

COURSE TITLE European Study Group for Industry (ESGI 190)

**Organiser:** Title, Name, e-mail: Morten Willatzen, Professor, AAU + Horia Cornean, Professor, AAU + Kasper Studsgaard Sørensen, postdoc, AAU

**Lecturers:**

From AAU: Title, Name, Affiliation Morten Willatzen, Professor, MATH, AAU + Horia Cornean, Professor, MATH, AAU + Kasper Studsgaard Sørensen, postdoc, MATH, AAU

From DTU: Poul Hjorth, Associate Professor, DTU Compute, DTU + Mads Peter Sørensen, Professor, DTU Compute, DTU

**ECTS:** 2,5 ECTS

**Time:** October 20-24, 2025

**Place:** Venue: DanHostel, Aalborg organized by MATH, Aalborg University, Aalborg

**Deadline:** PhD students can join the ESGi PhD course up until October 19, 2025

**Description:** ESGI is a conference workshop series for mathematicians originally initiated at the mathematics department at Oxford University, UK in 1968. In Denmark, ESGI has been held annually since 1998 at DTU or SDU. In 2025, ESGI is held at AAU for the first time (ESGI 190). The concept is that a group of professional mathematicians from different universities (professors, postdocs, PhD students) join forces to solve industrial mathematical problems proposed by companies for one week (Monday to Friday). On Monday morning the company problems are presented by company representatives. Participants then form teams (one team per company problem). Each participant selects a problem (team) where they believe their mathematical skills can be useful to solve the problem. The next four days all participants work on their chosen company problem and contribute with questions etc. in plenum by addressing the other company problems. The solution involves brainstorming in each group, formation of subgroups and close interaction and discussions to solve various mathematical subtasks related to each problem. Every day in the evening blackboard progress presentations are made by each group where all PhD students are asked to present their progress results in plenum (active participation). On Friday morning, results are presented in plenum where the company representatives usually participate and respond to the progress made during the week.

In the weeks following the workshop, PhD students work on solving outstanding tasks and finalize a written report to be handed out to the company. All PhD students must contribute to the written reports.

**Learning objectives:** The PhD student uses his/her advanced mathematical skills to brainstorm and solve new and complex industrial problems. The PhD students work together in groups with researchers (professors) and other fellow PhD students to prepare and present solutions in plenum. The ESGI concept is unique in that university employees together solve important practical problems. Communication takes place between people with different backgrounds (mathematics, physics, engineering, statistics, etc.) from both the university sector and the industry. ESGI is thus an ideal setting to enhancing one's professional network in mathematics in and outside the university world.

**Prerequisites:** A minimum background for participation is a completed MSc degree (PhD student) in a STEM program where mathematics plays a key role.

**Evaluation:** Active participation during the whole ESGI week, presentation in plenum, and contribution to the written report.

**ECTS and ESGI History in Denmark:** PhD students who actively contribute and fulfill the evaluation criteria have been awarded 2,5 ECTS at DTU and SDU in previous years.