



FSD3831 Future Sustainable Aviation 6.0 credits

Framtida hållbar luftfart

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for FSD3831 is valid from Fall 2024.

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

Completed degree project at the master's level in the field of engineering.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After passing the course, the student should be able to:

- Motivate the role and impact of aviation on the Sustainable Development Goals (SDGs).

- Evaluate the environmental impact of aviation based on current and future systems.
- Explain how emissions from aviation can be reduced using new technologies, alternative fuels, operations, and regulations.
- Identify the constraints and limitations in the application of sustainable measures in aviation.
- Explain the basic steps involved in turning new ideas into sustainable, market-ready solutions while identifying the challenges (e.g. costs and regulations).

Course contents

The course is organized around six different modules with the aim to address the topic of sustainable aviation from a holistic perspective. The first module gives an introduction to sustainability and then focuses on the environmental impact of aviation linked as well to travel patterns. Then the focus is set on the different mitigation measures to tackle the environmental impact of aviation within the areas of technology, alternative fuels, operations and regulations in the following way:

- **Technology:** The students will learn about the basics of aeronautics to then move towards future designs, propulsion systems and structural materials complemented with an overview of greener aviation technologies.
- **Alternative fuels:** This module will include sustainable aviation fuels, hydrogen, and electric aircraft with some basics on batteries finishing with a lecture on life cycle assessment.
- **Operations:** How aircraft fly has also a crucial impact on the environment. To understand it better, we approach the topic of trajectory optimization but also infrastructure needs and provide an introduction to air traffic management to understand the complexity of the systems involved and its boundaries for sustainable measures.
- **Regulations:** The different European and international regulations are presented, fostering the development and implementation of the mentioned measures for aircraft environmental impact reduction.

Finally, a module on innovation and commercialization is provided regarding potential sustainable measures ideas.

Examination

- PRO1 - Project, 6.0 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

The examination consists of creating a poster (individually or in a group) that describes the doctoral student's research area from the perspective of the course content, namely sustainability with a focus on aviation, and how the doctoral student's research area can contribute to sustainable aviation. This will then be presented to all course participants during a workshop at the end of the course.

Other requirements for final grade

Participation in the seminars and approved project (P).

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.