

ECE at CMU - Next Steps

Your Friendly Neighborhood 18-100 TAs :)

Plan For Today

- Overview of ECE Areas
- Other ECE Requirements
- IMB Program Explainer
- TA Tips and Tricks
- Comprehensive List of Resources
- Q&A + Activity

[Blank Visual Planner Sheet](#)

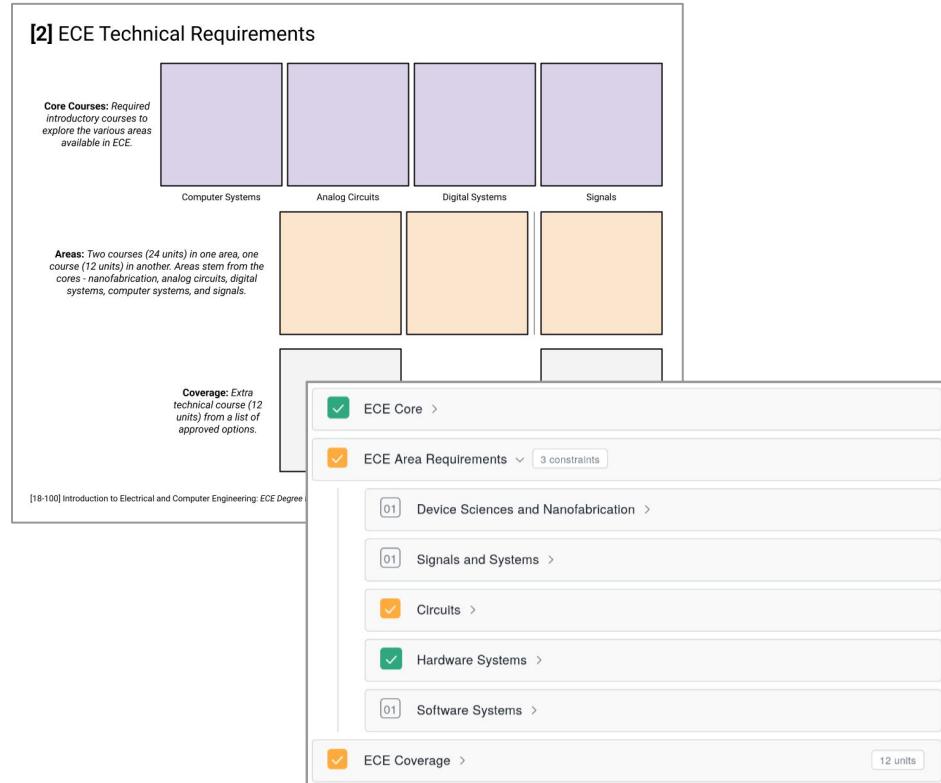
[Example In-Progress Planner Sheet](#)

[Stellic Degree Planner](#)

Click These!

ECE Cores + Areas - An Overview

- 4 required core classes
 - Introduction to fundamentals in each area in ECE
 - 1 primary professor, rotating support professor
- Areas stem from cores:
 - Area I: 2 classes
 - Area II: 1 class



ECE Core Classes - From 18-100

Broad introductions to the various areas of ECE



Computer Systems (18-213)

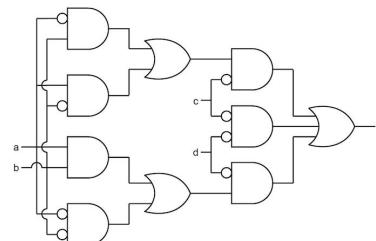
I2C Lab
Crypto Lab

(15-122 Prerequisite)



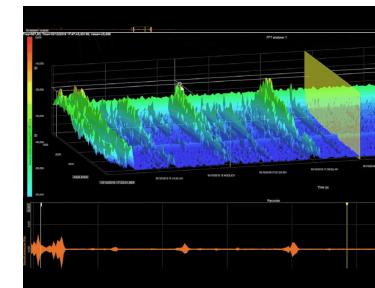
Analog Circuits (18-220)

Basic Circuits Lab
MOSFET Lab
555 Timer Lab
Op-Amp Lab
ADC Lab



Hardware Design (18-240)

MOSFET Lab
Adder Lab



Signals (18-290)

ADC Lab
Radio Lab
Machine Learning Lab*

Some can be taken together. Take in order of what you liked in 18-100!

Software Systems Area (18-213)



Professor Greg Kesden

"Programmer's view on how
computers execute programs, store
data, and communicate"

Labs: Cache, Memory Allocator (Malloc), Shell, Proxy, etc.

Some Area Courses:

- Computer security (18-330)
- **Embedded Systems (18-349)**
- Hardware/Software Interface (18-344)
- Computer Networks (18-441)
- Operating Systems (15-410)***
- Compiler Design (15-411)
- **Parallel Computer Architecture (15-418)**
- Distributed Systems (15-440)
- *Many, many more!*

See Stellic/course catalog for more details!

Analog Circuits Area (18-220)



Professor Mark Budnik

“Fundamental topics common to a wide variety of electrical engineering devices and systems”

Labs: Power Supplies, IR Transmitter, Inductor Coils, etc.

Area Courses:

- **Microelectronic Circuits (18-320)**
- Analog ICs (18-4/621)
- **Digital ICs (18-4/622)**

Other Interesting Courses:

- IoT Tapeout (18-420)
- Advanced Analog ICs (18-721)
- **Advanced Digital ICs (18-5/725)**
- RF ICs (18-723)
- Radiation-Hardened ICs (18-729)

See Stellic/course catalog for more details!

Nanofabrication Area (18-220)



Professor Jimmy Zhu

18-220 prerequisite, but separate area

Area Courses:

- Electromagnetics (18-300)
- **Semiconductors (18-310)**
- Electromagnetics (18-401)
- Microfabrication Methods (18-403)
- Nano-Bio-Photonics (18-416)
- Semiconductor Applications (18-419)

Other Interesting Courses:

- HackerFab (18-410)

See Stellic/course catalog for more details!

Hardware/Digital Logic Area (18-240)



Professor Bill Nace

“Basic issues in design and verification of modern digital systems”

Labs: VGA Video Games, RISC-V Processor, etc.

Area Courses:

- Hardware for Machine Learning (18-340)
- **Design Verification (18-341)**
- Hardware/Software Interface (18-344)
- **Computer Architecture (18-447)**

Other Interesting Courses:

- Tiny Tapeout Chip Design (18-224)
- Modern Computer Architecture (18-740)

See Stellic/course catalog for more details!

Signals Area (18-290)



Professor Tom Sullivan

“Mathematical foundation and computational tools for processing continuous and discrete time signals”

No Labs*

Some Area Courses:

- **Controls (18-370)**
- Electrical Power Systems (18-372)
- Nano/Micro Biomedical Devices (18-418)
- Machine Learning for Engineers (18-461)
- **Digital Signals Processing (18-491)**
- Image and Video Processing (18-793)

See Stellic/course catalog for more details!

Coverage and Capstone

Coverage: 300+ ECE class, or from select list
(see [ECE academic guide](#))

Capstone: Hands-On Design Project

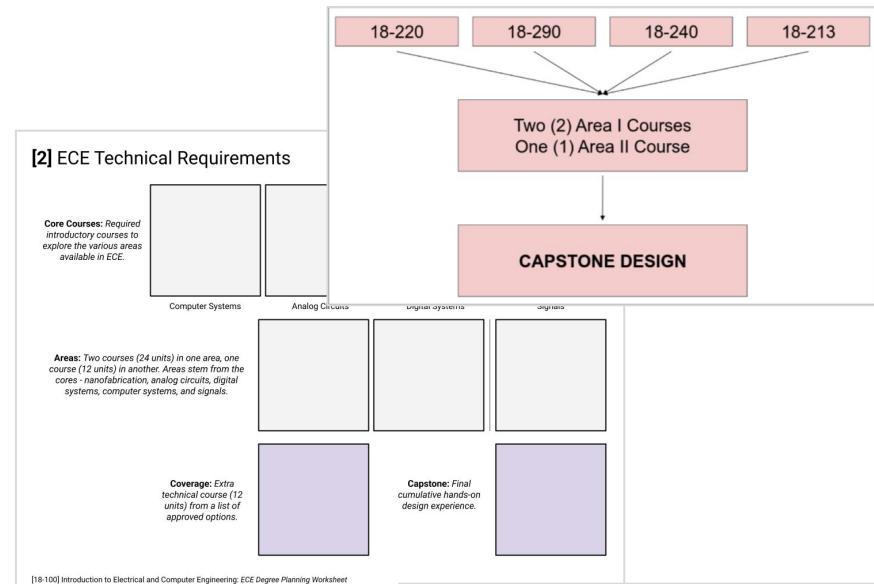
[ECE Design Experience \(18-500\)](#)

Advanced Digital IC Design (18-525)*

Rapid Computer Systems Prototyping (18-540)*

Mechatronic Design (18-578)*

*only offered in Spring



Math and Science Requirements

ECE Math (18-202)

- OR -

Two of the Following:

Vector Calculus (21-254)

3D Calculus (21-259)

Differential Equations (21-260)

Matrices (21-241/21-242)

Multidimensional Calculus (21-268)

[3] Other Technical Requirements

ECE Sophomore Seminar

Probability: 36-225,
36-219, or 21-325.

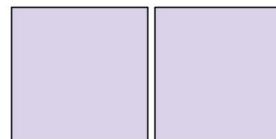
Concepts of
Mathematics (21-127)

Principles of Imperative
Programming (15-122)



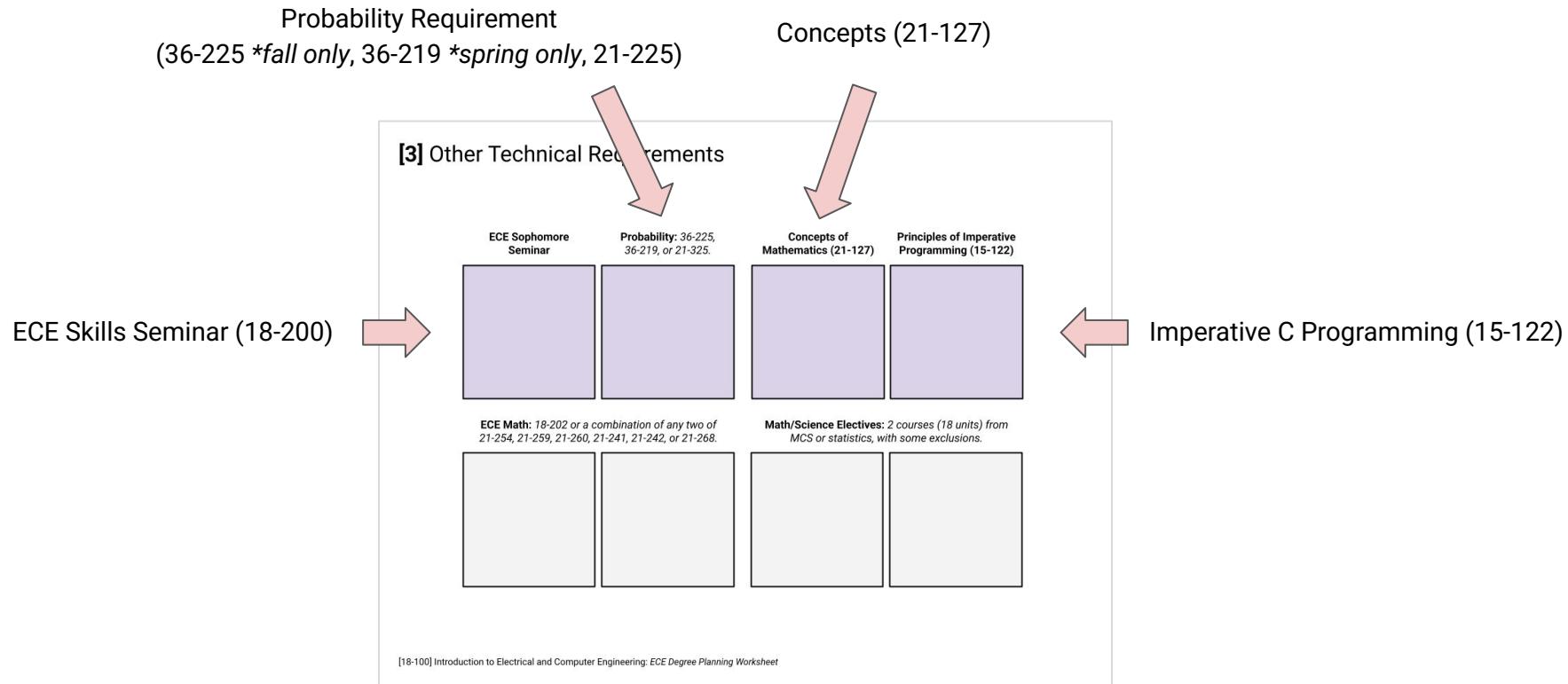
ECE Math: 18-202 or a combination of any two of
21-254, 21-259, 21-260, 21-241, 21-242, or 21-268.

Math/Science Electives: 2 courses (18 units) from
MCS or statistics, with some exclusions.



Any 2 Math or Science Classes
(With Some Restrictions)

Other Technical Requirements



First-Year CIT Requirements

Intro Engineerings: 18-100 + something else

First-Year Writing: Interpretation and Argument or 2 Writing Minis

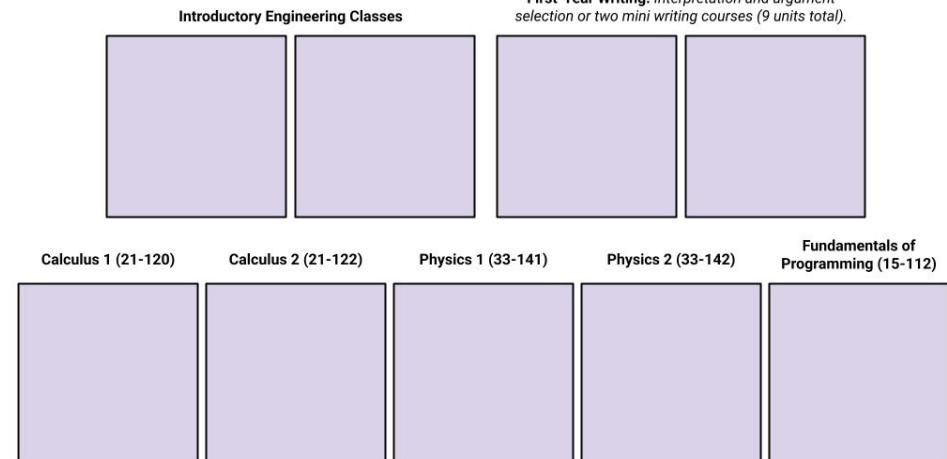
Calculus 1 (21-120), Calculus 2 (21-122)

Physics 1 (33-141), Physics 2 (33-142)

Fundamentals of Programming (15-112)*

*If you test out of 15-112, you must take at least 9 units of some "higher level" 15-XXX class

[1] CIT/ECE First-Year Requirements



General Education Requirements

Category Gen-Eds: 9 Units Class From:

- People, Places, Cultures (PPC)
- Social Analysis, Decision Making (SDM)
- Innovation, Internationalization (I&I)
- Writing and Expression (W&E)

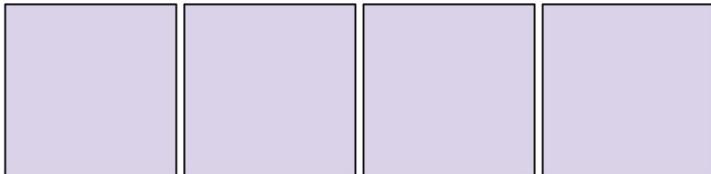
Electives: 27 Units of Non-Technical Courses

C@CM, Experiential Learning I, II, III

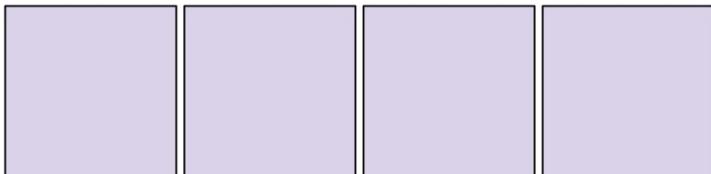
Free Electives: Needed to Achieve 379 Units

[4] General Education Requirements

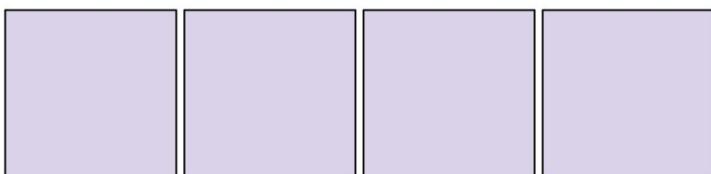
"Category" Courses: At least 9 units from each category. Classes cannot double-count towards multiple categories.



Electives: At least 27 units (3 classes) of non-technical courses. Up to 18 units can be fulfilled by AP/IB/Cambridge credit.



Miscellaneous: Other courses required by CIT. Experiential Learning courses do not contribute to unit count.



IMB (Integrated Master's Bachelor's) Program

Complete your Bachelor's and Master's degrees in ECE at the same time!

- Most students do 4+1 years

Requirements:

- **≥ 3.0 QPA***, 2nd semester junior or senior year
- **8 extra courses for Master's degree**
- **Courses cannot double count**
 - Single 300+-level ECE class can be counted towards graduate degree

[6] (Optional) Integrated Master's-Bachelor's (IMB)

Note: Introduction to Graduate Studies (18-989) can be skipped if pursuing the IMB track. A total of 97 units are required for the degree, of which 27 units can be satisfied via research project coursework.

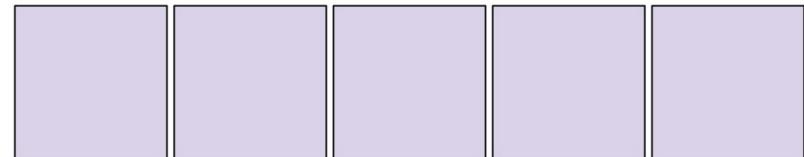
CIT Electives: 2 courses (24 units) at the graduate level or above from ECE, CIT, BrmE, ChemE, CivE, EPP, INI, IRI, MatSci, MechE, or CMU-Africa.



General Technical Elective



ECE Core: 5 courses (60 units) of graduate level or above ECE courses. If pursuing the IMB track, 1 undergraduate level course (12 units) can be counted towards this requirement. Courses cannot double count, but can be done prior to finishing the undergraduate degree.



TA Tips and Tricks

For sophomore year:

- Make friends in common classes → concepts, ECE cores, etc.
- Find the areas of ECE you do and don't like
- Try out cores you're interested in!
 - Prioritize cores you think you'll enjoy → unlocks higher-level classes
- Survive!
 - Generally limit yourself to 2 - 3 technical classes
 - Make sure to have time to experience college
- Apply to be an 18-100 TA! :)



TA Tips and Tricks: Overloading

You do not need to overload to graduate on time!

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- **379 (*Minus AP Credits) Units/8 Semesters → 47.375 Units/Semester**
- More important to learn in classes and be happy than to stress and graduate early.

Utilize FCEs, Discord TurtleBot, friends, advisors, etc. to help determine if schedules are feasible.

TurtleBot [APP](#) Today at 20:35



21-260 (DIFFRENTL EQUATIONS) = **9.5 hours/week**
18-290 (SIGNALS & SYSTEMS) = **11.3 hours/week**
18-310 (FUND SEMICONDTOR DEV) = **8.6 hours/week**
18-320 (MICROELECTC CIRCUITS) = **11.5 hours/week**
70-100 (GLOBAL BUSINESS) = **5.8 hours/week**
18-240 (STRC DES DIGTL SYSTM) = **15.9 hours/week**
Total FCE = **62.6 hours / week**

Unreasonable and Tortuous

TurtleBot [APP](#) Today at 20:42



36-225 (INTRO PROBLTY THEORY) = **8.5 hours/week**
18-202 (MATH FNDTN ELEC ENGR) = **10.9 hours/week**
18-200 (ECE SOPH SEMINAR) = **2.3 hours/week**
18-220 (ELETRONC DEV C ANL CR) = **10.7 hours/week**
76-299 (19TH CENT RSSN MST) = **9.5 hours/week**
73-102 (PRINCPLES OF MICROEC) = **7.4 hours/week**
Total FCE = **49.3 hours / week**

Much more doable!

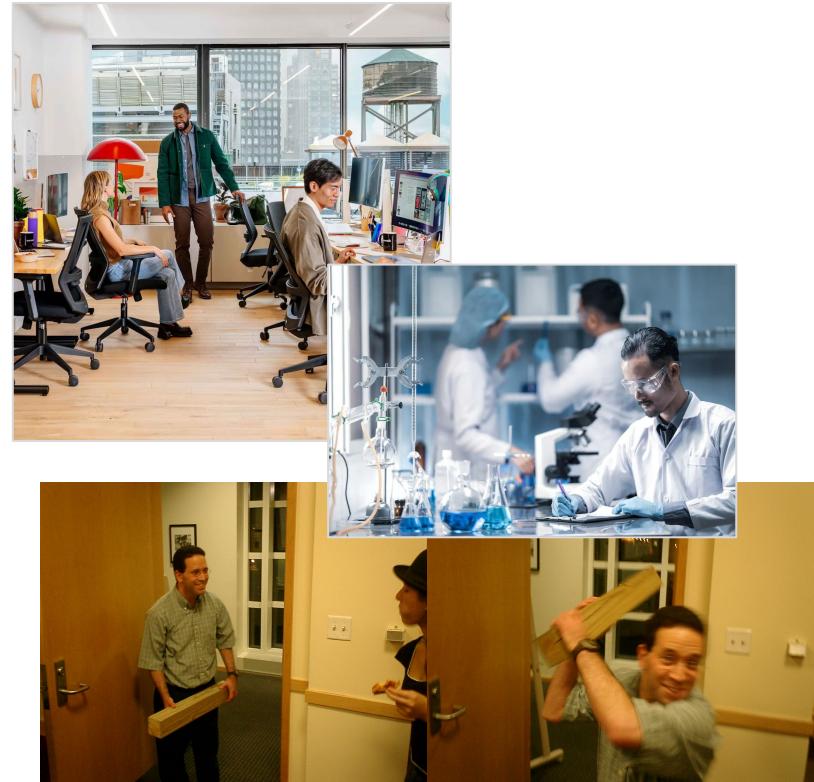
TA Tips and Tricks: Internships and Research

Getting Internships can be Hard

- Freshmen and Sophomores generally struggle to find positions
 - CPDC is useful for improving applications + aligning expectations
- Not getting an internship isn't the end of the world, plenty of time for work later :)

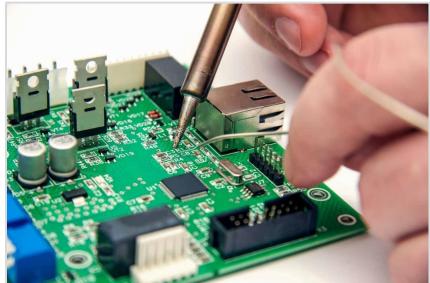
Alternative Summer Plans:

- Research → ask professors you are close to about what you might work together on
 - Can be paid!
 - Can count as letter-grade units (coverage)!
- 18-213, 15-122, 21-127, 33-142 offered as summer courses



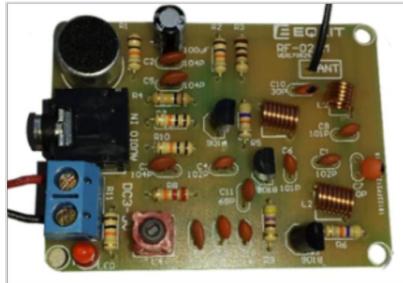
TA Tips and Tricks: Pass/Fail Classes

Up to 9 units of pass/fail credit can be counted towards your degree!



18-021: PCB Fabrication

Professor Jim Bain



18-059: Amateur Radio

Professor Tom Zajdel



98-XXX: StuCo

Student-Run Courses



69-XXX: P.E.

*Get Some Exercise!
Touch Grass!*

Semi-Comprehensive List of Other Resources

[Stellic Degree Planner](#)

[Faculty Course Evaluations](#)

[ECE Academic Guide/Requirements Page](#)

[CIT Advisors](#)

[List of All ECE Courses](#)

[ECE Advisors](#)

[ECE Peer Advisors](#)

Ask during OH / Post Questions to 18-100
Piazza > Course Planning

See also: [Previous \(F24\) Edition of the Choosing Courses in ECE Recitation Presentation](#)



How Did We Do? + Anonymous Q+A