

Dr. SVETLIN NAKOV
& TEAM

The C# logo is centered within a large purple diamond. The diamond is surrounded by several overlapping, semi-transparent diamonds in shades of purple, gray, and white, creating a layered, geometric effect. The text 'C#' is white and bold.

**BOOK, VIDEOS,
ONLINE JUDGE**

PROGRAMMING BASICS WITH C#



**SoftUni
Foundation**



**Software
University**

Contents

Contents	3
Table of Contents	7
Preface	13
Chapter 1. First Steps in Programming	27
Chapter 2.1. Simple Calculations	61
Chapter 2.2. Simple Calculations – Exam Problems	93
Chapter 3.1. Simple Conditions	107
Chapter 3.2. Simple Conditions – Exam Problems.....	135
Chapter 4.1. More Complex Conditions	147
Chapter 4.2. More Complex Conditions – Exam Problems	171
Chapter 5.1. Loops (Repetitions).....	189
Chapter 5.2. Loops – Exam Problems	209
Chapter 6.1. Nested Loops.....	223
Chapter 6.2. Nested Loops – Exam Problems.....	243
Chapter 7.1. More Complex Loops.....	255
Chapter 7.2. More Complex Loops – Exam Problems.....	287
Chapter 8.1. Practical Exam Preparation – Part I.....	297
Chapter 8.2. Practical Exam Preparation – Part II.....	323
Chapter 9.1. Problems for Champions – Part I.....	337
Chapter 9.2. Problems for Champions – Part II	349
Chapter 10. Methods	363
Chapter 11. Tricks and Hacks	391
Conclusion	403

"Programming Basics with C#" Book and Video Lessons

The **free** book "**Programming Basics with C#**" introduces the readers to writing **programming code** at beginner level (variables and data, conditional statements, loops and methods) using the **C#** language. It combines **tutorial**-style learning content with **video** lessons, **code examples** and a lot of practical **coding exercises** with automated online **evaluation** (judge) system to ensure efficient learning.

Watch the promo **video** about this book and video lessons: [https://youtu.be/ F606F3OgmQ](https://youtu.be/F606F3OgmQ).

Brief information about this edition:

- Title: **Programming Basics with C#**
- Authors: **Svetlin Nakov & Team**
- ISBN: **978-619-00-0902-3**
- Edition: **Faber Publishing, Sofia, 2019**
- License: **CC-BY-SA**
- Source code: <https://github.com/SoftUni/Programming-Basics-Book-CSharp-EN>

All **authors, editors, translators** and **contributors**: Alexander Krastev, Alexander Lazarov, Angel Dimitriev, Bilyana Borislavova, Daniel Tsvetkov, Dimiter Tatarski, Dimo Dimov, Diyan Tonchev, Elena Rogleva, Hristiyan Hristov, Hristo Hristov, Iskra Nikolova, Ivelin Kirilov, Julieta Atanasova, Kalin Primov, Kalina Milanova, Karina Cholakova, Kristiyan Pamidov, Lyuboslav Lyubenov, Marieta Petrova, Marina Shideroff, Mirela Damyanova, Nelly Karaivanova, Nikolay Bankin, Nikolay Dimov, Pavlin Petkov, Peter Ivanov, Petko Dyankov, Preslav Mihaylov, Rositsa Nenova, Ruslan Philipov, Stefka Vasileva, Svetlin Nakov, Teodor Kurtev, Tonyo Zhelev, Tsvetan Iliev, Vasko Viktorov, Ventsislav Petrov, Yanitsa Valeva, Yulian Linev, Zahariya Pehlivanova, Zhivko Nedylakov.

This book is available in **several versions** in different programming languages:

- [Programming Basics with C# \(English\)](#)
- [Programming Basics with C# \(Bulgarian\)](#)
- [Programming Basics with Java \(Bulgarian\)](#)
- [Programming Basics with JavaScript \(Bulgarian\)](#)
- [Programming Basics with Python \(Bulgarian\)](#)
- [Programming Basics with C++ \(Bulgarian\)](#)

Enjoy reading and **sign up** for the [Practical Free Training Course "Programming Basics"](https://softuni.org) (<https://softuni.org>) coming together with this book, because **programming is learned by practice**, code writing and solving many, many problems, not just by reading!

“Programming Basics with C#” Book and Video Lessons

Svetlin Nakov and Team

Alexander Krastev	Kalin Primov	Preslav Mihaylov
Alexander Lazarov	Kalina Milanova	Rositsa Nenova
Angel Dimitriev	Karina Cholakova	Ruslan Philipov
Bilyana Borislavova	Kristiyan Pamidov	Stefka Vasileva
Daniel Tsvetkov	Lyuboslav Lyubenov	Svetlin Nakov
Dimiter Tatarski	Marieta Petrova	Teodor Kurtev
Dimo Dimov	Marina Shideroff	Tonyo Zhelev
Diyan Tonchev	Mirela Damyanova	Tsvetan Iliev
Elena Rogleva	Nelly Karaivanova	Vasko Viktorov
Hristiyan Hristov	Nikolay Bankin	Ventsislav Petrov
Hristo Hristov	Nikolay Dimov	Yanitsa Valeva
Iskra Nikolova	Pavlin Petkov	Yulian Linev
Ivelin Kirilov	Peter Ivanov	Zahariya Pehlivanova
Julieta Atanasova	Petko Dyankov	Zhivko Nedylakov

ISBN: 978-619-00-0902-3

<https://csharp-book.softuni.org>

Sofia, 2019

“Programming Basics with C#” Book and Video Lessons

© Svetlin Nakov and Team, 2019

First Edition, September 2019

This book and video lessons are distributed **freely** under the [CC-BY-SA](#) open source license, which defines the following **rights** and **obligations**:

- **Sharing** – you can copy and distribute the book and videos freely in any format or media.
- **Adaptation** – you can copy, remix and modify portions of this book and video lessons and produce new content based on them.
- **Attribution** – when you use portions of this book and video lessons you should attribute the original source, along with link to it and this license, but not in any way that suggests the licensor endorses you or your use.
- **Share Alike** – if you remix, transform, or build upon this book and video lessons, you must distribute your contributions under the same license as the original.

All trademarks used in this book are the property of their respective owners.

Publisher: Faber Publishing, Veliko Tarnovo

ISBN: 978-619-00-0902-3

Official Web Site: <https://csharp-book.softuni.org>

Official Facebook Page: <https://fb.com/IntroProgrammingBooks>

Cover: Marina Shideroff – <https://behance.net/marinashideroff>

Source Code: <https://github.com/SoftUni/Programming-Basics-Book-CSharp-EN>

Table of Contents

- Contents 3
- Table of Contents 7
- Preface 13
 - Video: Book + Video Course Overview 13
 - The Book Uses C# and Visual Studio 13
 - Official Textbook at SoftUni..... 13
 - Who Is This Book Intended for? 13
 - Why Did We Choose C#? 14
 - Learning Resources: Code + Videos + Exercises + Judge 14
 - Programming Is Learned by Writing, Not Reading!..... 14
 - The Software University (SoftUni)..... 15
 - The Automated Judge System..... 16
 - How to Become a Software Developer? 17
 - More About the Book 22
- Chapter 1. First Steps in Programming 27
 - Video: Chapter Overview..... 27
 - Introduction to Coding by Examples..... 27
 - Computer Programs – Concepts..... 28
 - Languages, Compilers, Interpreters and Environments 29
 - Runtime Environments, Low-Level and High-Level Languages..... 31
 - Computer Programs – Examples..... 33
 - Development Environments (IDE) and Visual Studio 34
 - Example: Creating a Console Application "Hello C#" 39
 - Typical Mistakes in C# Programs 43
 - Exercises: First Steps in Coding..... 45
 - Lab: Graphical and Web Applications 51
- Chapter 2.1. Simple Calculations 61
 - Video: Chapter Overview..... 61
 - Introduction to Simple Calculations by Examples..... 61
 - The System Console..... 62
 - Reading Integers from the Console..... 62
 - Example: Calculating a Square Area 63
 - Data Types and Variables 64
 - Declaring and Using Variables 64
 - Reading Floating Point Numbers from the Console 65
 - Reading a Text from the Console 65
 - Printing and Formatting Text and Numbers..... 66
 - Arithmetic Operations..... 68
 - Concatenating Text and Numbers..... 70
 - Numerical Expressions..... 70

Exercises: Simple Calculations.....	72
Lab: GUI Applications with Numerical Expressions.....	87
Useful Web Sites for C# Developers.....	91
Chapter 2.2. Simple Calculations – Exam Problems.....	93
Simple Calculations – Quick Review	93
Exam Problems.....	94
Chapter 3.1. Simple Conditions.....	107
Video: Chapter Overview.....	107
Introduction to Simple Conditions by Examples	107
Comparing Numbers.....	107
Simple If Conditions.....	108
If-Else Conditions – Examples.....	111
Variable Scope.....	112
Sequence of If-Else Conditions	113
Debugging: Simple Operations with Debugger.....	114
Exercises: Simple Conditions.....	115
Lab: GUI (Desktop) Application – Currency Converter.....	130
Chapter 3.2. Simple Conditions – Exam Problems.....	135
Simple Conditions – Quick Review.....	135
Problem: Transportation Price	135
Problem: Pipes in Pool.....	137
Problem: Sleepy Tom Cat.....	139
Problem: Harvest.....	141
Problem: Firm	143
Chapter 4.1. More Complex Conditions	147
Video: Chapter Overview.....	147
Introduction to Complex Conditions by Examples	147
Nested If-Else Conditions	147
More Complex Conditions	150
Logical "AND"	151
Logical "OR"	153
Logical Negation (NOT)	154
More Complex Conditions – Examples	154
Switch-Case Conditional Statement.....	158
Exercises: More Complex Conditions	160
Lab: * GUI (Desktop) Application: Point and Rectangle	164
Chapter 4.2. More Complex Conditions – Exam Problems.....	171
More Complex Conditions – Quick Review	171
Problem: On Time for the Exam	172
Problem: Trip	175
Problem: Operations with Numbers.....	178

Problem: Game Tickets	181
Problem: Hotel Room	184
Chapter 5.1. Loops (Repetitions).....	189
Video: Chapter Overview.....	189
Introduction to Simple Loops by Examples	189
For Loops (Repeating Code Blocks)	190
Example: Numbers from 1 to 100	190
Example: Numbers up to 1000, Ending by 7	191
Example: All Latin Letters.....	192
Code Snippet for the for Loop in Visual Studio	192
Exercises: Loops (Repetitions).....	193
Lab: Turtle Graphics GUI Application	201
Exercises: Turtle Graphics.....	206
Chapter 5.2. Loops – Exam Problems	209
For Loops – Quick Review.....	209
Problem: Histogram	209
Problem: Smart Lilly	213
Problem: Back to the Past.....	215
Problem: Hospital.....	217
Problem: Division without Remainder	220
Problem: Logistics	221
Chapter 6.1. Nested Loops.....	223
Video: Chapter Overview.....	223
Introduction to Nested Loops by Examples	223
Nested Loops – Concepts	224
Exercises: Drawing Figures.....	229
Lab: Drawing Ratings in Web.....	236
Chapter 6.2. Nested Loops – Exam Problems.....	243
Nested Loops – Quick Review	243
Problem: Drawing a Fort.....	243
Problem: Butterfly	245
Problem: "Stop" Sign.....	247
Problem: Arrow	249
Problem: Axe	251
Chapter 7.1. More Complex Loops.....	255
Video: Chapter Overview.....	255
Introduction to More Complex Loops by Examples	255
For Loop with Step	256
While Loop.....	259
Greatest Common Divisor (GCD).....	261
Do-While Loop	262

Infinite Loops with Break.....	264
Nested Loops and Break	267
Handling Errors: Try-Catch	269
Exercises: More Complex Loops	271
Lab: Web Application with Complex Loops	276
Chapter 7.2. More Complex Loops – Exam Problems.....	287
More Complex Loops – Quick Review	287
Problem: Dumb Passwords Generator	287
Problem: Magic Numbers.....	289
Problem: Stop Number	292
Problem: Special Numbers	294
Problem: Digits.....	294
Chapter 8.1. Practical Exam Preparation – Part I.....	297
Video: Chapter Overview.....	297
The "Programming Basics" Practical Exam	297
Simple Calculations – Problems.....	297
Simple Conditions – Problems	301
Complex Conditions – Problems.....	304
Simple Loops – Problems	308
Drawing Figures – Problems	312
Nested Loops – Problems	316
Practical Exam Preparation – Summary.....	321
Chapter 8.2. Practical Exam Preparation – Part II	323
Types of Exam Problems	323
Problem: Distance	323
Problem: Changing Tiles	326
Problem: Flowers Shop	328
Problem: Grades	330
Problem: Christmas Hat.....	332
Problem: Letters Combination	334
Chapter 9.1. Problems for Champions – Part I.....	337
More Complex Problems on the Studied Material	337
Problem: Crossing Sequences.....	337
Problem: Magic Dates	341
Problem: Five Special Letters	344
Chapter 9.2. Problems for Champions – Part II.....	349
More Complex Problems on the Studied Material	349
Problem: Passion Shopping Days	349
Problem: Numerical Expression	353
Problem: Bulls and Cows	357
Chapter 10. Methods	363

Introduction by Examples	363
What Is a "Method"?	364
Methods with Parameters.....	368
Returning a Result from a Method	372
Methods Returning Multiple Values.....	375
Method Overloading	377
Nested Methods (Local Functions).....	380
Naming Methods.....	381
Good Practices When Working with Methods	382
Exercises: Methods.....	383
Chapter 11. Tricks and Hacks	391
Code Formatting	391
Naming Code Elements	393
Shortcuts in Visual Studio	394
Code Snippets in Visual Studio.....	394
Code Debugging Techniques.....	398
Tricks for C# Developers	400
What We Learned in This Chapter?	402
Conclusion	403
Developer Skills	403
This Book is Only the First Step!.....	403
How to Proceed After This Book?	403
Study Software Engineering in SoftUni.....	404
Study Software Engineering in Your Own Way.....	406
Recommended Resources for Developers.....	406