

Introductory and Intermediary Skills to 3D-Modeling

With Specialization in Blender and Fusion 360 for industry based design and manufacturing.

(Chapter Outlines)

*(LO.1) Represents Learning objective 1

*(FR.1) Represents Further Reading for chapter 1

*(E.1) Represents Modelling Exercises for chapter 1

*(DB1) Represents Design Brief part 1

(Chapter 1: A brief history, the current era, and looking ahead)

(LO.1)) → Why Learning 3D-modelling?

(LO.2)) → A retrospective: Leading up to the innovation of 3D computer based design

(LO.3)) → The modern 3D computer-based design landscape

(LO.4)) → Fusion 360 and the industry standard of design

(LO.5)) → The Future

(FR.1)) → Further reading for Chapter 1

(Chapter 2: 3D-Modelling Paradigms)

(LO.1)) → The three dimensions

(LO.2)) → The viewport

(LO.3)) → Translating

(LO.4)) → Rotating

(LO.5)) → Scaling

(LO.6)) → Geometry

(FR.2)) → Further reading for Chapter 2

(Chapter 3: Parametric Modelling)

(LO.1)) → Mathematically explaining object transformations

(LO.2)) → Mathematically explaining viewport movement

(LO.3)) → Mathematically explaining geometry rendering in the viewport

(FR.1)) → Further reading for Chapter 3

(Chapter 4: Basic Skills in Fusion 360)

- (LO.Introduction)
- (LO.Overview.1) → Main User Interface
- (LO.Overview.2) → Data Panel User Interface
- (LO.Overview.3) → Navigating the Viewport
- (LO.Overview.4) → Workspaces
- (LO.Overview.5) → Object Hierarchy
- (LO.Overview.6) → Design History
- (LO.Overview.7) → Basic Keyboard Shortcuts Part 1

- (LO.Create.1) → Creating Sketches
- (LO.Create.2) → Creating Sketches for Geometry
- (LO.Create.3) → Creating Sketches on Geometry
- (LO.Create.4) → Using the Extrude tool
- (LO.Create.5) → Using the Revolve tool
- (LO.Create.6) → Using the Hole tool
- (LO.Create.7) → Using the Mirror tool
- (LO.Create.8) → Using the Thicken tool
- (LO.Create.9) → Create a Solid Body
- (LO.Create.10) → Basic Keyboard Shortcuts Part 2

- (LO.Modify.1) → Using the Press-Pull tool
- (LO.Modify.2) → Using the Fillet tool
- (LO.Modify.3) → Using the Chamber tool
- (LO.Modify.4) → Using the Scale tool
- (LO.Modify.5) → Using the Combine tool
- (LO.Modify.6) → Basic Keyboard Shortcuts Part 3

- (E.4) → Basic Modelling Exercises
- (FR.4) → Further reading for Chapter 4

(Chapter 5: A first project)

- (DB1) (1) Design Brief Overview → Cam-Shaft Holder
- (1) Technical Drawings → Cam-Shaft Holder

- (DB2) (2) Design Brief Overview → Brake Attachment Point
- (2) Technical Drawings → Brake Attachment Point

(DB3) (3) Design Brief Overview → Fuse-box Manifold
(3) Technical Drawings → Fuse-box Manifold

(DB4) (4) Design Brief Overview → Oil-Cover Manifold
(4) Technical Drawings → Oil-Cover Manifold

(Chapter 6: Intermediatory Skills in Fusion 360)

(Chapter 7: A second project)

(Chapter 8: Further Intermediatory Skills in Fusion 360)

(Chapter 9: A third project)

(Chapter 10: Advanced Skills in Fusion 360)

(Chapter 11: Advanced Skills in Fusion 360)

(Chapter 12: Final Leaving Practices)

(Pacing Chart)

**Some points to note are outlined below the pacing chart.*

Term 02	Week	Lesson 1	Lesson 2
	01	Chapter 1: A brief history, the current era, and looking ahead	Chapter 1: A brief history, the current era, and looking ahead
	02	Chapter 2: 3D-Modelling Paradigms	Chapter 3: Parametric Modelling
	03	Chapter 4: Basic Skills in Fusion 360	Chapter 4: Basic Skills in Fusion 360
	04	Chapter 4: Basic Skills in Fusion 360	Chapter 4: Basic Skills in Fusion 360
	05	Chapter 4: Basic Skills in Fusion 360	Chapter 4: Basic Skills in Fusion 360
	06	Chapter 4: Basic Skills in Fusion 360	Chapter 5: A first project
	07	Chapter 5: A first project	Chapter 6: Intermediatory Skills in Fusion 360
	08	Chapter 6: Intermediatory Skills in Fusion 360	Chapter 6: Intermediatory Skills in Fusion 360
	09	Chapter 6: Intermediatory Skills in Fusion 360	Chapter 7: A second project
	10	Chapter 7: A second project	Chapter 7: A second project
Term 03	Week	Lesson 1	Lesson 2
	01	Chapter 8: Further Intermediatory Skills in Fusion 360	Chapter 8: Further Intermediatory Skills in Fusion 360
	02	Chapter 8: Further Intermediatory Skills in Fusion 360	Chapter 8: Further Intermediatory Skills in Fusion 360
	03	Chapter 8: Further Intermediatory Skills in Fusion 360	Chapter 9: A Third Project
	04	Chapter 9: A Third Project	Chapter 10: Advanced Skills in Fusion 360
	05	Chapter 10: Advanced Skills in Fusion 360	Chapter 10: Advanced Skills in Fusion 360
	06	Chapter 10: Advanced Skills in Fusion 360	Chapter 11: A final Project
	07	Chapter 11: A final Project	Chapter 11: A final Project
	08	Chapter 11: A final Project	Chapter 12: Final Leaving Practices

(Points to note)

**Below are outlined some points to note with the above pacing chart's organization.*

- (1) The lessons have been sort of staggered to especially between project lessons to allow students to:
 - a. Complete homework assignments of modelling practice/studies or homework models assigned by a teacher.
The use of such homework is to strengthen the skills students have learned in their lessons as there will be not enough time for students to completely practice learned skills
 - b. Allow students to catch up/complete on their projects if they fall behind.
 - c. Allow students to go through further reading if they so wish to.

- (2) Further reading is not a compulsory part of the course as it is only assigned if students may take interest in a given topic or if they if the teacher sees it fit to deliver such content if students are confident with the basic content. It should be noted that further reading does not only mean that there are physical texts for students to go through, but there are:
 - a. Further texts
 - b. Supplementary videos
 - c. More advanced modelling skills
 - d. More advanced modelling problems

- (3) Each lesson's structure is as outlined below:
 - a. The PowerPoint for a given chapter is went through with the students, some points are explained and further reading may be assigned if required or if students take interest in a particular topic. **Please Documents labelled vSPEC for a specimen example of such a PowerPoint for a section of Chapter 1.**

 - b. A Design brief is given for a project or a video is played that describes a certain skill/paradigm
 - i. If the chapter is any of the **blue** colored chapters above then a video is played that describes how to use a particular tool in fusion, students are advised to replicate the steps taken described in the video to produce a similar model to be able to make sure they remember the learned skill. **Please Documents labelled vSPEC for a specimen example of such a video for a section of Chapter 4.**
 - ii. If the chapter is any of the **yellow** colored chapter which are design/project-based chapters then a printed design brief is handed out to students in which a supposed client or company is asking for a particular object of product to be designed. **Please Documents labelled vSPEC for a specimen example of such a design brief for Chapter 5.**
 - iii. If the chapter is any of the **red** or **green** no video or design brief is to be given.

- c. After going through the PowerPoint and video/design brief there are exercises at the end of the chapter:
 - i. Students may attempt such modelling exercises in the class if time allows
 - ii. Or be assigned the modelling exercises by the teacher at their liberty. The staggered pacing chart accommodates such homework assignments quite easily allowing students to be assigned homework problems for one lesson and to be due the next lesson after the weekend.

- d. If the chapter is a project based chapter shown in yellow exemplar material may be shown to students from previous years' students' work as the 3D-modelling course matures.