Data Science, Analytics and Engineering (Bayesian Machine Learning), MS

ESDSEBMLMS

Program description

Degree awarded: MS Data Science, Analytics and Engineering (Bayesian Machine Learning)
This concentration in Bayesian machine learning within the MS program in data science, analytics and engineering is offered in partnership with the School of Mathematical and Statistical Sciences. With its programs in statistics, applied mathematics and theoretical mathematics, the school is distinctly positioned to enable students to understand the statistical, probability and mathematical bases for the technical tools and emerging concepts in statistical and probabilistic machine learning and data science. The school also supports students' ability to collect, maintain, analyze, model and decide based on heterogeneous, time-dependent, noisy, biased, hierarchical and potentially large data sets.

Bayesian thinking is particularly suited to addressing the difficult issues associated with these high-dimension complex modeling challenges. Bayesian learning, decision-making and computation have made a significant impact on many areas of data science. Hierarchical modeling, time series analysis, ensemble modeling, spatial modeling and causal modeling are among the various areas of expertise covered by this program. Students will be able to apply these tools in a variety of domains such as engineering, physics, biology, social sciences, economics and finance.

Students in this program perform Bayesian data analysis, modeling, remodeling, and decision-making in data-enriched environments. This includes the exploratory analysis of massive and complex data streams, Bayesian modeling and computing, data management, causal modeling, and inference and decision under uncertainty using Bayesian trees, neural networks and text modeling popular in industry and academia.

At a glance

- **College/School:** Ira A. Fulton Schools of Engineering
- **Location:** Tempe

Degree requirements

30 credit hours and a thesis, or
30 credit hours including the required capstone course (FSE 570)

Required Core (9 credit hours)
STP 502 Theory of Statistics II: Inference (3), EEE 554 Probability and Random Processes (3) or DSE 501 Statistics for Data Analysts (3)
CSE 511 Data Processing at Scale (3), CSE 512 Distributed Database Systems (3) or IFT 530 Advanced Database Management Systems (3)

Choose one from the following:
CSE 572 Data Mining (3)
CSE 575 Statistical Machine Learning (3)
EEE 549 Statistical Machine Learning: From Theory to Practice (3)
IEE 520 Statistical Learning for Data Mining (3)
IFT 511 Analyzing Big Data (3)
IFT 512 Advanced Big Data Analytics/AI (3)
MAE 551 Applied Machine Learning for Mechanical Engineers (3)
STP 550 Statistical Machine Learning (3)

Concentration (9 credit hours)
STP 505 Bayesian Statistics (3)
STP 540 Computational Statistics (3)
STP 551 Time Series Analysis (3)

Electives (6 or 9 credit hours)

Culminating Experience (3 or 6 credit hours)
FSE 570 Data Science Capstone (3)
STP 599 Thesis (6)

Additional Curriculum Information
Students should consult the academic unit for a list of approved electives and concentration course requirements.

Courses selected for required core or concentration may not be used as elective coursework on the same plan of study.

Admission requirements

Applicants must fulfill the requirements of both the Graduate College and the Ira A. Fulton Schools of Engineering.

Applicants are eligible to apply to the program if they have earned a bachelor's or master's degree in computing, engineering, mathematics, statistics, operations research, information technology or a related field from a regionally accredited institution.

Applicants must have a minimum cumulative GPA of 3.00 (scale is 4.00 = "A") in the last 60 hours of their first bachelor's degree program, or a minimum cumulative GPA of 3.00 (scale is 4.00 = "A") in an applicable master's degree program.

Applicants are required to submit:

1. graduate admission application and application fee
2. official transcripts
3. written statement
4. professional resume
5. two letters of recommendation
6. proof of English proficiency

Additional Application Information

An applicant whose native language is not English must provide proof of English proficiency regardless of current residency. Applicants demonstrate proficiency in the English language by scoring at least 90 on the TOEFL iBT (taken in a testing center), 7 on the IELTS or 115 on the Duolingo English test.

All applicants must demonstrate relevant coursework or experience in the following three areas:

- familiarity with Matlab, Python, SQL, R, or other relevant programming skills (in the professional resume)
- undergraduate linear algebra (e.g., MAT 343 Applied Linear Algebra)
- undergraduate statistics or probability (e.g., IEE 380 Probability and Statistics for Engineering Problem Solving, STP 420 Introductory Applied Statistics, STP 421 Probability, EEE 350 Random Signal Analysis)

In addition, applicants without an undergraduate degree in computer science, computer engineering, software engineering, information technology, industrial engineering, operations research, statistics or a related computing field must show evidence (in the professional resume) of at least one of the following certifications or equivalent experience:

- AWS-certified cloud practitioner
- Google data analytics certificate
- Google IT support certificate

In addition, this concentration requires completion of a three-credit course in linear algebra (equivalent to MAT 343 at ASU), which supersedes the second requirement above.

Tuition information

When it comes to paying for higher education, everyone's situation is different. Students can learn about [ASU tuition and financial aid](#) options to find out which will work best for them.

Application deadlines

Fall

Spring   [expand](#)

       [expand](#)

Career opportunities

Statisticians and data scientists are consistently ranked among the top jobs in the USA. Applied statisticians with a strong background in Bayesian learning and decision can pursue opportunities in a variety of fields to collect and curate large and complex data related to business plans, model and communicate findings, and support rational decision making. Industries who hire people with data science skills include financial markets, central banks, pharmaceutical, semiconductor, communications, energy and power systems industries, as well as institutions such as the National Institutes of Health, Centers for Disease Control and Prevention, and National Oceanic and Atmospheric Administration.

Contact information

[Electrical Engineering Program](#) | WXLR A213
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[Admission deadlines](#)