

Giornata della Didattica Innovativa

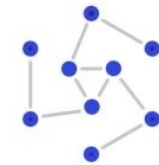


Università
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CIMDU

Centro per l'innovazione e
il miglioramento
della didattica universitaria

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Mentore per
la Didattica

LEADERSHIP, EMPOWERMENT, AND DIGITAL
INNOVATION IN EDUCATION AND LEARNING
(LEDIEL) - 39° ciclo

PROJECT-BASED LEARNING IN CIVIL ENGINEERING: *an opportunity to train complementary skills*

Davide Lo Presti

11/01/2024, Palermo

SMARTI**lab** Team

Ingegnerizzazione della sostenibilità di ogni fase del ciclo di vita delle infrastrutture di trasporto.



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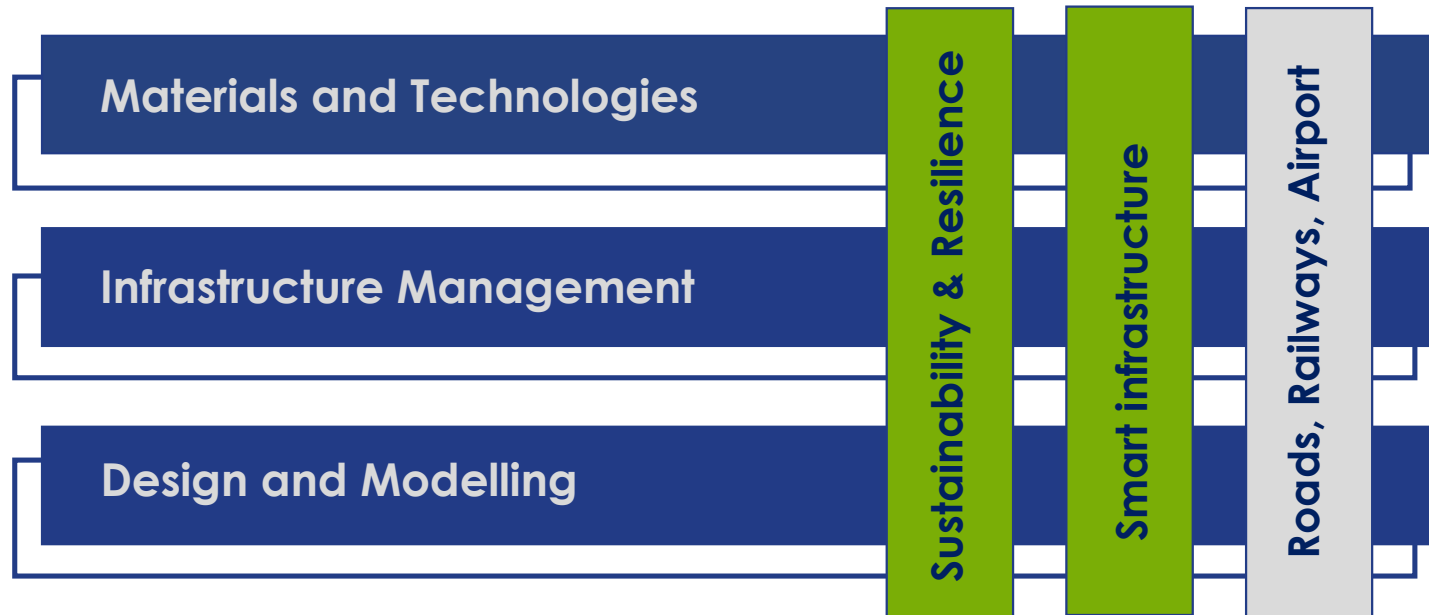


**Università
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SMARTI
lab Smart solutions for
sustainable transport
infrastructure

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SMARTI**lab** Themes



multi-disciplinary, fundamental and applied Research and Education for preserving existing transport infrastructure and shaping future transport systems

SMARTIlab Doctoral Networks



<http://superitn.eu>

(2013 - 2017) - Sustainable Pavement & Railways Initial Training Network training-through-research programme that empowered Europe by

- forming a new generation of 15 multi-disciplinary researchers
- Involving 29 partners from universities, research centres and companies/industries, from five EU countries (UK, Italy, France, Ireland and Spain) and the USA.



<http://smartietn.eu>

(2017-2021) - Sustainable Multi-Functional Automated Resilient Transport Infrastructure European Training Network towards the smartening of transport infrastructures in Europe and beyond.

- 15 multi-disciplinary researchers and
- more than **30 partners, 19 of which from industry (11 SMEs)** from **9 European countries, USA, Asia and Australia** will have the unmissable opportunity of learning-by-doing,

SMARTIlab EDUCATION



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Laurea Magistrale, Ingegneria Civile (LM-23) – UNIPA

- Smart Roads, Railways, Airports, (9 CFU)
- Sustainable Transport Infrastructure (6 CFU)



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“POWERCN2050: Pavement
Opportunities Worldwide in Education
and Research for Climate Neutral 2050”

Percorso di Studi Integrato di Laurea Magistrale Interateneo,
2-years Erasmus Mundus Joint Master in
“Sustainable and Resilient Pavement Engineering” –
Antwerp, UNIPA, Minho, Manipal – dal 2025/2026



Kick-Off meeting - Palermo 23-27 November 2023



PROJECT-BASED LEARNING IN CIVIL ENGINEERING:



UJG Mainz, November 2023

towards cooperation and harmonization for:

- **Project-based learning**
- *COIL: Collaborative Online International Learning*
- *BIP: Blended Intensive Programmes*



PROJECT-BASED LEARNING IN CIVIL ENGINEERING:

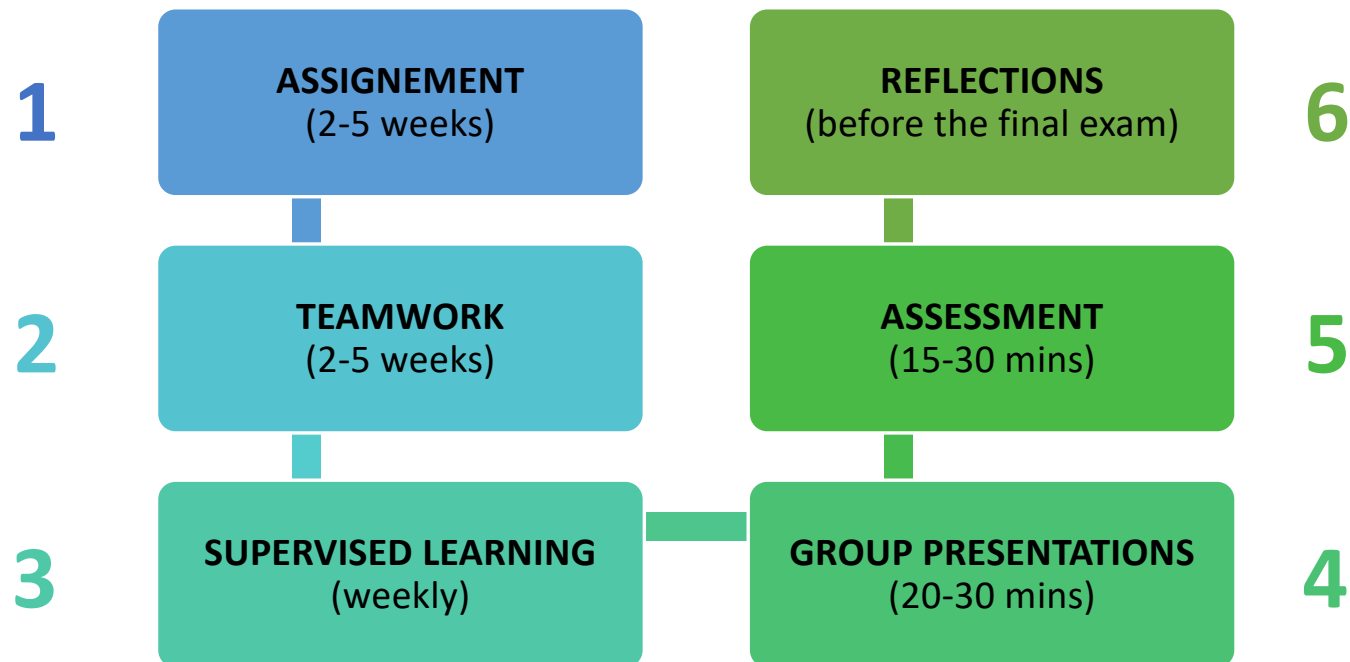
Brief description of the course (CSFA)

- Smart Roads, Railways, Airports (**9 ECTS**) is the last subject of the 2 years degree programme in civil engineering, hence, it has been shaped to provide students with cutting-edge contents as well as allowing students to gain complementary skills that will help them in their next career step.
- With this in mind, 2-3 project-based learning activities are included within the three modules of the course; these activities have been shaped to facilitate the learning process of main topics as well as allowing students to gain a series of complementary skills. (**5 – 10 students**)

PROJECT-BASED LEARNING IN CIVIL ENGINEERING:

Brief description of concept and set-up

Each project-based learning activity is structured in **6 stages**:



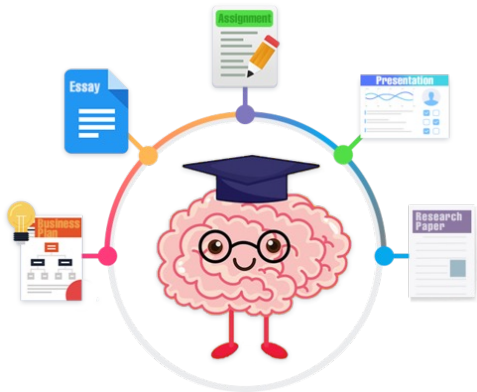
PROJECT-BASED LEARNING IN CIVIL ENGINEERING:

ASSIGNMENT
(2-5 weeks)

1. presentation of the activity and formation of the groups during one of the classes (15mins to 60 mins).

The students are

- provided with the **description of the activity** which some time needs an effort to actually identify the engineering problem
- asked to **propose the solution** in form of a report and group presentation.
- provided with an **evaluation rubric** and are informed that the evaluation will be performed at group-level.



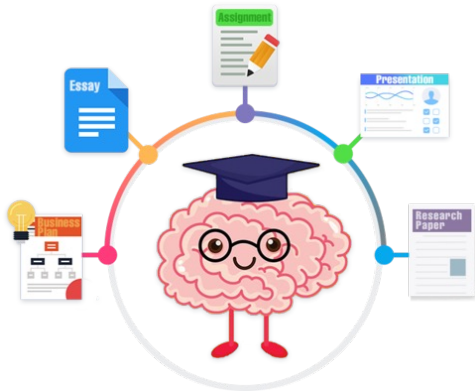
PROJECT-BASED LEARNING IN CIVIL ENGINEERING:

ASSIGNMENT
(2-5 weeks)

COMPLEMENTI STRADE FERROVIE
AEREOPORTI (17616)

Workshop 1

Smart Transport Infrastructure



Brief:

Using the SMARTI Guidelines, the reference documents on the slides, the other documents/links/video and any other relevant material related to Smart Transport Infrastructures, that you identify through research, prepare a presentation reporting how an existing transport infrastructure (road, railway, airport), might become “smarter” to cope with the fundamental challenges of our times

PROJECT-BASED LEARNING IN CIVIL ENGINEERING:

ASSIGNEMENT
(2-5 weeks)

COMPLEMENTI STRADE FERROVIE AEREOPORTI (17616)

Tasks:

You will need to structure your presentation with the sections listed below. Each section will be marked according to the attached rubric:

- Description of the selected SMARTI pillar with goals, state of the art, steppingstones, and vision to 2030
- Description of case study (existing transport infrastructure) with identification of constrains and opportunities
- Choice and explanation of “smartening” criteria
- Identification of a smarter transport infrastructure and assessment against “smartening” criteria
- Comparative discussion of assessment and conclusions



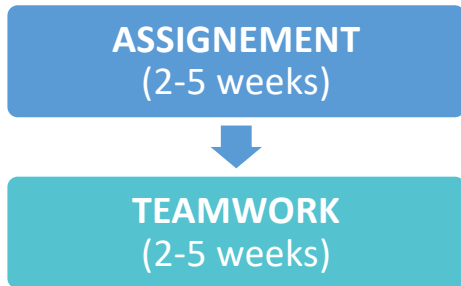
PROJECT-BASED LEARNING IN CIVIL ENG

ASSIGNEMENT
(2-5 weeks)



Quality of the presentation	Unclear progression of thoughts, failure to engage audience, poor quality slides, much too long or too short. 0 marks	Some structure but does not flow in places, some attempt to address the audience, legible slides, timing may be poor. 3 marks	Clear structure, good attempt to address the audience, clear and well-illustrated slides, good timing. 4 marks	Clear structure, fluent and engaging presentation, excellent graphics and layout, correct timing. 5 marks
Description of SMARTI pillar(s)	No description of goals, state of the art, steppingstones, and vision 0 marks	Goals, state of the art, steppingstones, and vision are identified but poor and disorganized 3 marks	Goals, state of the art, steppingstones, and vision are identified and described but perhaps incompletely 4 marks	Clearly defined and organised description of Goals, state of the art, steppingstones, and vision 5 marks
Description of case study with identification of constraints and opportunities	Superficial list of constraints and opportunities with no attempt to describe them. 0 marks	Several constraints and opportunities are identified with a brief description. 3 marks	Comprehensive list of constraints and opportunities are identified and described in some detail. 4 marks	Wide range of both constraints and opportunities considered and evidence of extensive research to understand their nature and extent. 6 marks
Choice and explanation of "smartening" assessment criteria	Smartening criteria are not stated 0 marks	Some smartening criteria are stated but are not explained or justified 3 marks	A range of smartening criteria are stated, along with how and why they were chosen 4 marks	Evidence of extensive research in identifying a full range of smartening criteria and clearly explained justification 6 marks
Assessment of case study against "smartening" criteria	No assessment of case study 0 marks	Cases study are assessed against the criteria but there may be little explanation of the results 3 marks	Cases study are assessed against the criteria and there is justification of the results but maybe incomplete or not always relevant 4 marks	The assessment has been made against all criteria and is justified with sound evidence. 5 marks
Comparative discussion of assessment and conclusions	No discussion or conclusions. 0 marks	Only superficial comparison of assessments, conclusions and answers to questions. 3 marks	Comparative assessment considers constraints and benefits with incomplete evidence. Appropriate conclusions. Questions are answered in some detail. 4 marks	Considers the relative constraints and benefits of both routes and refers to relevant evidence for justification. The conclusions are concise, justified and critical. Questions answered thoroughly and thoughtfully. 5 marks

PROJECT-BASED LEARNING IN CIVIL ENGINEERING:

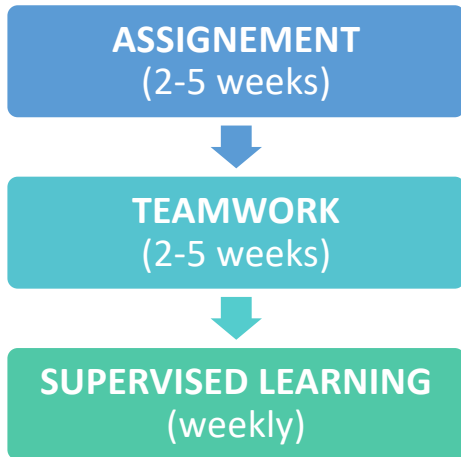


2. TEAMWORK outside the classroom (2 to 4 weeks).

- Creation of **groups** of 3-5 people (scalable). To stimulate collaboration and team-working
- Students are left **free to decide** the best way to define the problem, find solutions and deliver.



PROJECT-BASED LEARNING IN CIVIL ENGINEERING:

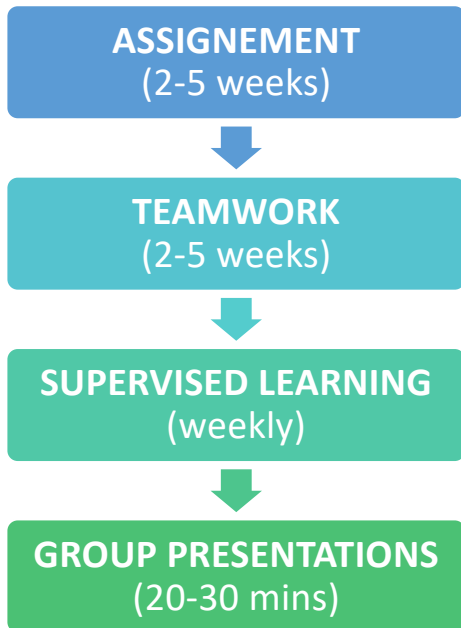


3. SUPERVISED LEARNING (15 mins to 60 mins every week).

- Up to 2 hours of support from the teacher is offered to students for any clarification in class.
- Groups continue working in class and also Teamwork is supervised



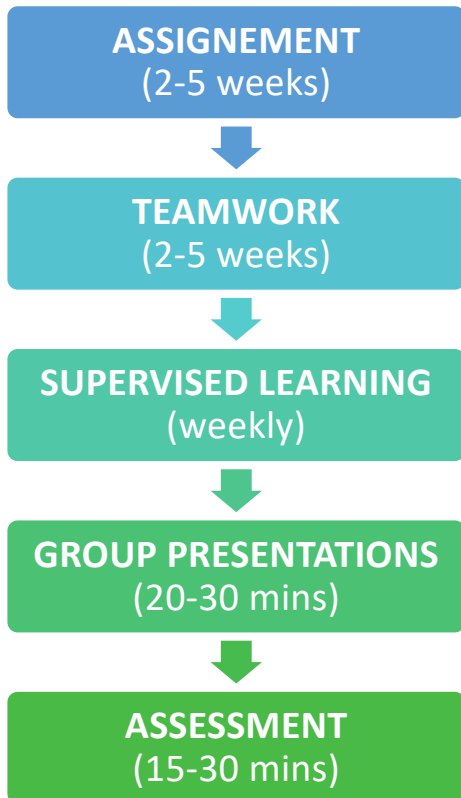
PROJECT-BASED LEARNING IN CIVIL ENGINEERING:



4. GROUP PRESENTATIONS (20-30 mins each).

- The teacher is preferably accompanied by an assistant teacher(s) and this commission receive the reports from the groups for the first time.
- The commission examines the reports then attend all the presentations in a row (up to 3 groups)
- Each group presents the work with freedom to decide template, font, colours, time slots for each student, and freedom to experience mistakes

PROJECT-BASED LEARNING IN CIVIL ENGINEERING:

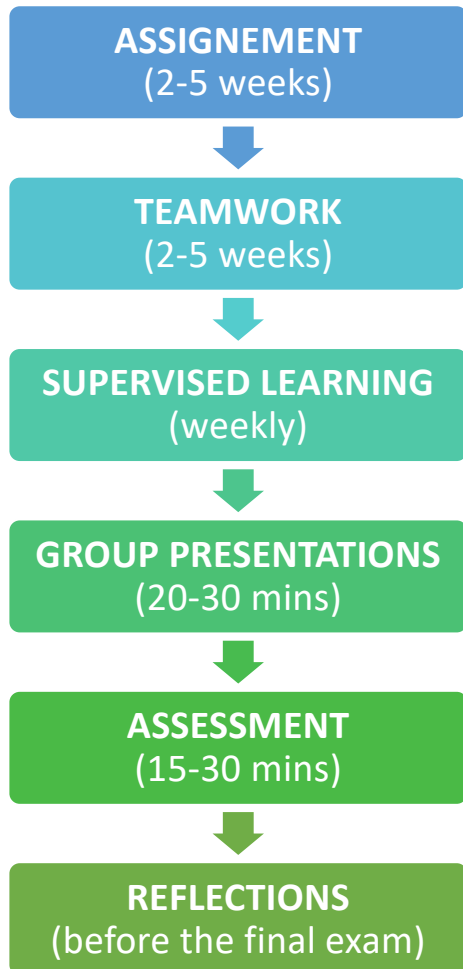


5. ASSESSMENT (15-30 mins each).

the assessment has 3 main phases,

- the first is a **peer-evaluation** that allows the commission to spot other prospective and challenges students in asking questions.
- In the second stage, the **commission discusses and reach a consensus** on the basis of the evaluation rubric.
- The final stage is **Feedback**, given to the groups in form of a final mark and with comments to to improve the project deliverables, but also given to each student in form of comments and discussions as well as their communication skills (also beyond the session with individual hints)

PROJECT-BASED LEARNING IN CIVIL ENGINEERING:



6. REFLECTIONS (before the final exam).

- **Review of the deliverables:** each group is then invited to take on board the comments and discussions, review the deliverables and presentations and bring a last version at the final exam.
- **Individual self-development:** the students are invited to reflect on the hints provided during the supervised learning, group presentations and assessment and self-reflect on their individual improvements and then attend the final exam.
- **FINAL EXAM:** the teacher highlights the importance of respecting a deadline and students are invited to attend the final exam only after wrapping-up. Exams usually starts by looking at deliverables

CONCLUSIONS



PROJECT-BASED LEARNING IN CIVIL ENGINEERING - *an opportunity to train complementary skills*

- **is this really an innovation for civil engineering?** NO but a structured replicable format centered on learning might be. Also, it's scalable and it has been delivered online too.
- **Which complementary skills can be trained?**
 1. **ASSIGNMENT:** Problem design, Research skills, organization skills
 2. **TEAMWORK:** Moderation skills, collaboration skills, acceptance
 3. **SUPERVISED LEARNING:** listening, no fear of question, questioning, follow-up, goal-oriented reasoning
 4. **GROUP PRESENTATIONS:** Public speaking, visual communication, strategy, teamwork
 5. **ASSESSMENT:** receiving Feedback, liability for the group
 6. **REFLECTIONS:** Self-development, finalizing deliverable, respecting important deadlines



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smart solutions
for sustainable
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infrastructure

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