

CIVIL-414

Design of precast concrete structures**Conception de structures en béton préfabriqué**

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Cursus	Sem.	Type
Génie civil	MA2, MA4	Opt.

Language	English
Credits	3
Session	Summer
Semester	Spring
Exam	During the semester
Workload	90h
Weeks	14
Hours	3 weekly
Lecture	1 weekly
Project	2 weekly
Number of positions	

Summary

The course deals with the design of precast reinforced concrete structures, both for bridges and for buildings.

The course is focused in learning by projects supplemented by some lectures by the teachers.

The students will work in groups to design a precast structure. The structures considered will be one of the following:

- Precast bridge
- Industrial building
- Office or commercial building
- Parking garage

The evaluation of the course will be by project.

In the evaluation will be considered the:

- Design notes of the structure, of each element and of the connections
- Drawings. General drawings of the structure, detailed drawings with reinforcement of the elements and detailed drawings of the connections
- Presentation of the project to the rest of the students and the teachers

Content

Given lectures by the teachers:

- General introduction for prefabrication in buildings
- General introduction for prefabrication in bridges
- Connections and detailing in precast structures

Design by project of precast structures:

- Design:
 - General dimensioning of the structure
 - Detailed design of the elements
 - Detailing of reinforcement

- Design of the connections
- Detailing of the connections
- Sketches (simplified drawings)
 - General drawing of the structure
 - Detailed drawings of the elements
 - Detailed drawings of the connections
- Presentation of the project

Keywords

Structural concrete, precast structures, reinforcement's detailing, design, dimensioning methods

Learning Prerequisites

Required courses

CIVIL-323 « Reinforced concrete structures»

Recommended courses

CIVIL-478 « Bridge design «

CIVIL-512 « Reinforced concrete structures - advanced topics «

Important concepts to start the course

It is recommended to have clear concepts of design and dimensioning of reinforced and prestressed concrete structures. A course on bridges is also recommended.

Learning Outcomes

By the end of the course, the student should be able to:

- Design precast structures
- Dimension connections of precast structures
- Design detailing the reinforcement for typical reinforced or prestressed concrete members
- Produce sketches for precast structures
- Present a project to the audience

Teaching methods

by projects and ex cathedra

Expected student activities

Assessment of a project (conceptual design of a precast structure, dimensioning of some members, detailing of relevant parts and connections), Sustainability assessment.

Assessment methods

continuous assessment during semester

Supervision

Office hours	Yes
Assistants	Yes
Forum	No

Resources

Bibliography

- *fib* Bulletin 6 Special design considerations for precast prestressed hollow core floors. Guide to good practice (180 pages, January 2000)
- *fib* Bulletin 19 Precast concrete in mixed construction. State-of-art report (68 pages, April 2002)
- *fib* Bulletin 21 Environmental issues in prefabrication. State-of-art report (56 pages, March 2003)
- *fib* Bulletin 29 Precast concrete bridges. State-of-art report (83 pages, November 2004)
- *fib* Bulletin 37 Precast concrete railway track systems. State-of-art report (38 pages, September 2006)
- *fib* Bulletin 41 Treatment of imperfections in precast structural elements. State-of-art report (74 pages, November 2007)
- *fib* Bulletin 43 Structural connections for precast concrete buildings. Guide to good practice (370 pages, February 2008)
- *fib* Bulletin 60 Prefabrication for affordable housing. State-of-art report (132 pages, August 2011)
- *fib* Bulletin 63 Design of precast concrete structures against accidental actions. Guide to good practice (78 pages, January 2012)
- *fib* Bulletin 74 Planning and design handbook on precast building structures. Manual– textbook (September 2014)
- *fib* Bulletin 78 Precast-concrete buildings in seismic areas. State-of-the-art report (March 2016)
- *fib* Bulletin 84 Precast Insulated Sandwich Panels. State of the art report (129 pages, ISBN 978-2-88394-124-3, December 2017)
- *fib* Bulletin 88 Sustainability of precast structures. State-of-the-art report (December 2018)
- *fib* Bulletin 94 Precast concrete bridge continuity over piers. Technical report (July 2020)
- *fib* Bulletin 99 Conceptual Design of Precast Concrete Bridge Superstructures. Technical report (August 2021)
- *fib* Bulletin 101 Precast concrete y tall buildings. State of the art report (December 2021)
- PCI Design Handbook MNL-120-10 ISBN 978-0-937040-87-4
- Precast concrete structures. Kim S. Elliot. 2017. ISBN 978-1498-723992

Ressources en bibliothèque

- *fib* bulletin 6
- *fib* bulletin 19
- *fib* bulletin 29
- *fib* bulletin 29
- *fib* bulletin 37
- *fib* bulletin 41
- *fib* bulletin 43
- *fib* bulletin 60
- *fib* bulletin 63
- *fib* bulletin 74
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