



Java Programming and Software Engineering Fundamentals Specialization

Explore a Career as a Software Engineer. Learn the basics of programming and software development



Instructors: [Andrew D. Hilton](#) +3 more

333,246 already enrolled

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5 course series

Get in-depth knowledge of a subject

4.6 ★

(14,466 reviews)

Beginner level

No prior experience required

6 months to complete

at 10 hours a week

Flexible schedule

Learn at your own pace

What you'll learn

Take your first step towards a career in software development with this introduction to Java—one of the most in-demand programming languages and the foundation of the Android operating system. Designed for beginners, this Specialization will teach you core programming concepts and equip you to write programs to solve complex problems. In addition, you will gain the foundational skills a software engineer needs to solve real-world problems, from designing algorithms to testing and debugging your programs.

Applied Learning Project

Centered around projects, this Specialization will help you create a portfolio of work to demonstrate your new programming skills. In the capstone you will create a recommender engine similar to those used by Netflix or Amazon. Additional projects in your portfolio will include: an interactive webpage that applies filters to images, an analysis of CSV data files, an encryption program, and a predictive text generator.

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Skills you'll gain

Integrated Development Environments Web Applications Javascript Image Analysis Computer Programming Data Manipulation Algorithms
Cascading Style Sheets (CSS) Encryption Software Engineering Data Import/Export Data Processing Web Servers Debugging Data Analysis
Predictive Modeling Java Programming Event-Driven Programming Statistical Analysis Software Design [View less skills](#)

Details to know



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Taught in English

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See how employees at top companies are mastering in-demand skills

- Learn in-demand skills from university and industry experts
- Master a subject or tool with hands-on projects
- Develop a deep understanding of key concepts
- Earn a career certificate from Duke University

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[Course details](#) ^

What you'll learn

After completing this course, you will be able to:

- ## 2. Write JavaScript



Course details ^

What you'll learn

After completing this course you will be able to:

- [Read less](#)

Skills you'll gain



Java Programming: Arrays, Lists, and Structured Data

Course 3 • 14 hours

[Course details](#) ^

What you'll learn

Build on the software engineering skills you learned in “Java Programming: Solving Problems with Software” by learning new data structures. Use these data structures to build more complex programs that use Java’s object-oriented features. At the end of the course you will write an encryption program and a program to break your encryption algorithm.

After completing this course, you will be able to:

1. Read and write data from/to files;
2. Solve problems involving data files;
3. Perform quantitative analyses of data (e.g., finding maximums, minimums, averages);
4. Store and manipulate data in an array or ArrayList;
5. Combine multiple classes to solve larger problems;
6. Use iterables and collections (including maps) in Java.

Skills you'll gain

Java Programming, Object Oriented Programming (OOP), Algorithms, Data Analysis, Encryption, Debugging, File Management, Cryptography, Data Processing, Computer Programming, Software Engineering, Web Servers



Java Programming: Principles of Software Design

Course 4 • 12 hours

[Course details](#) ^

What you'll learn

Solve real world problems with Java using multiple classes. Learn how to create programming solutions that scale using Java interfaces. Recognize that software engineering is more than writing code - it also involves logical thinking and design. By the end of this course you will have written a program that analyzes and sorts earthquake data, and developed a predictive text generator.

After completing this course, you will be able to:

1. Use sorting appropriately in solving problems;
2. Develop classes that implement the Comparable interface;
3. Use timing data to analyze empirical performance;
4. Break problems into multiple classes; design with their own methods;
5. Determine if a class from the Java API can be used in solving a particular problem;
6. Implement programming solutions using multiple approaches and recognize tradeoffs;
7. Develop object-oriented concepts including interfaces and abstract classes when developing programs;
8. Appropriately hide implementation decisions so they are not visible in public methods; and
9. Recognize the limitations of algorithms and Java programs in solving problems.

Skills you'll gain

Java Programming, Software Design, Algorithms, Computer Programming, Debugging, Performance Tuning, Application Programming Interface (API), Performance Testing, Data Structures, Predictive Modeling, Object Oriented Programming (OOP)



Java Programming: Build a Recommendation System

Course 5 • 5 hours

[Course details](#) ^

What you'll learn

Ever wonder how Netflix decides what movies to recommend for you? Or how Amazon recommends books? We can get a feel for how it works by building a simplified recommender of our own!

In this capstone, you will show off your problem solving and Java programming skills by creating recommender systems. You will work with data for movies, including ratings, but the principles involved can easily be adapted to books, restaurants, and more. You will write a program to answer questions about the data, including which items should be recommended to a user based on their ratings of several movies. Given input files on users ratings and movie titles, you will be able to:

1. Read in and parse data into lists and maps;
2. Calculate average ratings;
3. Calculate how similar a given rater is to another user based on ratings; and
4. Recommend movies to a given user based on ratings.
5. Display recommended movies for a given user on a webpage.

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Skills you'll gain

Java Programming, Algorithms, Data Analysis, Software Design, Data Processing, Java, Hypertext Markup Language (HTML), Object Oriented Programming (OOP), Data Structures



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Instructors



Andrew D. Hilton

Duke University

19 Courses • 1,126,254 learners



Robert Duvall

Duke University

8 Courses • 902,414 learners

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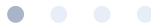
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Frequently asked questions

^ How long does it take to complete the Java Programming and Software Engineering Fundamentals?

Time to completion can vary based on your schedule, but most learners are able to complete the Specialization in 6-7 months.

^ How often is each course in the Specialization offered?

Each course in the Specialization is offered on a regular schedule, with sessions starting about once per month. If you don't complete a course on the first try, you can easily transfer to the next session, and your completed work and grades will carry over.

^ What background knowledge is necessary?

None! This Specialization is appropriate for anyone interested in learning more about computer science and software development. You should come with an open mind and motivation to learn how to solve difficult problems with code.

✓ Do I need to take the courses in a specific order?

✓ Will I earn university credit for completing the Java Programming and Software Engineering Fundamentals?

✓ What will I be able to do upon completing the Java Programming and Software Engineering Fundamentals?

✓ What software or equipment will I need to complete the assignments?

✓ Can I view the course materials for free?

▼ How is Google involved in content creation and teaching for this Specialization?

▼ Is this course really 100% online? Do I need to attend any classes in person?

▼ Can I just enroll in a single course?

▼ Is financial aid available?

▼ Can I take the course for free?

▼ Will I earn university credit for completing the Specialization?

Show less ^

More questions



[Visit the learner help center](#)

Financial aid available, [learn more](#)

Skills

Artificial Intelligence (AI)
Cybersecurity
Data Analytics
Digital Marketing
English Speaking
Generative AI (GenAI)
Microsoft Excel
Microsoft Power BI
Project Management
Python

Certificates & Programs

Google Cybersecurity Certificate
Google Data Analytics Certificate
Google IT Support Certificate
Google Project Management Certificate
Google UX Design Certificate
IBM Data Analyst Certificate
IBM Data Science Certificate
Machine Learning Certificate
Microsoft Power BI Data Analyst Certificate
UI / UX Design Certificate

Industries & Careers

Business
Computer Science
Data Science
Education & Teaching
Engineering
Finance
Healthcare
Human Resources (HR)
Information Technology (IT)
Marketing

Career Resources

Career Aptitude Test
Examples of Strengths and Weaknesses for Job Interviews
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