



Swift iOS



24-Hour Trainer

Complete learning package with online video tutorials

SWIFT™ iOS 24-HOUR TRAINER

INTRODUCTION	xxiii
► SECTION I: HELLO iOS!	
LESSON 1: HELLO iOS!	3
LESSON 2: A TOUR OF XCODE AND THE IOS SIMULATOR	19
LESSON 3: INTRODUCING SWIFT	35
LESSON 4: FUNCTIONS	53
LESSON 5: CLOSURES	57
LESSON 6: ERROR HANDLING	63
LESSON 7: OBJECT-ORIENTED PROGRAMMING WITH SWIFT	69
LESSON 8: SUPPORTING MULTIPLE DEVICE TYPES	85
LESSON 9: INTRODUCTION TO UIKIT AND ADAPTIVE LAYOUT	95
LESSON 10: INTRODUCTION TO STORYBOARDS	117
► SECTION II: MORE iOS DEVELOPMENT	
LESSON 11: HANDLING USER INPUT	143
LESSON 12: ALERT VIEWS AND ACTION SHEETS	155
LESSON 13: ADDING IMAGES TO YOUR VIEW	167
LESSON 14: PICKERS	177
LEGOUN 14. FIGNERO	
LESSON 15: NAVIGATION CONTROLLERS	193
LESSON 15: NAVIGATION CONTROLLERS	203
LESSON 15: NAVIGATION CONTROLLERS	203
LESSON 15: NAVIGATION CONTROLLERS	203 217 229
LESSON 15: NAVIGATION CONTROLLERS LESSON 16: TABLE VIEWS. LESSON 17: COLLECTION VIEWS LESSON 18: TAB BARS AND TOOLBARS	203 217 229 245

► SECTION III: STORING DATA AND NETWORK PROGRAMMING
LESSON 22: PROPERTY LISTS
LESSON 23: APPLICATION SETTINGS
LESSON 24: INTRODUCTION TO ICLOUD STORAGE
LESSON 25: INTRODUCTION TO CLOUDKIT
LESSON 26: INTRODUCTION TO CORE DATA
LESSON 27: CONSUMING RESTful JSON WEB SERVICES
► SECTION IV: BEYOND THE BASICS
LESSON 28: SOCIAL MEDIA INTEGRATION
LESSON 29: WHERE Am I? INTRODUCING CORE LOCATION
LESSON 30: INTRODUCTION TO MAP KIT
LESSON 31: USING THE CAMERA AND PHOTO LIBRARY
LESSON 32: INTRODUCTION TO USER INTERFACE TESTING
LESSON 33: INTRODUCTION TO TEST DRIVEN DEVELOPMENT 485
► SECTION V: REFERENCE
APPENDIX A: TESTING YOUR APP ON A DEVICE
APPENDIX B: BETA TESTING WITH TESTFLIGHT
APPENDIX C: APP STORE DISTRIBUTION
INDEX

Swift™ iOS 24-Hour Trainer

Swift™ iOS 24-Hour Trainer

Abhishek Mishra



Swift™ iOS 24-Hour Trainer

Published by John Wiley & Sons, Inc. 10475 Crosspoint Boulevard Indianapolis, IN 46256 www.wiley.com

Copyright © 2016 by John Wiley & Sons, Inc., Indianapolis, Indiana

Published simultaneously in Canada

ISBN: 978-1-119-07355-0 ISBN: 978-1-119-07346-8 (ebk) ISBN: 978-1-119-07342-0 (ebk)

Manufactured in the United States of America

10 9 8 7 6 5 4 3 2 1

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 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 please contact our Customer Care Department within the United States at (877) 762-2974, outside the United States 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://book-support.wiley.com. For more information about Wiley products, visit www.wiley.com.

Library of Congress Control Number: 2015957030

Trademarks: Wiley, the Wiley logo, Wrox, the Wrox logo, Programmer to Programmer, and related trade dress 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. Swift is a trademark of Apple, 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.

ABOUT THE AUTHOR

ABHISHEK MISHRA has been developing software for over 18 years and has experience with a diverse set of programming languages and platforms. He is the author of *iPhone and iPad App 24-Hour Trainer* and the technical reviewer of *Professional iOS Programming*. He holds a Master's degree in Computer Science from the University of London and is a freelance consultant and trainer specializing in mobile application development. His clients include British Sky Broadcasting, Centrica PLC, Expedia Inc., Kantar Media, and Havas Media. He lives with his wife and daughter in London.

ABOUT THE TECHNICAL EDITOR

CHAIM KRAUSE is a Simulation Specialist for the U.S. Army. One of his responsibilities is to develop small games for use at the Army University. Chaim has been developing software for about 30 years, progressing through BASIC, Delphi/Pascal, C++, Java, Objective-C, and C# on platforms from the TRS-80 through Windows, OS X, Android, and iOS. He has also worked with Arduinos. Chaim has been the Technical Editor for a dozen books on topics as varied as iPhone/iPad, Android, iWatch, Arduino, and Unity. When not working in front of a computer at his day job, Chaim is often sitting in front of a computer at home playing wargames or developing his own game. Chaim can be reached at chaim@chaim.com.

CREDITS

ACQUISITIONS EDITOR

Aaron Black

PROJECT EDITOR
Christina Haviland

TECHNICAL EDITOR

Chaim Krause

PRODUCTION EDITOR

Joel Jones

COPY EDITOR
Nancy Rapoport

MANAGER OF CONTENT DEVELOPMENT &

ASSEMBLY

Mary Beth Wakefield

PRODUCTION MANAGER

Kathleen Wisor

MARKETING DIRECTOR

David Mayhew

MARKETING MANAGER

Carrie Sherrill

PROFESSIONAL TECHNOLOGY & STRATEGY

DIRECTORBarry Pruett

BUSINESS MANAGER

Amy Knies

ASSOCIATE PUBLISHER

Jim Minatel

PROJECT COORDINATOR, COVER

Brent Savage

PROOFREADER

Nancy Bell

INDEXER

Nancy Guenther

COVER DESIGNER

Wilev

COVER IMAGE

© nyul/iStockphoto

ACKNOWLEDGMENTS

This book would not have been possible without the support of the team at John Wiley and Sons—Aaron Black, Christina Haviland, Nancy Rapoport, and Mariann Barsolo. I would also like to thank Chaim Krause for taking the time to read the entire manuscript and his keen eye for detail. It has been my privilege to work with you. Thank you.

CONTENTS

INTRODUCTION

SECTION I: HELLO iOS!	
LESSON 1: HELLO iOS!	3
iOS Developer Essentials	3
A Suitable Mac	3
A Device for Testing	4
An iOS Developer Account	4
The Official iOS SDK	6
The Typical App Development Process	6
Wireframes and Design	8
Coding	8
Testing	8
Home Screen Icon	9
Application Launch Image	10
Try It	11
Lesson Requirements	11
Hints	11
Step-by-Step	11
LESSON 2: A TOUR OF XCODE AND THE IOS SIMULATOR	19
The Welcome Screen	19
Creating a New Project	20
An Overview of the Xcode IDE	22
The Navigator Area	22
The Editor Area	26
The Utilities Area	28
The Debugger Area	30
The Toolbar	30
Features of the iOS Simulator	31
Installing and Uninstalling Applications	32
Limitations of the iOS Simulator	33
Try It	33
Lesson Requirements	33
Hints	33
Step-by-Step	33

xxiii

LESSON 3: INTRODUCING SWIFT	35
Introducing Xcode Playgrounds	35
Constants and Variables	37
Data Types	38
Comments	39
Strings	39
Tuples	40
Optionals Control Flow Statements	41 42
if-else	42
switch-case	44
Loops	45
Control Transfer Statements	49
Try It	50
Lesson Requirements	50
Hints	50
Step-by-Step	50
LESSON 4: FUNCTIONS	53
Declaring Functions	53
Parameters and Return Values	53
Try It	55
Lesson Requirements	55
Hints	55
Step-by-Step	55
LESSON 5: CLOSURES	57
Function Types	57
Closure Types	58
Global Closures	58
Nested Closures	58
Closure Expressions	59
Try It	60
Lesson Requirements Hints	60 60
Step-by-Step	60
LESSON 6: ERROR HANDLING	63
The ErrorType Protocol	63
Throwing and Catching Errors	64

Suppressing Error Handling	65
The defer Statement	66
Try It	66
Lesson Requirements	66
Hints	67
Step by Step	67
LESSON 7: OBJECT-ORIENTED PROGRAMMING WITH SWIFT	69
Creating Classes with Swift	70
Properties	70
Methods	71
Instantiating Objects	74
Inheritance	74
Computed Properties	76
Enumerations	77
Protocols	77
Try It	81
Lesson Requirements	81
Hints	81
Step-by-Step	81
LESSON 8: SUPPORTING MULTIPLE DEVICE TYPES	85
Device Differences	86
Screen Size	86
Icon Size	87
Device Orientation	89
The Universal XCode Template	90
Try It	91
Lesson Requirements	91
Hints	91
Step-by-Step	91
LESSON 9: INTRODUCTION TO UIKIT AND ADAPTIVE LAYOUT	95
Introducing the UIKit Framework	95
The UIButton Class	97
The UILabel Class	98
Basic Constraints	99
Previewing Your Layout	106
Creating Outlets	108
Creating Actions	110
Try It	110

Lesson Requirements Hints Step-by-Step	110 111 111
LESSON 10: INTRODUCTION TO STORYBOARDS	117
Try It Lesson Requirements Hints Step-by-Step	1 24 124 125 125
SECTION II: MORE IOS DEVELOPMENT	
LESSON 11: HANDLING USER INPUT	143
Text Fields Text Views Try It Lesson Requirements Hints Step-by-Step	143 146 147 147 148 148
LESSON 12: ALERT VIEWS AND ACTION SHEETS	155
Alert Views Action Sheets Try It Lesson Requirements Hints Step-by-Step	155 159 161 161 161
LESSON 13: ADDING IMAGES TO YOUR VIEW	167
The UIImage Class The UIImageView Class Try It Lesson Requirements Hints Step-by-Step	167 170 172 172 172 172
LESSON 14: PICKERS	177
Date Pickers Custom Pickers Try It	181 184 185

Lesson Requirements Hints	185 185
Step-by-Step	186
LESSON 15: NAVIGATION CONTROLLERS	193
Adding a Navigation Controller to a Storyboard The Navigation Controller Interface Try It Lesson Requirements Hints Step-by-Step	193 196 197 198 198 198
LESSON 16: TABLE VIEWS	203
Table View Appearance Creating a Table View with Interface Builder Static Table Views Dynamic Table Views Try It Lesson Requirements Hints Step-by-Step	203 205 206 207 211 211 211 211
LESSON 17: COLLECTION VIEWS	217
Creating a Collection View with Interface Builder Collection View Cells Collection View Delegate and Data Source Try It Lesson Requirements Hints Step-by-Step	218 219 220 222 222 223 223
LESSON 18: TAB BARS AND TOOLBARS	229
Creating a Tab Bar Controller Toolbars Try It Lesson Requirements Hints Step-by-Step	231 235 238 239 239 239

LESSON 19: CREATING VIEWS THAT SCROLL		
The UIScrollView Class Scroll Views and Text Fields Try It Lesson Requirements Hints Step-by-Step	245 248 249 249 250 250	
LESSON 20: POPOVERS AND MODAL VIEWS	257	
Popovers Modal Views Try It Lesson Requirements Hints Step-by-Step	257 260 262 262 263 263	
LESSON 21: TOUCHES AND GESTURES	269	
Touch Events Gesture Recognizers Try It Lesson Requirements Hints Step-by-Step	269 270 271 271 272 272	
SECTION III: STORING DATA AND NETWORK PROGRAMMING		
LESSON 22: PROPERTY LISTS	277	
Creating Property Lists Reading Property Lists Try It Lesson Requirements Hints Step-by-Step	277 279 280 280 280 280	
LESSON 23: APPLICATION SETTINGS	285	
Adding a Settings Bundle Reading Preferences with Code Try It	285 289 290	

Lesson Requirements Hints Step-by-Step	290 290 291
LESSON 24: INTRODUCTION TO ICLOUD STORAGE	295
Basic Concepts	295
Preparing to Use the iCloud Storage APIs	297
Creating an iCloud-Enabled App ID	297
Creating an Appropriate Provisioning Profile	302
Enabling Appropriate Entitlements in Your Xcode Project	308
Checking for Service Availability	309
Using iCloud Document Storage	310
Creating a New iCloud Document	311
Opening an Existing Document	312
Saving a Document	312
Searching for Documents on iCloud	313
Try It	315
Lesson Requirements	315
Hints	316
Step-by-Step	316
LESSON 25: INTRODUCTION TO CLOUDKIT	327
Containers, Databases, and Records	327
Development and Production Environments	330
The CloudKit Dashboard	331
Creating a Record Type	331
Deleting a Record Type	333
Creating Relationships Between Record Types	333
Adding Records	334
Modifying and Deleting Records	336
Resetting the Development Schema	337
Deploying to Production	337
Preparing to Use CloudKit	338
Create an iCloud-Enabled App ID	338
Create an Appropriate Provisioning Profile	344
Enable Appropriate Entitlements in Your Xcode Project	350
Common Operations	350
Checking for Service Availability	351
Creating Records Programmatically	351
Retrieving Records	352

Try It Lesson Requirements Hints Step-by-Step	352 353 353 353
LESSON 26: INTRODUCTION TO CORE DATA	381
Basic Concepts Managed Object Managed Object Context Persistent Store Coordinator Entity Description Managed Object Model Adding Core Data to a Project Instantiating Core Data Objects Writing Managed Objects Reading Managed Objects Try It Lesson Requirements Hints Step-by-Step	381 381 382 383 384 389 390 391 391 391 392
LESSON 27: CONSUMING RESTful JSON WEB SERVICES	399
Types of Web Services RESTful Web Services SOAP Web Services JSON and NSJSONSerialization NSURLSession and Application Transport Security Creating an NSURLSession Creating a Data Task Application Transport Security Try It Lesson Requirements Hints Step-by-Step	400 401 401 403 404 405 406 408 409 409
SECTION IV: BEYOND THE BASICS	
LESSON 28: SOCIAL MEDIA INTEGRATION	417
The Share Sheet Try It	418 421

Lesson Requirements Hints	421 421
Step-by-Step	421
LESSON 29: WHERE Am I? INTRODUCING CORE LOCATION	427
Permissions	428
Accuracy	430
Receiving Location Updates	431
Handling Errors and Checking Hardware Availability	433
Geocoding and Reverse Geocoding	434
Obtaining Compass Headings	435
Try It	436
Lesson Requirements	436
Hints	437
Step-by-Step	437
LESSON 30: INTRODUCTION TO MAP KIT	443
Adding Annotations	444
Accessory Views	447
Try It	447
Lesson Requirements	448
Hints	448
Step-by-Step	449
LESSON 31: USING THE CAMERA AND PHOTO LIBRARY	455
Selecting the Image Source	456
Presenting the Image Picker	456
Try It	459
Lesson Requirements	459
Hints	459
Step-by-Step	459
LESSON 32: INTRODUCTION TO USER INTERFACE TESTING	465
Adding Support for UI Testing to Your Project	465
Anatomy of a Test Case	468
New Classes for UI Testing	469
XCUIApplication	469
XCUIDevice	470
XCUIElementQuery	471
XCUIElement	472

XCUIElementAttributes	475
XCUIElementTypeQueryProvider	476
Test Assertions	477
UI Recording	478
Waiting for Elements in a UI Test	479
Try It	480
Lesson Requirements	480
Hints	480
Step-by-Step	481
LESSON 33: INTRODUCTION TO TEST DRIVEN DEVELOPMENT	485
Adding Support for Unit Testing to Your Project	486
TDD Techniques	488
Test First	488
Red-Green-Refactor	488
Don't Write Code You Do Not Yet Need	489
Anatomy of a Test Case	489
Test Assertions	491
Try It	493
Lesson Requirements	493
Hints	493
Step-by-Step	494
SECTION V: REFERENCE	
APPENDIX A: TESTING YOUR APP ON A DEVICE	507
APPENDIX B: BETA TESTING WITH TESTFLIGHT	527
APPENDIX C: APP STORE DISTRIBUTION	553
INDEX	569

INTRODUCTION

WHEN I FIRST BEGAN LEARNING IOS DEVELOPMENT, I started out like most developers, from the humble Hello World application. I was overwhelmed with new concepts, such as view controllers and table views. My background with C++ did not help much when it came to working with Objective-C, and I had to start from scratch. There was no book written on the subject and everything had to be learned from Apple's documentation and personal blogs.

Eventually I came to grips with Objective-C, and with practice, I grew more proficient. With the launch of iOS 7, Apple announced a new language called Swift, and it felt almost like going back to square one again, as I learned how to perform familiar tasks with a new language.

This book is written to help someone new to iOS development learn the basic concepts and (I hope) avoid making the mistakes I made when starting out myself. That being said, this book should also be useful for an experienced Objective-C developer who is looking to transition over to Swift. This book adopts a hands-on Try It approach, and you get to try out each new concept as you progress through the book.

iOS application development is a huge topic, and it is just not possible to include every single topic related to iOS application development in this book. When selecting topics to include in this book, I have tried to strike a balance between the absolute basics and more advanced topics such as Test Driven Development, CloudKit, and UI testing.

This book has been written for you, the reader. I hope that after reading this book, you can take your first steps into the wildly exciting world of iOS App development.

WHO THIS BOOK IS FOR

This book is for beginners with little programming experience who want to pursue a career in the exciting world of iOS development. It is also for experienced Objective-C developers who want to learn Swift programming.

Although you do not need to have any prior programming experience, a little knowledge will help you move faster through the initial lessons, particularly the basics of object-oriented software development. If you are a more experienced developer, then this book can help you get up-to-speed with new concepts relating specifically to iOS 9 development and Swift.

WHAT THIS BOOK COVERS

This book covers iOS 9 application development with Swift 2. That includes development for both the iPhone and the iPad. The lessons in this book use XCode 7.0 and make use of new Swift features such as the guard let clause. All of the lessons use storyboards to construct user interfaces.

The book starts off with an introduction to the Swift language followed by lessons that will teach you how to perform common tasks such as displaying alerts, pickers, and collection views. Toward the end of the book, you will find slightly more advanced topics such as iCloud document storage, CloudKit, Test Driven Development, and UI testing.

The appendixes cover ways to test and deploy your apps, ranging from deploying a build to your personal device to distributing your app to beta testers via TestFlight.

HOW THIS BOOK IS STRUCTURED

This book consists of 33 short lessons and 3 appendixes. Each lesson introduces a single topic and ends with a step-by-step Try It section where you get to apply the concepts you've learned in the lesson to create a simple iOS application. The source code for the Try It exercises is available for download at www.wrox.com/go/swiftios. Lessons toward the beginning of the book are simpler and progress in complexity as you work your way through the book.

If you are an absolute beginner to iOS development, you should progress through the lessons from cover to cover, sequentially. If you have prior experience with iOS development and want to read this book for a particular topic of interest, then you can jump right in with the relevant lessons.

iOS development is a vast topic and no single book can cover everything related to iOS development. However, several lessons contain sources for where to find additional information on the web.

When you're finished reading the book and watching the accompanying videos, you'll find lots of support in the P2P forums.

INSTRUCTIONAL VIDEOS

Learning is often enhanced by seeing in real time what's being taught, which is why most lessons in the book have a corresponding video tutorial available at www.wrox.com/go/swiftiosvid. And of course it's vital that you play along at home—fire up Xcode and try out what you read in the book and watch on the videos.

CONVENTIONS

To help you get the most from the text and keep track of what's happening, I've used a number of conventions throughout the book.

NOTE Boxes like this one hold important, not-to-be forgotten information that is directly relevant to the surrounding text.

REFERENCE References like this one point you to other lessons in the book, the book's website, and the instructional videos that accompany a given lesson.

As for styles in the text:

- I highlight new terms and important words when they are first introduced.
- I show URLs within the text like this: www.wrox.com.
- I present code in monofont type like this: persistence.properties.

ERRATA

We make every effort to ensure that there are no errors in the text or in the code. However, no one is perfect, and mistakes do occur. If you find an error in one of our books, such as a spelling mistake or faulty piece of code, we would be very grateful for your feedback. By sending in errata you may save another reader hours of frustration and at the same time you will be helping us provide even higher quality information.

To find the errata page for this book, go to www.wrox.com and locate the title using the Search box or one of the title lists. Then, on the Book Search Results page, click the Errata link. On this page you can view all errata that has been submitted for this book and posted by Wrox editors.

NOTE A complete book list including links to errata is also available at www.wrox.com/misc-pages/booklist.shtml.

If you don't spot "your" error on the Errata page, click the Errata Form link and complete the form to send us the error you have found. We'll check the information and, if appropriate, post a message to the book's errata page and fix the problem in subsequent editions of the book.

P2P.WROX.COM

For author and peer discussion, join the P2P forums at http://p2p.wrox.com. The forums are a web-based system for you to post messages relating to Wrox books and related technologies and interact with other readers and technology users. The forums offer a subscription feature to e-mail you topics of interest of your choosing when new posts are made to the forums. Wrox authors, editors, other industry experts, and your fellow readers are present on these forums.

At http://p2p.wrox.com, you will find a number of different forums that will help you not only as you read this book, but also as you develop your own applications. To join the forums, just follow these steps:

- 1. Go to http://p2p.wrox.com and click the Register link.
- 2. Read the terms of use and click Agree.
- **3.** Complete the required information to join as well as any optional information you wish to provide and click Submit.
- **4.** You will receive an e-mail with information describing how to verify your account and complete the joining process.

NOTE You can read messages in the forums without joining P2P, but in order to post your own messages, you must join.

Once you join, you can post new messages and respond to messages other users post. You can read messages at any time on the Web. If you would like to have new messages from a particular forum e-mailed to you, click the Subscribe to this Forum icon by the forum name in the forum listing.

For more information about how to use the Wrox P2P, be sure to read the P2P FAQs for answers to questions about how the forum software works as well as many common questions specific to P2P and Wrox books. To read the FAQs, click the FAQ link on any P2P page.

SECTION I Hello iOS!

- ▶ LESSON 1: Hello iOS!
- ▶ LESSON 2: A Tour of Xcode and the iOS Simulator
- ► LESSON 3: Introducting Swift
- ▶ LESSON 4: Functions
- ▶ LESSON 5: Closures
- ▶ LESSON 6: Error Handling
- ▶ LESSON 7: Object-Oriented Programming With Swift
- ▶ LESSON 8: Supporting Multiple Device Types
- ▶ LESSON 9: Introduction to UIKit and Adaptive Layout
- ▶ LESSON 10: Introduction to Storyboards