

Contents

Introduction	xiii
Blender Platforms	xiv
Blender Versions	xiv
Graphical User Interface	xiv
Content	xiv
Evolution	xiv
 	xv
The Author	
 	xvii
Acknowledgments	
 	xix
Download Blender 2.76	
 	xxi
Recommended Viewing	
Blender 3D Design Course: Tufts University	xxi
Supplements to the Book	xxi
 	1
1 The Blender Interface	1
1.1 The Graphical User Interface	1
1.2 The Blender Screen	1
1.3 Interface Input	3
1.4 Keyboard Shortcuts	4
1.5 Window Arrangements	5
1.6 The User Preferences Window	7
1.7 Preset Interface Arrangements	8
1.8 The 3D Window	9
1.9 Window Modes	12
1.10 Layers	13
1.11 Object Tools Panel (Tool Shelf Panel)	14
1.12 Moving in 3D Space	15

1.13	The Blender View Menu.....	18
1.14	The Properties Window.....	19
1.15	Blender Windows.....	21
1.16	Python Script.....	22
1.17	The Outliner Window.....	23
1.18	Add-Ons.....	29
1.19	Multiple Scenes	30
2	Navigation	35
2.1	Navigation.....	35
2.2	Navigate and Save	35
2.3	Windows File Explorer (Windows Explorer)	39
2.4	The Append or Link Command	41
2.5	Packing Data.....	42
2.6	Importing Objects	43
3	Creating and Editing Objects	45
3.1	Working with Basic Meshes.....	45
3.2	Placing Objects in the Scene	46
3.3	Edit Mode and Object Mode.....	48
3.4	Mesh Types.....	49
3.5	Cursor Placement.....	49
3.6	Moving Objects.....	50
3.7	Scaling Objects.....	50
3.8	Rotating Objects.....	50
3.9	Precision Manipulation	51
3.10	The Transformation Widget.....	52
3.11	Selecting Vertices, Edges, and Faces	52
3.12	Mesh Vertex Editing.....	54
3.13	Edit Mode Selection Options	54
3.14	Creating Vertices.....	55
3.15	Center Points	57
3.16	Object Display	58
3.17	Smooth and Flat Shading Options.....	58
3.18	Proportional Vertex Editing	58
3.19	Extruding Shapes.....	59
3.20	Creating Ground.....	60
3.21	Edge Loop Selection	61
3.22	Inset Faces.....	62
3.23	Joining and Separating Meshes	64
3.24	Object Groups	68
3.25	Deleting Vertices, Edges, or Faces	70
3.26	Adding Faces	70
3.27	Spin and Spin Duplicate	70
3.28	Modifiers.....	75
3.29	The Knife Tool.....	81

3.30	Bezier Curves and Circles.....	82
3.31	Sculpt Mode.....	86
3.32	Extruding a Cup.....	94
3.33	Extruding a Trough Method 1.....	97
3.34	Using Dupliverts	101
4	Materials	103
4.1	Introduction to Materials	103
4.2	Material Settings	103
4.3	Material Buttons	105
4.4	Material Colors	105
4.5	Adding a New Material	105
4.6	The Preview Tab	106
4.7	The Diffuse Tab	106
4.8	The Specular Tab	108
4.9	The Hardness Value	109
4.10	Ramp Shaders	110
4.11	Halo Settings	118
4.12	Transparency and Reflection	119
4.13	Vertex Painting	119
4.14	Materials and the GUI	124
4.15	The Outliner Window	126
4.16	Multiple Material Slots	131
4.17	Assigning Texture Color	134
5	Textures	137
5.1	Introduction to Textures	137
5.2	Material Textures	138
5.3	Texture Display in the 3D Window	141
5.4	Texture Mapping	142
5.5	Displacement Mapping	143
5.6	Texture Surface Displacement	144
5.7	UV Mapping	147
5.8	Selective UV Texture Mapping	152
5.9	Unwrapping with Seams	153
5.10	Texture Paint	155
6	World Settings	163
6.1	Introduction to World Settings	163
6.2	Mist	164
6.3	Stars	164
6.4	Texture as Background	164
6.5	Image as Background	167
6.6	Image as Template	168
7	Lighting and Cameras	169
7.1	Lighting Types and Settings	169

7.2	Lamp Settings.....	169
7.3	Cameras.....	172
7.4	Camera Settings Options.....	172
7.5	Camera Switching.....	173
7.6	Camera Tracking	174
8	Rendering and Ray Tracing	175
8.1	Rendering an Image or Movie	175
8.2	Rendering a JPEG Image	178
8.3	Rendering a Movie File	179
8.4	Playback.....	180
8.5	More Movie File Rendering.....	180
8.6	Video Codecs.....	181
8.7	Making a Movie	181
8.8	Ray Tracing.....	182
8.9	Cycles Ray Trace Rendering.....	182
9	Animation Basics	185
9.1	Introduction to Animation	185
9.2	Moving, Rotating, and Scaling.....	186
9.3	Viewing Your Animation	191
9.4	The Graph Editor Window.....	191
9.5	Editing the Curve	194
9.6	Other Types of Curves	196
9.7	Modifying Curves.....	197
9.8	Automatic Key Framing	199
9.9	Rotation Explained.....	200
9.10	Rotation Using F Curves.....	203
9.11	Animating Other Features	210
9.12	Keying Sets.....	212
9.13	Vertex Animation	212
9.14	Animation Following Curves	214
9.15	Displacement Sound Animation Control	227
10	3D Text	235
10.1	Introduction to 3D Text.....	235
10.2	Creating 3D Text in Blender.....	235
10.3	The Object Data Button “F”	236
10.4	Creating Text on a Curve.....	238
10.5	Converting Text to a Mesh Object	239
10.6	Converting Text to a Curve	240
10.7	Elefont 3D Text.....	240
11	Nurbs and Metashapes	243
11.1	Using Nurbs	243
11.2	Creating a Lofted Tunnel.....	245
11.3	Metashapes.....	246

12	Modifiers	249
12.1	Introduction to Modifiers.....	249
12.2	Modifier Stacks.....	251
12.3	Modifiers for Modifying.....	252
12.4	Modifiers for Generating	258
12.5	Modifiers for Deforming	285
12.6	Modifiers for Simulating	300
13	Particle Systems	317
13.1	Overview.....	317
13.2	Setting Up the Default Particle System	318
13.3	Particle Settings and Material Influence	327
13.4	The Particles Panel.....	327
13.5	Starting a Particle System	329
13.6	Material Influence on Particles.....	331
13.7	Particle Interaction.....	335
13.8	Wind Force	336
13.9	Sample Particle Settings.....	338
13.10	Keyed Particle Systems	340
13.11	Boids Particle Systems.....	342
13.12	Hair Particle Systems	349
13.13	The Assignment Tab	354
13.14	Fluid Particles.....	360
14	Child/Parent Relationships and Constraints	365
14.1	Child/Parent Relationships	365
14.2	Introduction to Constraints.....	367
14.3	Transform Constraints	368
14.4	Tracking Constraints	370
14.5	Relationship Constraints	372
14.6	Duplicating along Curves	379
14.7	Extruding along Curves	380
14.8	The Follow Path Constraint	381
15	Armatures	387
15.1	Adding an Armature.....	387
15.2	Single Bone Armatures	387
15.3	Armature Display Types	390
15.4	Multibone Armatures	392
15.5	Deforming a Mesh Object	393
15.6	Armature Modifiers	395
15.7	Humanoid Armatures	397
15.8	Disconnected Bones	397
15.9	Vertex Groups or Field of Influence	402
15.10	Inverse Kinematics	403

15.11 IK Constraint.....	404
15.12 Character Rigging.....	408
16 Shape Key and Action Editors	435
16.1 Introduction	435
16.2 Shape Key Editor.....	435
16.3 Action Editor.....	439
16.4 Shape Keys and Action Editor in Practice.....	441
17 Fluid Simulation	445
17.1 Introduction to Fluid Simulation.....	445
17.2 Basic Setup (Scenario 1).....	445
17.3 Basic Setup (Scenario 2).....	450
17.4 Fluid Simulation with Particle Objects	455
17.5 Fluid Simulation with Control Objects.....	456
17.6 Summary.....	457
18 Smoke Simulation	459
18.1 Smoke Generation	459
18.2 Creating Smoke from Scratch.....	459
18.3 Create a Domain	460
18.4 Smoke from a Mesh Object	461
18.5 Flow Object.....	461
18.6 Rendering.....	462
18.7 Domain Settings for Rendering.....	462
18.8 Material Buttons	462
18.9 Smoke Generation Settings	465
18.10 Using Particles.....	466
18.11 Fire	469
18.12 Color Ramp	470
18.13 Summary.....	472
19 Nodes	473
19.1 Introduction to Nodes.....	473
19.2 Material Nodes.....	478
19.3 Texture Nodes	486
19.4 Compositing Nodes.....	488
19.5 Node Groups.....	491
19.6 Saving and Appending Node Groups.....	493
19.7 Summary.....	494
20 Cycles Render	495
20.1 PC Specifications for Cycles.....	495
20.2 Start Cycles	496
20.3 Cycles in Perspective	503
20.4 Useful Cycles: Add Mist	507
20.5 Adding Texture in Cycles.....	510

21 The Blender Game Engine	513
21.1 Introduction to the Game Engine	513
21.2 Reinforcing Fundamentals.....	519
21.3 Examples	523
21.4 Game Animation	531
21.5 Rigid Bodies: Dynamics	535
21.6 Making a Stand-Alone Game	538
21.7 Summary.....	541
22 The Video Sequence Editor: Making a Movie	543
22.1 Making a Movie	543
22.2 The Video Editing Screen	545
22.3 Storyboard	547
22.4 Video Sequence Editor.....	547
22.5 Summary.....	555
23 Drivers	557
23.1 Blender Drivers	557
23.2 Randomize Object Properties.....	560
23.3 The Array Modifier	560
23.4 Shapes Keys.....	561
23.5 Randomizing Property Values.....	561
23.6 "Python" Script	561
23.7 Register the Script.....	562
23.8 Set Up the 3D Window	563
23.9 Rotation Driver Properties	564
23.10 Alternative Method for Activating.....	568
23.11 Reevaluating Drivers	568
23.12 Scale Properties Driver	569
23.13 X-Axis Scale Driver (Scripted Expression)	569
23.14 Y-Axis Scale Driver (Max, Min, Sum, Average Values with Variable)	569
23.15 Z-Axis Scale Driver (Single Property with Variable)	571
23.16 Material Property Drivers	573
23.17 Duplicating the Object	574
24 Installing Add-Ons	575
24.1 Installing	575
24.2 Finding the File	576
24.3 Installing the Python Script	577
24.4 Activating the Script	578
24.5 Using the Script	579
Bibliography	581
Appendix A: Basic Blender Commands	583
Index	587