

Course Introduction

What (and how) are we going to learn?

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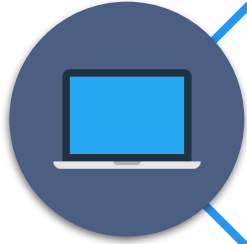
Course Objectives

**Mathematical concepts
for software developers**

Course Objectives

- Learn how math and science can be used in software development
- Develop an intuition about math concepts
- Learn how to implement math concepts in code
- Learn how to solve problems using numerical methods
- Learn how to apply the scientific method to solve everyday (and special) development tasks
- Write your own research, communicate and compare results with the community
- Get excited about mathematics :)

Prerequisites



Programming Basics

- Understand what variables and for-loops are
- Software development experience is a plus but not required



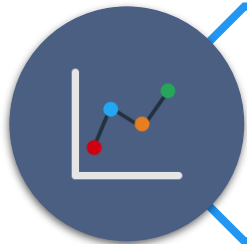
High-School Mathematics

- Have a basic math logic and intuition



Intermediate English

- Understand what is written on the slides



Scientific Mindset

- Be open to (and not afraid of) challenges



Course Format Details

Curriculum, schedule, trainer,
lecture format, exam

Curriculum

- Course introduction
- High-school math review
- Basic algebra
- Linear algebra
- Calculus
- Probability and combinatorics
- Statistics
- Hypothesis testing
- Final exam

Course Schedule

- Lessons
 - 7 lectures + 7 exercises x 4 hours each
- "**Lectures**" – mostly intuition building, some theoretical stuff, examples
- "**Exercises**" – implementing the concepts we learned
 - Most courses have one but not the other
 - We'll try to combine them while still looking over a broad range of math and applications
- Exercises at home
 - 10 hours+ / week – the more, the better
- Practical exam
 - 5-20+ hours

Course Schedule (2)

■ Lectures

- Cover new material, build foundations and understanding of new concepts
- Bring examples of how math concepts are applied in software
 - Scientific programming
 - Math in day-to-day programming / software engineering

■ Exercises

- "Case studies"
- Continue to build intuition
- We'll solve problems together
 - See how the concepts we just learned apply by implementing them

■ Time allocation

- Course: 2 Mar 2023 – 1 June 2023
- **Exam: 4 June 2023 / 11 June 2023**
- **Retake: 18 June 2023**

Final Exam

- Practical project
 - Work on your own, present your results (documentation, code, etc.) in a **limited** amount of time
- Find a topic which includes a math-related problem
 - Perform research (scientific papers, community forums, etc.)
 - Document your own findings
 - Implement your idea
- Notes
 - You **DO NOT** need to create something from scratch; understanding other people's work and implementing it is fine
 - You **DO NOT** need to have a positive research result
 - "My hypothesis was wrong" is perfectly valid and can give you full score
 - It's better if you connect your project to your work / interests / etc.

Grading Scheme

- Exercises (Labs): up to 20%
 - Due date: at the end of the course
 - Graded on a "passing" / "failing" basis
 - To pass a lab, solve at least two problems correctly
- Final exam: up to 80%
 - Theoretical exam (quiz): 30% (24% of total grade)
 - Practical exam (project): 70% (56% of total grade)
 - Develop at your own pace
 - **Upload deadline:** Friday before the exam date, 12:00 PM
 - Project defense
 - Online: Sunday, according to schedule
- Discord server / Facebook group activity: bonus up to 10%
- Other bonuses: up to 10%

Grading and Course Certificates

- All students will be graded on a scale from 2,00 to 6,00
 - The same way the standard grading in Bulgaria works
- Everyone who scores $\geq 5,00$ (total) will get a **certificate** from SoftUni
- Everyone who scores $\geq 3,00$ (on both theory and practice) can get a MoES certificate as well
 - You need to apply explicitly within a limited time



Why bother?

- Starting point for a **new career** or **continuing education** in your current field
- **Career assistance**
 - The SoftUni career center will help you find work
- Official and recognizable
 - Employers value certificates
- Proof of hard work :)
 - Shareable and verifiable
- We make sure that everyone who scores $\geq 5,00$ knows what they're doing :)

STRENGTH

+0

11

DEXTERITY

+2

14

CONSTITUTION

+2

15

INTELLIGENCE

+6

22

WISDOM

+4

18

CHARISMA

+3

16



DUNGEONS & DRAGONS®

Yordan Darakhiev

CHARACTER NAME

Trainer

CLASS

Human

RACE

Researcher

BACKGROUND

Lawful Good

ALIGNMENT

FEATURES & TRAITS

- Programmer
 - .NET / full-stack Web developer
- Machine learning engineer
 - Multiple projects, mainly image processing
- Trainer
 - Various programming courses
 - Scientific (and popular) lectures
- Scientist / Enthusiast
 - BSc & MSc in Astrophysics
 - Currently pursuing a PhD

PROFICIENCIES & LANGUAGES

- Machine learning
- Research
- Teaching
- Software engineering
- Python
- C#
- JavaScript



Learning Resources

**Learn more
and share your knowledge**

SoftUni Resources

- [AI module page](#)
- [Course page](#)
- [Facebook group](#)
- [Discord server](#)
- Guidelines
 - Ask and answer questions
 - I will try to answer your questions as well
 - Post what you've learned
 - Links to resources, code snippets, ideas, tips and tricks
 - Share your problems (homework or not) and help solve them
 - Create and maintain a community

Online Resources

■ Books

- ["How Not to Be Wrong"](#) – Jordan Ellenberg
- ["Numerical Recipes in C"](#) – Cambridge University (free download)
- ... and anything else you can find

■ Websites

- [Khan Academy](#)
- [Coding the Matrix](#)
- Communities: [Kaggle](#), [Quora](#), [Stack Exchange](#)
- Online courses: [Coursera](#), [edX](#), [MIT OCW](#), [Stanford](#), etc.

■ YouTube

- [3Blue1Brown](#)
- [Daniel Shiffman](#), [AsapSCIENCE](#), [Veritasium](#), [Vsauce](#), [Stand-Up Maths](#), [CrashCourse](#), [Numberphile](#), [Computerphile](#), [Vi Hart](#), [blackpenredpen](#), [Mathologer](#), [Tom Rocks Maths](#)

The image features a white background with two blue decorative bars. The top bar is a solid blue strip. The bottom bar is a gradient blue strip that transitions from a lighter blue on the left to a darker blue on the right. The word "Questions?" is centered in a blue, sans-serif font.

Questions?