

Instructor Guide- Fluid Kinematics



This instructor guide can be used to implement the module “Fluid Kinematics” in the classroom.

Module Aim

The overall aim of this module is supporting educators introducing various topics related to fluid dynamics fundamentals with simulation. This module serves as a foundation, providing slides that can easily be expanded to go into detail for various topics depending on specific course curriculum. Details of how simulation can aid visualization and exploration of concepts through images and homework.

It is important to note that this module is meant to supplement materials taught in an introductory course and not to replace the course in its entirety.

Suitable Courses

It is well suited for an Introduction to Fluid Kinematics course.

Contents

- Lesson 1- Introduction to Fluid Kinematics
- Lesson 2- Description of Fluid Motion
- Lesson 3- Fluid Flow Rotation
- Lesson 4- Fluid Flow Visualization
- Lesson 5- Fluid Flow Measurement
- Simulation examples (including simulation files)
 - » Cyclone Separator
 - » Propagation of Car Exhaust in a Ventilated Garage
- Homework (including simulation files)
 - » Flow through a 90- degree Bend Pipe
 - » Room with Air-Conditioning Vents
- Quiz Questions

Module Duration

Approximately 2 hours.

Learning Outcomes

Students are able to:

1. Understand fluid kinematics and fluid motion.
2. Describe rotational flows and vorticity.
3. Understand flow visualization and measurement techniques.
4. Solve simple fluid flow problems using Ansys Fluent

References and additional resources

This content was adapted from the [Ansys Innovation Course Fluid Kinematics](#).

Additional Ansys Education Resources of interest:

- [Lecture Unit: Introduction to Fluid Mechanics with Ansys Discovery](#)
- [Case Study: Flow over an Airfoil in Ansys Discovery](#)