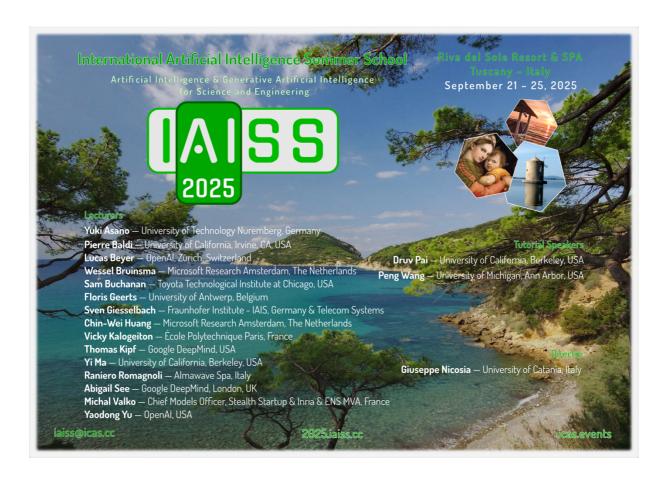# International Artificial Intelligence Summer School – IAISS 2025

A Residential Summer School in AI & Generative AI for Science and Engineering

Riva del Sole Resort & SPA – Castiglione della Pescaia (Grosseto) Tuscany, Italy
21 – 15 September 2025
https://2025.iaiss.cc
iaiss@icas.cc
Schedule Ver. 1.1 (5 pages) – April 10, 2025

	Sun, 21 Sept	Mon, 22 Sept	Tue, 23 Sept	Wed, 24 Sept	Thu, 25 Sept
09:00 – 09:50	Lecture	Lecture	Lecture	Free time	Lecture
09:50 – 10:40	Lecture	Lecture	Lecture		Lecture
10:40 – 11:20	Coffee break	Coffee break	Coffee break		Coffee break
11:20 – 12:10	Lecture	Lecture	Lecture		Lecture
12:10 – 13:00	Lecture	Lecture	Lecture		Lecture
13:00 – 15:00	Lunch	Lunch	Lunch	Lunch	Lunch
15:00 – 15:50	Lecture	Lecture	Lecture	Lecture	Free time
15:50 – 16:40	Lecture	Lecture	Lecture	Lecture	
16:40 – 17:20	Coffee break	Free time	Coffee break	Coffee break	Lecture
17:20 – 18:10	Lecture		Lecture	Lecture	Lecture
18:10 – 19:00	Lecture		Lecture	Lecture	Lecture
19:00 – 19:50	Lecture		Lecture	Lecture	Lecture
20:00	Dinner	Dinner	Dinner	Social Dinner*	Dinner
		21:30 Poster Session 1	21:30 Poster Session 2		

Lectures

Yuki Asano, *University of Technology Nuremberg, Germany*
Lecture 1/3 *"Self-supervised Learning 1"*
Lecture 2/3 *"Self-supervised Learning 2"*
Lecture 3/3 *"Vision-Language Learning"*

Pierre Baldi, *University of California, Irvine, CA, USA*
Lecture 1/3 *"The AI-driven Hospital of the Future"*
Lecture 2/3 *"Foundations of Attention Mechanisms and Transformers"*
Lecture 3/3 *"AI Safety: Challenges and Solutions"*

Lucas Beyer, *OpenAI, Zürich, Switzerland*
Lecture 1/4 *"Transformers Part 1"*
Lecture 2/4 *"Transformers Part 2"*
Lecture 3/4 *"Vision and VLMs Part 1"*
Lecture 4/4 *"Vision and VLMs Part 2"*

Wessel Bruinsma, *Microsoft Research Amsterdam, The Netherlands*
Lecture 1/3 "Foundation Models for Earth Systems 1/3"
Lecture 2/3 "Foundation Models for Earth Systems 2/3"
Lecture 3/3 "Foundation Models for Earth Systems 3/3"

Sam Buchanan, *Toyota Technological Institute at Chicago, USA*
3 Lectures TBA
Topics: *White-Box Deep Networks, White-box transformers, Machine Learning.*

Floris Geerts, *University of Antwerp, Belgium*
Lecture 1/3 *"Foundations of GNN Expressiveness"*
Lecture 2/3 *"Beyond Standard GNNs: Increasing Expressiveness"*
Lecture 3/3 *"Expressiveness of GNNs in Practice"*

Sven Giesselbach, *Fraunhofer Institute - IAIS, Germany & Telecom Systems*
Lecture 1/3 *"From Large Language Models to Reasoning Models"*
Lecture 2/3 *"Multi-Agent System"*
Lecture 3/3 *"Applications of Foundation Models"*

Chin-Wei Huang, *Microsoft Amsterdam, The Netherlands*
Lecture 1/3 *"Foundation of Generative Models"*
Lecture 2/3 *"Physics for Generative Modeling: Diffusion Models"*
Lecture 3/3 *"Generative Models for Molecular Science"*

Vicky Kalogeiton, *École Polytechnique Paris, France*
Lecture 1/3 *"From GANs to Diffusion Models for Image Synthesis"*
Lecture 2/3 *"Control and Guidance in Diffusion Models"*
Lecture 3/3 *"Conditional Generation of Multimodal Data"*

Thomas Kipf, *Google DeepMind, USA*
Lecture 1/3 *"Introduction to Graph Neural Networks"*
Lecture 2/3 *"Graph Neural Networks for Physical Simulation"*
Lecture 3/3 *"Compositional World Models"*

Yi Ma, *University of California, Berkeley, USA*
Lecture 1/3 *"Principles of Deep Representation Learning 1/3"*
Lecture 2/3 *"Principles of Deep Representation Learning 2/3"*
Lecture 3/3 *"Principles of Deep Representation Learning 3/3"*

Raniero Romagnoli, *Almawave SpA, Italy*
Lecture TBA
Topics: Large Language Models, Generative AI, AI.

Abigail See, *Google DeepMind, London, UK*
Lecture 1/3 *"Detecting AI-Generated Text"*
Lecture 2/3 *"SynthID: a Watermark for LLM-Generated Text"*
Lecture 3/3 *"Neural Text Generation: History to Present"*

Michal Valko, *Meta Paris, France*
Lecture 1/3 *"Thinking about Thinking: Metacognitive Capabilities of LLMs 1/3"*
Lecture 2/3 *"Thinking about Thinking: Metacognitive Capabilities of LLMs 2/3"*
Lecture 3/3 *"Thinking about Thinking: Metacognitive Capabilities of LLMs 3/3"*

Yaodong Yu, *OpenAI, USA*
3 Lectures TBA
Topics: *Interpretable white-box deep neural networks, differentially private foundation models, white-box transformers, machine learning.*

TUTORIAL SPEAKERS:

Druv Pai, *University of California, Berkeley, USA*
3 Tutorials TBA
Topics: *Deep Learning Theory, NLP, Computer Vision, White-Box Transformers, Demystifying Extreme-Token Phenomena in LLMs.*

Peng Wang, *University of Michigan, Ann Arbor, USA*
3 Tutorial TBA
Topics: *Mathematical foundations of deep learning models (supervised learning models, diffusion models and large language models).*

LECTURERS:
Yuki Asano, *University of Technology Nuremberg, Germany*
Pierre Baldi, *University of California, Irvine, CA, USA*
Lucas Beyer, *OpenAI, Zürich, Switzerland*
Wessel Bruinsma, *Microsoft Research Amsterdam, The Netherlands*
Sam Buchanan, *Toyota Technological Institute at Chicago, USA*
Floris Geerts, *University of Antwerp, Belgium*
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Useful Information

1. **Registration**: *Sept 20 @ 15:30 – 19:30* (in the foyer of the conference centre near The Crown conference room). Inside the Riva del Sole it is mandatory to wear the badge.

2. Conference Room: **The Crown** (in the conference centre of the Riva del Sole Resort & SPA, number 7 on the resort map).

3. **Very Important**: *during lessons and Q&A sessions, absolute silence is recommended, you must not make noise, you must not disturb the Lecturer during the lesson or while she/he is answering questions posed by the audience.*

4. **Group Photo:** *Sept 21 @ 13:00 Meeting point: terrace adjacent to the restaurant.*

5. **Resort Map** and **Castiglione della Pescaia Map**.

6. In the program you will find the list of **accepted posters.** The **Poster Session 1** will be held on **Sept 22 @ 21:30 Poster Session 2** will be held on **Sept 23 @ 21:30.** The two Poster Sessions will be held in the **Da Vinci Conference Room** (first floor of the Congress Centre, number 6 on the resort map). *Those who have problems and cannot make the poster, please send us an email now, deadline by August 2nd.*

   a. We recommend preparing and printing a poster of **size B0** (1000 × 1414 mm or 39.4 × 55.7 inches) in VERTICAL orientation on the board (avoid landscape orientation). If for some reason the B0 size is not possible, then use the A0 size (841 mm x 1189 mm, or 33.1 inches x 46.8 inches).
   b. **It is not possible to print posters at the course venue. When you arrive at the course venue the posters must already be printed**.
   c. The Summer School Organisers will provide all necessary supplies for mounting the posters (tape, etc).
   d. *The poster boards will be ready each morning from 08:45.* All presenters are asked to hang their posters as soon as possible in the same morning of their assigned poster session. This way all delegates will be able to study them ahead of the poster session and come prepared with specific questions. Presenters are also asked to remove their posters at the end of the session. Any poster left unmanned on its poster boards after the poster session will be removed.

7. Obviously, *we recommend bringing your work laptop.*

8. Participants who need to take an **exam/project/oral to have the 8 ECTS** credited are asked to email acdl@icas.cc and Prof. Nicosia giuseppe.nicosia.1@gmail.com ***Please read the FAQ section "ETCS Credits Recognition"***

9. Inside Riva del Sole Resort & SPA, **badges must be worn at all times**.

10. *****For social dinner on the Sept 24, if possible, we advise everyone **to dress up** (jacket and tie, suit, etc.).*

11. **Certificates** will be given out on the last day of the course. To receive the certificate you must have at least 85% of class attendance (we have CNNs/Transformers to compute and infer attendance ;-).

12. One last thing do not forget bathing suits, sunscreen, and stay hydrated.

"But don't you see that the whole trouble lies here? In words, words. Each one of us has within him a whole world of things, each man of us his own special world. And how can we ever come to an understanding if I put in the words, I utter the sense and value of things as I see them; while you who listen to me must inevitably translate them according to the conception of things each one of you has within himself. We think we understand each other, but we never really do."

<div align="right"><u>Luigi Pirandello</u>, Six Characters in Search of an Author.</div>

Poster Sessions

Sept 22 @ 21:30 Poster Session 1 (Da Vinci Conf Room, 1st floor of the Congress Centre, number 6 on the resort map).

TBA

Sept 23 @ 21:30 Poster Session 2 (Da Vinci Conf Room, 1st floor of the Congress Centre, number 6 on the resort map).

TBA

"Those who have an eye find what they are looking for even with their eyes closed"

Italo Calvino