

MASTER YOUR SKILLS 2025

D3.2 Course Syllabus

CONCRETO ACADEMY & Universidad Politécnica de Madrid

3 April – 12 April 2025



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Project Number 101140028

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CONCRETO
ACADEMY

MASTER YOUR SKILLS 2025 Course Syllabus

3-12 April 2025 / Escuela Técnica Superior de Ingenieros de Caminos, Canales y Puertos – Sala Torres Quevedo
Calle del Prof. Aranguren, 3, 28040 Madrid

CONTACT

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COURSE DESCRIPTION & OBJECTIVES

The **CONCRETO MASTER YOUR SKILLS** is the first in-person activity of the CONCRETO Teaching & Training Programme of CONCRETO 2025. This activity is organized and led by the Universidad Politécnica de Madrid, a partner in the CONCRETO Project.

This course will provide an overview of the history of concrete technology and its applications. Through case studies, lab and field applications, students will learn about deterioration mechanisms, assessment techniques and repair strategies, with a focus on retrofitting techniques.

An in-depth introduction to different retrofitting methods, including structural and energy retrofitting, will be studied and discussed through lectures led by experts, case studies and via technical field trips.

Guest lecturers and practitioners will participate in the seminar to provide different perspectives on the challenges and issues related to the rehabilitation of concrete structures: “*How to RETROFIT a concrete structure to respond to current codes without altering the original Architectural Intent & Fabric*” – this is one of the challenges that this course aims to tackle.

Students will participate in several technical field trips including visits with different companies: HOLCIM, Grupo Puma, SIKA and Saint Gobain. In addition, the students will visit the Instituto de Ciencias de la Construcción Eduardo Torroja, the Hipódromo de Zarzuela and the Torroja Museum.

During the course, students will be assigned a “Retrofit Case Study Project” to design and develop in teams. Each team will be asked to complete small assignments and presentations. Review sessions with experts will be organized during the course with a final presentation scheduled for the morning of April 12, 2025.

STRUCTURE & FORMAT

All activities will be held in person. The activities will include a mix of face-to-face lectures and laboratory activities, and field trips. Most topics will be introduced by an illustrated lecture followed by discussion of the lecture, complemented by laboratory activity.

As a general rule, please note that students are responsible for providing their own lunch. More information is described in the detailed programme.

Teaching materials will be uploaded to the CONCRETO CLOUD – Master Your Skills:

<https://www.dropbox.com/scl/fo/ef1imonm02m00pzve0uo8/AGeCqI6RQix7lhZm6TG-SMk?rlkey=wavqjrvoy3t8la8jkt8ynk1k9&e=1&st=cvaq4rya&dl=0>

REQUIREMENTS

Students are expected to arrive on time and attend all classes for the entire scheduled meeting time. Cell phones are prohibited during class and are to be put away except during break time. Laptops are allowed for class notes only.

Students are asked to contribute to a positive learning environment.

Students are expected to bring their own helmet, safety vest and safety shoes during all laboratory and field activities.

Students are encouraged to bring their own laptop if they have one. Preferred software includes AutoCAD 2D-3D, Adobe Suite, Microsoft Office, SketchUp, and Revit.

#ASKME

In order to ensure an open and respectful learning environment, we invite you all to email us as to how you identify: name to use in class, preferred pronouns, anything that will allow us to create the best classroom environment possible to learn together.

CRITICAL DATES

03/04 Start date of the course for HEIS and VET Students (18 students in total)

08/04 Start date of the course for TA Students (10 students in total)

11/04 CONCRETO DAY

12/04 Student Presentations

TA Students are welcome to join the leisure activity in Toledo on April 6th and the technical field trip on April 7th. Their assistance is OPTIONAL for these two days.

Leisure Activity

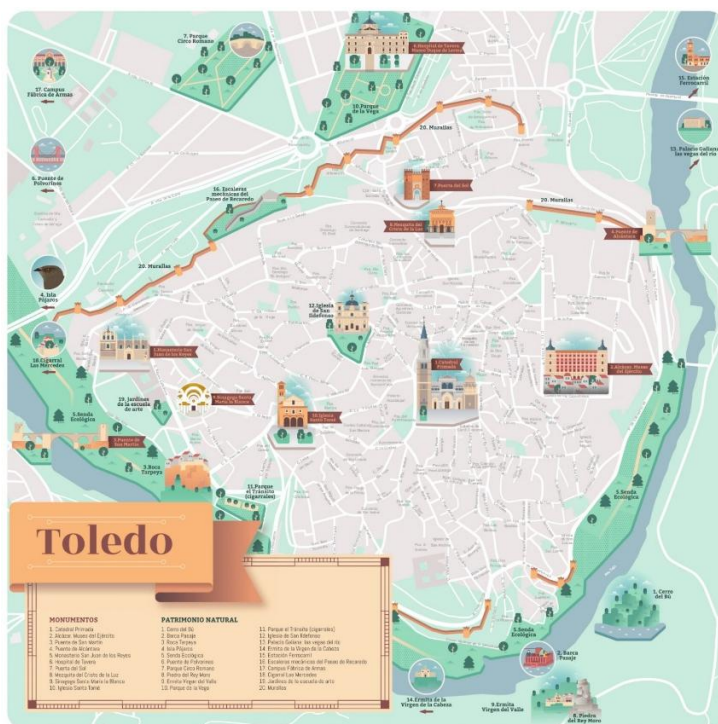
“Ruta de Tapas” and visit of Madrid City Centre– 5 APRIL 2025

A “Ruta de Tapas” and a visit of Madrid City Centre is proposed to the students during the afternoon of Saturday 5 April. More details will be provided during the course.

This activity is not compulsory, but it is recommended to encourage group harmony while discovering Spanish gastronomy and culture. Students are responsible for the cost of the tapas and drinks (30€ approximately). The guides of the tour will be Julie and Rolando from Universidad Politécnica de Madrid and CONCRETO Alumni.



A DAY in Toledo – 6 APRIL 2025



A “fun” day to explore the beauty of Toledo including a guided tour of its architecture is scheduled on Sunday. The trip will start from “Intercambiador de Plaza Elíptica” (bus station) with the bus VAC 023 (express service, 50 minutes) at 10:00. The bus is free of charge for people with the Individual Public

Transportation Card (see below). If not, the ticket can be purchased directly on the bus. Further details will be provided during the course. This event is not mandatory. The contact for the organization is Natalia. The visit includes the Monasterio San Juan de los Reyes, Museo Victorio Macho, Catedral de Toledo.

VAC 023 Madrid (Plaza Elíptica) - Toledo



HORARIOS DE SALIDA DE MADRID (Intercambiador de Plaza Elíptica) (Vigente de 1 de septiembre a 31 de julio)

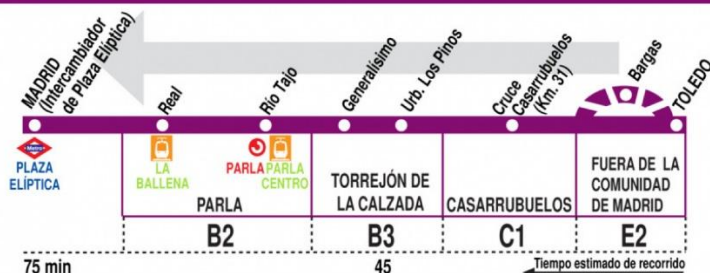
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Domingos y festivos																	
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Notas: ^b Por Bargas.
^t Servicio expres, directo a Toledo (tiempo estimado recorrido 50 minutos).
* Sólo viernes laborables.

AL ALSA. (Intercambiador de Plaza Elíptica). 28026 MADRID. **Tel: 902 422 242** www.alsa.es

VAC 023 Toledo - Madrid (Plaza Elíptica)



HORARIOS DE SALIDA DE TOLEDO (Vigente de 1 de septiembre a 31 de julio)

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Domingos y festivos																
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AL ALSA. (Intercambiador de Plaza Elíptica). 28026 MADRID. **Tel: 902 422 242** www.alsa.es

GETTING AROUND THE UPM CAMPUS

Website: <https://caminos.upm.es/>

Location: Escuela Técnica Superior de Ingenieros de Caminos, Canales y Puertos.

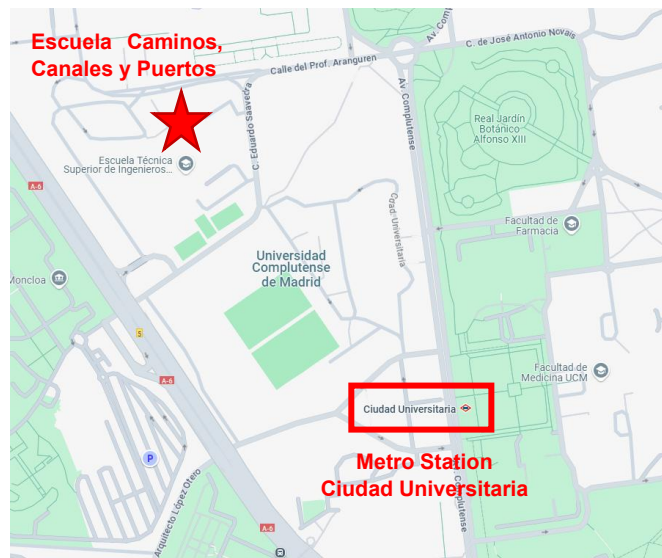
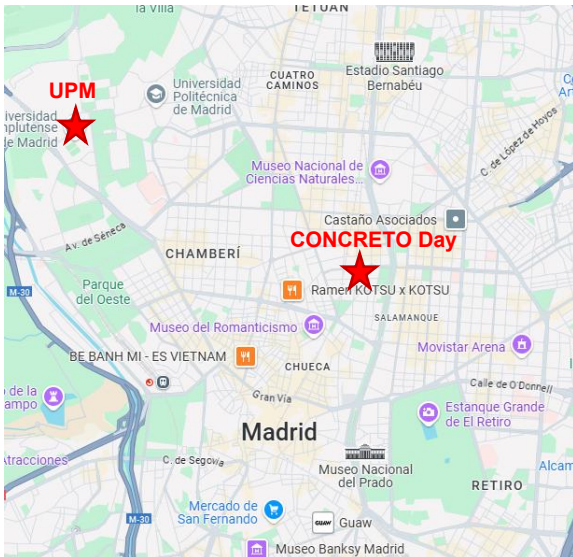
Calle del Prof. Aranguren, 3, 28040 Madrid

UPM: [Higher Technical School of Civil Engineers - Google Maps](#)

To get to the *Escuela de Caminos* from the centre of Madrid, take **metro line 6** (grey) to the *Ciudad Universitaria* station, then the school is a 10-minute walk away.

Alternatively, you can take **bus line G** from *Moncloa* metro station, or **bus line F** from the *Cuatro Caminos* metro station. Both lines stop directly in front of the School.

There is a cafeteria in the school where students can buy their lunch (6.70€). Each student will be responsible for covering their own costs for food.



The students (if under 26) may buy the [NUEVA TARJETA TRANSPORTE PÚBLICO PERSONAL INDIVIDUAL](#) (INDIVIDUAL PUBLIC TRANSPORTATION CARD) which costs only 4€ (emission cost) and, then, it can be charged with 1 month of transport for just 8€ (total cost: 12€). This includes bus, metro and cercania (local train) (including the bus to Toledo on 6 April).

CONCRETO DAY

The **CONCRETO DAY** is the Second Multiplier event of the CONCRETO Project. This event is scheduled for 11 April from 9:30 – 15:30. This is a public event, and it is organized as a Conference Day. It will be held in the *Colegio de Ingenieros de Caminos, Canales y Puertos*.

Location: Colegio de Ingenieros de Caminos, Canales y Puertos. C. de Almagro, 42, Chamberí, 28010 Madrid. [Colegio de Ingenieros de Caminos, Canales y Puertos - Google Maps](#)

The programme of CONCRETO DAY will highlight projects and case studies representing good practice in Spain. Students are required to attend this event. **The registration using the QR Code is needed!**

CONCRETO ACADEMY

CONCRETO DAY 11.04.25

Second Multiplier Event

Colegio de Ingenieros de Caminos, Canales y Puertos, Auditorium, 42nd Almagro street, Madrid

9:30 Greetings and Welcome
Miguel Ángel Carrillo. Colegio de Ingenieros de Caminos, Canales y Puertos President
José Miguel Atienza. Universidad Politécnica de Madrid. ETSICCP Director
Elena Cujarro. Consejo Superior de los Colegios de Arquitectos de España Vicepresident
Javier González. Fundación Laboral de la Construcción. Director of Training and Employment

10:00 Introduction to the CONCRETO Academy
Irene Matteini. Scientific Director
Elisabetta Margiotta. Project Coordinator

10:30 Restoration of the Legazpi Fruit and Vegetable Market in Madrid
Eduardo Díaz-Pavón. (INTEMAC)

11:00 The diagnosis and dismantling of the Francisco Silvela flyover in Madrid
Javier León (FHecor) and Juan Jesús Álvarez (DRAGADOS)

11:30 Coffee Break

12:00 A Case Study on the Effectiveness of Inhibitors for Comprehensive Corrosion Control
Carlos Polimón. (RETINEO)

12:30 Corrosion monitoring in concrete structures
Carmen Andrade. (CIMNE)

13:00 Closing Remarks
Miguel Ortega Cornejo. President ofACHE

13:15 h Cocktail

Free Registration

Event sponsored by

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www.concreto-academy.org

The event will be held in English
Registration necessary



DETAILED SCHEDULE

THURSDAY 3 APRIL	
<p>09:30 – 11:30 Sala Torres Quevedo Civil Engineering School - UPM</p>	<p><u>Course Introduction</u> Introduction to the Universidad Politécnica de Madrid Introduction to the Master Your Skills Course Activities Introduction of the PROJECT Assignment & Retrofit Case Study Project & Working Teams</p> <p><u>Lecture 01: Concrete structural systems and their conservation</u> Presented by L. Todisco, <i>School of Civil Engineering, Lab. of Structures</i></p>
<p>11:30 – 12:00</p>	<p>Coffee break</p>
<p>12:00 – 13:30 Sala Torres Quevedo Civil Engineering School - UPM</p>	<p><u>Lecture 02: Concrete pathologies (1.5h)</u> Presented by J. Devénes, <i>School of Civil Engineering, Lab. of Structures</i></p>
<p>13:30 – 14:30</p>	<p>Lunch break</p>
<p>14:30 – 16:30 Sala Torres Quevedo Civil Engineering School - UPM</p>	<p><u>Presentation of the Retrofit Case Study Project (1h)*</u> Presented by J. Carmona, <i>Mecanismo</i>, and P. Olalquiaga, <i>Olalquiaga Arquitectos</i></p> <p>*This lecture will be recorded and uploaded in the cloud. TA Students will have access and are encouraged to watch it prior to arriving in Madrid.</p> <p><u>Lecture 03: Destructive and non-destructive tests of concrete, survey and representation (1h)</u> Presented by J. Devenes, <i>School of Civil Engineering, Lab. of Structures</i></p>

FRIDAY 4 APRIL	
<p>09:00 – 10:30</p> <p>Instituto Juan de la Cervia, Calle Serrano 137, 28006, Madrid</p>	<p><u>Visit to the Retrofit Case Study Project</u></p> <p>Presented by J. Carmona and P. Olalquiaga</p> <p>Bring your own PPE (Personal Protection Equipment)!</p> <p>After visiting the Retrofit Case Study Project, the class will be travelling to HOLCIM by bus provided by UPM.</p>
<p>11:00 – 16:30</p> <p>HOLCIM, TO-2628, Km. 6, 45740 Villasequilla, Toledo</p>	<p><u>Technical Field Trip</u></p> <p>Visit to the HOLCIM Technology and Cement Innovation Centre</p> <p>This session will be dedicated to the exploration of cement manufacturing & concrete durability. The activities will be led by the HOLCIM Team. A detailed programme will be provided at the beginning of the course.</p> <p>Lunch break from 13:00 to 14:00 will be provided by HOLCIM.</p> <p>The return to Madrid will be also by private bus.</p>

SATURDAY APRIL 5TH	
<p>09:30 – 11:00</p> <p>Sala Torres Quevedo Civil Engineering School - UPM</p>	<p><u>Lecture 04: Assessment, diagnostic and structural retrofitting (1.5h)</u></p> <p>Presented by L. Todisco, <i>School of Civil Engineering, Lab. of Structures</i></p>
<p>11:00 – 11:30</p>	<p>Coffee break</p>
<p>11:30 – 13:30</p> <p>Sala Torres Quevedo Civil Engineering School - UPM</p>	<p><u>Teamwork</u></p>
<p>13:30 – 15:00</p> <p>Madrid City Centre</p>	<p>Lunch break “Ruta de tapas”</p> <p>See details above on Field Trip Section</p>
<p>15:00 – 18:00</p> <p>Madrid City Centre</p>	<p><u>Visit Madrid City Centre</u></p> <p>See details above on Field Trip Section</p>

SUNDAY 6 APRIL	
<p>9:00 – 18:00</p>	<p><u>Field Trip to Toledo</u></p> <p>See details above on Field Trip Section.</p>

MONDAY 7 APRIL	
<p>08:30 – 13:00 Grupo Puma, Av. del Guijar, 37, 28500 Arganda del Rey, Madrid</p>	<p><u>Technical Field Trip</u> Visit to Grupo Puma</p> <p>Students are picked up by private bus from the Puerta de Arganda metro (line 9) / suburban train station at 8:30 and taken to Grupo Puma's facilities in Arganda del Rey. Only a safety vest is required for this visit.</p> <p>Agenda:</p> <ul style="list-style-type: none"> • 9:00 Reception. Presentation of the company • 9:15 Main novelties of the structural code • 9:30 Pathology and repair of reinforced concrete, repair procedures according to UNE-EN 1504. Practical cases • 10:15 Protection and waterproofing of reinforced concrete • 11:00 Coffee break • 11:15 Reconstruction and protection of a concrete structural element • 12:00 Levelling, filling and anchoring with grouting mortars • 12:45 End of the day. Group photo.
<p>13:00 – 14:00</p>	<p>Lunch break - Restaurant los Geranios: https://maps.app.goo.gl/eqt3AAU4yLnAMDga9 Menu cost: 11€ (to be paid by each student).</p>
<p>14:00 – 16:30 SIKA S.A.U. C. de los Aragoneses, 17, 28108 Alcobendas, Madrid</p>	<p><u>Technical Field Trip</u> Visit to SIKA</p> <p>Students are picked up by private bus at the PUMA GROUP facilities to SIKA. After the visit, the students will travel back to Madrid by public transport. For the return trip, each student will be responsible for covering their own transportation costs.</p> <p>Agenda: - Strengthening techniques of concrete elements</p>

TUESDAY 8 APRIL	
<p>09:30 – 11:30 Aula 30 Civil Engineering School - UPM</p>	<p><u>Interim Case Study Presentations</u></p> <p><u>Teamwork</u></p>
<p>11:30 – 12:00</p>	<p>Coffee Break</p>
<p>12:00 – 13:30 Aula 30 Civil Engineering School - UPM</p>	<p><u>Lecture 05: Durability tests of concrete elements (theory + lab activity)</u> Presented by R. Baldiviezo, <i>School of Civil Engineering, Lab. of Structures</i></p>
<p>13:30 – 14:30</p>	<p>Lunch Break</p>

<p>14:30 – 16:30 Chemistry Lab Civil Eng School - UPM</p>	<p><u>Technical presentation</u> Products from Saint Gobain</p> <p>Agenda: - Part 1: Chemical Additives in the Repair of Concrete Structures and Prevention Strategies (Bonding Bridge Additives and Corrosion Inhibitors) - Part 2: Monitoring of durability in concrete structures.</p>
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WEDNESDAY 9 APRIL	
<p>09:30 – 16:30 Instituto Torroja C. de Serrano Galvache, 4, 28033 Madrid</p>	<p><u>Technical Field Trip</u> Visit to Institute of Construction Science Eduardo Torroja</p> <p>The class will be travelling to the Instituto Torroja using public transportation Manoteras (line 4), bus 29 and Bambú (line 1). The class will travel back to Madrid with public transport. For both trips, each student will be responsible for covering their own transportation costs.</p> <p>Agenda</p> <ul style="list-style-type: none"> • 9:30 - 10:00 Reception & Welcome • 10:00 - 11:30 Tour of Facilities and Workshops • 11:30 - 11:45 Coffee Break • 11:45 - 13:45 Theoretical-Practical Session (durability, types of concrete, 3D printing) • 13:45 - 14:30 Lunch at Torroja Restaurant (€10 menu). Beforehand is necessary a list with name/surname/ID and special dietary preferences. • 14:30 - 16:30 Theoretical-Practical Session (concrete testing, CO₂ calculation in concrete, recent research fields in concrete) • 16:30 End of the Day & Group Photo

THURSDAY 10 APRIL	
<p>09:30 – 11:30 Sala Torres Quevedo Civil Engineering School - UPM</p>	<p><u>Lecture 06: Learning from the Field – Musmeci Bridge</u> Presented by L. Todisco, <i>School of Civil Engineering, Lab. of Structures</i></p> <p><u>Lecture 07: Learning from the Field – Centenario Bridge</u> Presented by M. Corral, <i>School of Civil Engineering, Lab. of Structures</i></p>
<p>11:30 – 12:00</p>	<p>Coffee Break</p>
<p>12:00 – 14:00 Sala Torres Quevedo Civil Engineering School - UPM</p>	<p><u>Technical presentation</u> Kerakoll: Monolithic concrete restoration and successful cases Presented by Jose Dobón, <i>Product Manager Kerakoll Iberica</i></p>

14:00 – 15:00	Lunch Break
15:00 – 18:00 Hipódromo de la Zarzuela , Av. Padre Huidobro, S/N, A6 KM 8, Moncloa - Aravaca, 28023 Madrid	<u>Technical Field Trip</u> Visit Hipódromo de la Zarzuela and Torroja Museum Presented by Fundación Eduardo Torroja and Leonardo Todisco The class will be travelling by public transport from UPM and then back to Madrid with public transport. Each student will be responsible for covering their own transportation costs.

FRIDAY 11 APRIL	
9:30 – 14:00 Auditórium Colegio de Ingenieros de Caminos Canales y Puertos, C. de Almagro, 42, Chamberí, 28010 Madrid.	<u>CONCRETO DAY</u> Second Multiplier Event of the CONCRETO Project. For more info, refer to the Section dedicated to the programme of the CONCRETO DAY.
14:00 – 15:30	Lunch break (offered by technical sponsors)
15:30 – 17:30 Sala Ágora Colegio de Ingenieros de Caminos Canales y Puertos, C. de Almagro, 42, Chamberí, 28010 Madrid.	<u>Teamwork</u>

SATURDAY 12 APRIL	
09:30 – 12:00 Sala Torres Quevedo Civil Engineering School - UPM	<u>Student Presentations</u> Final Discussion

Additional Resources:

- ACI American Concrete Institute (www.concrete.org)
- Concrete Repair Association (www.concreterepair.org.uk)
- ICRI International Concrete Repair Institute (www.icri.org)
- English Heritage (www.english-heritage.org.uk)
- ICOMOS ISC20c (www.icomos-isc20c.org)
- Docomomo USA ([Home - Docomomo International](http://Home-DocomomoInternational.com))
- APTi Association for Preservation Technology (<https://www.apti.org/>)
- Twentieth-Century Society (www.c20society.demon.uk)
- Modern Movement Heritage (https://issuu.com/waelajam/docs/a._cunningham-modern_movement_herit)

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