Summary
The goal of the course is to provide the physics and technology basis for controlled fusion research, from the main elements of plasma physics to the reactor concepts.

Content
1) Basics of thermonuclear fusion
2) The plasma state and its collective effects
3) Charged particle motion and collisional effects
4) Fluid description of a plasma
5) Plasma equilibrium and stability
6) Magnetic confinement: Tokamak and Stellarator
7) Waves in plasma
8) Wave-particle interactions
9) Heating and non inductive current drive by radio frequency waves
10) Heating and non inductive current drive by neutral particle beams
11) Material science and technology: Low and high Temperature superconductor - Properties of material under irradiation
12) Some nuclear aspects of a fusion reactor: Tritium production
13) Licensing a fusion reactor: safety, nuclear waste
14) Inertial confinement

Learning Prerequisites
Recommended courses
Basic knowledge of electricity and magnetism, and of simple concepts of fluids

Learning Outcomes
By the end of the course, the student must be able to:
• Design the main elements of a fusion reactor
• Identify the main physics challenges on the way to fusion
• Identify the main technological challenges of fusion

Teaching methods
Ex cathedra and in-class exercises
Assessment methods
oral examen (100%)

Resources
Ressources en bibliothèque

Websites
• https://spcnet.epfl.ch/nuclfus/