



Fusion CORE: Engineering

Instructor guide

Instructor lead course duration: ~590 minutes

Level: Foundational

Product: Autodesk® Fusion®

This instructor guide is a comprehensive tool for facilitating this in the classroom. Prepare to teach this course by thoroughly reviewing this document, as well as all related course materials and resources.

We've summarized the core Fusion skills in the CORE: Engineering course so you can familiarize yourself with them before delivering this learning content in the classroom. It's always recommended that you work through the course yourself in preparation for each lesson.

Learning objectives:

- Describe engineering decision making
- Create a parametric design of a rim
- Apply features and patterns to detail a design
- Build an assembly with inserted hardware
- Apply physical materials and measure mass properties
- Solve and review a simulation study
- Create detailed drawings.

Each module is listed below along with suggested time allocations for instruction. The referenced demonstrations are based on the step-by-step instruction included in the course. Review the video tutorials for the detailed instruction in each module.

Getting started

Total time required for module: 20 minutes

Discuss objectives: 3 minutes

Demonstrate: 10 minutes

- Review course overview and learning objectives
- Download the course resources and software
- Create an Autodesk ID
- Install the software
- Review the starter activity and articles

Hands-on time: 5 minutes

Review objectives: 2 minutes

Explore how designs are engineered

Total time required for module: 28 minutes

Discuss objectives: 3 minutes

Demonstrate: 5 minutes

- Review the design and engineering workflows
- Describe key engineering development stages
- Describe the available engineering workspaces in Fusion
- Explore engineering tools in Fusion

Hands-on time: 8 minutes

Review objectives: 2 minutes

Module quiz: 10 minutes

Create a rim cut sketch

Total time required for module: 50 minutes

Discuss objectives: 3 minutes

Demonstrate: 10 minutes

- Convert bodies to components
- Rename components
- Create a sketch
- Apply sketch dimensions
- Apply sketch constraints

Hands-on time: 25 minutes

Review objectives: 2 minutes

Datasets:

- *09_Sketch_Constraints.f3d*
- *03_FSAE_Rim_Engineer.f3d*
- *03_FSAE_Rim_Engineer2.f3d*

Module quiz: 10 minutes

Practice exercise: Convert bodies to components in a hybrid assembly

Total time required for module: 20 minutes

Dataset:

- *Hub_Hybrid_Assembly.f3d*

Challenge exercise: Create a complex sketch for a rim spoke

Total time required for module: 25 minutes

Dataset:

- *Complex_Spoke_Sketch.f3d*

Detail and pattern rim features

Total time required for module: 45 minutes

Discuss objectives: 3 minutes

Demonstrate: 10 minutes

- Create an extrude cut
- Create a pattern
- Create an extrude to an object
- Create a fillet
- Create a chamfer

Hands-on time: 20 minutes

Review objectives: 2 minutes

Datasets:

- *03_FSAE_Rim_Engineer3.f3d*
- *03_FSAE_Rim_Engineer4.f3d*
- *11_Sketch_Projections.f3d*
- *12_Extrude.f3d*
- *16_Fillets.f3d*
- *20_Patterns.f3d*

Module quiz: 10 minutes

Practice exercise: Create a detailed recess on a rim

Total time required for module: 20 minutes

Dataset:

- *Detailed_Spoke_Recess.f3d*

Challenge exercise: Create a pattern of rim feature faces

Total time required for module: 20 minutes

Dataset:

- *Spoke_Face_Pattern.f3d*

Create a rim assembly with hardware

Total time required for module: 50 minutes

Discuss objectives: 3 minutes

Demonstrate: 15 minutes

- Use Insert Fastener
- Apply a physical material
- Measure mass properties

Hands-on time: 20 minutes

Review objectives: 2 minutes

Datasets:

- *03_FSAE_Rim_Engineer5.f3d*
- *03_FSAE_Rim_Engineer6.f3z*
- *38_Joints.f3d*
- *39_Assembly_Constraints.f3d*
- *34_Physical_Materials.f3d*

Module quiz: 10 minutes

Practice exercise: Insert hardware for an assembly

Total time required for module: 15 minutes

Dataset:

- *Bolted_Flange.f3d*

Challenge exercise: Replace inserted hardware on an assembly

Total time required for module: 20 minutes

Dataset:

- *Change_Flange_Hardware.f3z*

Simulate static stress on a rim

Total time required for module: 45 minutes

Discuss objectives: 3 minutes

Demonstrate: 10 minutes

- Review a simulation setup
- Solve a simulation
- Review simulation results

Hands-on time: 20 minutes

Review objectives: 2 minutes

Datasets:

- *03_FSAE_Rim_Engineer_with_Simulation.f3z*
- *62_Simulation_Simplify.f3d*
- *63_Simulation_Load_setup.f3d*
- *64_Simulation_Constraint_Setup.f3d*
- *65_Simulation_Material_Setup.f3d*
- *66_Simulation_Meshing.f3d*
- *67_Simulation_Solve.f3d*

Module quiz: 10 minutes

Practice exercise: Use simulation simplify to remove rim details

Total time required for module 15 minutes

Dataset:

- *FSAE_Rim_Simulation_Simplify.f3z*

Challenge exercise: Use local mesh refinement on a rim

Total time required for module 20 minutes

Dataset:

FSAE_Rim_Local_Mesh.f3z

Create a detailed drawing of a rim

Total time required for module: 50 minutes

Discuss objectives: 3 minutes

Demonstrate: 10 minutes

- Create a detailed drawing
- Create drawing views
- Apply drawing dimensions
- Apply drawing annotations

Hands-on time: 25 minutes

Review objectives: 2 minutes

Datasets:

- *03_FSAE_Rim_Engineer7.f3z*
- *46_Detailed_Drawing.f3z*

Module quiz: 10 minutes

Practice exercise: Create drawing views of a rim

Total time required for module: 15 minutes

Dataset:

- *FSAE_Rim_Drawing_Views.f3z*

Challenge exercise: Create rim dimensions with tolerance

Total time required for module: 20 minutes

Dataset:

- *FSAE_Rim_Drawing_Views.f3z*

Project:

Total time required for module: 90 minutes

Dataset:

- *Rim_Front.f3d*
- *Rim_Back.f3d*
- *Tire.f3d*

Final test

Total time required for module: 15 minutes