Summer School 2023
"First Steps in Biosphere-Atmosphere Modelling"

University of Helsinki, Institute for Atmospheric and Earth System Research (INAR), Lappeenranta-Lahti University of Technology, Department of Computational Engineering and Lahti University Campus are pleased to announce the summer school "First steps in Biosphere-Atmosphere Modelling" to be held at University of Helsinki Lahti campus, 5th to 16th of June 2023.

Time
5th to 16th of June 2023

Location
University of Helsinki Lahti-campus
Niemenkatu 73, 15140 Lahti, Finland

Programming
In this course you will not run any existing model or analyze data from a model but you will get a basic and detailed knowledge on how to write an atmospheric model from scratch. During the course, everyone will program his or her own 1-dimensional atmospheric boundary layer model with equations of flow for the atmospheric boundary layer, chemical kinetics by systems of differential equations, emissions of biogenic volatile organic compounds (BVOCs) from vegetation, deposition of gases and aerosols and numerical solutions for aerosol formation and growth. The model will be coded in Fortran 95.

Additionally, we will for the first time include lectures on possible applications of machine learning and artificial intelligence techniques in atmospheric science. Most of the models describing the atmosphere rely on mathematical concepts such as partial differential equations (PDEs). These PDEs usually are enriched by some data and then numerically solved in the computer to obtain a model output, which in turn can be analyzed by atmospheric scientists. Considering this procedure, it appears to be mandatory for everybody, who deals with mathematical models, to understand how these models work. This is necessary to set up models correctly and to draw accurate conclusions from model output. Thus, we will discuss some of the most common mathematical concepts that are needed to understand models in atmospheric sciences and illuminate their respective strengths and weaknesses.

Requirements

A basic knowledge of programming in some computer language (e.g., Fortran, C++, Python, Matlab) is required. In the course, we will only provide a small amount of Fortran-lectures to teach the basics of Fortran and programming. You will also need to bring your own laptop.

Pre-course activities

There will be a Fortran online-teaching material available and pre-exercises to be solved before the course. The lectures and tasks will be sent per email to the participants after the selection in April 2023. If adequate Fortran software is not available, we will advise and help the selected participants in the installation before the course starts.

Exam and assessment

Students write a scientific report based on the results of their model simulations and send the report and their developed numerical code to Michael Boy and Putian Zhou.

Credits

5 ECTS, Helsinki University (no grades – only Pass or Fail)

Teachers

Professor Michael Boy is the corresponding teacher. The list of other teachers includes
• Dr Putian Zhou (University of Helsinki, Finland)
• Dr Lukas Pichelstorfer (University of Helsinki, Finland)
• Assist. Professor Andreas Rupp (Lappeenranta University of Technology, Finland)
• Dr Carlton Xavier (Lund University, Sweden)
• Dr Metin Baykara (Istanbul Technical University, Turkey)
• Petri Clusius (University of Helsinki, Finland)

Social activities

• On the first day we will provide a guided tour of the town Lahti

• Visit to Lahti Ski Museum & Ski jumping tower

• Get together / Outdoor activities & Picnics

• A dinner will be arranged for all course participants in the last evening

• Additional events are in planning and will be organized

Costs

The course fee is 2000 EUR. This fee covers

• All academic and social programs during the course

• Lunch and coffee break on all course days

• Accommodation in two-person rooms (in case single rooms are required the extra expenses must be covered by the participants)

• A lot of work and fun

Students and post-doctoral researchers from LUT and UH can apply for a special course fee by contacting Michael Boy.

The fee does not cover

Travel expenses to and from Lahti, personal health, and civil liability insurance, personal expenses such as drinks, telephone, photocopies, etc. during the course.

Insurance

The organizers of the course cannot accept liability for personal accident or loss or damage to private property of attending students, which may occur either during or arise from the course. Participants are therefore advised to arrange their own appropriate insurance coverage.

Application

Applicants must register to the course before the 31st of March 2023 by filling in the form, which is available below. We welcome applications from participants from all over the world.

Registration: https://elomake.helsinki.fi/lomakkeet/121565/lomake.html

If you have any question concerning the course, please don't hesitate to contact Michael Boy (michael.boy@helsinki.fi).

Feedbacks from the participants of previous summer schools and a selection of pictures are available at:

https://www.helsinki.fi/en/researchgroups/multi-scale-modelling/first-steps-in-biosphere-atmosphere-modelling