

Machine Learning and Data Science

Information Session for New Students

2026/2027 Entry

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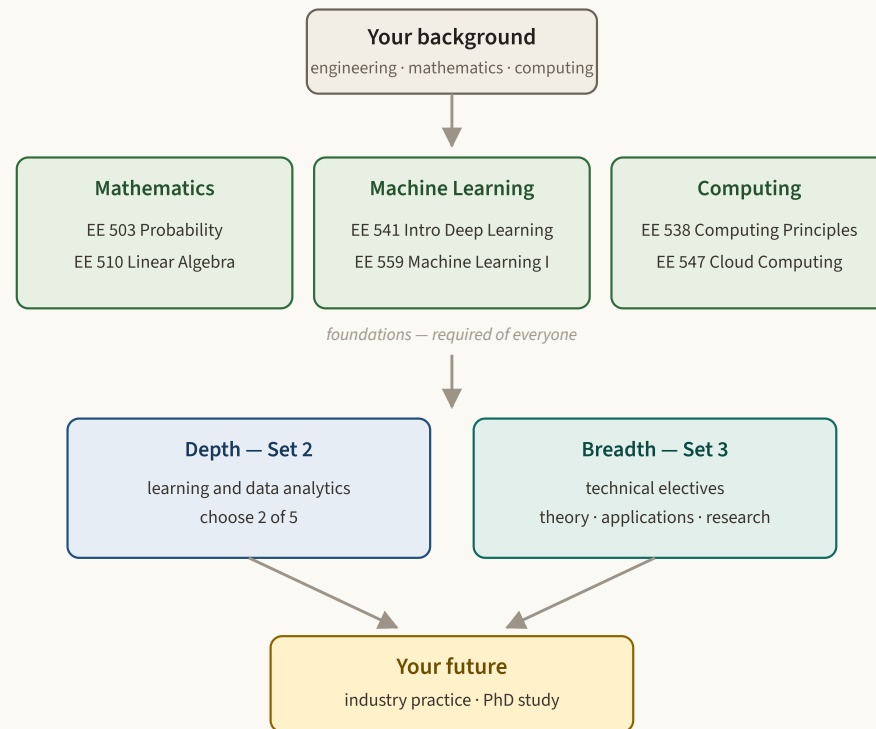
Program Philosophy and Preparation

Philosophy

- Depth on core MLDS topics
- Breadth across theory, methods, and applications
- Long-term and short-term time horizons
- Created to enable you to start and thrive in a career that includes MLDS as a major component

Preparation

- All admitted students have been judged to have appropriate background for the degree
- MLDS requires a breadth of technical knowledge — review or fill in background material early
- Background material: [background preparation guide — link TBD](#)



MLDS vs the Standard MS EE

MLDS specifies most of the program; the standard MS EE leaves course choice to you and your adviser.

MS ECE (MLDS)

32 units

- Prescribed foundation: 5 courses, 16 units — all required
- Two of five Set 2 courses required
- Electives from a defined list — CSCI, ISE, and MATH options pre-approved
- Two proficiency requirements: DSP and computing

MS EE (standard)

28 units

- No fixed core — flowchart guidance, adviser-approved electives
- Every non-EE course requires written adviser approval
- At least 20 units in EE; at most 12 units at the 400 level
- No proficiency requirements

Both programs: minimum 3.0 GPA · at most 4 units of EE 590 Directed Research · at most 4 transfer units

Degree Requirements

Foundational Proficiency	DSP and computing — both required	counts toward Set 3
Set 1 · Foundations	five courses — all required	16 units
Set 2 · Learning and Data Analytics	choose two of five	6–8 units
Set 3 · Technical Electives	choose from the approved list	8–10 units
Set 1 · 16	Set 2 · 6–8	Set 3 · 8–10 = 32 units

Requirements of record: USC Catalogue 2026–27 — MS ECE (Machine Learning and Data Science)

Course Requirements

Foundational Proficiency — both required

counts toward Set 3

EE 483 Introduction to Digital Signal Processing 4

EE 538 Computing Principles for Electrical Engineers 2

Set 1 — Foundations

all required · 16 units

EE 503 Probability for Electrical and Computer Engineers 4

EE 510 Linear Algebra for Engineering 4

EE 541 A Computational Introduction to Deep Learning 2
co-req: EE 503 and EE 510EE 547 Applied and Cloud Computing for Electrical Engineers 2
pre-req: EE 538EE 559 Machine Learning I: Supervised Methods 4
co-req: EE 503 and EE 510

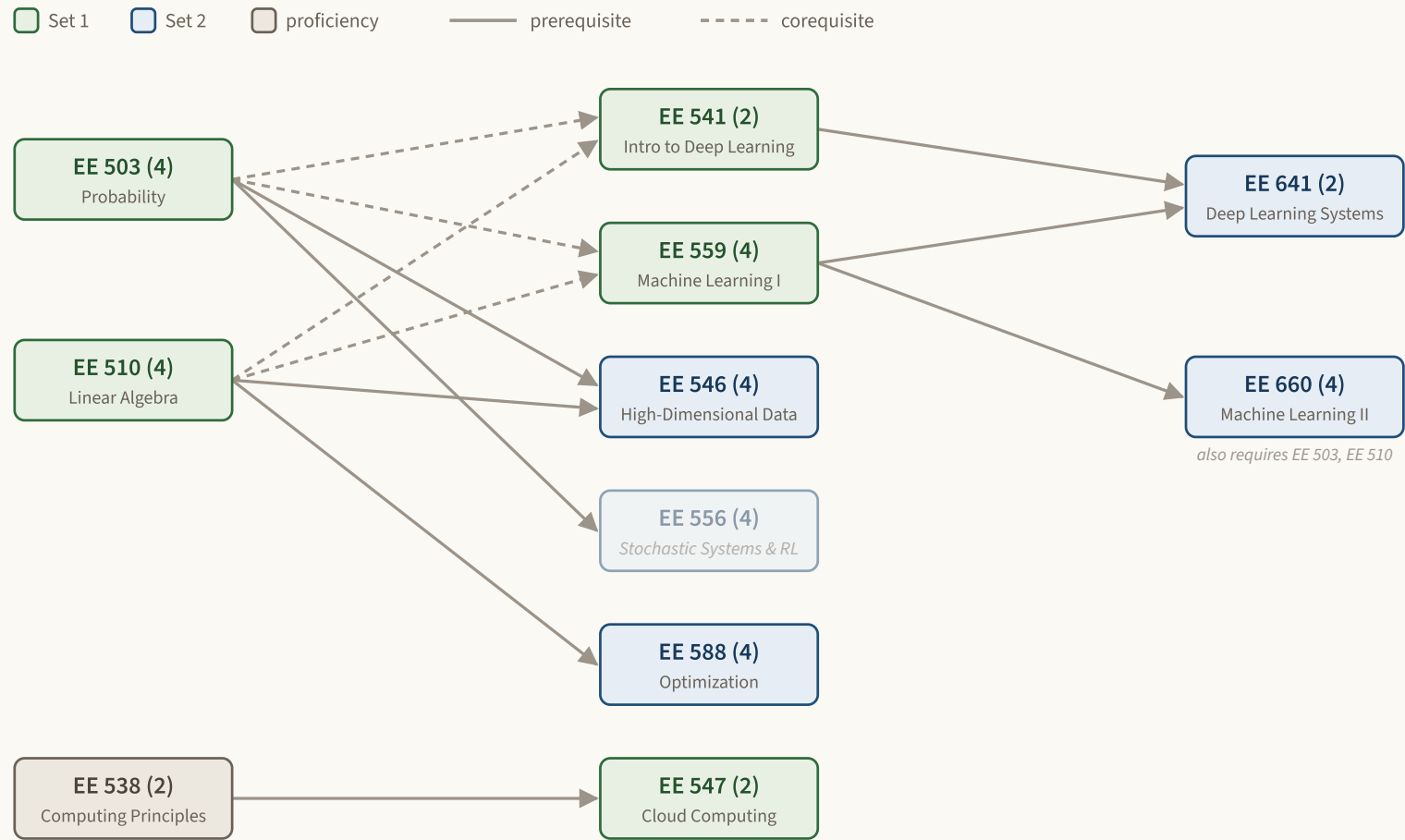
Set 2 — Learning & Data Analytics

choose 2 · 6–8

EE 546 Mathematics of High Dimensional Data 4
pre-req: EE 503 and EE 510EE 556 *Stochastic Systems and Reinforcement Learning* 4
pre-req: EE 503EE 588 Optimization for Information & Data Sciences 4
pre-req: EE 510EE 641 Deep Learning Systems 2
pre-req: EE 541 and EE 559EE 660 Machine Learning II: Foundations & Methods 4
pre-req: EE 503, EE 510, and EE 559

Prerequisites

EE 503 and EE 510 come first — nearly every later course requires them.



Set 3 — Technical Electives

8–10 units: the remainder of the 32 after Sets 1 and 2. Any additional Set 2 course also counts.

Theory and methods

CSCI 570 Analysis of Algorithms	4
CSCI 585 Database Systems	4
EE 517 <i>Statistics and Data Analysis for Engineers</i>	4
EE 542 Internet and Cloud Computing	4
EE 561 Foundations of Artificial Intelligence	4
EE 562 Random Processes in Engineering	4
EE 563 Inference and Estimation: Theory and Algorithms	4
EE 564 Digital Communications and Coding Systems	4
EE 565 Information Theory & Applications to Data Sciences	4
EE 575 <i>Computational Differential Geometry for Engineers</i>	4
EE 586L <i>Advanced DSP Design Laboratory</i>	4
EE 592 Computational Methods for Inverse Problems	4
EE 596 Wavelets & Graphs for Signal Processing & ML	4
EE 689 Computational Intelligence and Neural Learning	4
ISE 538 Markov Models for Performance Analysis	4
MATH 541a Introduction to Mathematical Statistics	3

Applications

CSCI 544 Applied Natural Language Processing	4
CSCI 677 Advanced Computer Vision	4
EE 519 Speech Recognition and Processing for Multimedia	3
EE 569 Introduction to Digital Image Processing	4
EE 619 <i>Advanced Topics in Automatic Speech Recognition</i>	3
EE 669 Multimedia Data Compression	4
EE 682 Law, AI and Intellectual Property for Engineers	4

Research — 4 units max

EE 590 Directed Research	1–4
EE 594ab Master's Thesis	4

Foundational proficiency

EE 483 Introduction to Digital Signal Processing	4
EE 538 Computing Principles for Electrical Engineers	2

Example Schedules — Four Semesters

Plan A — two Set 2 courses in the third semester

Semester 1 (Fall)		Semester 2 (Spring)		Semester 3 (Fall)		Semester 4 (Spring)	
EE 503 Probability (4)		EE 538 Computing Principles (2)		EE 547 Applied and Cloud Computing (2)		Set 3 electives (2–4)	
EE 510 Linear Algebra (4)		EE 559 Machine Learning I (4)		Set 2 — two courses (6–8)			
EE 541 Computational Intro to Deep Learning (2)		EE 483 Digital Signal Processing (4)					
10 units		10 units		8–10 units		2–4 units	

Plan B — one Set 2 course plus EE 641

Semester 1 (Fall)	Semester 2 (Spring)	Semester 3 (Fall)	Semester 4 (Spring)
EE 503 Probability (4)	EE 538 Computing Principles (2)	EE 547 Applied and Cloud Computing (2)	Set 3 electives (4)
EE 510 Linear Algebra (4)	EE 559 Machine Learning I (4)	Set 2 — one course (4)	
EE 541 Computational Intro to Deep Learning (2)	EE 483 Digital Signal Processing (4)	EE 641 Deep Learning Systems (2)	
10 units	10 units	8 units	4 units

Planning Notes

Placement exams can substitute for EE 483 and EE 538. The DSP exam must be passed by the end of the first week of your second semester.

- First semester — evaluate whether 8 or 10 units is best for you
- Course order — take Foundational Proficiency and Set 1 courses early; most later courses require them
- Choosing Set 2 — pick the pair that matches your direction
 - EE 660 — mathematical foundations; a natural fit if you lean theory or a PhD
 - EE 641 — building and deploying deep learning systems
 - EE 546 — high-dimensional data methods
 - EE 588 — optimization; control and robotics
- Set 2 timing — EE 641 is offered in fall only; choose your two Set 2 courses a semester ahead
- Project load — EE 541, EE 559, EE 547, and EE 641 have substantial projects
 - Three classes with large projects in the same semester is probably too many
 - Check course syllabi or ask the instructor

Example Schedule — Five Semesters with Summer

8 units in the first semester; EE 559 in summer¹

Semester 1 (Fall)	Semester 2 (Spring)	Semester 3 (Summer)	Semester 4 (Fall)	Semester 5 (Spring)
EE 503 Probability (4)	EE 538 Computing Principles (2)	EE 559 Machine Learning I (4) ¹	EE 547 Applied and Cloud Computing (2)	Set 3 electives (4)
	EE 541 Computational Intro to Deep Learning (2)		Set 2 — one course (4)	
EE 510 Linear Algebra (4)	EE 483 Digital Signal Processing (4)		EE 641 Deep Learning Systems (2)	
8 units	8 units	4 units	8 units	4 units

¹ subject to EE 559 being offered in summer — confirm before planning on it

Careers in Industry

Roles this degree prepares you for — and where that preparation happens.

Machine learning engineer	build, train, and ship models in production	EE 541 · 559 · 641 · 547
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Data / applied scientist	statistical modeling, experiments, decisions from data	EE 503 · 559 · 660
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ML infrastructure engineer	data pipelines, serving, and compute at scale	EE 547 · 542
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Research engineer	implement new methods — industry research labs	Set 2 · EE 590
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Research Opportunities

The department runs more than seventy **research centers and labs**; these areas are closest to MLDS.

RESEARCH AREAS

Communications, information theory, and machine learning

Signal and image processing

Control, autonomy, and intelligent systems

Computer engineering and systems for ML

CENTERS AND INSTITUTES

Signal and Image Processing Institute (SIPI)

Ming Hsieh Institute (MHI)

USC + Amazon Center on Secure and Trusted Machine Learning

USC–Capital One Center for Responsible AI in Finance (CREDIF)

Getting involved

- Research conversations usually start in a course — talk to your instructors
- EE 590 Directed Research — by request after your first semester; up to 4 units count toward Set 3
- EE 594ab Master's Thesis — the larger commitment

After your MS

If you start your career after the MS

- Learn the material in your courses
- Improve your software skills — use them in classes and in your own projects
- Explore, study, and practice MLDS on your own
- Consider internships and research projects
 - Internships during the program: check CPT eligibility and timing with Student Services and OIS
- Develop contacts: peers, industry, faculty

If you start a PhD after the MS

- Do very well in your courses
- Develop contacts with faculty
- Participate in research projects
 - EE 590 Directed Research possible after your first semester, by request — not guaranteed

Getting Started

- 1 Accept your Ed Discussion invitation — sent to your USC email
- 2 Review the background preparation guide — [link TBD](#)
- 3 Decide how you will satisfy each proficiency — course, or a **placement exam**; the DSP exam must be passed by the end of the first week of your second semester
- 4 Check your first-semester enrollment — EE 503 and EE 510, plus EE 541 for a 10-unit start
- 5 Bring schedule questions to Samantha Graves — Student Services, EEB 102E

Contacts and Resources

PROGRAM

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STUDENT SERVICES

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PROFICIENCY COURSES

EE 483 (DSP) — Prof. Justin Haldar · jhaldar@usc.edu

EE 538 (Computing) — Dr. Brandon Franzke · franzke@usc.edu

RESOURCES

[USC Catalogue 2026–27](#) — MS ECE (Machine Learning and Data Science) — requirements of record

[Program page](#) — MS ECE (Machine Learning and Data Science)

[Placement and proficiency exams](#)

Class discussion: [Ed](#) — [MLDS, 2026 entry](#) — access by invitation

[These slides](#) — PDF

Discussion

Comments and advice from the faculty and staff present

Questions and comments from students

And hopefully some answers

Slides from this session will be posted.