POLITECNICO MILANO 1863 | DIPARTIMENTO DI ENERGIA

Summer School

Thermophysical properties of fluids for energy and CCS applications: modelling and measurement

23 - 27 June 2025

Politecnico di Milano - Department of Energy

Piacenza Campus

Funded by the European Union

Encase

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Organizing Institution
Department of Energy, Politecnico di Milano

Course Director
Prof. Manuele Gatti, Department of Energy - Politecnico di Milano

Duration
Monday 23rd - Friday 27th June, 2025, from 9:00 a.m. to 5:30 p.m.

Location
Politecnico di Milano - Piacenza Campus
Via Scalabrini, 76, 29121, Piacenza (ITALY)
Classroom L (Caserma Neve)

Attendance
The Summer School will be held in person.

Registration fee
No registration fee required for PhD students enrolled at POLIMI.
Registration fee for all other participants: 100 €
VAT is not applicable to the registration fees due to art. 10 DPR 633/26.10.72 and subsequent modifications.

Registration includes lunches and coffee breaks for 5 days.

Staff
Specializing Master and Continuing Education office
Department of Energy, Politecnico di Milano.
External relations office, Piacenza Campus, Politecnico di Milano.

Contacts
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How to apply

In order to apply for this Summer School please click the following link **https://www.polimi.it/en/corsi/master-universitari-e-corsi-post-laurea/translate-to-english-dettaglio-master/494**

and insert your application as requested.

The deadline for the application is **23 May 2025**.

Minimum number of participants: 10
Maximum number of participants: 40

If the minimum number participants is reached, the course will start as planned. If not, the course will be postponed or cancelled.

This communication will be sent to participants by 28 May 2025 along with detailed instructions on how to proceed with the payment of the registration fee.

If necessary, the Direction may modify the programme, the Faculty and the course teaching method.

In case of proven and serious circumstances preventing from participating to the course, the participant has got two options:
1)To obtain the refund of the registration fee, provided that the subject student has duly informed the course staff by 29 May 2025. No refund is granted after 29 May 2025.
2)To keep on hold the registration fee, assuming the relevant amount is used for the following course session. In line with the above, this option is viable, as long as the course staff has been properly informed, again by 29 May 2025.

Politecnico di Milano is only liable for the refund of the registration fees already honored.

Target audience

The School is open to:

- PhD students
- Early-stage researches/engineers (upon availability of seats)

Required documents for the application:

- Identity Document or Passport
- PhD enrolment certificate
- Curriculum Vitae (1 page maximum)
- Short motivation letter

Selection process:

PhD students from POLIMI are automatically enrolled.
In case more than 40 PhD students apply, the application will be revised and confirmed by the organizing committee, giving priority to PhD students and, if needed, assessing the coherence of the research activities with the topics of the Course and the motivation letter.

Summer School Contents

In the framework of the Horizon Europe project ENCASE Our partners - ENCASE, PoliMI organizes the 1st Summer School on "Thermophysical properties of fluids for energy and CCS applications: modelling and measurement" which will cover both advanced numerical tools (Equations of State models, properties correlations, etc.) and measurement methods and standards for the characterization of thermophysical properties of fluids relevant to the low carbon energy field such as:

- CO_2-based mixtures relevant to CO_2 capture, transportation and storage (ENCASE topic)
- Solvents for CO_2 capture
- New generation refrigerants (pure fluids and mixtures)
- Working fluids for advanced thermodynamic cycles
- Fluids for energy storage applications

Training format

Lectures will be offered by Italian and international professors and researchers expert of thermodynamic properties modelling and measurement, as well as industry experts. Q&A and discussion session will conclude each seminar.

Language

English.

ECTS/CFU credits and exam mode

Attendance at the Summer School allows the acquisition of 5 ECTS credits, recognized upon the exam completion (for PoliMi PhD students). The exam consist in a short review paper or a numerical model application to a case study of interest to the PhD student (topic and deadline to be agreed with the teacher) and it is part of the PhD program in Energy and Nuclear Science and Technology.

Certificate of attendance

At the end of the Summer School, the participants will receive a certificate of attendance, provided that they have attended at least 70% of the lectures.

Lecturers

Dr. Monika Thol | Ruhr University Bochum, Germany

Dr. Laura Fedele | National Research Council (CNR), Italy

Dr. Gabriele Chinello | TÜV-SÜD National Engineering Laboratory, Scotland

Dr. Carlo De Servi | Delft University of Technology, The Netherlands

Prof. Ferruccio Doghieri | University of Bologna, Italy

Prof. Manuele Gatti | Politecnico di Milano, Italy

Dr. Andreas Jaeger | Technical University Dresden, Germany

Prof. Jean-Noël Jaubert | University of Lorraine, France

Prof. Georgios Kontogeorgis | Technical University of Denmark, Denmark

Dr. Eric Lemmon | National Institute of Standards and Technology, USA

Prof. Luca Molinaroli | Politecnico di Milano, Italy

Prof. Christophe Proust | University of Technology of Compiegne, France

Eng. Stefano Signorini | LEAP s.c.a.r.l., Italy

Prof. Roland Span | Ruhr University Bochum, Germany

Dr. Morten Tjelta | Institute for Energy Technology (IFE), Norway

Prof. Martin Trusler | Imperial College London, United Kingdom

Prof. Thijs J.H. Vlugt | Delft University of Technology, The Netherlands

SUMMER SCHOOL AGENDA

23-27 JUNE 2025
Piacenza Campus
Dept. of Energy - Politecnico di Milano

TIMESLOT	MONDAY 23 JUNE	TUESDAY 24 JUNE	WEDNESDAY 25 JUNE
09:00 - 10:00	**Manuele Gatti** Thermodynamic models for process simulation: state of the art, requirements and trends	**Jean-Noël Jaubert** The state of the Cubic EOS: theory and mixing rules, evolution and applications	**Martin Trusler** Thermophysical Properties and Phase Behavior of Fluids involved in geological CO_2 Storage, as part of the CCS chain
10:00 - 11:00	**Luca Molinaroli** The search for new and optimal refrigerants for low and high temperature heat pumps: methods and applications	**Jean-Noël Jaubert** The state of the Cubic EOS: theory and mixing rules, evolution and applications *(Applicative session)*	**Martin Trusler** Thermophysical Properties and Phase Behavior of Fluids involved in geological CO_2 Storage, as part of the CCS chain
Coffee Break & Logo and Activities Presentation "Associazione La Matita Parlante" (23rd June)			
11:30 - 12:30	**Carlo De Servi** Computer-Aided Cycle and Working fluid optimisation in power cycles	**Monika Thol** How to calculate transport properties of fluids and mixtures? An application of the TREND software *(Applicative session)*	**Eric Lemmon** REFPROP software demonstration *(Applicative session)*
Lunch			
14:00 - 15:00	**Carlo De Servi** Computer-Aided Cycle and Working fluid optimisation in power cycles *(Applicative session)*	**Eric Lemmon** Past, present and future of High-Accuracy Equations of State combining Art and Science	**Laura Fedele** State of the art techniques and methods for measuring the thermophysical properties of new pure refrigerants and mixtures
15:00 - 16:00	**Ferruccio Doghieri** Statistical Associating Fluid Theory (SAFT) for the computation of thermodynamic properties of fluid mixtures: the most relevant developments and applications	**Eric Lemmon** Past, present and future of High-Accuracy Equations of State combining Art and Science	**Georgios Kontogeorgis** Electrolyte thermodynamic models with potential applications to CCS
Coffee Break			
16:30 - 17:30	**Monika Thol** How to calculate transport properties of fluids and mixtures?	**Andreas Jaeger** Influence of the Equation of State on the Design of Advanced Power and Refrigeration Cycles	**Georgios Kontogeorgis** Electrolyte thermodynamic models with potential applications to CCS
SOCIAL EVENT TUEASDAY 24 JUNE H. 21:30	**Evening Concert offered by Campus Cultura with free entrance (Politecnico di Milano - Piacenza - Campus Arata)**		

SUMMER SCHOOL AGENDA

23-27 JUNE 2025
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Dept. of Energy - Politecnico di Milano

TIMESLOT	THURSDAY 26 JUNE	FRIDAY 27 JUNE
09:00 - 10:00	**Gabriele Chinello** The relevance of high accuracy thermophysical properties data in CCUS: an overview on flowmetering aspects	**Roland Span** Multiparameter EOS: theory and applications, history, recent trends and future challenges
10:00 - 11:00	**Gabriele Chinello** The relevance of high accuracy thermophysical properties data in hydrogen: an overview on flowmetering aspects	**Roland Span** Multiparameter EOS: theory and applications, history, recent trends and future challenges
	Coffee Break	
11:30 - 12:30	**Stefano Signorini** Measuring density, VLE and heat capacities of CO_2-based mixtures	**Christophe Proust** Modelling phase equilibria with solids: how to extend from VLE to SVLE models
	Lunch	
14:00 - 15:00	**Thijs J.H. Vlugt** Molecular simulation for predicting the thermophysical properties of fluids	**Morten Tjelta** The relevance of thermophysical properties of CO_2 mixtures for assessing acid reactions and corrosivity
15:00 - 16:00	**Thijs J.H. Vlugt** Molecular simulation for predicting the thermophysical properties of fluids *(Applicative session)*	**Manuele Gatti** Wrap-up session interactive discussion, main highlights and takeaways from the school
	Coffee Break	
16:30 - 17:30		

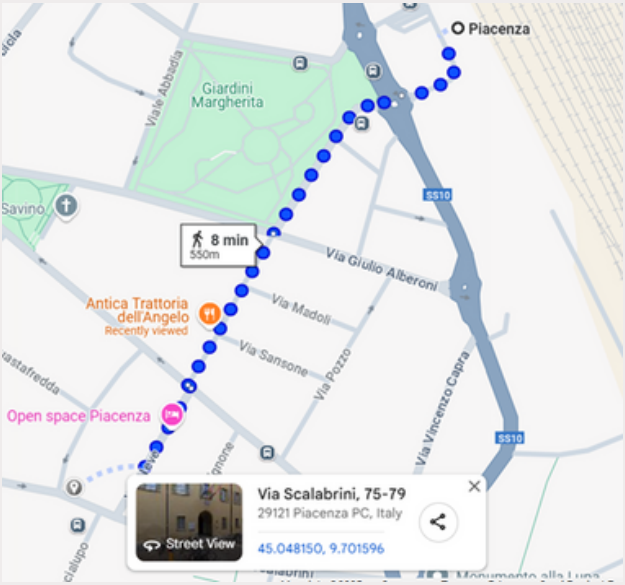
Summer School Location

Where?

Politecnico di Milano
Piacenza Campus (Caserma Neve)
Via Giovanni Battista Scalabrini, 76 Piacenza, Italy (location)

How to reach it?

10 minutes by walk from Piacenza train station



Reaching Piacenza

Closest airports?

Milano Linate airport + 1h car/taxi to Piacenza (or +1h 30min metro + train)*
Milano Malpensa airport + 1h 30min car/taxi to Piacenza (or + 2 h trains)*
Milano Bergamo-Orio al Serio airport + 1h 30min car/taxi to Piacenza (or + 2h bus/trains)*

* Shuttle buses are available from all airports **to Milan Central Train Station** from some service providers. Contact the organizing staff for more details.

Closest train station from Milan?

Milan Central Train Station (Milano Centrale): direct regional trains to Piacenza every 1 to 2 hour. Approximate trip time: 50 min

Milan Rogoredo Train Station (Milano Rogoredo): direct regional trains every ½ to 1 hour. Approximate trip time: 40 – 50 min

Contacts
Department of Energy
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