

Berkeley Engineering | BerkeleyHaas

PROFESSIONAL CERTIFICATE IN MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE



OVERVIEW

Technologies driven by machine learning (ML) and artificial intelligence (AI) have transformed industries and everyday life — from facial and voice recognition software to intelligent robotics for manufacturing, life-saving medical diagnostics, self-driving vehicles, and much more. The possibilities for ML/AI applications are virtually unlimited and sought after in practically every industry segment. That's why global organizations are actively recruiting IT professionals with the specialized skills and proficiencies needed to develop future ML/AI technological innovations.

It's an ideal time to launch your career in ML/AI engineering. Grandview Research reports that the global AI market is valued at \$62.35 billion, of which North America accounted for over a 40% share of revenue in 2020. Furthermore, the global AI market is predicted to

expand at a compound annual growth rate of 40.2% from 2021 to 2028.

However, if you want a rewarding career in this high-paying IT segment, you will need to demonstrate the ability to solve complex problems with today's ML/AI tools.

The Professional Certificate in Machine Learning and Artificial Intelligence from UC Berkeley (ranked the #1 university in the world by Forbes magazine) is built in collaboration with the College of Engineering and the Haas School of Business. Over the course of this program, you will gain hands-on experience solving real-world technical and business challenges using the latest ML/AI tools available. You will leave the program with highly sought-after skills that will help you build a successful career in this field.

\$145,000

The average salary for an entry-level ML engineer with zero to two years of experience

(Source: EMSI)



WHO IS THIS PROGRAM FOR?

This program is designed to provide learners with the fundamental knowledge and practical applications of ML/AI tools and frameworks needed to transition into an exciting, high-demand career in this field. This program is for anyone with a technology or math background, including:

- IT and engineering professionals who want to unlock new opportunities for career growth and chart a cutting-edge career path
- Data and business analysts who want to gain better growth trajectories
- Recent science, technology, engineering, and mathematics (STEM) graduates and academics who want to enter the private sector and scale the positive impact of evolving technologies

Future Job Titles:

This program will equip you with the hands-on skills needed to launch or accelerate your career in ML and AI. Representative job titles include:

- Data Scientist
- Machine Learning Scientist
- Machine Learning Engineer
- Artificial Intelligence Engineer

Applicants must have:

- A bachelor's degree or higher
- Strong math skills
- Some programming experience

Also recommended:

- An educational background in STEM fields
- Technical work experience
- Some experience with Python, R, or SQL
- Some experience with statistics and calculus

KEY TAKEAWAYS

In this program, you will:



Develop a comprehensive understanding of ML/AI concepts and identify the best ML models to fit various business situations



Learn how to implement the ML data science life cycle and devise cutting-edge solutions to real-life problems within your own organization



Interact and collaborate with industry experts to understand the technical and business applications of ML/AI



Develop a market-ready GitHub portfolio to show prospective employers



Learn from UC Berkeley's globally recognized faculty and gain a verified digital certificate of completion from UC Berkeley Executive Education

YOUR LEARNING JOURNEY

The Professional Certificate in Machine Learning and Artificial Intelligence is presented by UC Berkeley's world-class faculty, and it will give you the opportunity to learn cutting-edge skills from the world's best minds in ML/AI. This multimodule curriculum teaches the key ML/AI skills that organizations seek and includes recorded faculty videos and demonstrations, hands-on coding activities, discussions, quizzes, and a capstone project. By the end of the program, you will have a career-ready GitHub portfolio that demonstrates your ML/AI knowledge to potential employers.

SECTION 1

Introduction to the
Foundations of ML/AI

SECTION 2

AI/ML
Techniques

SECTION 3

Advanced ML/AI
Topics and
Capstone Project

PROGRAM MODULES

Get ready for an exciting career in ML/AI engineering. By the end of this program, you will be able to apply the latest ML/AI tools to model and analyze real-world data and draw informed conclusions. You will also have the expertise to confidently communicate ML/AI concepts and use them to solve complex problems.

Section 1

Foundations of ML/AI

- Explore the basic concepts and learn about the industry-standard notations of ML/AI.
- Explore real-world contexts for the data science life cycle.
- Analyze data using selection and statistical techniques and draw business conclusions from visualizations.
- Gain hands-on experience with Python, Jupyter, pandas, Seaborn, Plotly, and GitHub.

Module 1

Introduction to Machine Learning

Module 2

Fundamentals of Machine Learning

Module 3

Introduction to Data Analysis

Module 4

Fundamentals of Data Analysis

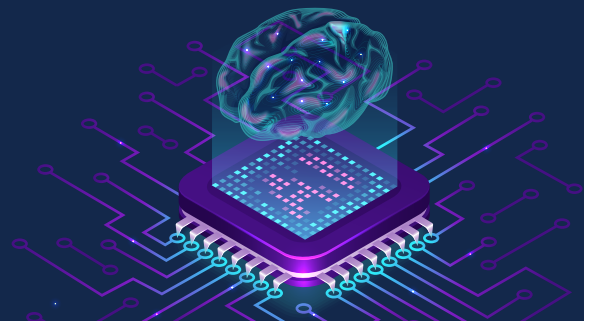
Module 5

Practical Applications I

564,978

Job postings in the US asking for ML or AI as a skill between July 2020 and June 2021

(Source: EMSI)



ML/AI Techniques

- Create and apply the k-means algorithm in Python and compare the results of multiple clustering techniques on a given dataset.
- Differentiate between linear and non-linear regression models and predict outcomes using multiple linear regression models.
- Work with regularized models containing various types of features, parameters, and model complexities.
- Interpret uncertainty in time series analysis and forecasting using error bars and various ML/AI decision models.
- Learn how to program hyperparameters using scikit-learn and gain hands-on experience in creating visual decision trees.

Module 6

Clustering and Principal Component Analysis

Module 7

Linear and Multiple Regression

Module 8

Feature Engineering and Overfitting

Module 9

Model Selection and Regularization

Module 10

Time Series Analysis and Forecasting

Module 11

Practical Applications II

Module 12

Classification and k-Nearest Neighbors

Module 13

Logistic Regression

Module 14

Decision Trees

Module 15

Gradient Descent and Optimization

Module 16

Support Vector Machines

Module 17

Practical Applications III

Advanced Topics and Capstone

- Identify and answer learner identified, industry-specific questions using ML/AI techniques.
- Apply multiple advanced techniques to solve real-world ML/AI problems.
- Develop a professional GitHub portfolio showcasing your skills to prospective employers.

Module 18

Natural Language Processing

Module 19

Recommendation Systems

Module 20

Capstone I

Module 21

Ensemble Techniques (GBM, XGB, and Random Forest)

Module 22

Deep Neural Networks I

Module 23

Deep Neural Networks II

Module 24

Capstone II



TOOLS AND RESOURCES IN THE PROGRAM



Python



Jupyter



pandas



Seaborn



Plotly



GitHub

INDUSTRY INSIGHTS

Gain a deeper understanding of ML/AI models and applications through real-world industry examples. Take away new ideas and problem-solving concepts to solve complex ML/AI problems within your own organization.



Peet's Coffee

Learn how this specialty coffee roaster and retailer in the San Francisco Bay Area uses ML to determine the best location for new stores.

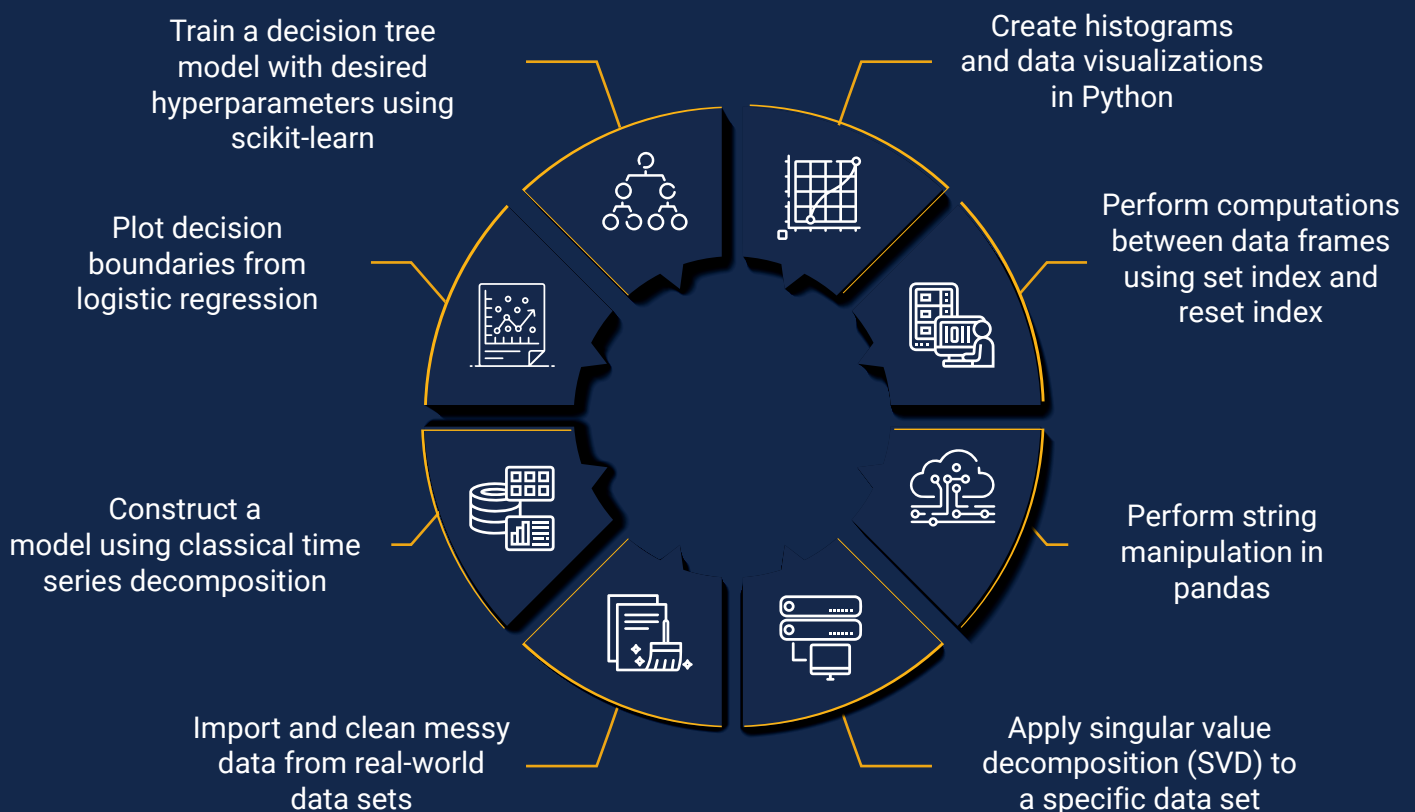
Note: All product and organization names are trademarks or registered trademarks of their respective holders. The study of these products and/or organizations does not imply any affiliation with or endorsement by them.

CAPSTONE PROJECT

The knowledge gained each week in this ML/AI program prepares you to conduct your own research and analysis in a capstone project. You will gain the opportunity to interact with industry experts to identify a specific problem within your field and leverage their expertise along with the concepts, models, and tools taught in the program to devise a solution to your chosen problem. By the end of the program, you will come away with a professional-quality GitHub portfolio presentation that you can share on your LinkedIn profile or with potential employers.

HANDS-ON CODING ACTIVITIES

Coding exercises are integrated into various modules. They allow you to practice building composite skills to prepare you for assignments and portfolio projects.



**This is a sample of the coding activities that will be integrated throughout the program.*

PROGRAM FACULTY

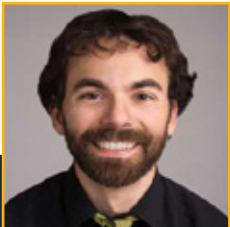
Technical Experts from UC Berkeley's College of Engineering



Gabriel Gomes

Researcher and lecturer with the Mechanical Engineering Department and the Institute of Transportation Studies at UC Berkeley

Gabriel Gomes is a researcher and lecturer with the Mechanical Engineering Department and the Institute of Transportation Studies at UC Berkeley. He received a doctorate degree in automatic control theory in 2004 from UC Berkeley. Since then, he has focused his research on various problems in the modeling, simulation, and control of traffic networks. As a lecturer at UC Berkeley, he has taught courses in partial differential equations, control theory, and mathematical modeling. Gomes also supervises capstone projects with the Master of Engineering program at the Fung Institute. These projects cover a wide range of topics, including robotics, solar energy, machine learning, natural language processing, traffic simulation, reinforcement learning, autonomous vehicles, and smart exercise machines. He is the author of over 50 papers in various areas of engineering.



Joshua Hug

Associate Teaching Professor with the department of Electrical Engineering and Computer Sciences at UC Berkeley

Associate Teaching Professor Josh Hug has been with the department of Electrical Engineering and Computer Sciences at UC Berkeley since August 2014, and he was a lecturer at Princeton University from 2011 to 2014. He received his Ph.D. in 2011 from UC Berkeley, with research focused on computational models of bacterial signal processing and decision making. He received his B.S. in electrical engineering in 2003 from the University of Texas at Austin. In 2017, he received the Diane S. McEntyre Award for Excellence in Teaching Computer Science, and in 2018, he received the Jim and Donna Gray Award for Excellence in Undergraduate Teaching of Computer Science. He has taught courses in artificial intelligence, data structures, rule-based and generative art, information security, data science, and the social implications of computing.

PROGRAM FACULTY

Business Experts from UC Berkeley's Haas School of Business



Reed Walker

Associate Professor of Business and Public Policy and Economics at UC Berkeley

Reed Walker is an Associate Professor of Business and Public Policy and Economics at UC Berkeley. His research explores the social costs of environmental externalities, such as air pollution and how regulations to limit these externalities contribute to gains and/or losses to the economy. He is the faculty codirector of the UC Berkeley Opportunity Lab's Climate and Environment Initiative. He is also a research associate at the Energy Institute at Berkeley, a faculty research fellow at the National Bureau of Economic Research, and a research fellow at IZA. He received his Ph.D. in economics from Columbia University.



Jonathan Kolstad

Associate Professor | Egon & Joan Von Kaschnitz Distinguished Professorship

Jonathan Kolstad is an Associate Professor of Economic Analysis and Policy at Berkeley Haas and a research associate at the National Bureau of Economic Research. He is also the codirector of the Health Initiative at the UC Berkeley Opportunity Lab.

He is an economist whose research interests lie at the intersection of health economics, industrial organization, and public economics. He is particularly interested in finding new models and unique data that can account for the complexity of markets in health care, notably the role of information asymmetries and incentives. He has studied the impact of quality information on demand and intrinsic surgeon incentives. In a series of papers, he has evaluated the impact of the Massachusetts health insurance expansion on a variety of outcomes. He has also gathered unique data to understand the role of information frictions in consumer decision making in insurance markets and in medical treatments.

Kolstad was awarded the Arrow Award from the International Health Economics Association for the best paper in health economics in 2014 and the NIHCM Foundation Research Award in 2016. He is also a cofounder and was chief data scientist at Picwell. He received his Ph.D. from Harvard University and his B.A. from Stanford University.

CAREER PREPARATION AND GUIDANCE

Breaking into the field of machine learning and artificial intelligence requires a precise combination of technical knowledge and business acumen. This program will guide you in developing a career path in the field by assisting you in crafting your elevator pitch and sharpening your interview skills. These services are provided by Emeritus, our learning collaborator for this program. The support team includes program leaders and career coaches, who will help you reach your learning goals and navigate your job search. The primary goal is to equip you with the skills needed to prepare for a career in machine learning and artificial intelligence. However, we do not guarantee a job placement.

CAREER ASSISTANCE SERVICES PROVIDED BY EMERITUS



Live career coaching and open Q&A sessions, resume feedback, mock interviews, and career development exercises



Access to resume referrals to our employer partners



Assistance in crafting your elevator pitch and preparing for your job interviews



Insights on negotiating your salary



CAREER EXERCISES FOCUSED ON LAUNCHING A CAREER IN ML/AI



A bird's-eye view of the current job market landscape and five-year market trajectory



Insights on the key players within the industry, latest trends, and industry-specific interview tips



Opportunity to network with global peers and instructors

CERTIFICATE

Get recognized! Upon successful completion of the program, UC Berkeley Executive Education grants a verified digital certificate of completion to participants. Participants must complete 80% of the required activities, including a capstone project (if applicable), to obtain the certificate of completion. This program also counts toward a Certificate of Business Excellence.



Note: This program results in a digital certificate of completion and is not eligible for degree credit/CEUs. After successful completion of the program, your verified digital certificate will be emailed to you in the name you used when registering for the program. All certificate images are for illustrative purposes only and may be subject to change at the discretion of UC Berkeley College of Engineering, Haas School of Business, and Berkeley Executive Education.



BerkeleyHaas

This program counts toward a
Certificate of Business Excellence

CURRICULUM DAYS

Four days

PILLAR(S)

Entrepreneurship & Innovation

Strategy & Management

A UC Berkeley Executive Education Certificate of Business Excellence gives individuals the opportunity to create a personal plan of study structured by our four academic pillars. Participants will earn a mark of distinction with certification from a world-class university and enjoy the flexibility of completing the program in up to three years.

[LEARN MORE](#)

THE LEARNING EXPERIENCE



Keeping It Convenient

Access to program content is flexible and available through multiple devices, allowing working professionals to easily manage schedules and learn remotely – anytime, anywhere. Participants enrolled in the program obtain access to learning materials in a modular approach, with new content released weekly. Program modules include a variety of teaching instruments, such as:



Video lectures



Discussions



Class materials



Knowledge checks



Coding assignments



A capstone project

Our programs are designed to meet the needs of individual learning styles while also leveraging the power of peer learning. This is achieved through a user-friendly learning platform that enables participants to navigate the program content easily to achieve learning objectives.

Keeping It Real

Our pedagogical approach is designed to bring concepts to life and includes:

- Bite-sized learning techniques
- Real-world application
- Peer-learning discussions

To further personalize the program modules, live teaching sessions are scheduled during the program, often with a Q&A. For participants who are unable to attend these live sessions, a recording is made available, so nothing is missed. Our industry-leading learning platform allows participants to create a profile, connect and collaborate with peers, and interact with academic and industry experts, such as program leaders and teaching assistants. Assignments are often linked to the participants' real-world situations, making the concepts inherently practical.

Keeping It Interesting

Our globally connected classrooms enable participants to seamlessly interact with their peers to complete group assignments and stay on track toward program completion — with culturally enriching encounters along the way.

Program Requirements

To access our programs, participants will need the following:

- A valid email address
- A computing device connected to the internet: PC or laptop, tablet, or smart phone
- The latest version of their preferred browser to access our learning platform assignments

- Microsoft Office and a PDF viewer to access content, such as documents, spreadsheets, presentations, PDF files, and transcripts

Other Requirements

Programs may necessitate the use of various software, tools, and applications. Participants will be informed about these additional requirements at the registration stage or when the program begins. Our program advisors are also available to respond to any queries about these requirements.



ABOUT THE UNIVERSITY OF CALIFORNIA, BERKELEY

The University of California, Berkeley is a public research university in Berkeley, California. Founded in 1868, UC Berkeley serves as the flagship of the 10 University of California campuses. Since its founding, UC Berkeley has grown to instruct over 40,000 students per year in approximately 350 undergraduate and graduate degree programs, covering numerous disciplines on-campus and online.

UC Berkeley ranks fourth in the US News & World Report Best Global Universities rankings and has been consistently cited as one of the six most prestigious universities in the world by the Times Higher Education World Reputation Rankings.

ABOUT BERKELEY ENGINEERING EXECUTIVE AND PROFESSIONAL EDUCATION

As one of the world's top engineering schools, we understand engineers and what they face moving into leadership and organizational development roles.

Berkeley Engineering Executive and Professional Education (EPE) cultivates an integrated perspective through our range of offerings and by working with you to develop customized education programs tailored to your engineers' needs.

We draw on the talents of our world-renowned faculty — industry innovators with real-world experience as entrepreneurs, heads of R&D, and other industry experts — to create targeted programs focused on applying ideas. Many of our offerings include hands-on projects that make participants' learning both tangible and executable upon their return to their organization or workplace. We create and deliver educational programs that suit the demands of your business: in content, length, and location. Our graduates include professionals at many organizational levels: from mid-career engineers to CEOs, CTOs, and CIOs.

ABOUT UC BERKELEY EXECUTIVE EDUCATION

UC Berkeley Executive Education offers a portfolio of online and in-person programs developed by the most forward-thinking minds in academia and industry to accelerate the careers of professionals around the globe. Here, executives have abundant resources at their fingertips, from award-winning faculty and national laboratory research to the vibrant ecosystem of Silicon Valley. These tools, engaged in one of the most dynamic learning environments in the world, combine to create a powerful experience for business executives seeking a competitive edge.

ABOUT THE UC BERKELEY COLLEGE OF ENGINEERING



Academic programs,
graduate and undergraduate,
ranked in the top 5 by US News
& World Report



Faculty members of the
National Academy of
Engineering

There are many reasons why Berkeley Engineering is ranked among the top three engineering schools in the world: because we offer a dynamic, interdisciplinary, hands-on education; because we challenge conventional thinking and value creativity and imagination; and because our students and faculty are driven by social commitment and the desire to change the world. In the classroom, the research lab, or the design studio, our community is both welcoming and tightly knit. Whether they're pursuing groundbreaking research or teaching students, our faculty members are engaged and accessible. We're a village of entrepreneurs and collaborators within the big city of a renowned public university. At Berkeley Engineering, we're making a world of difference.

ABOUT THE UC BERKELEY HAAS SCHOOL OF BUSINESS

As the second oldest business school in the United States, the Haas School of Business at the University of California, Berkeley has been questioning the status quo since its foundation in 1898.

Berkeley Haas is at the heart of what's next. We invite you to learn more about Berkeley Haas, our exceptional faculty members — including two Nobel Prize laureates in economics — and our community of dedicated students and alumni. Our mission is to help extraordinary people achieve great things. At Haas, we live our distinctive culture out loud by embracing our four defining leadership principles: question the status quo, confidence without attitude, students always, and beyond yourself.

Each year, nearly 5,000 undergraduate and graduate students, as well as Executive Education participants from around the world, learn on the Berkeley Haas campus and online. They join a network of over 41,000 alumni eager to help each other grow and thrive in their professional lives.



DURATION

6 months, online
15–20 hours per week

PROGRAM FEES

\$7,500

ABOUT EMERITUS

UC Berkeley Executive Education is collaborating with online education provider Emeritus to offer a portfolio of high-impact online programs. These programs leverage UC Berkeley Executive Education's thought leadership in management practice, developed over years of research, teaching, and practice. By working with Emeritus, we are able to broaden access beyond our on-campus offerings in a collaborative and engaging format that stays true to the quality of the University of California, Berkeley. Emeritus's approach to learning is based on a cohort-oriented design to maximize peer-to-peer sharing and includes live teaching with world-class faculty as well as hands-on project-based learning. In the last year, more than 100,000 students from over 80 countries have benefited professionally from Emeritus programs.



Berkeley Engineering | BerkeleyHaas

Delivered in affiliation with



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