



Graduate Student Orientation

Introduction to Graduate Programs and MS EE Program Details

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COLUMBIA UNIVERSITY



**WELCOME TO THE COLUMBIA
ELECTRICAL ENGINEERING
DEPARTMENT**



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
- minimum GPA=2.5, at the end of every semester
- must be completed within 5 years



Full-Time Enrollment for **International Students on a Student VISA**

- The 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
- So, 3 semesters to complete the MS program
 - You need to take a min. of 12 credits, 12 credits and then 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

EE MASTER OF SCIENCE PROGRAM CHECKLIST

NAME: _____
(Please print)

UNI: _____

**This form provides a checklist to track your progress in the
Master of Science Program in Electrical Engineering**

MS EE Program

Requirements Checklist [link](#)

Courses	Credits
Total credits	

Summary of M.S.E.E. 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 these should be taken within the first 24.
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 advisor approval.
6. ___ No credit for Math & Science courses covering traditional undergraduate engineering topics (e.g., STAT GU4203 Probability Theory).
7. ___ 1 credit for required PDL course (outside of 30 credits, but 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.

Important Notes:

- 1) All courses outside the standard list on the next page must be approved.
- 2) Course "credits" are 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 and the SEAS bulletin is the authoritative source for the M.S.E.E. program requirements.



Tracking MS Program Progress

- Each student is responsible to 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, consult with the EE Associate Director of Student Affairs



MS EE Concentrations

- Concentrations

- 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

- <http://www.ee.columbia.edu/ms-concentrations>

- <http://bulletin.engineering.columbia.edu/optional-ms-concentrations>

- Concentrations are optional, but recommended, and students can freely choose courses as long as they comply with program requirements



MS EE Program - Course Selection

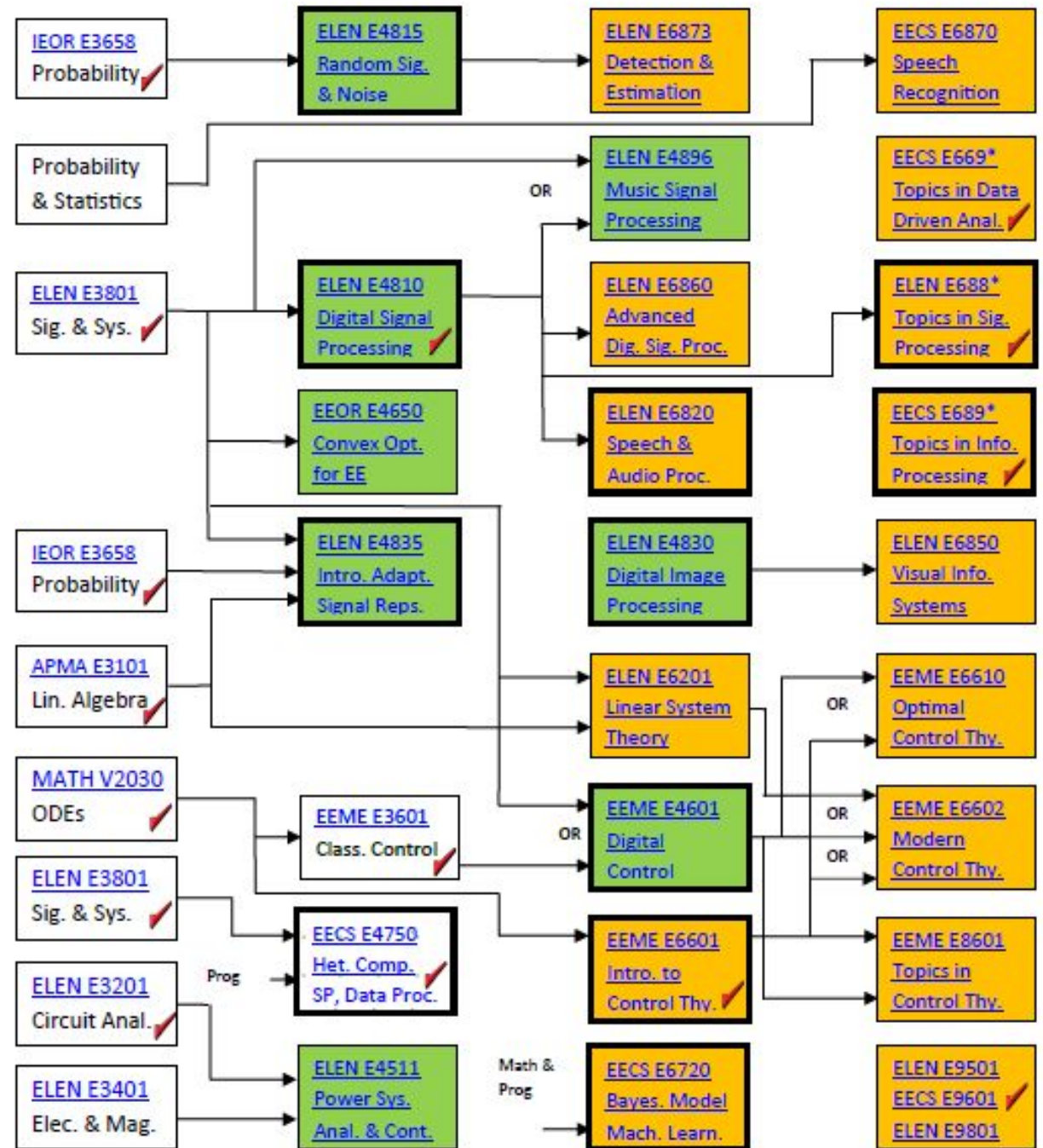
- Key Requirements:
 - Min. of 15 credits from EE-listed courses (ELEN, EECS, CSEE, ECBM, ...)
 - Min of 12 credits out of first 24 credits have to be from EE-listed courses
- Students can take courses outside of the EE department
 - Many courses in SEAS, some courses in other schools
 - The checklist contains the list of pre-approved courses
 - If not clear, request for approval has to be submitted to the EE Associate Director of Student Affairs



MS EE Program - Course Selection

- Course Flowcharts:
 - Flowcharts indicate the pre-requisites and suggested program sequences
 - For details of course prerequisites, attend the first lecture and discuss with the course instructor

Example of a course flowchart (for Signals, Information and Data)





Course Registration

- Attend multiple classes during the initial week of classes and add and/or drop classes
- Academic calendar
 - <http://registrar.columbia.edu/event/academic-calendar>
 - Friday, September 13, 2019
 - End of Change of Program Period
 - Last Day to Add Class, Last Day to Receive Tuition Refund for Class Dropped
 - Thursday, November 14, 2019
 - Last Day to Drop Class (no refund)
 - Last Day to Pass/Fail



MS EE Registration for COMS and CSOR courses

CS Department manages registration for EE students for CS classes through direct SSOL registration or through SSOL waitlists

- EE students have access to the waitlists for 4000 and 6000-level CMOS courses starting with August 27.
- EE dept. will have its own Machine Learning course in the spring of 2020.
- Hybrid sections for fall 2019:
 - COMS 4111 W H02 INTRODUCTION TO DATABASES
 - CSOR 4231 W H02 ANALYSIS OF ALGORITHMS I
 - COMS 4705 W H02 NATURAL LANGUAGE PROCESSI
 - COMS 4701 W H01 ARTIFICIAL INTELLIGENCE
 - COMS W4131 H01 Computer Vision
 - COMS W4771 H02 Machine Learning
- Students enrol into Hybrid sections through SSOL waitlists

Monitor updates on EE emails to students



H Sections

- H sections are hybrid course sections for on-campus students
- H sections do not have an assigned classroom
- Students view lecture videos online instead of going to a classroom
- Lectures are taped during a regular section, and promptly available for viewing on the Columbia Video Network (CVN)



H Sections

- All other components of H sections are exactly the same as non-H sections
- Instructors and TAs hold office hours
- Students do the same homework assignments and take the same exams as classroom sections



MS Student Advising

- After this orientation, MS students will see an EE faculty member for 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
- Talk to students during open lab sessions
- Talk to 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 will supervise your research
 - Then, you need to register for independent research: ELEN E4998 or ELEN E6001
 - Each professor has a separate section
 - Maximum of 3 credits/semester
 - Faculty may be able to offer paid positions
- Information about research in the EE department: <http://www.electrical-engineering.columbia.edu/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, discussions with Ph.D. students
- Open labs during orientation are a good source of information
- Students need to do well in courses
- Spring semester is typically a good first opportunity, but starting to explore early is key



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
 - <http://www.ee.columbia.edu/ee-departmental-positions>
 - Some positions are available in the CS department
- Students need to have good grades and be known to faculty who teach a particular class
- Applications are kept on file throughout the semester, and continuously searched for matches



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
 - up to 1.5 credits counting to 30 MS EE credits



Internships – Fieldwork or Curricular Practical Training (CPT)

- International students on a VISA need to register for course E6999 Fieldwork
 - Requires an advisor
 - 1 or 1.5 credit course
- The EE career placement officer (CPO) assists students in the process of applying for E6999



Internships – Fieldwork or Curricular Practical Training (CPT)

- Requirements
 - Need to apply well ahead of the engagement
 - 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 formal CPT process



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 as evidence of abilities
 - However, passing the exam does not imply that a student will be accepted into the PhD program
 - To transfer into the Ph.D. program, MS students need to apply to the Ph.D. program and be accepted.
 - Finding a Ph.D. supervisor is a prerequisite for getting accepted into the Ph.D. program



Career Advising

Columbia University career advising:

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

The MS EE Career Placement Officer (CPO) is focused on assisting EE students with career planning:

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



Information Resources

- Attend other orientation events, go over the SEAS orientation package
- Ask students during today's visits to open labs
- Discuss with student ambassadors
- EE, CE web sites
 - <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 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.
 - Raina M. Ranaghan, Career Placement Officer
 - Office: 1311 Mudd, Phone: 212-851-9252
 - Email: rmr2185@columbia.edu
 - Office Hours: Tues. & Thur. (10 - 11 am) & (1:30 - 3:30 pm) or 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 committee
 - Matthias Preindl, mp3501@columbia.edu



Note About Information in the 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.



GOOD LUCK!