In the dynamic landscape of engineering and scientific research, multiscale modelling has emerged as an indispensable tool for mastering thermal and fluid dynamics phenomena across varying length and time scales. The 20th UIT Summer School aims at providing engineers, PhD students and post-doc researchers with the most effective tools to address multiscale modelling in thermal fluid dynamics. The initiative aims to demystify multiscale techniques for those unfamiliar, recognizing untapped potential in various fields. Encompassing micro to macro scales, the program covers topics such as microstructure thermodynamics, transport phenomena in advanced materials, and applications of nanofluids. Lectures provide insights into practical applications and theoretical foundations, fostering a deeper understanding of heat and mass transfer across scales. Essential mathematical concepts like model reduction, coarse-graining, and machine learning techniques are also covered. By combining theory and hands-on experience, the Summer School seeks to equip participants with the skills necessary to navigate the intricate landscape of multiscale modelling, offering a unique opportunity for growth and discovery in engineering.

CONTRIBUTORS

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ADDITIONAL INFORMATIONS

Additional info about the Summer Schools can be found on the website: **www.uitonline.eu**.
For any further questions and requests, please contact: Professor Pietro Asinari, Director of 20th UIT Summer School pietro.asinari@polito.it

CREDITS FOR PHD STUDENTS

PhD Students can gain credits according to the regulation of their own PhD School. In addition to the Attendance Certificate, a Proficiency Certificate can be obtained upon submission of a report on one of topics addressed in the program.

APPLICATION AND FEES

The registration fee is € 800,00 and includes attendance to the Summer School, coffee breaks during the lessons, and full board treatment in a double room from the dinner of Sunday, 1 September to the lunch of Saturday, 7 September. For single room accommodation a € 120 supplement will be required. Each participant is kindly asked to confirm at the reception his/her presence at the lunch of Saturday, 7. The 50% of registration fee (€ 400,00) must be paid before 19 July 2024, following the instructions given within the registration form. The remaining 50% (€ 400,00) plus the single room supplement (€ 120,00), if requested, must be paid directly during the check-in at Certosa di Pontignano.
Please, to apply download (**here**) and complete (in PDF or RTF format) the registration form, and kindly send it by e-mail, before 19 July 2024, to:
info@lacertosadipontignano.com
Adriano.Lezzi@unibs.it

LOCATION

The 20th Summer School will be held in the prestigious Ancient Certosa di Pontignano, a unique place where nature, history and hospitality blend together in a memorable harmony, at a few kilometers from Siena, in the heart of Chianti, on a hill dominating the town. Further information: www.lacertosadipontignano.com.

20th UIT Summer School
2 – 6 September 2024

Image generated by the Artificial Intelligence of WALL-E

"Realize that everything connects to everything else"
Leonardo da Vinci

MULTISCALE MODELLING IN THERMAL FLUID DYNAMICS: THEORY AND APPLICATIONS

Director: Professor Pietro Asinari
Politecnico di Torino

Certosa di Pontignano (Siena)

CARTHUSIA PONTINIANI

Programme

	Monday 2 September	Tuesday 3 September	Wednesday 4 September	Thursday 5 September	Friday 6 September
8.30	*P. Asinari* *Multi-scale modelling: From quantum to molecular modelling*	*M. Fasano* ***Hands-on**: Heat & mass transfer in nanostructured materials (GROMACS)*	*A. A. Franco* *Modelling of batteries: Part II*	*A. Cardellini* *Modelling of transport properties of complex fluids*	*M. Atzori* ***Hands-on**: CFD and urban flows (OpenFOAM®)*
9.20	*P. Asinari* *Multi-scale modelling: From quantum to molecular modelling*	*M. Fasano* ***Hands-on**: Heat & mass transfer in nanostructured materials (GROMACS)*	*A. A. Franco* *Modelling of batteries: Practices in virtual reality*	*A. Cardellini* *Modelling of transport properties of complex fluids*	*M. Atzori* ***Hands-on**: CFD and urban flows (OpenFOAM®)*
10.15	***Coffee break***	***Coffee break***	***Coffee break***	**Coffee break**	***Coffee break***
10.45	*P. Asinari* *Multi-scale modelling: From quantum to molecular modelling*	*M. Fasano* ***Hands-on**: Heat & mass transfer in nanostructured materials (GROMACS)*	*A. A. Franco* *Modelling of batteries: Practices in virtual reality*	*A. Cardellini* *Modelling of transport properties of complex fluids*	*E. Chiavazzo* ***Hands-on**: Machine learning based orchestration in high-dimensional parameter spaces (Google COLAB)*
11.40 **12.30**	*P. Asinari* *Multi-scale modelling: From quantum to molecular modelling*	*D. Picchi* *Modelling of surface phenomena: thin films and wetting*	*P. Asinari* *Multi-scale modelling: From molecular to continuum modelling*	*O. Manca* *Computational heat transfer in nanofluid models*	*E. Chiavazzo* ***Hands-on**: Machine learning based orchestration in high-dimensional parameter spaces (Google COLAB)*
13.00	***Lunch***	***Lunch***	***Lunch****	***Lunch***	***Lunch***
14.15	*P. Asinari* *Multi-scale modelling: From quantum to molecular modelling*	*D. Picchi* *Modelling of surface phenomena: thin films and wetting*	*P. Asinari* *Multi-scale modelling: From molecular to continuum modelling*	*O. Manca* *Computational heat transfer in nanofluid models*	*E. Chiavazzo* ***Hands-on**: Machine learning based orchestration in high-dimensional parameter spaces (Google COLAB)*
15.10	*M. Fasano* ***Hands-on**: Molecular dynamics simulations (GROMACS)*	*D. Picchi* *Modelling of surface phenomena: thin films and wetting*	*P. Asinari* *Multi-scale modelling: From molecular to continuum modelling*	*M. Atzori* *Turbulence and atmospheric boundary layers*	*E. Chiavazzo* ***Hands-on**: Good variables of machine learning and other black-box models (Google COLAB)*
16.00	***Coffee break***	***Coffee break***	*Opportunity for the attendees to present and discuss their own activity research with school speakers.*	***Coffee break***	***Coffee break***
16.30	*M. Fasano* ***Hands-on**: Molecular dynamics simulations (GROMACS)*	*A. A. Franco* *Introduction to batteries, their production and working principles*		*M. Atzori* *Turbulence and atmospheric boundary layers*	*E. Chiavazzo* ***Hands-on**: Good variables of machine learning and other black-box models (Google COLAB)*
17.20 **18.15**	*M. Fasano* ***Hands-on**: Molecular dynamics simulations (GROMACS)*	*A. A. Franco* *Modelling of batteries: Part I*		*M. Atzori* *Turbulence and atmospheric boundary layers*	*E. Chiavazzo* ***Hands-on**: Good variables of machine learning and other black-box models (Google COLAB)*
20.00	***Dinner***	***Dinner***	***Dinner***	***Dinner***	***Dinner***