# Programming Fundamentals – Training Program

The “**Programming Fundamentals**” course extends the previously gained basic coding skills from the “[**Programming Basics**](https://softuni.bg/courses/programming-basics)” course at the Software University and adds additional **knowledge** and **practical programming skills** like using source control systems, **Git**and **GitHub**for team collaboration, understanding the basic **data types** in programming, extracting pieces of code into **methods** with parameters and return value, using the **debugger** to trace the program execution and find bugs, processing sequences of elements using **arrays** and **lists**, using **collections**, working with **matrices**for processing tabular data, working with **dictionaries** to map keys to values, using **strings** for text processing, and the basics of working with **classes** and **objects**, using API classes and defining simple classes. Along with the programming techniques, the **algorithmic thinking** and **problem solving** skills are advanced by solving hundreds of practical programming problems. All exercises and exams are automatically evaluated with real-time feedback through the [SoftUni online **judge system**](https://judge.softuni.bg/). At the end all students take a **practical programming exam**.

## Using Git and GitHub

* Creating a GitHub account
* Installing a console-based Git client, TortoiseGit and GitHub Desktop
* Cloning Git repositories, pulling the latest version
* Changing versioned resources: commit and push to Git
* Merging and resolving conflicts
* Using the GitHub issue tracker

## Debugging and Troubleshooting Code

* Using the debugger: tracing the program execution, breakpoints, watches
* Searching for information in Google, MSDN and StackOverflow

## Data Types and Methods

* Data types and type conversion
* The switch-case statement
* Methods, parameters and return value
* Naming classes, files, methods, parameters, variables

## Arrays

* Defining, initializing and processing arrays
* Reading arrays from the console – String.Split(…)
* Printing arrays at the console – String.Join(…)
* Foreach-loop
* Arrays – problems

## Lists and Matrices

* Lists and the List<T> type
* Sorting lists and arrays
* Lists – problems
* Multi-dimensional arrays and matrices
* Matrices – problems

## Strings, Dictionaries, Lambda and LINQ

* String formatting and format strings
* Basic string operations: concatenation, searching, substring, remove, replace
* Dictionaries and Dictionary<K, V>
* Data processing with lambda functions and LINQ: filtering, mapping, ordering

## Objects and Classes

* Creating and using objects
* Using API classes: random numbers, date / time calculations, download file
* Calculations with big integers
* Defining simple classes: bundle a few fields together

## Exam Preparation

* 4 problems for 6 hours
* Students solve sample exam problems, like at the real exam
* Trainers and mentors help the students during the exam
* At the end of each hour the trainers explain the solution of one of the problems

## Practical Exam

* 4 problems for 6 hours
  + Problem 1: Simple logic + Loops + Formatting
  + Problem 2: Arrays
  + Problem 3: Matrices
  + Problem 4: Strings and Dictionaries