

DEE FPOP 2025

Retrospective

- what we did
- what first-years said
- what to do next

Discover Electrical Engineering (DEE) is a first-year pre-orientation program (FPOP) that spans four-ish days. The FPOP has three foci: theory, practice, and – most importantly – community.

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Four-ish Days, Three Foci

Theory

- Chalk Talks Titus

Practice

- Laboratory Projects Colin

Community

- Community-Building Activities Titus
- Meet the EECS Community Titus

We overhauled the DEE FPOP for 2025, focusing on theory, practice, and community.

Theory and Practice

Chalk Talks

- Lumped Element Abstraction Thu. (AM)
- Operational Amplifiers Thu. (PM)
- Fourier Transform Fri. (AM)
- RC/RL Circuits and Filtering Fri. (PM)

Laboratory Projects

- DIY Loudspeaker (from 8.02) Wed. (PM)
- Voltage Dividers Thu. (AM)
- Operational Amplifiers Thu. (PM)
- Oscilloscopes and FFT Fri. (AM)
- Filtering Fri. (PM)
- Bass-Boost Circuit (a la 6.200) Sat. (AM/PM)

Theory: Chalk Talks

Chalk Talk #1: Lumped Elements

- Continuum physics: Maxwell's equations
- Discrete blocks: Lumped element abstraction
- Constitutive relations (R, L, C, sources)
- Conservation laws (KVL, KCL)
- Examples: Voltage and current dividers

Chalk Talk #2: Operational Amplifiers

- Problem: Circuits are not inherently modular
- Solution: Operational amplifier (op-amp)
- Examples: Buffer and non-inverting amplifier

Day #1: Intro to DC circuit analysis and design

Theory: Chalk Talks

Chalk Talk #3: Fourier Transform

- Time and frequency domains
- Measuring similarity between signal and sinusoid
- Complex numbers and Euler's formula
- Fourier transform: Build a signal from sinusoids

Chalk Talk #4: RC/RL Circuits, Filtering

- Constitutive relations for capacitors and inductors
- Impedance
- RC/RL circuits as filters

Day #2: Intro to AC circuit analysis and design

Practice: Lab Projects

DIY Loudspeaker (from 8.02)

Construct a loudspeaker using:

- a coil of wire
- a permanent magnet
- acoustic transducer (magnetic force $\rightarrow$ sound)

Analysis Projects

- Hands-on experience with electrical circuits
- Lab equipment: Multimeter, oscilloscopes, etc.

Design Project: Bass-Boost Circuit

- Voltage divider: Turn 9V battery into 3V source
- Buffer with op-amp to enforce modularity
- Implement RC low-pass filter

Community

Community-Building Activities

- | | |
|------------------------------------|-----------|
| • Icebreakers | Wed. (AM) |
| • Campus Scavenger Hunt | Wed. (PM) |
| • Rainy-Day Pizza Party | Wed. (PM) |
| • Outing: Harvard Square | Thu. (PM) |
| • Outing: Boston Common | Fri. (PM) |
| • Kahoot! (Design Project Warm-Up) | Sat. (AM) |

We were deliberate about building a welcoming, inclusive community for all first-years.

Community

Community-Building Activities

- Icebreakers

Wed. (AM)

Activity #1: Similarity Score

- Earlier this summer, everyone filled out a questionnaire.
- We made groups based on similarities in your responses.
- There is an envelope for each group.
- In that envelope is a list with your group's similarities.
- Each group has 15 minutes to write down similarities.
- You get points for each match with the list we made.

After 15 minutes, reveal that the groups are arbitrary. The envelopes are empty. We got the first-years thinking about the many things they have in common with each other.

Community

Community-Building Activities

- Icebreakers

Wed. (AM)

Activity #2: Buddy Up, Listen Up

- Pair up first-years with each other.
- One first-year is the talker-buddy.
- The other first-year is the listener-buddy.
- We show a discussion topic on the slide.
- Talker-buddy talks uninterrupted. (2 min.)
- Listener-buddy summarizes, asks a question. (1 min.)
- Talker-buddy and listen-buddy swap roles.
- Rinse and repeat with a new discussion topic.

The activity sounds lame but is very effective in practice.

Community

Meet the EECS Community

- | | |
|-------------------------------------|-----------|
| • Course 6 Talk (LaCurts, Liu, Han) | Wed. (AM) |
| • Soft and Micro Robotics (Chen) | Wed. (AM) |
| • Numerical Analysis to MRI (White) | Wed. (PM) |
| • Embedded Systems (Steinmeyer) | Wed. (PM) |
| • Makerspace Tour: Metropolis | Wed. (PM) |
| • Professor Panel (Coday, Smidt) | Thu. (AM) |
| • Lunch (Hartz, Notaros, Rau, Shen) | Thu. (PM) |
| • Undergraduate Panel | Fri. (AM) |
| • Lunch (Foland, Griffin, Hom, You) | Fri. (PM) |

We provided opportunities to learn about Course 6 and interact with the EECS community.

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End-of-FPOP Survey

Which events did you especially like?

- | | |
|--------------------------------------|-------|
| • Embedded Systems (Steinmeyer) | 22/26 |
| • Makerspace Tour: Metropolis | 20/26 |
| • Lunch with EECS Community | 20/26 |
| • Outing: Harvard Square | 19/26 |
| • Outing: Boston Common | 18/26 |
| • Design Project: Bass-Boost Circuit | 18/26 |
| • DIY Loudspeaker | 17/26 |
| • Soft and Micro Robotics (Chen) | 15/26 |
| • Professor Panel (Coday, Smidt) | 14/26 |

Joe Steinmeyer, makerspace tours, lunch, going outside, and lab projects were especially popular.

End-of-FPOP Survey

Course 6-3: Computer Science

- more interested than before 5/26
- same as before 19/26
- less interested than before 2/26

Course 6-4: Artificial Intelligence

- more interested than before 6/26
- same as before 18/26
- less interested than before 2/26

Course 6-5: Electrical Engineering

- more interested than before 20/26
- same as before 5/26
- less interested than before 1/26

End-of-FPOP Survey

6.100: Intro to Programming and CS

- more interested than before 7/26
- same as before 18/26
- less interested than before 1/26

6.200: Circuits and Electronics

- more interested than before 22/26
- same as before 2/26
- less interested than before 2/26

6.300: Signal Processing

- more interested than before 23/26
- same as before 1/26
- less interested than before 2/26

End-of-FPOP Survey

6.205: Digital Systems Laboratory

- more interested than before 17/26
- same as before 9/26
- less interested than before 0/26

6.310: Feedback and Control

- more interested than before 14/26
- same as before 12/26
- less interested than before 0/26

6.390: Intro to Machine Learning

- more interested than before 17/26
- same as before 9/26
- less interested than before 0/26

End-of-FPOP Survey

6.900: Engineering for Impact

- more interested than before 19/26
- same as before 7/26
- less interested than before 0/26

18.06/18.C06: Linear Algebra

- more interested than before 16/26
- same as before 9/26
- less interested than before 1/26

End-of-FPOP Survey

Favorite Chalk Talk

- Fourier Transform 13/26
- Lumped Element Abstraction 5/26
- RC/RL Circuits and Filtering 5/26
- Operational Amplifiers 1/26

Favorite Laboratory Project

- Bass-Boost Circuit (a là 6.200) 15/26
- DIY Loudspeaker (from 8.02) 8/26
- Operational Amplifiers 2/26
- Filtering 1/26
- Oscilloscopes and FFT 0/26
- Voltage Dividers 0/26

End-of-FPOP Survey

Chalk talks imparted some level of understanding and intuition

- strongly agree 13/26
- agree 9/26
- neutral 3/26
- disagree 1/26
- strongly disagree 0/26

Labs were practical, hands-on experiences

- strongly agree 13/26
- agree 11/26
- neutral 1/26
- disagree 0/26
- strongly disagree 1/26

End-of-FPOP Survey

Chalk talks were interesting

- strongly agree 8/26
- agree 9/26
- neutral 7/26
- disagree 0/26
- strongly disagree 2/26

Lab projects were interesting

- strongly agree 10/26
- agree 11/26
- neutral 3/26
- disagree 0/26
- strongly disagree 2/26

End-of-FPOP Survey

Chalk talks were too fast-paced

- strongly agree 2/26
- agree 8/26
- neutral 8/26
- disagree 6/26
- strongly disagree 2/26

Lab projects were too fast-paced

- strongly agree 0/26
- agree 9/26
- neutral 7/26
- disagree 8/26
- strongly disagree 2/26

End-of-FPOP Survey

We should get rid of chalk talks

- strongly agree 2/26
- agree 2/26
- neutral 5/26
- disagree 9/26
- strongly disagree 8/26

We should get rid of lab projects

- strongly agree 1/26
- agree 1/26
- neutral 1/26
- disagree 10/26
- strongly disagree 13/26

End-of-FPOP Survey

I learned how I can apply theory to practical projects

- strongly agree 7/26
- agree 15/26
- neutral 2/26
- disagree 1/26
- strongly disagree 1/26

More theory? More practice?

- more emphasis on theory 3/21
- keep as is 8/21
- more emphasis on practice 10/21

End-of-FPOP Survey

The DEE FPOP team was approachable, friendly, helpful, etc.

- strongly agree 17/26
- agree 7/26
- neutral 1/26
- disagree 0/26
- strongly disagree 1/26

More interested in EE now than before?

- strongly agree 11/26
- agree 10/26
- neutral 3/26
- disagree 0/26
- strongly disagree 2/26

End-of-FPOP Survey

Pre-FPOP, I could see myself as an EE

- strongly agree 17/26
- agree 7/26
- neutral 1/26
- disagree 0/26
- strongly disagree 1/26

Post-FPOP, I can see myself as an EE

- strongly agree 10/26
- agree 11/26
- neutral 3/26
- disagree 1/26
- strongly disagree 1/26

End-of-FPOP Survey

I learned a lot during the DEE FPOP

- strongly agree 13/26
- agree 9/26
- neutral 2/26
- disagree 1/26
- strongly disagree 1/26

I liked the DEE FPOP

- strongly agree 14/26
- agree 9/26
- neutral 1/26
- disagree 1/26
- strongly disagree 1/26

Similar responses for “learning” and “liking.”

End-of-FPOP Survey

Some recommendations

- Fewer and/or shorter chalk talks (×3)
- Chalk talks were too fast-paced (×2)
- Let us go outside, go on lab tours, etc. (×2)
- Chalk talks should be more detailed
- Fewer and/or more interesting labs
- Voltage divider lab needs improvement
- Provide notes and/or slides for later use
- Release schedule earlier, quit running late
- State what we are going to do before we do it
- Provide icebreakers for breakfast and/or brunch
- Some speakers were boring
- Introduce guests at the start of lunch
- More (optional) evening events would be fun

6.300: The Comeback Class

A few years ago . . .

- Only required for Course 6-1 (~ 40 students)
- Enrollment continued to steadily decline

Today . . .

- Now required for Course 6-5 (90+ students)¹
- Elective for Course 6-4 and Course 6-9
- 23/26 more interested in 6.300 after the FPOP²
- Most popular FPOP chalk talk: Fourier transform
- Many of our FPOP guests promoted 6.300³

¹With 94 declarations, Course 6-5 ranked as the third most popular major for the MIT Class of 2028 as of April 2025.

²One more than 6.200, which came in second with 22/26.

³Maybe this happened because Titus invited all the guests.

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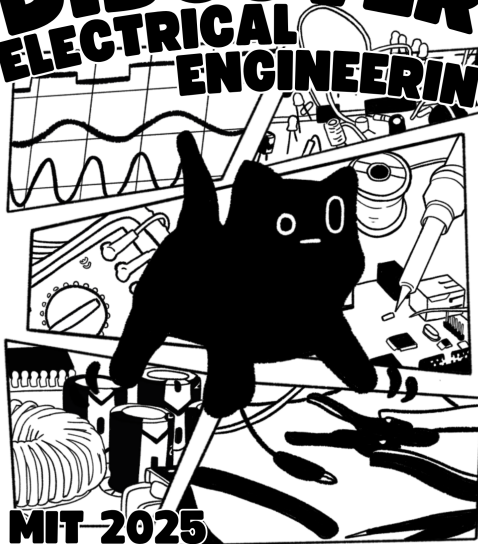
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What to Do Next

Some observations

- Joe Steinmeyer is prime-time programming
- More emphasis on practice and less on theory
- Laboratory projects were popular; refine them
- Tie future chalk talks more closely to lab projects
- Cool: Signal processing, Fourier transforms, . . .
- Difficult to get faculty and lecturers to attend
- Good representation (but could still do better)
- Take the first-years outside more often
- Plan more/longer (optional) evening activities
- Counselors played key role in building community
- Moving between 34-401 and 34-501 was easy
- Best if EECS UG Office manages all food orders
- Felt a little old and out-of-touch as an MEng

DISCOVER ELECTRICAL ENGINEERING



MIT 2025