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Introduction to Chip Design with Open-Source EDA Tools

Instructors: Luca Berton +1 more

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1 module
Gain insight into a topic and learn the fundamentals.

Beginner level
Recommended experience

3 hours to complete

Flexible schedule
Learn at your own pace

What you'll learn

- ✓ Develop basic chip layouts using open-source EDA tools.
- ✓ Design, simulate, and validate a functional logic circuit.
- ✓ Analyze and evaluate the chip design workflow and apply design principles.
- ✓ Apply open-source EDA tools to solve practical design challenges.

Skills you'll gain

Electronic Hardware | Electronics | Computer-Aided Design | Electronic Systems | Verification And Validation | Electronics Engineering | Design | Open Source Technology | Engineering Design Process | Simulation and Simulation Software | Application Specific Integrated Circuits | Technical Design | Hardware Design | Electronic Components | Schematic Diagrams | Electrical and Computer Engineering | Semiconductors View less skills

Details to know

Shareable certificate
Add to your LinkedIn profile

Taught in English

Assessments
2 assignments

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

PETROBRAS TATA DANONE Capgemini P&G L'ORÉAL

Chips power the technology we rely on daily, from smartphones to self-driving cars. This course is your gateway to the fascinating world of chip design, using cutting-edge, free, open-source tools that make this complex process accessible to everyone. Whether you're an aspiring engineer, a curious hobbyist, or someone exploring a career in hardware design, this course offers a hands-on, practical learning experience with tools like Magic, KiCAD, and OpenROAD.

Through clear, step-by-step demonstrations, you'll learn how to design chip layouts, simulate their functionality using NGSPICE, and validate them for real-world applications. Along the way, you'll dive into essential concepts such as digital logic, layout creation, and simulation, all while solving practical design challenges.

This content is designed for electrical engineering students, aspiring chip designers, open-source developers, and junior hardware engineers with a basic understanding of electronic circuits, familiarity with digital logic, and a strong interest in chip design. It provides foundational knowledge and practical insights to help kickstart your journey in the dynamic field of hardware engineering and open-source chip development.

To get the most out of this course, learners should have a basic understanding of electronic circuits and be familiar with digital logic concepts. An interest in chip design is also essential, as the course dives into both theoretical and practical aspects of designing and validating logic circuits using open-source tools. Prior exposure to circuit simulation or related topics would be an added advantage but is not mandatory.

By the end of this course, learners will be equipped to develop basic chip layouts using open-source EDA tools. They will analyze and evaluate the chip design workflow, applying core design principles effectively. Additionally, participants will gain the ability to design, simulate, and validate a functional logic circuit, while confidently utilizing open-source EDA tools to tackle real-world design challenges in the field of chip design.

Read less

Introduction to Chip Design with Open-Source EDA Tools

Module 1 • 3 hours to complete

Module details

In this course, you'll explore the fascinating world of chip design using cutting-edge, free, open-source tools. Whether you're an aspiring engineer, a curious hobbyist, or exploring a career in hardware design, you'll gain hands-on experience with tools like Magic, KiCAD, and OpenROAD, making the complex process of chip design accessible and practical for everyone.

What's included

11 videos · 6 readings · 2 assignments · 1 plugin

Hide info about module content

11 videos • Total 80 minutes

Introduction to the Course & Meet Your Instructor • 3 minutes

What is Chip Design? • 8 minutes

Open-Source Tools in Chip Design • 9 minutes

Chip Design Flow with Magic and SkyWater PDK • 12 minutes

Exploring the Capabilities of Magic • 7 minutes

Exploring the Interface of KiCAD • 8 minutes

Configuring NGSPICE for Simulation • 8 minutes

Building a Logic Circuit in KiCAD • 9 minutes

Simulating a Circuit with NGSPICE • 6 minutes

Generating the Final Layout with OpenROAD • 5 minutes

Congratulations and Continuous Learning Journey • 1 minute

6 readings • Total 45 minutes

Welcome to the Course: Course Overview • 5 minutes

Hands-On Learning: Create and Verify Layout Using NGSPICE • 10 minutes

Additional Resources: SkyWater PDK Documentation • 5 minutes

Hands-On Learning: Simulate Logic Circuit via Software • 10 minutes

Setting up OpenROAD • 10 minutes

The Ultimate Guide to Open Source EDA Tools • 5 minutes

2 assignments • Total 50 minutes

Introduction to Chip Design with Open-Source EDA Tools • 20 minutes

Introduction to KiCad and EDA Tools • 30 minutes

1 plugin • Total 15 minutes

EDA Tool Consultation: Guiding a New Team Member's Toolchain Setup • 15 minutes

Instructors

Luca Berton
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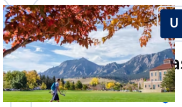

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Frequently asked questions

When will I have access to the lectures and assignments?

To access the course materials, assignments and to earn a Certificate, you will need to purchase the Certificate experience when you enroll in a course. You can try a Free Trial instead, or apply for Financial Aid. The course may offer 'Full Course, No Certificate' instead. This option lets you see all course materials, submit required assessments, and get a final grade. This also means that you will not be able to purchase a Certificate experience.

What will I get if I purchase the Certificate?

When you purchase a Certificate you get access to all course materials, including graded assignments. Upon completing the course, your electronic Certificate will be added to your Accomplishments page - from there, you can print your Certificate or add it to your LinkedIn profile.

Is financial aid available?

Yes. In select learning programs, you can apply for financial aid or a scholarship if you can't afford the enrollment fee. If fin aid or scholarship is available for your learning program selection, you'll find a link to apply on the description page.

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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- How Does Cryptocurrency Work?
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