation Engineering and Mobility           | Statistical lab for industrial data analysis              | 9   | STAT-A01/B ex SECS-S/02 | 1        |



**Table C of “Minor IT – Infrastrutture Smart”  
activated in the University as part of the inter-university guiding project “Transition Engineering”:**

**Training activities for the promotion of digital skills**

| <b>Exam</b>                             | <b>CFU</b> | <b>SSD</b>                 | <b>Semester</b> |
|-----------------------------------------|------------|----------------------------|-----------------|
| Network security                        | 6          | IINF-05/A<br>ex ING-INF/05 | 2               |
| Machine learning and big data           | 9          | IINF-05/A<br>ex ING-INF/05 | 2               |
| Technologies for information systems    | 9          | IINF-05/A<br>ex ING-INF/05 | 2               |
| System and process control              | 9          | IINF-04/A<br>ex ING-INF/04 | 2               |
| Modelli e algoritmi di ottimizzazione   | 9          | MATH-06/A<br>ex MAT/09     | 2               |
| Robotics for bioengineering             | 6          | IINF-04/A<br>ex ING-INF/04 | 2               |
| Control of complex systems and networks | 6          | IINF-04/A<br>ex ING-INF/04 | 2               |

**Table D of “Minor IT – Infrastrutture Smart”  
activated in the University as part of the inter-university guiding project “Transition Engineering”:**

**Training activities for the promotion of transversal skills**

In the first application, and pending a detailed survey of the available teaching resources, the activities of Table D will be developed through seminar cycles, also accreditable as additional knowledge (TAF F). In the long term, the activities of Table D will preferably be structured through project work.