



TECHNICAL ASPECTS OF ARTIFICIAL INTELLIGENCE

ABOUT THE CERTIFICATE PROGRAM

A program in artificial intelligence with orientation to deep learning combines theoretical knowledge and practical skills to develop solutions for complex problems in artificial intelligence (AI). With courses in natural language processing (NLP), computer vision, probability and statistics, and proficiency in Tensor Flow the program equips individuals with the tools needed to understand, implement, and advance deep learning models.

At its core, deep learning leverages neural network architectures to model complex relationships and patterns within data. The program begins by establishing a solid foundation in probability and statistics, providing students with the necessary mathematical background to understand the probabilistic frameworks underlying deep learning algorithms. This knowledge forms the basis for understanding concepts such as stochastic gradient descent, regularization techniques, and Bayesian inference, which are essential for training deep neural networks effectively.

The courses in natural language processing delve into the intricacies of processing and analyzing textual data. Students learn techniques for tokenization, word embeddings, and sequence modeling, which are fundamental for tasks like sentiment analysis, machine translation, and text generation. Through hands-on projects, students gain practical experience in building and fine-tuning deep learning models for various NLP tasks using PyTorch, a popular framework known for its flexibility and scalability.

Similarly, the computer vision courses focus on understanding and interpreting visual data. Students learn about image preprocessing, feature extraction, and convolutional neural networks (CNNs)—a class of deep learning models specifically designed for analyzing visual data. They explore applications such as image classification, object detection, and semantic segmentation, mastering techniques to extract meaningful

insights from images and videos. With PyTorch, students implement and experiment with state-of-the-art computer vision algorithms, gaining insights into model architectures, optimization strategies, and performance evaluation.

Throughout the program, emphasis is placed on hands-on projects and practical applications. Students work on real-world datasets and industry-relevant projects, applying their knowledge to solve challenging problems in NLP and computer vision domains. By working collaboratively and engaging with cutting-edge research, students develop critical thinking skills and gain insights into the latest advancements in deep learning.

Upon completion of the program, graduates are well-equipped to pursue careers in AI research, industry, and academia. They possess a comprehensive understanding of deep learning principles, coupled with practical experience in implementing and deploying deep learning solutions. Whether advancing the frontiers of AI research or developing innovative applications in industry, graduates of the program play a vital role in shaping the future of artificial intelligence.

Why Get Specialized in These Topics?

Specializing in deep learning offers numerous advantages for professionals looking to advance in AI-driven fields. Here are a few reasons:

- **Cutting-Edge Technology:** Deep learning is at the forefront of AI advancements, powering breakthroughs in fields like autonomous systems, healthcare, natural language processing, and more. Specializing in this area places you at the heart of innovation.
- **High Demand in the Job Market:** As AI applications continue to expand across industries, there is a growing demand for professionals with deep learning expertise. Companies are seeking individuals who can develop and implement these advanced models for complex problems.
- **Versatile Application:** Deep learning is a versatile skill, applicable in a variety of industries: healthcare, finance, automotive, retail, entertainment.
- **Pushing the Boundaries of AI:** Deep learning is behind the most advanced AI systems today, including natural language models like GPT and computer vision systems. Specializing in deep learning allows you to push the boundaries of what AI can achieve.
- **Endless Learning Opportunities:** The field is rapidly evolving, with new architectures, techniques, and applications emerging. Specializing in deep learning offers continuous learning opportunities as the technology progresses.
- **Real-World Impact:** Deep learning enables the development of AI systems that can transform industries, improve efficiencies, and solve critical problems. For example, it helps in creating more accurate diagnostic tools in healthcare, reducing errors, and enhancing decision-making processes.
- **Better Problem Solving:** Deep learning offers sophisticated solutions for highly complex, non-linear problems that traditional machine learning struggles to address. With deep learning skills, you can tackle problems in pattern recognition, predictive modeling, and automation more effectively.
- **Competitive Edge:** Companies working on cutting-edge AI technologies are always looking for specialized talent. Deep learning expertise provides a competitive edge, especially in research-driven, high-tech environments.
- **Entrepreneurial Opportunities:** Deep learning opens the door to entrepreneurship, as it can be applied to build innovative AI-driven products and services in a wide range of sectors. Understanding deep

learning equips you with the tools to explore such opportunities.

- Advancing Your Career: Specializing in deep learning can propel your career forward by giving you the skills necessary for high-impact roles like AI research scientist, data scientist, AI engineer, or deep learning expert.

Program Audience

The target audience for a Deep Learning Certificate Program typically includes a broad spectrum of professionals and students looking to enhance their skills in AI and deep learning. Here are some key groups that would benefit from this program:

- Data Scientists and Machine Learning Engineers
- Software Engineers and Developers
- AI Enthusiasts and Hobbyists
- Researchers and Academics
- Students in Computer Science or Related Fields
- Business Analysts and AI Consultants
- Professionals in Industry-Specific Roles (healthcare, finance, retail and marketing professionals; engineers working on self-driving cars or robotics; entrepreneurs and startup founders; IT and tech managers; lifelong learners and career switchers).

The Deep Learning Certificate Program is designed for individuals with varying levels of experience in AI and tech, from beginners who want to learn foundational skills to seasoned professionals aiming to expand their expertise.

Program Benefits

- Courses taught by industry experts
- Completing these courses involves working on projects that provide practical experience
- Optional prerequisite knowledge provided within our organization for students who may need additional support to successfully complete the program
- The knowledge gained can be applied across different domains, making students versatile and valuable in various industries
- Gaining a broad and deep understanding of AI and machine learning, equipping students with the skills needed to tackle a wide range of problems
- After completing these courses, students will be well-prepared to engage in advanced AI and machine learning tasks, whether in research, development, or applied industry roles

Program Details

Prerequisites

The recommended prerequisite course the [Probability and Statistics for Deep Learning](#) and [Introduction to Programming](#) are *not* required to complete the certificate. Those who have the required background knowledge

may skip the prerequisite without a department waiver. Please note that the prerequisite course does not count towards the certificate. For any questions, please contact unex-techdata@ucsd.edu.

Requirements

Students will be required to take three required courses, totaling nine (9) units, to obtain the certificate.

Prerequisites <small>Recommended but not required</small>					
TITLE & COURSE NUMBER	UNITS	FALL	WINTER	SPRING	SUMMER
Introduction to Programming CSE-40028	3.0	Online	Online	Online	Online
Probability and Statistics for Deep Learning CSE-41305	3.0	Online		Online	
Required Courses <small>All three required</small>					
TITLE & COURSE NUMBER	UNITS	FALL	WINTER	SPRING	SUMMER
Introduction to Deep Learning for Computer Vision CSE-41388	3.0	Online	Online	Online	Online
Natural Language Processing CSE-41344	3.0		Online		Online
Deep Learning Using TensorFlow CSE-41312	3.0	Online		Online	

Length

Students can complete the program in 9 months, by taking one course per quarter for 3 consecutive quarters. Additional time may be needed if they take the prerequisite course. Students have up to five years to fulfill all certificate requirements.

Cost

Each course fee is currently \$775. The total cost of the program is \$2,420, which includes the \$95 certificate fee. For students who need the Probability and Statistics for Deep Learning course will add an addition of \$775 To the cost of the program for a total of \$3,195. Please note that all fees are subject to change and do not include textbooks.

Electives

There are no elective courses.

FREQUENTLY ASKED QUESTIONS

How do I apply to the certificate Program?

STEP 1: If you have a My Extension account, skip to Step 2. If you do not have a My Extension account, go to myextension.ucsd.edu, click "Create an account" on the right side of the page, and follow the instructions to create an account. Once you have a My Extension account, continue to Step 2.

STEP 2: Click on the "Apply Now" button on the [certificate page](#). Complete the required fields on the application. Then click Save Your Work button. Once you have saved the application, the "Submit" button will appear. Click the "Submit" button to submit your application for review and consideration. Once submitted, your application cannot be changed. You can track the progress of your application at [My Extension](#).

Is there an application fee for the certificate program?

Current application or certificate fees, if any, are listed under the “Apply Now” button on the [certificate page](#) on our website.

Is this program in-class or online?

The courses in this program are offered in online format only. For online classes, all assignments and test/quizzes are completed online and submitted through Canvas, our online learning management system.

Can the prerequisite be waived if I have taken a prerequisite course elsewhere or have equivalent working knowledge?

The recommended prerequisite course the [Probability and Statistics for Deep Learning](#) is not required to complete the certificate. However, it serves as a guideline to students as to the level of knowledge required for students enrolling into the required courses in this program. Those who wish to skip the prerequisite may do so without a department waiver. Please email unex-techdata@ucsd.edu if you would like to see the syllabus of the prerequisite course.

Is financial aid available?

- UC San Diego Division of Extended Studies offers continuing education loans through UC Approved Lenders. Each institution offers low competitive interest rates and flexible payment options. You are also encouraged to contact your personal financial institution about possible lending solutions. Direct links to UC Approved Lenders can be found on our website’s [Financial Resources](#) page. The Employment Development Department (EDD) provides a comprehensive range of employment and training services in partnership with state and local agencies/organizations. More information is available on their website at edd.ca.gov.
- Career Centers Located throughout San Diego County offer their communities comprehensive employment and training services benefiting both business and job seekers. More information is available on their website at workforce.org.
- Please click [here](#) for information about Veteran’s Benefits.
- Free Application for Federal Student Aid (FAFSA) funds are limited to degree programs only and cannot be used for courses or certificate fees at UC San Diego Division of Extended Studies.

Is this certificate program open to non-California residents?

Yes, the program is open to non-California residents, including non-US residents. The tuition is the same for all students. If you have questions about how enrolling in courses may or may not affect your visa status, please contact our International Department at ipinfo@ucsd.edu or (858) 534-6784.

If I work full-time, will I still be able to complete this program?

Yes. Our programs are designed to be working-student friendly and most of our students are working professionals. The courses are typically three units, which amounts to approximately 27-30 hours of class time.

Will I get any hands-on experience in the program?

Most courses combine theory with hands-on exercises.

Is the program accredited?

UC San Diego is accredited by the Western Association of Schools and Colleges (WASC). UC San Diego Division of Extended Studies — like all other UC San Diego schools, colleges, and departments — is accredited by WASC through the University. All courses and certificate programs offered by UC San Diego Division of Extended Studies have been developed and are administered in accordance with Division of Extended Studies policy and the regulations of the Academic Senate of the University of California.

Do you provide job or internship placement?

No, we do not currently offer job placement assistance, internships, or career services assistance.

ABOUT THE COURSES

When does course enrollment open for each quarter?

Our classes post to our website and become open for enrollment approximately two months prior to the new quarter starting. If you would like to receive an email reminder, you can sign up for our newsletter(s) in [My Extension](#), under the “Preferences” tab.

When should I enroll in a course?

We recommend enrolling as soon as possible, as occasionally classes will reach capacity.

Once I have enrolled in a course, when will I get online access to it?

If you have enrolled at least three days before the course begins, you will have access starting on the first day of class. You should receive an email from Student Services with instructions for how to login to the course. If you have enrolled on or after the start date of the course, you will have access to the course within one business day.

How are the online courses formatted?

Online courses are asynchronous with prerecorded lectures, corresponding PowerPoints, and subsequent materials as provided by the instructor. They have a start and end date, but all the lessons are uploaded to our Learning Management System, so that you can learn at your own pace. However, please be aware that you may have weekly assignments, quizzes and/or tests that are due on specific dates. To access your online course, first login to your [My Extension](#) account, next select “My Courses” from the menu. From your list of courses, select the course you would like to access, and click the link that appears in the “Location” section. You will then be redirected to the Learning Management System (LMS) where your course is located.

We are currently using Canvas as our (LMS) for all our online courses. While students do not get access to their respective courses until the first day of the course, we encourage students who are new to Canvas to click on the following link to Canvas and: [Take the free tour of Canvas](#).

For online courses, will I ever need to attend in person?

The online courses in this program are offered entirely online. All course requirements, including lectures, tests, quizzes, and assignments will be completed online. You will not be required to attend in person.

What if I am having trouble with my Learning Management System or My Extension?

Please contact Student Services at (858) 534-3400 or unex-reg@ucsd.edu if you experience any issues logging in to any of our systems.

When does enrollment for a course close?

Enrollment in a course may be closed for one or more of the following reasons:

- The course is at capacity. If the course is at capacity, you will only be able to join the waitlist. If space becomes available in the course, students on the waitlist are contacted in the order they joined the waitlist.
- The course has progressed to a point where students will no longer be able to make-up missed work and be successful in the course.
- The course is cancelled due to low enrollments.

For all three of these reasons, we recommend students enroll early in their courses of interest.

When is the refund deadline for courses?

The refund deadline for courses in this program is typically six days after the start of the course. The exact refund deadline for each section is listed in the section notes.

What are the grading options for courses?

You can take courses for one of three options: Letter Grade, Pass/No Pass, or Not for Credit. If you are taking a course towards a certificate, you *must* complete your courses for credit (i.e., Pass/No Pass or Letter Grade) and receive a C-/Pass or higher grade. Grades below a C-, No Pass, and Not for Credit will *not* count towards certificate requirements.

How will I receive my final grade?

Once the course is completed, the instructor has 10 working days to submit your grades. After the grades have been posted, you can view and print them via [MyExtension](#), your online education management portal. Please contact Student Services at 858-534-3400 or unex-reg@ucsd.edu if you experience any issues with logging in.

What kind of credit do I earn?

The courses in this program are post-baccalaureate, professional-level, credit bearing courses. Credit earned in these courses may lead to the award of a formal certificate by UC San Diego Division of Extended Studies or may be applied toward an academic degree or professional credential, subject to the approval of the *receiving* institution.

If you wish to transfer credit, it is your responsibility to confer with the receiving institution before enrolling, as each individual academic institution decides whether to accept Division of Extended Studies credits.

Are courses transferrable?

UC San Diego Division of Extended Studies is not a degree granting institution; however, many UC San Diego Division of Extended Studies courses can be transferred to other colleges or universities. The transferability of credit is determined solely by the *receiving* institution. You should discuss how your individual courses will transfer with the Office of the Registrar at the receiving institution prior to enrolling.

Can I take a course without registering for the certificate?

Yes, you may take any course in this program without registering for the certificate, provided you have fulfilled all prerequisites for the course.

How long is each course?

Three-unit courses run for approximately 8-10 weeks. For exact course dates of upcoming sections, visit the webpage of the course you are interested in taking on [our website](#).

When is each course offered?

Please visit the course page on [our website](#) to see when courses are typically offered. You can also see a full program schedule by clicking on the “View Schedule” button under the “Courses” section on the [certificate page](#).

How can I get more information on the specific courses?

Please email unex-techdata@ucsd.edu to request specific course syllabi.

How many hours can I expect to spend studying outside of class time?

Each student has their own learning style so this can vary greatly. As a rule of thumb, expect to spend an average of two hours studying for every hour you spend in-class.

What are the instructors’ credentials?

The program courses are taught by seasoned professionals and overseen by an advisory board of leaders in the field. You can view the advisor list under the “Advisors” section on the [certificate page](#). You can find information about a course instructor, including a biography and credentials, on the course page.

What are the required textbooks for a course?

Instructors will post the current text requirements and recommendations on the course page on our website. Please note the textbooks requirements are subject to change every quarter and different instructor may require different books, even if they are teaching the same course in the same quarter, so be sure to check the textbook requirements for the section in which you are enrolling.

Will I be able to order the required textbooks before the class begins?

Yes, you can order the book(s) any time after enrolling in the course. You may order books through the campus bookstore or online retailers, such as Amazon.com.

For more Information

For program specific questions, please visit the [certificate page](#) on our website or contact us at unex-techdata@ucsd.edu. For administrative questions, please contact our Student Services Department at unex-reg@ucsd.edu or (858) 534-3400.