

AUTOCAD[®] 2010 ESSENTIALS

Munir M. Hamad

Autodesk[®] Approved Instructor



JONES AND BARTLETT PUBLISHERS

Sudbury, Massachusetts

BOSTON TORONTO LONDON SINGAPORE

World Headquarters

Jones and Bartlett Publishers
40 Tall Pine Drive
Sudbury, MA 01776
978-443-5000
info@jbpub.com
www.jbpub.com

Jones and Bartlett Publishers
Canada
6339 Ormindale Way
Mississauga, Ontario L5V 1J2
Canada

Jones and Bartlett Publishers
International
Barb House, Barb Mews
London W6 7PA
United Kingdom

Jones and Bartlett's books and products are available through most bookstores and online booksellers. To contact Jones and Bartlett Publishers directly, call 800-832-0034, fax 978-443-8000, or visit our website www.jbpub.com.

Substantial discounts on bulk quantities of Jones and Bartlett's publications are available to corporations, professional associations, and other qualified organizations. For details and specific discount information, contact the special sales department at Jones and Bartlett via the above contact information or send an email to specialsales@jbpub.com.

Copyright © 2010 by Jones and Bartlett Publishers, LLC

All rights reserved. No part of the material protected by this copyright may be reproduced or utilized in any form, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without written permission from the copyright owner.

Autodesk, AutoCAD are registered trademarks or trademarks of Autodesk, Inc., and/or its subsidiaries and/or affiliates in the USA and/or other countries. All other brand names, product names, or trademarks belong to their respective holders. Autodesk reserves the right to alter product offerings and specifications at any time without notice, and is not responsible for typographical or graphical errors that may appear in this document. © 2010 Autodesk, Inc. All rights reserved.

AutoCAD® 2010 design and documentation software, one of the world's leading CAD programs, allows you to speed up documentation, share ideas accurately, and explore ideas more intuitively in 3D. It is powerful and flexible, and you can customize it for your specific needs.

Production Credits

Publisher: David Pallai
Editorial Assistant: Melissa Potter
Production Director: Amy Rose
Production Manager: Jennifer Bagdigian
Associate Production Editor: Melissa Elmore
Senior Marketing Manager:
Andrea DeFronzo

V.P., Manufacturing and Inventory Control:
Therese Connell
Composition: International Typesetting
and Composition, Inc.
Cover Design: Kristin E. Parker
Cover Image: © Happy Alex/Shutterstock, Inc.
Printing and Binding: Malloy, Inc.
Cover Printing: Malloy, Inc.

Library of Congress Cataloging-in-Publication Data

Hamad, Munir M.

AutoCAD 2010 essentials / Munir Hamad.

p. cm.

Includes bibliographical references.

ISBN 978-0-7637-7629-9 (pbk.)

1. Computer graphics. 2. Computer-aided design. 3. AutoCAD. I. Title.

T385.H32933 2009

620'.00420285536--dc22

2009010994

6048

Printed in the United States of America

13 12 11 10 09 10 9 8 7 6 5 4 3 2 1

TABLE OF CONTENTS

Preface	xi
Chapter 1: Introduction to AutoCAD 2010	1
1.1 What is AutoCAD?	1
1.2 How to Start AutoCAD 2010	2
1.3 Understanding the AutoCAD 2010 Interface	2
1.4 Points in AutoCAD	9
1.5 AutoCAD Default Settings	10
1.6 Things You Should Know about AutoCAD	10
1.7 Drawing Limits	10
1.8 Units and Spaces	11
1.9 Viewing Commands	12
1.10 Creating a New File	13
1.11 Opening an Existing File	14
Introducing AutoCAD 2010 (Exercise 1)	17
Chapter Review	18
Chapter Review Answers	18
Chapter 2: Drafting Using AutoCAD 2010	19
2.1 Introduction	19
2.2 The Line Command	20
2.3 Drafting Using Dynamic Input	21
Drawing Lines: First Method (Exercise 2)	22
2.4 Precision Method 1: Snap and Grid	23
Snap and Grid (Exercise 3)	24
2.5 Precision Method 2: Direct Distance Entry and Ortho	25
Direct Distance Entry and Ortho (Exercise 4)	26
2.6 The Arc Command	27
Drawing Arcs (Exercise 5)	28
2.7 The Circle Command	30
Drawing a Circle (Exercise 6)	31
2.8 Precision Method 3: Object Snap (OSNAP)	32

2.9	Object Snap Tracking (OTRACK)	36
	Drawing Using OSNAP and OTRACK (Exercise 7)	39
	Drawing Using OSNAP and OTRACK (Exercise 8)	41
2.10	The Pline Command	41
	Drawing Polylines (Exercise 9)	44
2.11	Polar Tracking	44
	Drawing Using Polar Tracking (Exercise 10)	48
2.12	The Erase Command	49
2.13	Oops, Undo, and Redo Commands	52
2.14	Redraw and Regen Commands	53
	Erase, Oops, Undo, and Redo (Exercise 11)	55
	Chapter Review	55
	Chapter Review Answers	56
Chapter 3: How to Set Up Your Drawing		57
3.1	Things to Consider before You Set Up Your Drawing	57
3.2	Step 1: Drawing Units	58
3.3	Step 2: Drawing Limits	60
	Drawing Units and Limits (Exercise 12)	61
3.4	Step 3: Creating Layers	62
	Layer Names, Colors, Linetypes, and Lineweights (Exercise 13)	69
3.5	Layer Functions	69
	Layer Functions (Exercise 14)	76
3.6	Quick Properties, Properties, and Match Properties	77
	Quick Properties, Properties, and Match Properties (Exercise 15)	80
	Creating Our Project (Metric) (Workshop 1-A)	80
	Creating Our Project (Imperial) (Workshop 1-B)	82
	Chapter Review	83
	Chapter Review Answers	83
Chapter 4: A Few Good Construction Commands		85
4.1	Introduction	85
4.2	The Offset Command	86
	Offsetting Objects (Exercise 16)	88
4.3	The Fillet Command	89
	Filleting Objects (Exercise 17)	92
4.4	The Chamfer Command	92
	Chamfering Objects (Exercise 18)	95
4.5	The Trim Command	96
	Trimming Objects (Exercise 19)	98
4.6	The Extend Command	99
	Extending Objects (Exercise 20)	101
4.7	The Lengthen Command	101
	Lengthening Objects (Exercise 21)	103
4.8	The Join Command	103
	Joining Objects (Exercise 22)	104

Drawing the Plan (Metric) (Workshop 2-A)	105
Drawing the Plan (Imperial) (Workshop 2-B)	108
Chapter Review	112
Chapter Review Answers	112
Chapter 5: Modifying Commands	113
5.1 Introduction	113
5.2 Selecting Objects	114
5.3 The Move Command	118
Moving Objects (Exercise 23)	119
5.4 The Copy Command	120
Copying Objects (Exercise 24)	121
5.5 The Rotate Command	122
Rotating Objects (Exercise 25)	123
5.6 The Scale Command	124
Scaling Objects (Exercise 26)	125
5.7 The Array Command	126
Rectangular Array (Exercise 27)	127
Polar Array (Exercise 28)	130
5.8 The Mirror Command	131
Mirroring Objects (Exercise 29)	132
5.9 The Stretch Command	133
Stretching Objects (Exercise 30)	134
5.10 The Break Command	134
Breaking Objects (Exercise 31)	136
5.11 Grips	137
Using Grips (Exercise 32)	140
Chapter Review	141
Chapter Review Answers	142
Chapter 6: Dealing with Blocks	143
6.1 What Are Blocks?	143
6.2 Creating Blocks	144
Creating a Block (Metric) (Workshop 3-A)	147
Creating a Block (Imperial) (Workshop 3-B)	148
6.3 Inserting Blocks	149
Inserting Blocks (Metric and Imperial) (Workshops 4-A and 4-B)	151
6.4 Exploding Blocks	152
6.5 Using Design Center	153
6.6 Automatic Scaling	156
Using the Design Center (Metric) (Workshop 5-A)	158
Using the Design Center (Imperial) (Workshop 5-B)	158
6.7 What Is a Tool Palette?	159
6.8 Creating a Tool Palette	161

6.9	Customizing a Tool Palette	163
	Using and Customizing Tool Palettes (Metric and Imperial) (Workshops 6-A and 6-B)	167
6.10	Editing Blocks	167
	Editing Blocks (Metric) (Workshop 7-A)	169
	Editing Blocks (Imperial) (Workshop 7-B)	169
	Chapter Review	170
	Chapter Review Answers	170
Chapter 7: Hatching		171
7.1	Hatching in AutoCAD	171
7.2	Selecting the Hatch Pattern	171
7.3	Selecting the Area to be Hatched	175
7.4	Previewing the Hatch	177
	Hatching Using the Hatch Command (Metric) (Workshop 8-A)	178
	Hatching Using the Hatch Command (Imperial) (Workshop 8-B)	178
7.5	Hatching Options	179
7.6	Hatch Origin	182
	Associative Hatching and Hatch Origin (Metric) (Workshop 9-A)	183
	Associative Hatching and Hatch Origin (Imperial) (Workshop 9-B)	184
7.7	Advanced Features	184
7.8	Hatching Using Tool Palettes	187
	Hatching and Tool Palette (Metric and Imperial) (Workshops 10-A and 10-B)	188
7.9	The Gradient Command	188
	Using the Gradient Command (Exercise 33)	192
7.10	Editing an Existing Hatch or Gradient	192
	Edit Hatching (Metric) (Workshop 11-A)	194
	Edit Hatching (Imperial) (Workshop 11-B)	195
	Chapter Review	195
	Chapter Review Answers	196
Chapter 8: Text and Tables		197
8.1	Introduction	197
8.2	Text Style	198
	Creating Text Styles (Metric) (Workshop 12-A)	201
	Creating Text Styles (Imperial) (Workshop 12-B)	202
8.3	Single Line Text	202
8.4	Multiline Text	203
	Writing Text (Metric and Imperial) (Workshops 13-A and 13-B)	214
8.5	An Introduction to Editing Text	215
8.6	Editing Text Using Quick Properties and Properties	215
8.7	Text and Grips	218

8.8	Check Spelling and Find and Replace	219
	Editing Text (Metric and Imperial) (Workshops 14-A and 14-B)	220
8.9	Table Style	221
	Creating Table Style (Metric) (Workshop 15-A)	226
	Creating Table Style (Imperial) (Workshop 15-B)	226
8.10	The Table Command	227
	Inserting Tables (Metric) (Workshop 16-A)	229
	Inserting Tables (Imperial) (Workshop 16-B)	230
	Chapter Review	231
	Chapter Review Answers	232
 Chapter 9: Dimensioning Your Drawing		233
9.1	Introduction	234
9.2	Dimension Types	235
9.3	Dimension Style: The First Step	237
9.4	The Lines Tab	238
9.5	The Symbols and Arrows Tab	241
9.6	The Text Tab	243
9.7	The Fit Tab	246
9.8	The Primary Units Tab	248
9.9	The Alternate Units Tab	250
9.10	The Tolerances Tab	250
9.11	Creating a Sub Style	252
9.12	Controlling Dimension Styles	254
	Creating Dimension Styles (Metric) (Workshop 17-A)	255
	Creating Dimension Styles (Imperial) (Workshop 17-B)	256
9.13	An Introduction to Dimensioning Commands	257
9.14	The Linear Command	258
9.15	The Aligned Command	260
	Linear and Aligned Dimensions (Exercise 34)	261
9.16	The Angular Command	262
9.17	The Arc Length Command	262
9.18	The Radius Command	263
9.19	The Diameter Command	264
9.20	The Jogged Command	265
9.21	The Ordinate Command	265
	Angular, Arc Length, Radius, Diameter, and Dimensions (Exercise 35)	266
	Ordinate and Jogged (Exercise 36)	267
9.22	The Continue Command	268
9.23	The Baseline Command	269
	Continuous and Baseline Dimensions (Exercise 37)	269
9.24	The Quick Dimension Command	270
9.25	Dimension Blocks and Grips	271

9.26	Dimension Block Properties	274
	Quick Dimension and Editing (Exercise 38)	274
9.27	An Introduction to the Multileader	275
9.28	Multileader: Creating the Style	277
9.29	Multileader Commands	281
	Multileader (Exercise 39)	284
	Putting Dimensions on the Plan (Metric) (Workshop 18-A)	284
	Putting Dimensions on the Plan (Imperial) (Workshop 18-B)	285
	Chapter Review	286
	Chapter Review Answers	287
 Chapter 10: Plotting Your Drawing		289
10.1	Introduction	289
10.2	Model Space Versus Paper Space	290
10.3	An Introduction to Layouts	290
10.4	How to Switch between Model Space and Layouts	291
10.5	How to Create a New Layout	292
10.6	What Is the Page Setup Manager ?	294
	Creating Layouts and Page Setup (Metric) (Workshop 19-A)	297
	Creating Layouts and Page Setup (Imperial) (Workshop 19-B)	298
10.7	Layouts and Viewports	299
10.8	Adding Viewports to Layouts	300
10.9	Model Space and Paper Space Modes in Layouts	306
10.10	Modifying, Scaling, and Maximizing Viewports	307
10.11	Freezing Layers in Viewports	310
10.12	Layer Override in Viewports	310
	Inserting and Scaling Viewports (Metric) (Workshop 20-A)	311
	Inserting and Scaling Viewports (Imperial) (Workshop 20-B)	312
10.13	An Introduction to Plot Style Tables	314
10.14	The Color-Dependent Plot Style Table	314
10.15	The Named Plot Style Table	319
	Plot Style Tables (Exercise 40)	323
10.16	The Plot Command	324
10.17	What Is a DWF File?	326
10.18	What Is a DWFx File?	326
10.19	Exporting DWF, DWFx, and PDF Files	327
10.20	The Publish Command	329
10.21	How to View DWF and DWFx Files	332
	Creating a Multiple-Sheet DWF File (Metric and Imperial) (Workshops 21-A and 21-B)	332
	Chapter Review	333
	Chapter Review Answers	334

Appendix A: How to Create a Template File	335
A.1 Introduction	335
A.2 Which Elements Are Included in a Template File?	335
A.3 How to Create a Template File	336
Appendix B: Inquiry Commands	341
B.1 Introduction	341
B.2 The Distance Command	341
B.3 The Radius Command	342
B.4 The Angle Command	343
B.5 The Area Command	344
Index	347



PREFACE

INTRODUCTION

- ◇ AutoCAD® has been the de facto drafting tool for PC users since 1982. As you read this, millions and millions of engineers, draftsmen, project managers, and engineering students are creating their drawings with AutoCAD.
- ◇ This book is perfect for new and novice users of AutoCAD 2010. It is also a very handy tool for college and university drafting instructors using AutoCAD 2010.
- ◇ This book will not teach what engineering drafting is or how to produce it. Knowing drafting and design concepts are prerequisites for using this book.
- ◇ This text can be instructor-led or self-taught.
 - The estimated time to complete instructor-led courseware is three days at eight hours a day.
 - If you opt to teach yourself, you have the luxury of completing the courseware at your own pace.
- ◇ At the end of each chapter, you will find Chapter Review questions that will help you test yourself to see if you understand the subject.
- ◇ There are 40 exercises integrated throughout the book to help you quickly implement what you have learned.
- ◇ There are 21 workshops that, together, will complete a full project (a small villa), starting with the creation of the project through plotting. Solving all of the workshops will teach you to:
 - Simulate a real-life project from beginning to end, thereby allowing you to implement what you have learned.

- Organize the information in a logical order.
 - Learn all of the basic commands and functions in AutoCAD 2010.
- ◇ This text will cover the basic and intermediate levels of AutoCAD 2010.

PURPOSE AND OBJECTIVES

- ◇ At the completion of this book, the reader will be able to:
- Understand what AutoCAD is and how to deal with its basic operations, including the filing system
 - Draw different objects with speed and precision
 - Set up drawings
 - Construct drawings in simple steps
 - Modify any object in a drawing
 - Create, insert, and edit blocks
 - Hatch using different hatch patterns and methods
 - Create text and tables
 - Insert and edit dimensions
 - Prepare and plot a drawing

PREREQUISITES

- ◇ The author assumes that you have experience using computers and the Microsoft® Windows® operating system.
- ◇ Also, you should have knowledge of starting new files, opening existing files, saving files, using “Save As” with files, closing files with or without saving, and exiting software.
- ◇ Because these commands are similar in all software packages, the author does not cover these subjects, unless it is necessary to demonstrate a command specific to AutoCAD.

ABOUT THE DVD

- ◇ A DVD is included in the book and contains the following:
 - The AutoCAD 2010 trial version, which will last for 30 days starting from the day of installation. This version will help you solve all of the exercises and workshops in the book. Students with a valid university email address can visit <http://students8.autodesk.com/?lbon=1> for student versions of the AutoCAD material for the duration of the class.
 - Exercise and workshop files, which will be your starting point to solving all exercises and workshops in the book. Copy the **Book Exercises** and **Book Workshops** folder onto your hard drive. You will find two folders inside the workshop folder. The first one is named **Metric** for the metric units workshops, and the second one is named **Imperial** for the imperial units workshops.

