

**WELCOME
TO THE COLUMBIA
ELECTRICAL ENGINEERING
DEPARTMENT**

Graduate Student Orientation, Fall 2022

Introduction to Graduate Programs and MS EE Program Details

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Note About Information in These Slides

If there is any contradiction between the SEAS bulletin, checklists, slides, oral information, or other, the SEAS bulletin should be followed. Any exception needs to be approved in writing by the EE department.

- Students need to carefully follow the instructions of the SEAS and Columbia university
- International Student Office (ISSO) is the only competent body to establish if a student is following the requirements about the legal status and appropriate courses for individual students

Graduate Programs in the EE Department

Master of Science in Electrical Engineering (MS EE).

Master of Science in Computer Engineering (MS CE):

- In collaboration with the Computer Science department

PhD in Electrical Engineering:

- Research focus

MS EE Program

30 credits total:

- all courses at 4000 level or above
- min. 15 credits at 6000 level
- min. 15 credits in EE
- max. 6 credits for research projects



MS EE Program

- 30 credits total:
 - max. 3 credits for classes outside science/engineering and for non-technical classes within the engineering school (course approval required)
 - no credit for math/science classes covering traditional undergraduate material
 - see details in the checklist
- must be completed within
 - 5 years for domestic students
 - 3 semesters for international students
- minimum cumulative GPA of 2.5, at the end of every semester
 - if this criterion is not met, the student can not get the diploma

Full-Time Enrollment for International Students on a Student VISA

- US Dept. of Homeland Security requires international students on a student visa to maintain full-time enrollment
- Full-time enrollment = 12 credits/semester
 - The last semester is an exception, can be less than 12 credits
- 3 semesters to complete the MS program
- You need to take a min. of (i) 12 credits + (ii) 12 credits and then (iii) 6 credits, e.g., fall/spring/fall, fall/spring/summer, spring/fall/spring
- You can take 15 credits/semester and finish in two semesters, but few students do. This is very challenging academically.

Full-Time Enrollment for International Students on a Student VISA

Clarifications and special rules are communicated via SEAS email or other means. ISSO is the office that is able to address individual questions.

Watch for emails from

- From SEAS Office of Graduate Student Affairs
 - SEAS GSA <seas_academics@columbia.edu>
- From EE dept.
 - ee-studentaffairs@ee.columbia.edu,

MS EE Program

Requirements
checklist
(version March 25, 2021)

[link](#)

COURSE NUMBER & NAME	CREDITS
Total credits	

Summary of MS EE. degree requirements

1. ___ 30 course credits, all 4000-level or above, and taken for a letter grade (i.e., no P or R grades).
2. ___ at least 15 credits at or above 6000 level.
3. ___ at least 15 credits in EE (including joint courses); 12 of which should be taken within the first 24 credits.
(joint: EECS, CSEE, BLME, ECBM, ...)
4. ___ No more than 6 research credits (e.g., ELEN E4998, ELEN E6001, ELEN E6002).
5. ___ No more than 3 credits total for courses
 - (a) Outside of SEAS and the Math & Science departments (e.g., Economics or Business courses), or
 - (b) Non-technical courses in SEAS or the Math & Science departments (e.g., IEOR E4702 Human Factors); these courses require prior advisor approval.
6. ___ No credit for Math & Science courses covering traditional undergraduate engineering topics (e.g., STAT GU4203 Probability Theory).
7. ___ Required 0-credit PDL course (no tuition fee).
8. ___ 2.5 GPA minimum.
9. ___ Completion within 5 years; students on a visa need to respect the time limit of their visa, typically a maximum of 3 semesters.
10. ___ No more than 1.5 credits for internships of any type over the whole MS program.

Important Notes:

- 1) All courses outside the list on the next page must be pre-approved.
- 2) Course "credits" are the same as the number of "points" for each course.
- 3) Each student is responsible to ensure that the courses they select satisfy all requirements, especially if they are constrained by a deadline, e.g. imposed by their student visa.
- 4) This checklist is just for tracking purposes. The SEAS bulletin is the authoritative source for the M.S.E.E. program requirements.

Tracking MS Program Progress

- Each student is must ensure that his/her selected courses satisfy all the requirements, especially if he/she is constrained by a deadline such as that imposed by a student visa
- The department does not verify every semester if the student's course selection satisfies the requirements
- If it is not clear if a particular course can be used for the MS program, students must consult with the EE Associate Director of Student Affairs, and ask for written approval, which may or may not be granted by the faculty committee.

MS EE (Elective/Optional) Specializations

Specializations:

- Data-Driven Analysis and Computation
- Networking
- Wireless and Mobile Communications
- Integrated Circuits and Systems
- Smart Electric Energy
- Systems Biology and Neuroengineering
- Lightwave (Photonics) Engineering
- Microelectronic Devices

Specializations are suggestive/optional - students can freely choose courses as long as they comply with program requirements (checklist).

MS EE Program - Course Selection

Key Requirements:

- Min. of 15 credits from EE-listed courses (ELEN, EECS, CSEE, ECBM, ...)
- Min. of 12 credits out of first 24 credits have to be from EE-listed courses

Students can take courses outside of the EE department:

- Many courses in SEAS, some courses in other schools
- The checklist (back side) contains the list of pre-approved courses
- If not clear, a request for approval has to be submitted to the EE Associate Director of Student Affairs, for consideration by the faculty committee
- Example: by default SIPA and business school classes do not qualify

MS EE Program - Course Selection

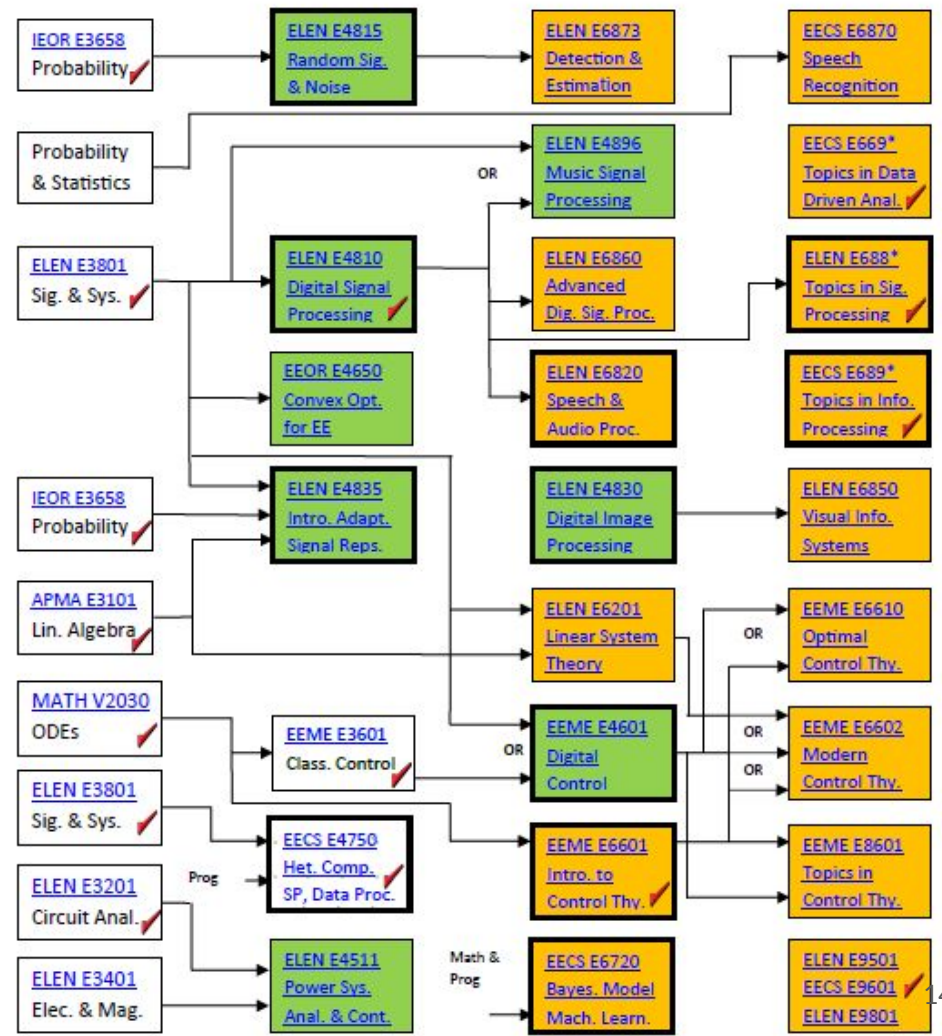
Course Flowcharts:

- Flowcharts indicate the pre-requisites and suggested program sequences
- For details on course prerequisites, attend the first lecture and discuss with the course instructor
- Flowcharts do not have to be followed exactly, they just communicate reasonable course selections to become an expert in a subfield

Electrical Engineering Department

Course Flowcharts

Example of a course flowchart for 2018 Signals, Information and Data



Course Registration

Attend multiple classes during the initial week of classes and add and/or drop classes.

Columbia academic calendar:

- <https://www.registrar.columbia.edu/event/academic-calendar>

Important dates are related to:

- End of Change of Program Period = Last Day to Add Class, Last Day to Receive Tuition Refund for Class Dropped (in September)
- Last Day to Drop Class (no financial refund)
- Last Day to Pass/Fail



Registration into Courses in Other Departments

Computer Science department manages registration for EE students for CS classes through SSOL waitlists. Some CS classes open the waitlists late in July, some later. Actual move from a waitlist to registration could happen as late as in September. EE students have access to the waitlists for 4000 and 6000-level COMS courses

Some popular CS courses:

- CSOR W4231 ANALYSIS OF ALGORITHMS I
 - has special allocation for EE students - take advantage of that!
- COMS W4111 INTRODUCTION TO DATABASES (Fall, FallB)

Monitor EE emails for announcements and updates

Contact the CS department for details.

MS Student Advising

After this orientation, MS students will have an opportunity to talk to a EE faculty member in an advising session.

Once per semester, MS students should meet one of the EE faculty on the MS advising committee:

- discuss class registration and academic matters
- best to talk to a single faculty in your area of interest
- good time is during the course registration periods

Seek interaction with senior students.

Seek interaction with EE ambassadors.

Research Opportunities for MS Students

MS EE program allows up to 6 credits of research:

- First, you need to find a faculty member who is willing to supervise your research
- Then, you need to register for independent research: ELEN E4998 or ELEN E6001/E6002
- Each professor has a separate section
- Maximum of 3 credits of research per semester
- Faculty may be able to offer paid positions

Information about research in the EE department:

- <http://www.ee.columbia.edu/ee-research>

Research Opportunities for MS Students

Requires faculty supervisor:

- significant time commitment on part of faculty

No formal structure:

- Students need to establish a relationship through course work, via discussions with Ph.D. students

Students need to do well in courses prior to applying for research.

Second semester is typically a good first opportunity, but starting to explore the opportunities early is desirable.

MS EE Thesis Option

Research in an area of Electrical Engineering culminating in a verbal presentation and a written thesis document approved by the thesis advisor. Must obtain permission from a thesis advisor to enroll. Typical thesis projects span two terms: an ELEN E6001 or E6002 advanced project and the E6003 Master Thesis with the same instructor. Students must use a department recommended format for thesis writing.

Prerequisites: A minimum of 3 points of credits in ELEN E6001 or E6002 advanced projects with the same instructor, the instructor's permission to enroll, and the following MS program requirements: a minimum 12 points of credit completed and a GPA of at least 3.5.

MS EE Honors Program

- Students with an exceptionally high GPA during their studies at Columbia get the recognition of “MS EE Honor Student”
- Approximately 10% of students are selected
- Honor Students get the opportunity to obtain a paid research assistant (RA) position, if the student finds an interested faculty advisor
- They can take part in up to two RA engagements
- <http://www.ee.columbia.edu/ms-ee-honors-program>

Course Assistant, Lab Assistant and Grader Positions

- A limited number of paid Course Assistant (CA), Lab Assistant (LA) and Grader positions are available in the EE dept. for qualified students
- EE dept. application information on the web
- <https://www.ee.columbia.edu/content/part-time-academic-positions-students>
- Some positions are available in the CS department
- Students need to have good grades and be known to faculty who teach a particular class

Internships in Companies – Fieldwork or Curricular Practical Training (CPT)

- Internships in industry offer a great way to gain experience and can be an important step to finding a full-time industry position
- Internships are most often taken during the summer and/or the last semester
- International students on a student VISA: can take an internship after 2 semesters
- Students can earn credit towards the MS degree
- At most total of 1.5 credits counting to 30 MS EE credits.

Jennifer Lee, the EE career placement officer (CPO), assists students in finding internships and applying for E6999 fieldwork (CPT) course.

Internships – Fieldwork or Curricular Practical Training (CPT)

International students on a VISA need to register for course E6999 Fieldwork:

- Requires an approval by an EE faculty advisor
- 1 or 1.5 credit course
- Total number of CPT credits for the whole MS EE program can be no more than 1.5



Internships – Fieldwork or Curricular Practical Training (CPT)

Requirements:

- Need to apply well ahead of the engagement (Jennifer processes in Spring)
- Letter from employer with a job description
- Need to submit a report and employer evaluation at the end of the internship
- <http://www.ee.columbia.edu/cpt-and-internship-guidelines>

As an alternative, some summer research positions are available on campus:

- They do not require the formal CPT process

GET - Global Engineering Track

DETAILS AVAILABLE FROM THE SEAS OFFICE

GET Program:

- SEAS-level add-on program, available to all majors
- GET requires students to participate in a 6 to 10-week summer internship in the U.S. or globally, as well as to enroll in our ENGI E4200 Global Engineering course
- Has modified internship participation rules, compared to a usual program
- <https://www.gradengineering.columbia.edu/global-engineering-track>



Doctoral Qualifying Exam (DQE)

Written and oral exam required of students in the MS/Ph.D. or Ph.D. track:

- Held in January every year
- Students should take it at the earliest opportunity

Written part covers undergraduate-level material at graduate-level sophistication:

- 6 areas
- more details on the EE website

Oral part consists of three 15 minute one-on-one interviews.



Doctoral Qualifying Exam (DQE)

MS students can take the exam to verify their abilities.

However:

- Passing the exam (as a MS EE student) does not imply that a student will be accepted/transferred into the PhD program
- To get into the Ph.D. program, MS EE students need to additionally apply to the Ph.D. program and be accepted.
- Finding a Ph.D. supervisor is a prerequisite for getting accepted into the EE Ph.D. program

Career Advising

Columbia University career advising:

- <http://www.columbia.edu/content/students.html>
- <https://www.careereducation.columbia.edu/jobs-internships>

The CPO, Jennifer Lee, is focused on assisting EE students with career development:

- <http://www.ee.columbia.edu/students-0>

Information Resources

Attend other orientation events, go over the SEAS orientation package.

Seek discussion with student ambassadors, and senior students.

Electrical Engineering and Computer Engineering websites:

- <http://www.ee.columbia.edu/>
- <https://www.ee.columbia.edu/ms-program-ee>
- <http://www.compeng.columbia.edu/>

Information Resources

The SEAS Bulletin:

- <http://www.engineering.columbia.edu/bulletin/>

EE academic support staff:

Elsa Sanchez, Director of Student Affairs

- Office: 1313 S. W. Mudd, Phone: +1 212-854-3104
- Email: elsa@ee.columbia.edu
- Office hours: 10:30am-12:00pm, 2:30pm-4:00pm or by appt.

Jennifer Lee, Career Placement Officer

- Office: 1311 Mudd, Phone: 212-851-9252
- Email: jl308@columbia.edu
- Office hours by appt.



Information Resources

Faculty members in the MS EE student advising committee:

- Dion Khodagholy, dk2955@columbia.edu
- Predrag Jelenkovic, predrag@ee.columbia.edu
- Zoran Kostic, zk2172@columbia.edu, *chair of the MS EE committee*
- Matthias Preindl, mp3501@columbia.edu

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Thanks!

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