Graduate Student Orientation:
Electrical Engineering & Computer Engineering

Prof. Gil Zussman
MS Advising Committee Chair
Outline of Today

• 10:00 - 1:00   Introduction
  Overview of Courses
  Libraries
  Career Service

• 1:00 - 1:45   Lunch / student panel

• 2:00 - 4:00   Advising appointments
  8 Open Labs

• Detailed schedule - in the folders
• Advising appointments - online
Research Overview Day

• Friday, Sept. 9, 9:30 - 4:00 Davis Auditorium
• 21 faculty members will give 15 minutes presentations about their research
• Organized according to the areas
• Important in case you want to get involved in research projects

• Detailed agenda – in folders
Columbia Electrical Engineering

- Founded in 1889 (at Thomas Edison’s suggestion)
- Source of many inventions
  - Transatlantic cables (Pupin)
  - FM radio (Armstrong)
  - MPEG-2 DVD coding (Anastassiou)
- 22 faculty + joint appointments (CS, AP) + adjuncts
- Students:
  - ~100 undergraduates (juniors + seniors, including Comp.Eng.)
  - ~250 MS students
  - ~130 Ph.D. candidates
EE Department

• 5 main focus areas:
  – Networking and Communications
  – Signal and Information Processing
  – Integrated Systems / Circuits
  – Microelectronics Devices, Electromagnetics, Photonics, and Plasma Physics
  – Systems Biology

• 5-10 faculty per area (including overlaps and joint appointments)
Recent Initiatives (subset)

- **New DOE Energy Frontier Research Center on Photovoltaic Technology**
  - 5 years, $19M, Yardley/Heinz EE, Brus Chemistry (PIs), Kymissis, Osgood, Shepard in EE and others as co-PIs
  - Improve photovoltaic efficiency through fundamental understanding and molecule-scale control of the key steps in the photovoltaic process in organic and hybrid materials

- **NSF Center on Optical Techniques for Actuation, Sensing, & Imaging of Biological Systems**
  - 5 years, $3M, Shepard EE (PI) and 19 faculty members from 9 departments, 6 schools
  - optical methods for biosensing and bioimaging, on-chip biological sensor systems using nanoscale device fabrication capabilities

- **DOD MURI on Graphene Research**
  - 5 years, $7.5M, Osgood EE (PI), with Mech E, Physics, Chemistry and Cornell U co-PIs
  - explore the unique properties of graphene and new device applications
Recent Initiatives (contd.)

- **Energy Harvesting Active Networked Tags for Disaster Recovery**
  - Winner of Vodafone Foundation's "Wireless Innovation" competition, new NSF grant
  - Collaborative effort between EE and CS
  - Energy harvesting tags, ultra low power communications, tracking/locating survivors

- **Photonics and optical interconnect networks**
  - New DOD/DARPA/NSF ERC grants, PI Bergman (EE), co-PIs Zussman (EE) and Carloni (CS)
  - High-performance computing systems, fast future Internet, cross-layer optimized access networks

- **Media Informatics**
  - DARPA/ONR/NGA/NSF/DOJ grants, large-scale multimedia analysis and search, Chang, Ellis (EE), Attinger (ME), Kender (CS), Sajda (BME)
  - Media NYC 2020 by NYC Mayor office, Columbia STV, EE, CS, NYU-Poly
  - Connect media industry and university research in new media areas
EE Strategic Strength Areas

- Systems Biology & Neuroengineering
- Media Informatics & Communication Systems
- Energy Harvesting, Efficiency, & Sustainability
- Ambient Intelligent Cyber-Physical Systems
EE/CE MS Program

• 30 credits total
  – all at 4000 level or above, with some further exclusions...
  – min. 15 credits at 6000 level  (CompEng: all in EE or CS)
  – EE: min. 15 credits in EE or CS (min. 10 credits in EE)
  – CompEng: min. 15 credits from “core” (min. 6 in EE and CS)
  – max. 6 credits for research projects  (CompEng: max 9 credits)
  – max. 3 credits outside science/engineering

• Normal load: ~12 credits/semester
  – i.e. 3 semesters to complete MS
    • Fall/Spring/Fall  or  Fall/Spring/Summer
  – DHS limits for I-20 etc... refer to Columbia ISSO
MASTER OF SCIENCE DEGREE PROGRAM WORKSHEET
COLUMBIA UNIVERSITY
ELECTRICAL ENGINEERING

Student: ____________________________
(please print)
UNI: ____________________________

CHECKLIST

Courses | Pts.
---|---

M.S. degree requirements are as follows:

1. _____ 30 points of credit
2. _____ 15 points at or above 6000 level
3. _____ no credit for ≤ 3000 level courses
4. _____ 2.5 GPA minimum
5. _____ 15 points in EE or CS
6. _____ 10 points in EE
Concentrations

- MSEE can have an optional ‘concentration’
  - a particular set of co-ordinated courses to cover a certain field
- Bulletin lists several options
  - Multimedia Networking, Telecommunications Engineering,
  - Media Engineering, Lightwave Engineering...
- These are just suggestions!
  - You are free to put together your own program
  - Depth-area Roadmaps indicate dependencies, sequences
Advising

- Individual’s MS program is supervised by a faculty advisor:
  - any EE faculty member
  - ideally, work with a single faculty in your area of interest

- Meet with advisor (at least) once per semester to approve pre-registration:
  - ... but a useful resource for other topics
  - Today – 2pm
Research

• MSEE program allows up to 6 units of research
  – ELEN E4998/ELEN E6001
  – typically 3 units/semester max.
  – (CompEng: 9 units)

• Requires faculty supervisor
  – .. a significant time commitment

• No formal structure
  – .. just need to establish a relationship
  – .. e.g. through coursework

• Open labs today are a good source of information
Doctoral Qualifying Exam

- Oral/written exam **required** of students on Ph.D. track
  - MS students **may** take as evidence of their abilities
  - .. but they must still apply to the Ph.D. program (and be accepted)!
  - .. which means finding a willing Ph.D. **supervisor**

- Held in January every year
  - best taken at earliest opportunity

- Written exam covers undergraduate-level **material** at graduate-level **sophistication**
  - 6 areas
  - more details on EE web site

- Oral exam consists of three 15 minute one-on-one interviews
Teaching Assistant and Grader Positions

• A limited number of Teaching Assistant and Grader positions are available
• Application form available in the website:
  • http://www.ee.columbia.edu/pages/jobs/for_students/index.html
Information Resources

- EE, CE web sites

- MSEE Information Resources
    includes links to: FAQ, curriculum roadmaps, bulletin lists, etc.

- The SEAS Bulletin

- Ask the faculty/staff:
  - MS committee
  - Elsa Sanchez, Student Affairs Coordinator