Professional certifications in computer science

Level up with graduate courses from Arizona State University

6–9 months
15–20 hours/week

$1,500
Per course

100% online
All content available on demand
Optional live sessions weekly

Accelerate
your path to a master's degree in
computer science

Earn a professional certification in computer science to increase your technical abilities and support your next step. With live sessions and immersive projects that encourage collaboration with peers, you'll build your portfolio and gain tangible skills that are in demand across industries.

Plus, when you earn a grade of "B" on your first attempt in at least three courses, you'll satisfy the GPA requirement for ASU Online's Master of Computer Science. When you meet all other admission requirements and enroll, you'll start the program with nine of the 30 credits needed to graduate.

Start your application

AI and machine learning

In this certification, you'll learn about artificial intelligence through theoretical and practical lenses. Through a series of lectures and team-based projects, you'll gain an understanding of statistical machine learning, supervised and unsupervised learning, knowledge representation and reasoning, deep learning and more.

Additionally, you'll strengthen your foundational skills in mathematics and explore topics such as machine learning paradigms, ways to create autonomous agents and how to train and optimize deep neural networks. Upon completion of your courses, you'll be prepared to advance your career in AI, work effectively on machine learning projects and identify opportunities to leverage AI in your current role.

Choose and pass three of the following courses with a "B" or better to earn your certification:

Artificial Intelligence

In this course, you'll examine the core concepts in designing autonomous agents that can reason, learn and act to achieve user-given objectives. You'll also be prepared to address emerging technical and ethical challenges using a principled approach to the field. Key topics include principles and algorithms that empower modern applications and future technology development for self-driving vehicles, personal digital assistants, decision support systems, speech recognition and natural language processing, autonomous game playing agents and household robots.

Intro to Deep Learning in Visual Computing

In this course, you'll learn the basic principles of designing and training deep neural networks with a focus on computer vision. You'll also gain an understanding of the founding principles for training deep neural networks, along with techniques to train and optimize them. Additionally, you'll gain insight into the principles of CNNs, generative modeling for unsupervised learning and much more.

Knowledge Representation and Reasoning

Knowledge representation and reasoning (KRR) is one of the fundamental areas in Artificial Intelligence. It's concerned with how knowledge can be represented in formal languages and manipulated in an automated way so that computers can make intelligent decisions based on the encoded knowledge. KRR techniques are key drivers of innovation in computer science and have led to significant advances in practical applications in a wide range of areas from artificial intelligence to software engineering. In recent years, KRR has also derived challenges from new and emerging fields including the semantic web, computational biology and the development of software agents. In this graduate-level course, you'll receive an introduction to fundamental concepts, as well as survey recent research and developments in the field of knowledge representation and reasoning.

Statistical Machine Learning

In this course, you'll investigate the data mining and statistical pattern recognition that support artificial intelligence. You'll also learn about topics such as supervised learning, unsupervised learning and deep learning, including major components of machine learning and the data analytics that enable it.

Certification Courses

CSE 571	Artificial Intelligence

CSE 598	Intro to Deep Learning in Visual Computing

CSE 579	Knowledge Representation and Reasoning

CSE 575	Statistical Machine Learning

Big Data

This certification prepares you to bring data insights to organizations in all industries and play a key role in driving business decisions. You'll discover data mining techniques and learn to apply mathematical theory to big data analysis, classification, clustering and association rule mining.

As you complete practical projects led by expert faculty, you'll also gain a variety of skills, including data models and processing, data visualization, Java and Python, NoSQL databases and queries, reinforcement learning and spatial data.

Choose and pass three of the following courses with a "B" or better to earn your certification:

Data Mining

In this course, you'll study the fundamentals of data mining and pattern recognition. You'll gain a deeper understanding of data through hands-on experience in the topic areas of big data analysis, classification, clustering and association rule mining. You'll also explore advanced topics such as reinforcement learning, deep learning, transfer learning and Deep Mind for Google. By the end of the course, you'll be able to apply state-of-the-art data mining technology to real world applications, analyze and compare competing techniques and design optimal solutions for a given set of application-driven constraints.

Data Visualization

This course covers techniques and algorithms for creating effective visualizations based on principles from graphic design, visual art, perceptual psychology and cognitive science to enhance the understanding of complex data.

Data Processing at Scale

In this course, you'll delve into new frameworks for processing and generating large-scale datasets with parallel and distributed algorithms. You'll also cover the design, deployment and use of state-of-the-art data processing systems which provide scalable access to data.

Statistical Machine Learning

In this course, you'll investigate the data mining and statistical pattern recognition that support artificial intelligence. You'll also learn about topics such as supervised learning, unsupervised learning and deep learning, including major components of machine learning and the data analytics that enable it.

Certification Courses

| CSE 572 | Data Mining |

| CSE 578 | Data Visualization |

| CSE 511 | Data Processing at Scale |

| CSE 575 | Statistical Machine Learning |

Cybersecurity

Build essential cybersecurity skills by studying cryptography, software security, network security and more with this professional certification. You'll select three courses from a variety of topics from information assurance and encryption to data privacy and secure network design.

Upon completing this certification, you'll understand how to protect and defend information systems by ensuring their availability, integrity, authentication and confidentiality. You'll also be prepared to apply protection, detection and reaction best practices in cybersecurity to organizations across industries.

Choose and pass three of the following courses with a "B" or better to earn your certification:

Advanced Computer and Network Security

In this course, you'll focus on the areas of applied cryptography, system security and the principles and practices of network security. You'll also explore the necessary tools, techniques and concepts of network security for modern computer networks. Coverage of advanced network security includes both cutting-edge technologies and research topics, primarily at the MAC layer and above.

Distributed and Multiprocessor Operating Systems

In this course, you'll learn both the fundamental concepts and principles of distributed systems and the practical skills for developing distributed systems. Specific topics covered include distributed systems architecture, communication, coordination, consistency and replication.

Software Security

In this course, you'll gain an understanding of the theories, tools and techniques to identify, exploit and mitigate software security vulnerabilities in the network, binary and web levels. You'll also study vulnerability classes to understand how to protect software and how to secure software.

Applied Cryptography

Cryptography provides the underlying security methods for the web and many other computer applications. Assuring the quality, validity and privacy of information is one of the key applications of Cryptography. In this course, you'll learn about the design usage of cryptographic protocols for online and offline computing applications.

Information Assurance and Security

In this course, you'll gain an understanding of the problems associated with information assurance (IA) and security and the possible solutions, especially related to the security of information on computers and networks. This course will focus on IA technology, as well as IA policy, management, legal and ethical issues.

Certification Courses

CSE 548	**Advanced Computer Network Security**
CSE 531	**Distributed and Multiprocessor Operating Systems**
CSE 545	**Software Security**

CSE 539	**Applied Cryptography**
CSE 543	**Information Assurance and Security**

Software engineering

Software engineering encompasses a combination of engineering, computing, project leadership and software construction. This project-based certification focuses on developing your ability to complete high quality products that are maintainable, reliable and scalable.

Upon completion, you'll have a variety of knowledge and skills valued by employers across disciplines. You'll understand how to apply software development concepts to blockchain technology, complete testing, implement software architecture and design principles and predict application reliability using operational profiles.

Choose and pass three of the following courses with a "B" or better to earn your certification:

Advanced Software Analysis and Design

Software analysis and design proposes optimal software solutions to solve complex problems. In this hands-on course, you'll apply methodologies, frameworks and fundamentals, as well as techniques of design, implementation and software architecture to demonstrate real world applications. Key topics include object-oriented analysis and design, software architecture and design principles, quality attributes of software architecture, stakeholder perspectives and team approaches, mobile applications, service-oriented architecture and microservices-based web applications and software engineering perspectives regarding robotics and autonomous systems.

Mobile Computing

In this course, you'll gain an in-depth understanding of the fundamental concepts and challenges in the area of mobile computing, as well as study the existing and proposed solutions for these challenges from both a research and development perspective. Key topics include mobile app development, wireless communication, mobile technology management, mobility tracking, context awareness and programming applications on mobile systems.

Engineering Blockchain Applications

Blockchain technology is revolutionizing digitalization prospects for many industries and emerging as a rapidly growing field. By detailing the architecture of the technology, this course ensures that you'll be versed in blockchain fundamentals. You'll also gain insight into the abstract nature of blockchain technology and understand its broad applications. Topics include the mathematical and cryptographic underpinnings of the technology, as well as mining, consensus protocols, networking and decentralized governance. This course also features an extended case study called "How It Works at Dash."

Software Verification, Validation and Testing

Software as a stand-alone product or embedded within a system plays an integral role in our world today. As a consequence, it's essential that software works as expected. This requires software testing which entails answering both the verification question, "Are we building the product right?", and the validation question, "Are we building the right product?" Understanding these questions is crucial for developing good test cases. This course is designed for anyone involved in testing software at any level from code modules to system testing. You'll learn about strategies and techniques for testing software, as well as planning and tracking testing efforts.

Certification Courses

CSE 598	Advanced Software Analysis and Design

CSE 535	Mobile Computing

CSE 598	Engineering Blockchain Applications

CSE 565	Software Verification, Validation and Testing

How it Works

1 — **Apply now** to begin your nondegree application to ASU.

2 — **Create an account or sign in.**
Nondegree will be pre-populated; click the Start New Application button.

3 — **Fill out your personal, institution and residency information.**
Under Institution Info, select the professional certification you'd like to complete.

4 — **Review and submit your application to ASU.**
Your application and fee applies to the semester in which you are admitted only.

5 — **Enroll in courses.**

Frequently asked questions

How do I turn my professional certification into university credit?

For each of the three required courses in your professional certification program, you'll receive three credits on an ASU transcript when you earn a grade of "B" or higher. Additionally, successfully completing your professional certification with a 3.00 GPA on the first attempt is a pathway to the Master of Computer Science, where only an additional 21 credits will be needed to receive your degree. Note, you may complete an additional course if you choose and receive a maximum of 12 credits on your ASU transcript.

To be eligible for both the certification programs and the Master of Computer Science, you must've earned a bachelor's degree or higher from a regionally accredited institution in the U.S. or the equivalent of a U.S. bachelor's degree from an international institution that is officially recognized by that country.

I have questions about the application or enrollment process. Who should I contact?

If you need assistance with the status of your application, or have issues registering for a course, email mcsenrollment@asu.edu for assistance.

What will I get for completing a professional certification?

You'll receive nine credits on an ASU transcript, along with a certification from the Ira A. Fulton Schools of Engineering. Please note that you must still meet all other admission criteria to be eligible for the Master of Computer Science.