

# AutoCAD 2015 and AutoCAD LT 2015

NO EXPERIENCE REQUIRED





# AUTOCAD® 2015 AND AUTOCAD LT® 2015

**NO EXPERIENCE REQUIRED**

Donnie Gladfelter



Senior Acquisitions Editor: Willem Knibbe  
Development Editor: Kathi Duggan  
Technical Editor: Melanie Perry  
Production Editor: Eric Charbonneau  
Copy Editor: Sharon Wilkey  
Editorial Manager: Pete Gaughan  
Vice President and Executive Group Publisher: Richard Swadley  
Associate Publisher: Chris Webb  
Book Designer: Franz Baumhackl  
Compositor: Cody Gates, Happenstance Type-O-Rama  
Proofreader: Nancy Bell  
Indexer: Ted Laux  
Project Coordinator, Cover: Todd Klemme  
Cover Designer: Wiley  
Cover Image: ©2013 Donnie Gladfelter

Copyright © 2014 by John Wiley & Sons, Inc., Indianapolis, Indiana  
Published simultaneously in Canada  
ISBN: 978-1-118-86229-2  
ISBN: 978-1-118-93249-0 (ebk.)  
ISBN: 978-1-118-86239-1 (ebk.)

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, scanning or otherwise, except as permitted under Sections 107 or 108 of the 1976 United States Copyright Act, without either the prior written permission of the Publisher, or authorization through payment of the appropriate per-copy fee to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, (978) 750-8400, fax (978) 646-8600. Requests to the Publisher for permission should be addressed to the Permissions Department, John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, (201) 748-6011, fax (201) 748-6008, or online at [www.wiley.com/go/permissions](http://www.wiley.com/go/permissions).

**Limit of Liability/Disclaimer of Warranty:** The publisher and the author make no representations or warranties with respect to the accuracy or completeness of the contents of this work and specifically disclaim all warranties, including without limitation warranties of fitness for a particular purpose. No warranty may be created or extended by sales or promotional materials. The advice and strategies contained herein may not be suitable for every situation. This work is sold with the understanding that the publisher is not engaged in rendering legal, accounting, or other professional services. If professional assistance is required, the services of a competent professional person should be sought. Neither the publisher nor the author shall be liable for damages arising herefrom. The fact that an organization or Web site is referred to in this work as a citation and/or a potential source of further information does not mean that the author or the publisher endorses the information the organization or Web site may provide or recommendations it may make. Further, readers should be aware that Internet Web sites listed in this work may have changed or disappeared between when this work was written and when it is read.

For general information on our other products and services or to obtain technical support, please contact our Customer Care Department within the U.S. at (877) 762-2974, outside the U.S. at (317) 572-3993 or fax (317) 572-4002.

Wiley publishes in a variety of print and electronic formats and by print-on-demand. Some material included with standard print versions of this book may not be included in e-books or in print-on-demand. If this book refers to media such as a CD or DVD that is not included in the version you purchased, you may download this material at <http://booksupport.wiley.com>. For more information about Wiley products, visit [www.wiley.com](http://www.wiley.com).

**Library of Congress Control Number: 2014931957**

**TRADEMARKS:** Wiley and the Sybex logo are trademarks or registered trademarks of John Wiley & Sons, Inc. and/or its affiliates, in the United States and other countries, and may not be used without written permission. Autodesk, AutoCAD, and AutoCAD LT are registered trademarks of Autodesk, Inc. All other trademarks are the property of their respective owners. John Wiley & Sons, Inc. is not associated with any product or vendor mentioned in this book.

10 9 8 7 6 5 4 3 2 1

Dear Reader,

Thank you for choosing *AutoCAD 2015 and AutoCAD LT 2015: No Experience Required*. This book is part of a family of premium-quality Sybex books, all of which are written by outstanding authors who combine practical experience with a gift for teaching.

Sybex was founded in 1976. More than 30 years later, we're still committed to producing consistently exceptional books. With each of our titles, we're working hard to set a new standard for the industry. From the paper we print on to the authors we work with, our goal is to bring you the best books available.

I hope you see all that reflected in these pages. I'd be very interested to hear your comments and get your feedback on how we're doing. Feel free to let me know what you think about this or any other Sybex book by sending me an email at [contactus@sybex.com](mailto:contactus@sybex.com). If you think you've found a technical error in this book, please visit <http://sybex.custhelp.com>. Customer feedback is critical to our efforts at Sybex.

Best regards,

A handwritten signature in black ink, appearing to read "Chris Webb". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

CHRIS WEBB  
Associate Publisher  
Sybex, an Imprint of Wiley

*To my wife, Helen, and all educators who teach with a relentless passion to positively impact the lives of their students.*

## ACKNOWLEDGMENTS

*Following the ideals I* learned as an Eagle Scout in the Boy Scouts of America, I had but one goal as I began this project more than five years ago: to help other people. More specifically, I wanted to help the next generation of design professionals just as the previous generation helped me get my own start. As is often the case in the pursuit of helping others, the greatest reward has proven to be the selfless support I have received from everyone who has accompanied me on this journey.

From day one of this project, I have had the extraordinary privilege of working with the world-class team at Wiley/Sybex. Their professionalism, dynamism, and dedication to their craft is apparent as you read through this book. Special thanks to my editorial manager, Pete Gaughan, who wore many hats to keep this year's project on track. Thank you to my developmental editor, Kathryn Duggan, for tracking down all 1,000+ images in this book; my copy editor, Sharon Wilkey, for keeping my use of the English language in check; and my production editor, Eric Charbonneau, for making it all look exceptional in print. Commemorating my fifth anniversary of this book, a special note of appreciation to Melanie Perry, who has served as my technical editor since day one of this project. And finally, thank you to Willem Knibbe for your many years of support as my acquisitions editor.

Featured on the cover of this book is a photo I took of the train station in Glattfelden, Switzerland. A sincere thank you to Koni Ulrich for hosting my wife Helen and me, along with our close friends Andrea and JJ Frankovich, as I traced the roots of my sixth great-grandfather Casper Glattfelder during our May 2013 visit. Your hospitality (and great beer) helped create memories that will last a lifetime.

Finally, a special thanks to the most dedicated and most important member of the production team: my beautiful wife, Helen. Although I wasn't always able to show it during the late nights and weekends that define what we affectionately call "book season," I love you and thank you for the support you give me each and every day. As a teacher at a school for autism, your passion to impact the lives of your students is infectious and serves as inspiration for me to reach a little higher with each passing day.

# ABOUT THE AUTHOR

*Donnie Gladfelter is a* highly visible and respected thought leader in the CAD community. As an Autodesk Certified Instructor, he is well known for his blog The CAD Geek ([www.thecadgeek.com](http://www.thecadgeek.com)), has worked with hundreds of design professionals as a business development manager at CADD Microsystems, and is a popular speaker at Autodesk University and other industry events. Donnie has proudly dedicated himself to empowering CAD professionals by providing training and services to companies around the world, has served on the board for the Autodesk User Group International (AUGI), and is an active member of the design community.

A proven communicator, Donnie has reached thousands of people worldwide through many publications and various public speaking engagements. As a speaker at Autodesk University since 2007, Donnie has presented a long list of popular sessions and served as host for Autodesk University Virtual in 2010. Other speaking engagements have drawn audiences of more than 60,000 people.

Leading a peripatetic existence as a highly trusted and respected member of the CAD community, he has earned a professional reputation founded on both integrity and loyalty. Backed by more than a decade of experience, his personal mantra of empowering CAD professionals is embodied by his current position as a business development manager at CADD Microsystems, where he helps design teams throughout the Mid-Atlantic and across the world apply technology the way they do business through frequent seminars, workshops, and classroom-style training.

Donnie and his beautiful wife live in Richmond, Virginia. You can reach him at [donnie.gladfelter@thecadgeek.com](mailto:donnie.gladfelter@thecadgeek.com).

# CONTENTS AT A GLANCE

	<i>Introduction</i>	<i>xvii</i>
CHAPTER 1	Getting to Know AutoCAD for Windows	1
CHAPTER 2	Learning Basic Commands to Get Started	31
CHAPTER 3	Setting Up a Drawing	65
CHAPTER 4	Developing Drawing Strategies: Part 1	95
CHAPTER 5	Developing Drawing Strategies: Part 2	175
CHAPTER 6	Using Layers to Organize Your Drawing	259
CHAPTER 7	Combining Objects into Blocks	327
CHAPTER 8	Controlling Text in a Drawing	389
CHAPTER 9	Using Dynamic Blocks and Tables	471
CHAPTER 10	Generating Elevations	547
CHAPTER 11	Working with Hatches, Gradients, and Tool Palettes	609
CHAPTER 12	Dimensioning a Drawing	649
CHAPTER 13	Managing External References	713
CHAPTER 14	Using Layouts to Set Up a Print	761
CHAPTER 15	Printing a Drawing	811
CHAPTER 16	Creating 3D Geometry	847
CHAPTER 17	Rendering and Materials	939
	<i>Index</i>	<i>981</i>



# CONTENTS

*Introduction*

*xvii*

<b>CHAPTER 1</b>	<b>Getting to Know AutoCAD for Windows</b>	<b>1</b>
	Starting AutoCAD for Windows . . . . .	2
	Exploring the User Interface . . . . .	2
	Using the New Tab . . . . .	3
	Introducing Workspaces . . . . .	5
	Exploring the Drafting & Annotation Workspace . . . . .	6
	Putting the User Interface to Work . . . . .	10
	Using the Ribbon . . . . .	12
	Using File Tabs to Manage Drawings . . . . .	15
	Working in the Command-Line Interface. . . . .	17
	Understanding the Status Bar. . . . .	20
	Using the Application Menu. . . . .	22
	Using the Keyboard. . . . .	27
	Using the Mouse . . . . .	28
	If You Would Like More Practice. . . . .	29
	Are You Experienced? . . . . .	30
<b>CHAPTER 2</b>	<b>Learning Basic Commands to Get Started</b>	<b>31</b>
	Using the Line Tool. . . . .	31
	Using Coordinates . . . . .	37
	Using Relative Coordinates . . . . .	41
	Using the Direct Distance Method . . . . .	44
	Drawing the Shape . . . . .	44
	Using Relative Cartesian Coordinates. . . . .	45
	Erasing Lines . . . . .	46
	Using Relative Polar Coordinates . . . . .	47
	Using Direct Input . . . . .	47
	Using the <i>Offset</i> Command . . . . .	49
	Using the <i>Fillet</i> Command. . . . .	52

Completing the Shape .....	56
Offsetting Lines to Mark an Opening .....	56
Extending Lines .....	57
Trimming Lines .....	59
If You Would Like More Practice...	62
Are You Experienced? .....	63

---

### **CHAPTER 3      Setting Up a Drawing      65**

---

Setting Up the Drawing Units .....	66
Setting Up the Drawing Size .....	71
Using the Grid .....	72
Setting Up Drawing Limits .....	76
Drawing with Grid and Snap .....	79
Taking a Closer Look at Dynamic Input .....	82
Saving Your Work .....	85
Saving Drawings to Your Hard Drive or Network Drive .....	86
Saving Drawings to Autodesk 360 Storage .....	89
Understanding AutoCAD Units .....	91
Exploring Options for Linear Units .....	92
Exploring Options for Angular Units .....	93
Are You Experienced? .....	94

---

### **CHAPTER 4      Developing Drawing Strategies: Part 1      95**

---

Laying Out the Walls .....	96
Creating Polylines from Existing Objects .....	97
Creating and Editing Polylines .....	100
Creating the Exterior Wall Lines .....	102
Creating the Interior Walls .....	106
Cutting Openings in the Walls .....	120
Creating Doors .....	130
Drawing Swinging Doors .....	131
Copying Objects .....	142
Mirroring Objects .....	144
Scaling the Bathroom Door .....	149
Drawing a Sliding Glass Door .....	151
Drawing the Bifold Doors .....	162
Reviewing Drawing Strategies Used in This Chapter .....	168

If You Would Like More Practice...	169
An Alternative Sliding Glass Door.....	169
An Addition to the Cabin.....	170
Three Views of a Block.....	171
Are You Experienced?.....	173

---

<b>CHAPTER 5</b>	<b>Developing Drawing Strategies: Part 2</b>	<b>175</b>
------------------	--	------------

---

Starting and Running Commands.....	175
Drawing the Thresholds.....	178
Drawing the Front Threshold.....	179
Drawing the Back Threshold.....	184
Drawing the Decks and Stairs.....	186
Drawing the Front Deck.....	186
Drawing the Deck Posts.....	190
Drawing the Stairs.....	195
Mirroring the Post and Railing.....	197
Drawing the Back Deck and Stairs.....	201
Using Point Filters to Finish the Deck.....	206
Laying Out the Kitchen.....	210
Drawing the Counter.....	211
Drawing the Stove and Refrigerator.....	216
Completing the Stove with Parametrics.....	218
Drawing the Kitchen Sink.....	233
Constructing the Bathroom.....	236
Setting Running Object Snaps.....	237
Drawing a Shower Unit.....	239
Drawing the Bathroom Sink and Mirror.....	241
Positioning the Toilet and Shelves.....	245
Drawing the Hot Tub.....	249
If You Would Like More Practice...	252
Drawing the Cabin Again.....	252
Drawing Something Else.....	253
Drawing Furniture for the Cabin.....	253
Drawing a Gasket.....	254
Drawing a Parking Lot.....	256
Are You Experienced?.....	258

---

**CHAPTER 6      Using Layers to Organize Your Drawing      259**


---

Using Layers as an Organizing Tool . . . . .	260
Setting Up Layers . . . . .	262
Assigning Linetypes to Layers . . . . .	274
Assigning Objects to Layers . . . . .	279
Turning Off and Freezing Layers . . . . .	295
Drawing the Headers . . . . .	299
Drawing the Roof . . . . .	303
Setting a Linetype Scale Factor . . . . .	309
Drawing the Ridgeline . . . . .	312
Using the Layer Walk Tool . . . . .	313
Setting Properties of Layers and Objects . . . . .	316
Assigning a Color or a Linetype to an Object Instead of a Layer . . . . .	316
Making a Color or a Linetype Current . . . . .	317
Using the Action Recorder . . . . .	317
If You Would Like More Practice . . . . .	321
Creating a Layer State . . . . .	321
Setting Up Layers for Your Trade or Profession . . . . .	325
Are You Experienced? . . . . .	326

---

**CHAPTER 7      Combining Objects into Blocks      327**


---

Making a Block for a Door . . . . .	328
Inserting the Door Block . . . . .	336
Understanding and Using Groups . . . . .	341
Finding Blocks in a Drawing . . . . .	344
Using Grips to Detect a Block . . . . .	344
Using the <i>LIST</i> Command to Detect a Block . . . . .	345
Using the Properties Palette to Examine a Block . . . . .	347
Creating a Window Block . . . . .	348
Inserting the Window Block . . . . .	353
Rotating a Block during Insertion . . . . .	354
Using Snap Tracking to Set the Insertion Point . . . . .	357
Changing a Block's Scale Factor by Using Object Properties . . . . .	360
Finishing the Windows . . . . .	362
Revising a Block . . . . .	366
Sharing Information between Drawings . . . . .	369
Copying Objects between Drawings . . . . .	369

Using the AutoCAD DesignCenter . . . . .	371
Using Other Ways to Share Information between Drawings . . . . .	377
If You Would Like More Practice... . . . .	385
Are You Experienced? . . . . .	387

---

## **CHAPTER 8      Controlling Text in a Drawing      389**

---

Setting Up Text Styles . . . . .	390
Determining the Text and Drawing Scales . . . . .	391
Defining a Text Style for View Titles . . . . .	392
Placing Titles of Views in the Drawing . . . . .	397
Using Annotative Text . . . . .	401
Defining an Annotative Text Style . . . . .	402
Placing Room Labels in the Floor Plan . . . . .	404
Using Text in a Grid . . . . .	417
Creating a Border and Title Block . . . . .	428
Using Multiline Text . . . . .	446
Finishing the Title Block . . . . .	446
Using Mtext for General Notes . . . . .	450
Using the Spell-Check Feature . . . . .	459
Exploring Other Aspects of Multiline Text . . . . .	463
If You Would Like More Practice... . . . .	468
Are You Experienced? . . . . .	470

---

## **CHAPTER 9      Using Dynamic Blocks and Tables      471**

---

Using Attributes for a Grid . . . . .	472
Defining Blocks with Attributes . . . . .	477
Inserting Blocks with Attributes . . . . .	479
Editing Attribute Text . . . . .	482
Setting Up Multiple Attributes in a Block . . . . .	483
Defining a Block with Multiple Attributes . . . . .	488
Calculating Areas . . . . .	490
Inserting the Room Information Block . . . . .	494
Editing Attributes . . . . .	499
Controlling the Visibility of Attributes . . . . .	503
Exploring Other Uses for Attributes . . . . .	507
Creating a Dynamic Block . . . . .	507
Setting Up Parameters and Actions . . . . .	509

Fine-Tuning the Dynamic Block with the Properties Palette . . . . .	513
Inserting a Dynamic Block . . . . .	517
Creating a Table . . . . .	524
Defining a Table Style . . . . .	524
Designing a Table . . . . .	528
Adding Formulas to a Table . . . . .	532
Creating Tables from Attributes . . . . .	537
Modifying the Table Display . . . . .	542
If You Would Like More Practice . . . . .	544
Are You Experienced? . . . . .	545

---

## **CHAPTER 10      Generating Elevations      547**

Drawing the South Elevation . . . . .	548
Creating the South Elevation . . . . .	549
Setting Up Lines for the Heights . . . . .	551
Using Construction Lines to Project Elevation Points . . . . .	553
Copying Objects by Using Grips . . . . .	554
Trimming Lines in the Elevation . . . . .	557
Assigning Elevation Layers . . . . .	563
Drawing the Decks in Elevation . . . . .	565
Generating the Other Elevations . . . . .	583
Making the Opposite Elevation . . . . .	583
Revising the New South Elevation . . . . .	586
Making the Front and Back Elevations . . . . .	593
Considering Drawing Scale Issues . . . . .	604
Drawing Interior Elevations . . . . .	605
If You Would Like More Practice . . . . .	606
Are You Experienced? . . . . .	607

---

## **CHAPTER 11      Working with Hatches, Gradients, and Tool Palettes      609**

Hatching the South Elevation . . . . .	610
Looking at Hatch Patterns . . . . .	614
Hatching the Rest of the South Elevation . . . . .	616
Using Hatches in the Floor Plan . . . . .	629
Creating the User-Defined Hatch Pattern . . . . .	630
Controlling the Origin of the Hatch Pattern . . . . .	632
Finishing the Hatches for the Floors . . . . .	634
Modifying the Shape of Hatch Patterns . . . . .	637

Creating and Managing Tool Palettes . . . . .	639
Creating a New Tool Palette . . . . .	639
Setting Up a Palette for Hatches . . . . .	642
Creating a Palette for Commands . . . . .	644
If You Would Like More Practice... . . . .	646
Creating the Hatch Patterns for the Other Elevations . . . . .	647
Are You Experienced? . . . . .	648

---

<b>CHAPTER 12</b>	<b>Dimensioning a Drawing</b>	<b>649</b>
-------------------	-------------------------------	------------

---

Introducing Dimension Styles . . . . .	649
Preparing for Dimensioning . . . . .	650
Creating a Text Style for Dimensions . . . . .	652
Making a New Dimension Style . . . . .	653
Setting Up the Primary Units Tab (Architectural) . . . . .	658
Setting Up the Primary Units Tab (Metric) . . . . .	660
Completing the Dimension Style Setup . . . . .	661
Exploring the Alternate Units and Tolerances Tabs . . . . .	664
Placing Dimensions on the Drawing . . . . .	666
Placing Horizontal Dimensions . . . . .	666
Using the Dimension Continue Command . . . . .	668
Using the Dimension Baseline Command . . . . .	671
Setting Up Vertical Dimensions . . . . .	673
Finishing the Dimensions . . . . .	676
Using Other Types of Dimensions . . . . .	677
Using Radial Dimensions . . . . .	678
Adding a Diameter Dimension . . . . .	679
Adding an Arc Length . . . . .	680
Setting Up Parent and Child Dimensioning Styles . . . . .	681
Using Aligned and Angular Dimensions . . . . .	684
Using Leader Lines . . . . .	686
Modifying Dimensions . . . . .	692
Editing Dimension Text Content . . . . .	693
Moving Dimensions . . . . .	696
Adjusting Space between Stacked Dimensions . . . . .	698
Using Dimension Overrides . . . . .	700
Dimensioning Short Distances . . . . .	701
If You Would Like More Practice... . . . .	705
Dimensioning the Garage Addition . . . . .	705

Dimensioning to a Centerline . . . . .	706
Practicing on Your Own. . . . .	710
Are You Experienced? . . . . .	711

---

## **CHAPTER 13      Managing External References      713**

---

Drawing a Site Plan. . . . .	714
Using Surveyor's Units. . . . .	715
Drawing the Driveway . . . . .	719
Setting Up an External Reference . . . . .	727
Using the External References Palette . . . . .	727
Organizing the Drawing Objects. . . . .	733
Moving and Rotating an Xref. . . . .	735
Modifying an Xref Drawing . . . . .	736
Modifying an Xref by Making It the Current Drawing. . . . .	736
Modifying an Xref from within the Host Drawing . . . . .	740
Adding an Image to a Drawing . . . . .	745
Putting Xrefs to Use . . . . .	749
Exploring Additional Xref Features . . . . .	751
Setting the Xref Path. . . . .	751
Changing Path Types. . . . .	754
Binding Xrefs . . . . .	755
Exploring on Your Own . . . . .	758
If You Would Like More Practice. . . . .	759
Building Architectural References . . . . .	759
Comparing Reference Types . . . . .	760
Are You Experienced? . . . . .	760

---

## **CHAPTER 14      Using Layouts to Set Up a Print      761**

---

Preparing the Title Block . . . . .	762
Creating the Title Block Drawing . . . . .	762
Sizing and Cleaning Up the Title Block . . . . .	765
Defining the Title Block Attributes. . . . .	767
Setting Up a Sheet Template . . . . .	772
Finishing the Sheet Template. . . . .	778
Creating Plan Sheets. . . . .	781
Creating the Cover Sheet. . . . .	781
Generating Floor Plan Sheets . . . . .	783
Composing the Floor Plan Sheets. . . . .	788



Creating Elevation Sheets . . . . .	793
Composing the South Elevation . . . . .	794
Composing the Other Elevations . . . . .	795
Using Sheet Set Manager . . . . .	798
Creating a New Sheet Set . . . . .	798
Adding Drawings to a Sheet Set . . . . .	802
Defining Sheet Properties . . . . .	804
If You Would Like More Practice... . . . .	808
Are You Experienced? . . . . .	809

---

## **CHAPTER 15      Printing a Drawing      811**

---

Using the Plot Dialog Box . . . . .	812
Assigning Lineweights to a Drawing . . . . .	817
Assigning Lineweights to Layers . . . . .	818
Updating Xref Layer Definitions . . . . .	824
Plotting from Model Space . . . . .	827
Configuring the Plot . . . . .	827
Previewing a Print . . . . .	829
Plotting a Drawing Using Layouts . . . . .	832
Publishing a Single Layout . . . . .	832
Publishing Multiple Layouts . . . . .	834
Publishing with Sheet Set Manager . . . . .	837
A Few Words about Plot Styles . . . . .	839
Introducing Plot Style Table Files . . . . .	840
Understanding How Plot-Style Table Files Are Organized . . . . .	841
Going Forward . . . . .	845
If You Would Like More Practice... . . . .	845
Are You Experienced? . . . . .	846

---

## **CHAPTER 16      Creating 3D Geometry      847**

---

Modeling in 3D . . . . .	848
Setting Up the 3D Workspace and Environment . . . . .	848
Making the Walls . . . . .	854
Creating the Door and Window Block-Outs . . . . .	858
Moving and Rotating in 3D . . . . .	863
Using the First Right-Hand Rule . . . . .	864
Cutting the Openings . . . . .	868

Creating the Floor, Foundation, and Thresholds . . . . .	870
Creating the Foundation and Supports . . . . .	873
Building the Windows . . . . .	874
Navigating with the ViewCube . . . . .	890
Adding the Sliding Door . . . . .	893
Building the Decks. . . . .	897
Putting a Roof on the Cabin . . . . .	916
Getting Further Directions in 3D . . . . .	930
Using Other Solid-Modeling Tools. . . . .	930
Using Mesh-Modeling Tools. . . . .	933
Using Surface-Modeling Tools. . . . .	935
If You Would Like More Practice. . . . .	937
Are You Experienced? . . . . .	937

---

**CHAPTER 17      Rendering and Materials      939**

---

Creating Cameras to Reproduce Views . . . . .	940
Using the Loft Tool. . . . .	940
Creating the Cameras . . . . .	945
Creating a Lighting Scheme. . . . .	950
Creating a Light Source. . . . .	950
Enabling Shadows . . . . .	954
Creating the First Render . . . . .	956
Controlling the Background of the Rendering. . . . .	960
Adding Materials . . . . .	964
Adjusting the Material Mapping . . . . .	969
Rendering to a File. . . . .	974
If You Would Like More Practice. . . . .	978
Are You Experienced? . . . . .	979

<i>Index</i> . . . . .	981
------------------------	-----

# INTRODUCTION

*This book was born* of the need for a simple yet engaging tutorial that would help beginners step into the world of Autodesk® AutoCAD® or Autodesk® AutoCAD LT® software without feeling intimidated. That tutorial has evolved over the years into a full introduction to the ways in which architects and civil and structural engineers use AutoCAD to increase their efficiency and ability to produce state-of-the-art computerized production drawings and designs.

Because the Microsoft Windows versions of AutoCAD and AutoCAD LT are so similar, it makes sense to cover the basics of both programs in one book. For most of the book, the word *AutoCAD* stands for the Windows versions of both AutoCAD and AutoCAD LT. Although Apple Macintosh versions of both AutoCAD and AutoCAD LT are available, the interface and underlying tool set on that platform prevent it from aligning with the workflows and procedures outlined in this book.



When you come to a section of a chapter that applies to AutoCAD only, the icon shown here is displayed in the margin to alert you. When appropriate, extra information for AutoCAD LT users is provided to give you a work-around or otherwise keep you in step with the tutorial.

Because AutoCAD LT doesn't have 3D commands or features, the last two chapters, which are an introduction to drawing in 3D, apply only to AutoCAD. But AutoCAD LT users can be assured that it is very much the same program as AutoCAD, with only minor differences. You'll be prompted when those differences arise, most of which involve 3D features.



When you come to a section that applies to one of the many new features found inside AutoCAD 2015, the icon shown here is displayed in the margin to alert you. This book is directed toward AutoCAD and AutoCAD LT novices—users who know how to use a computer and perform basic file-managing tasks, such as creating new folders and saving and moving files, but who know little or nothing about AutoCAD or AutoCAD LT. If you're new to the construction and design professions, this book will be an excellent companion as you learn AutoCAD. If you're already practicing in those fields, you'll immediately be able to apply the skills you'll pick up from this book to real-world projects. The exercises have been successfully used to train architects, engineers, and contractors, as well as college and high school students, in the basics of AutoCAD.

For those of you in other trades and professions, the project that runs through the book—drawing a small cabin—has been kept simple so that it doesn't require special training in architecture or construction. Also, most chapters have additional information and exercises specifically designed for non-AEC (architecture, engineering, and construction) users. Anyone wanting to learn AutoCAD will find this book helpful.

## What Will You Learn from This Book?

Learning AutoCAD, like learning any complex computer program, requires a significant commitment of time and attention and, to some extent, a tolerance for repetition. You must understand new concepts to operate the program and to appreciate its potential as a drafting and design tool. However, to become proficient at AutoCAD, you must also use the commands enough times to gain an intuitive sense of how they work and how parts of a drawing are constructed.

At the end of most chapters, you'll find one or more additional exercises and a checklist of the tools you have learned (or should have learned). The steps in the tutorial have a degree of repetition built into them that allows you to work through new commands several times and build up confidence before you move on to the next chapter.

Progressing through the book, the chapters fall into five general areas of study:

- ▶ **Chapters 1 through 3** familiarize you with the organization of the AutoCAD user interface, cover a few of the basic commands, and equip you with the tools necessary to set up a new drawing, including the use of a standard, such as the National CAD Standard (NCS), to organize your files.
- ▶ **Chapters 4 and 5** introduce the basic drawing commands and develop drawing strategies that will help you use these commands efficiently.
- ▶ **Chapters 6 through 11** work with the major features of AutoCAD, such as blocks, hatches, and annotation. You'll also learn about using layers to organize the various components of a drawing by applying the NCS.
- ▶ **Chapters 12 through 15** examine intermediate and advanced AutoCAD features, including managing and creating document sets by using Sheet Set Manager.
- ▶ **Chapters 16 and 17** cover the 3D modeling tools by exploring 3D solids and 3D surfaces. You'll also learn how to apply materials to 3D objects, allowing you to produce eye-catching 3D visualizations. In the process of exploring these elements, you'll follow the steps involved in laying out the floor plan of a small cabin. You'll then learn how to generate elevations from the floor plan, and eventually you'll learn how to set up a title block and layouts to print your drawing.

Along the way, you'll also learn how to do the following:

- ▶ Use the basic drawing and modify commands in a strategic manner
- ▶ Set up layers by using an established standard
- ▶ Assign colors to your drawing
- ▶ Define and insert blocks
- ▶ Generate elevation views
- ▶ Place hatch patterns and fills on building components
- ▶ Use text in your drawing

Chapters in the latter part of the book touch on the more advanced features of AutoCAD, including the following:

- ▶ Creating dynamic drawings by using geometric and dimensional parametric constraints
- ▶ Dimensioning the floor plan
- ▶ Drawing a site plan and managing drawings of varying units
- ▶ Efficiently organizing drawing sets by using external references
- ▶ Setting up and managing drawings for printing with layouts
- ▶ Making a print of your drawing
- ▶ Working in 3D (for AutoCAD users)

All these features are taught by using the cabin as a continuing project. As a result, you'll build a set of drawings that document your progress throughout the project. You can use these drawings later as reference material if you need to refresh your memory with content that covers a specific skill.

## Files on the Website

If you're already somewhat familiar with AutoCAD and you're reading only some of the chapters—or if you want to check your work on the cabin against the book at different stages, you can pull the accompanying files from this book's page on Wiley's website at [www.sybex.com/go/autocad2015ner](http://www.sybex.com/go/autocad2015ner). Click the Resources & Downloads button on that page.

To help you learn AutoCAD further, a companion website is also available at [www.thecadgeek.com](http://www.thecadgeek.com) that, in addition to the dataset, offers a comprehensive library of instructional videos, additional exercises, and more. Visiting this site will also let you view this book's errata and interact with the author by posing questions you may have about its contents.

## Hints for Success

Because this book is essentially a step-by-step tutorial, it has a common side effect with tutorials of this type. After you finish a chapter and see that you have progressed further through the cabin project, you may wonder exactly what you just did and whether you could do it again without the help of the step-by-step instructions.

This feeling is a natural result of this type of learning tool, and you can do a couple of things to get beyond it:

- ▶ *You can work through the chapter again.* Doing so may seem tedious, but it will help you draw faster. You'll be able to accomplish the same task in half the time it took you to do it in the first place. If you do a chapter a third time, you'll halve your time again. Each time you repeat a chapter, you can skip more and more of the explicit instructions, and eventually you'll be able to execute the commands and finish the chapter by just looking at the figures and glancing at the steps. In many ways, this process is like learning a musical instrument. You must go slowly at first, but over time and through practice, your pace will pick up.
- ▶ *Follow the course of the book but apply the steps to a different project.* You might draw your own living space or design a new one. If you have a real-life design project that isn't too complex, that's even better. Your chances for success in learning AutoCAD, or any computer program, are greatly increased when you're highly motivated—and a real project of an appropriate size can be the perfect motivator.

## Ready, Set...

Even with some of the most knowledgeable and passionate teachers by my side, I remember how overwhelming it was to learn AutoCAD as a student in high school. With each command I learned, it seemed that there were another five I had yet to learn, and that was before AutoCAD evolved into the sophisticated, Microsoft Windows–based modeling and design platform that it is today.

Ironically, the biggest challenge to knowing AutoCAD wasn't learning the commands, but rather learning how to apply them in the most efficient way.

For several years, my personal mantra has been simple: to “empower CAD professionals.” While writing this book, I didn't want simply to introduce a bunch of commands without also putting them in context and demonstrating how to apply them to create drawings efficiently. With each exercise building on the previous one, you'll learn not only the individual commands but also how everything snaps together as you produce a complete document setup in the same way as industry professionals do. As the title says, there is “no experience required”—only an interest in the subject and a willingness to learn!

---

### **FREE AUTODESK SOFTWARE FOR STUDENTS AND EDUCATORS**

The Autodesk Education Community is an online resource with more than 5 million members that enables educators and students to download—for free (see website for terms and conditions)—the same software used by professionals worldwide. You can also access additional tools and materials to help you design, visualize, and simulate ideas. Connect with other learners to stay current with the latest industry trends and get the most out of your designs. Get started today at [www.autodesk.com/joinedu](http://www.autodesk.com/joinedu).





## Getting to Know AutoCAD for Windows

*Opening either the Autodesk® AutoCAD® or Autodesk® AutoCAD LT®* program for the first time presents you with an expansive canvas of tools, settings, and more. Faced with this seemingly endless landscape of options, you are probably wondering where you should start. This chapter faces that question head on and breaks down the many components of the user interface into manageable segments, introducing you to essential operations, such as opening drawings. Even if you've used earlier versions of AutoCAD, you'll still want to review this chapter to become acquainted with changes that have taken place in recent years.

The 2015 release continues the evolution of the user interface seen in recent versions of the software but maintains a foundational parity between AutoCAD and AutoCAD LT. Generally speaking, both platforms offer the same 2D drafting experience. The biggest difference is that AutoCAD LT doesn't have any 3D capability, whereas AutoCAD offers many powerful tools for 3D modeling. (These tools are the topics of Chapter 16, "Creating 3D Geometry," and Chapter 17, "Rendering and Materials.") With so little separating the two platforms, I refer to both interchangeably as *AutoCAD* for most purposes in this book.

### **In this chapter, you will learn to**

- ▶ **Open a new drawing**
- ▶ **Familiarize yourself with the AutoCAD and AutoCAD LT Application windows**
- ▶ **Modify the display**
- ▶ **Display and arrange AutoCAD tools**

## Starting AutoCAD for Windows



If you installed AutoCAD by using the default settings for the location of the program files, start the program by choosing Start > All Programs > Autodesk > AutoCAD 2015 > AutoCAD 2015, or by choosing Start > Programs > Autodesk > AutoCAD LT 2015 > AutoCAD LT 2015, depending on the program you're using. (This command path might vary depending on the Windows operating system and the scheme you are using.) Alternatively, you can double-click the AutoCAD 2015 icon or the AutoCAD LT 2015 icon on your desktop.

---

### WHAT THIS BOOK COVERS

Although this book does not focus on the discipline-specific tools found within products based on AutoCAD for Windows such as AutoCAD® Architecture or AutoCAD® Civil 3D®, it does focus on the core AutoCAD skills necessary to use these vertical AutoCAD platforms. To use one of these vertical products to learn the topics covered in this book, choose Start > All Programs > Autodesk > AutoCAD *Product Name* 2015 > AutoCAD *Product Name* As AutoCAD 2015.

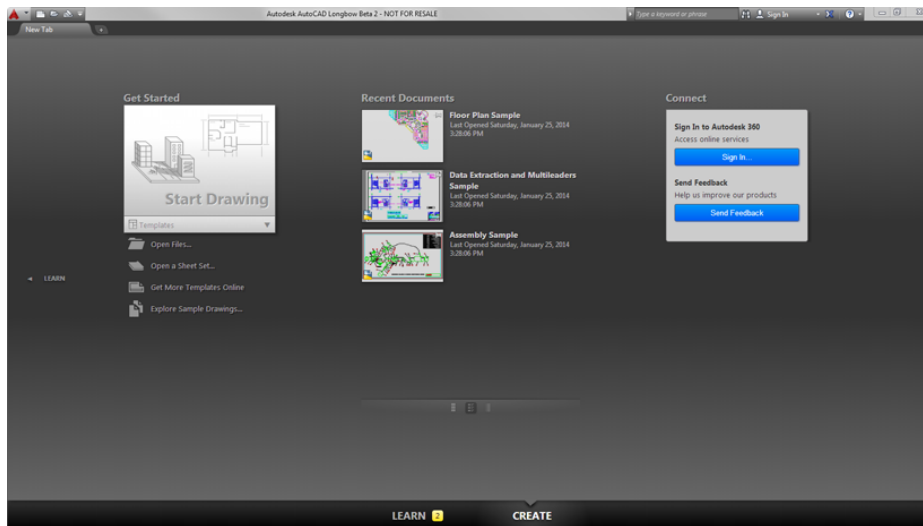
The Mac version of AutoCAD applies an OS X native interface that differs from its Windows counterparts. Although the core concepts covered in this book are universal, the step-by-step procedures differ between the two operating systems. The procedures covered in this book are intended for use with only the Windows-based version of AutoCAD.

## Exploring the User Interface

Like most Windows-based applications, AutoCAD launches inside an Application window. Serving as a starting point, the New Tab is the first user interface (UI) displayed within the Application window, but workspaces will control the overall composition of your AutoCAD environment from there. I'll explain the general function of workspaces shortly, including the default workspace named Drafting & Annotation, but first I'll explain the New Tab.

## Using the New Tab

Before creating or opening any drawings, the New Tab is displayed to provide a starting point for your entire AutoCAD experience. This interface is organized into two parts: one page for creating drawings, and another page for learning about AutoCAD. The Create page shown in Figure 1.1 is displayed by default and serves as a launchpad for creating and working with the drawing files that compose your projects.

**NEW**

**FIGURE 1.1:** The Create page on the New Tab

The Create page contains three columns and may include up to four panels:

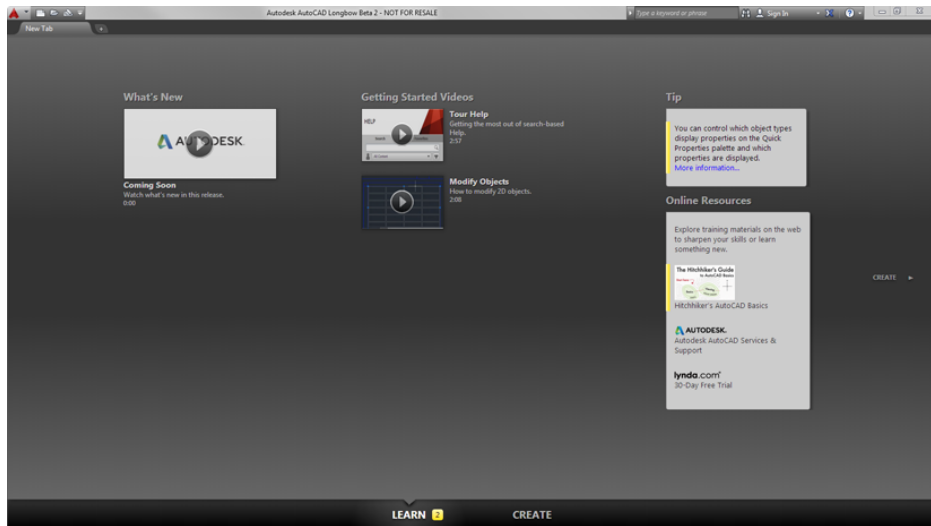
**Get Started** Serving as a pseudo File menu, the Get Started panel is focused on creating new files and browsing for existing files. The Start Drawing tool enables you to quickly create new drawing files, whereas the other tools let you open existing drawings and sheet sets, access templates online, and even view a collection of sample drawings.

**Recent Documents** AutoCAD keeps a running record of each drawing file you open and displays the most recent drawings in this panel. The length of this recent document history is configurable with the `OPTIONS` command.

**Notifications** This panel is visible only when there is an issue regarding your current configuration of AutoCAD. It notifies you of graphic configuration issues, product updates, and more.

**Connect** Autodesk® 360 is the cloud computing platform integrated into AutoCAD 2015. The Connect panel is made up of cloud services such as storage and rendering, and it provides quick access to the full portfolio of Autodesk 360 services.

Selecting the Learn page tab at the bottom of the New Tab, or the page arrow on the left edge, opens the Learn page shown in Figure 1.2. You can access basic information about AutoCAD from this page.



**FIGURE 1.2:** The Learn page on the New Tab

Like the Create page, the Learn page is divided into three columns and includes panels for the following:

**What's New** This panel features video content demonstrating the many new features and enhancements found in AutoCAD 2015.

**Getting Started Videos** The videos on this panel are intended for anyone just getting started with AutoCAD, and highlight a collection of tools essential for creating drawings.

**Tip** This panel is especially helpful after you master the basics of AutoCAD. It displays suggestions for streamlining your existing workflows.

**Online Resources** Quickly access web-based materials such as the main AutoCAD Services & Support page, which provides access to product information, troubleshooting articles, and even training videos.

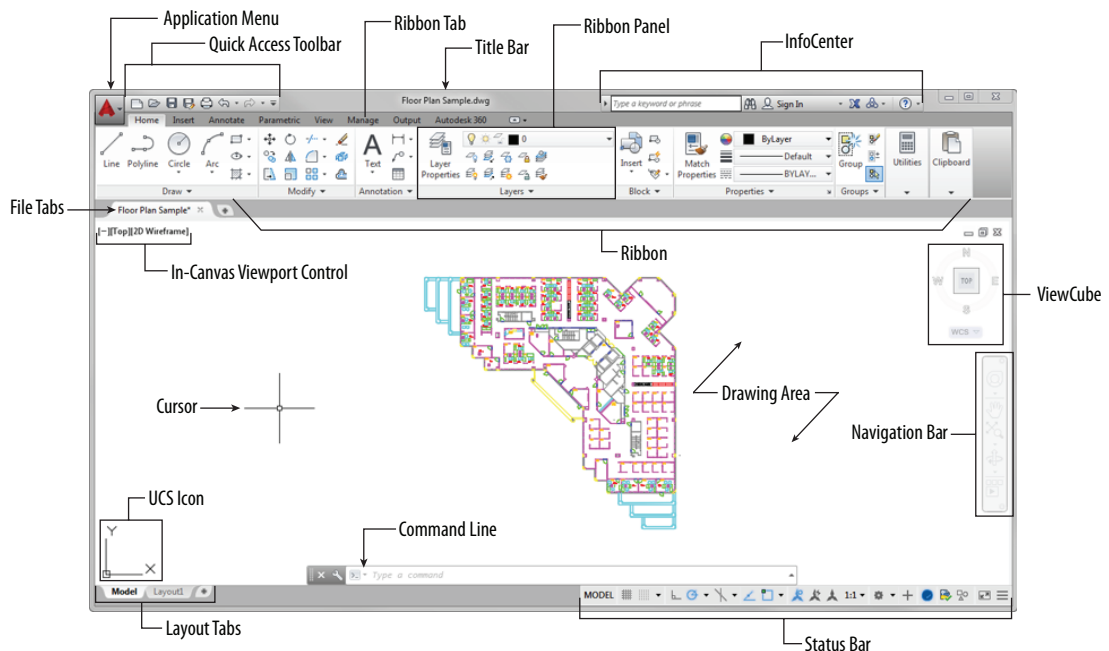
## Introducing Workspaces

Our tour of the user interface has so far been limited to the New Tab that displays after starting AutoCAD. Opening or creating a drawing will dismiss the New Tab interface and load a vast assortment of tools in addition to the drawing you selected. To load this interface, click the Start Drawing tool on the Create page.

The collection of tools displayed after creating or opening a drawing is called a *workspace*, and AutoCAD includes several designed to match the type of work you're doing. Most of this book uses the default Drafting & Annotation workspace, but Chapters 16 and 17 (which focus on 3D) use the available 3D workspaces. The standard workspaces found within AutoCAD are as follows:

**Drafting & Annotation** Utilizing the Ribbon, this workspace (shown in Figure 1.3) is considered the default AutoCAD workspace. Unless otherwise specified, this is also the workspace used throughout this book.

AutoCAD and AutoCAD LT offer numerous dialog boxes with various combinations of buttons and text boxes. You'll learn many of their functions as you progress through the book.



**FIGURE 1.3:** The Drafting & Annotation workspace

**3D Basics** Provides the core tools needed to get started with 3D modeling in AutoCAD (for AutoCAD users only—3D features are not included in AutoCAD LT).

**3D Modeling** Provides the complete set of 3D modeling tools found in AutoCAD, including materials via the Materials Browser (for AutoCAD users only—3D features are not included in AutoCAD LT).

AutoCAD verticals such as AutoCAD Architecture and AutoCAD Civil 3D build on the standard workspaces outlined here and introduce discipline-specific tools in tandem with those found in the standard version of AutoCAD discussed in this book. Although any AutoCAD vertical can be used to complete the exercises in this book, I recommend using the AutoCAD vertical (for example, Architecture or Civil 3D) as an AutoCAD application shortcut to start AutoCAD and maintain parity with this book.

## Exploring the Drafting & Annotation Workspace

As the default UI configuration for AutoCAD, the Drafting & Annotation workspace shown previously in Figure 1.3 serves as the primary workspace throughout this book. Having a good understanding of this workspace is imperative as you perform the exercises in the coming chapters. To ensure your success with those exercises, I'll start by breaking down what you can expect when using the Drafting & Annotation workspace. From top to bottom and from left to right, the following elements make up this workspace:

**Application Menu** The Application menu contains the tools for opening, saving, and printing (plotting) your drawings. These options are similar to the File drop-down menu that has been deprecated since the Ribbon was introduced in AutoCAD. When the Application menu is open, the menus for these tools project from the upper-left corner of the AutoCAD window and cover the drawing area and any open dialog boxes.

**Quick Access Toolbar** Located to the right of the Application menu, the Quick Access toolbar provides immediate access to some of the most frequently used commands to complete tasks such as creating, opening, saving, and plotting drawings. This toolbar is a customizable element of the UI that maintains a consistent appearance as you interact with your designs, and many AutoCAD users choose to build on its default task coverage.