Harvard College Engineering Society (HCES)
presents...

HUGE

HCES Undergraduate Guide to Engineering

2020 - 2021

TABLE OF CONTENTS

Foreword

When we first began editing HUGE in early January, we did not expect it to release in the middle of a global pandemic. We did not expect to finish this over Zoom while stuck in quarantine and facing a future much more uncertain than what we expected when the decade started. But instead we're here now, getting ready for a new virtual semester and a new virtual year of learning.

In these tumultuous times (new adjective, like it?), the goal of HUGE is still the same: **to give the student perspective on the best ways to study engineering at Harvard, and have fun while doing it**. We want to provide the resources that will allow you to get started with your undergraduate engineering experience and prepare you for whatever you choose to do next.

The future is going to be tough and unpredictable, and this guide is by no means the last word in advice. We have a section on advice for coronavirus times, but here are three basic principles that will serve you well:

1) **Reach out to people** - classmates and other students, but also advisors, fellow club members, teaching fellows, and professors. It may take a couple tries, but everyone (even professors!) will be happy to help!

2) **Make plans, even if it seems inevitable that they will change.** It's much easier to have a plan you can adapt than to be starting from scratch. Understand what opportunities are out there, and figure out what you most want to do.

3) **Stay healthy, and stay connected!** It's cliche, but it works the best. Now more than ever, your mental and physical health is the most important thing - staying healthy and happy is what will keep you

engaged and successful with classes. Engineering is a tough line of work, but it gets much easier when you complain to friends (virtually) about it.

With the guide, we've kept most of the basic information about classes and course plans, how to study, and finding summer opportunities.. But we're also adding a section for **coronavirus advice**, specifically talking about (what we think, so far) are the best practices for virtual class.

The current global crises have challenged and changed some of the assumptions we take for granted about our world. But it also opens up an opportunity for us as engineers to shape the world in years to come. We hope this guide gets you started on the path to engineering a brighter future!

Sincerely,
Your HCES Mentorship Co-Chairs
August 2020

I. Introduction

The HCES Undergraduate Guide to Engineering (HUGE) is designed to introduce interested students to the world of Harvard engineering. Whether you're a new student still considering whether engineering is right for you, or a seasoned engineer looking for classes next semester, this guide should have something for you.

Engineering is a unique path at Harvard - it's the only group of concentrations that offers a S.B. degree, and even the A.B. track requires more than the average number of courses for most Harvard concentrations. In addition, there are a multitude of courses important to engineers. Some are required and others are highly suggested. Some are even outside the Engineering Sciences (ES) course label. For a new first year student (or even pre-frosh!), that's pretty scary. This guide will make it much less scary and give you the tools to be successful in engineering.

Not sure where to start with engineering courses? Need to find an advisor? Looking for the next interesting course, or a neat alternative to common course plans? Curious about **free lunches**? Read on, and we'll show you all the neat things about Harvard engineering!

A. Wait, Who Wrote This?

The **Harvard College Engineering Society (HCES)** is the umbrella student organization for Harvard engineers. We organize all kinds of events for engineers. Whether it's career workshops or mentorship programs, goody bags for newly minted sophomore engineers, or the occasional good time, we got you covered.

II. Why Should I Be an Engineer?

(hint: it's not just for the lunches)

Let's be real. Engineering is a tough course of study at Harvard. Engineering concentrations can require as little as **14** or as many as **22 courses**, and the truth is that a good number of these courses will be challenging. Hopefully though, if you believe Engineering is right for you, a lot of the courses will be interesting and exciting.

There are a multitude of different answers, some of which you may have heard when considering what to study in college: Engineers make good money. Engineers have an easier time finding jobs. Engineering is a respected profession (and heaven have mercy if you aren't otherwise a doctor or lawyer).

But while the above may be true, the real reason boils down to this: ***engineering is worth it***. By the time you graduate, you will have gained fresh insights into how the world around you functions. You will never be able to look at commonplace things like a bicycle, an electrical outlet, an internal combustion engine, a countertop stove, or a swivel chair the same way again. You will have developed a quantitative understanding of the physical universe, which will allow you to tackle and solve problems effectively and efficiently. And you will know how to do things, setting the stage for you to make a difference in whatever field you are inspired to contribute to: solving the energy crisis, taking the medical field to the next level, improving living conditions for the less fortunate, or powering the next era of human flight and exploration.

III. The Engineering Disciplines

There are **4** major engineering disciplines at Harvard - **Biomedical, Electrical, Environmental, and Mechanical Engineering**. While the classes required for each of these concentrations may be very different, all of them share a core set of basic math and science courses necessary for engineers. In this section, we'll be going over some 2-year starting plans, ranging from exploratory guides into engineering to accelerated paths that dive into a concentration early.

A. Generic Engineering Starting Plan

The following is the generic two-year plan for all the engineering disciplines:

Freshman Fall Foundational Math Science/Gateway Course	**Freshman Spring** Foundational Math Science/Gateway Course
Sophomore Fall Foundational Math (if needed) Science Engineering	**Sophomore Spring** Foundational Math (if needed) Science Engineering

Generally, if you're considering declaring an engineering concentration you should aim to take two STEM courses per semester in freshman year and three per semester by sophomore year. The foundational math courses (Math 1a/b, Math 21a/b, and higher) and most science or engineering gateway courses (Physics 12 or 15, LS1a, PS11, CS50, AM10 or ES courses) are broadly applicable across all engineering disciplines, so **don't be afraid of being locked into any one concentration** after taking these introductory courses.

Keep in mind, there are **three general sets of requirements** across the engineering programs: **two physics** courses, one to **three general science courses** (which vary by AB vs. SB and concentration), and math up to **Math 21a/b**. If you start in the 21-level math courses, you will need to take one extra applied math course for all concentrations (marked with "(if needed)" below). Freshman year is a great time to clear these out without committing to any one path!

Foundational Math

- Math 1a/b - *Calculus*
- Math 21a/b - *Multivariable Calculus/Linear Algebra*
- Math 22a/b, 23a/b, 25a/b, 55a/b - *Proof-based Multivariable Calculus/Linear Algebra (and beyond)*

For engineering, you are **required to complete math up to the 21 level**. If you start at the 21 level, you will need to take an additional Applied Math (AM) course.

First, Math 1 will cover the basics of single-variable calculus - differentiation, integration, etc. All 4 engineering curriculums are designed to start at Math 1, so don't worry if you haven't taken calculus in high school.

Distinguishing between Math 21, 22, and 23 is nuanced, and your advisor (and math professors) will have their own takes. Generally, **Math 22 and above are proof-based courses**, where you will get experience building and thinking about proofs. Writing proofs is a very useful and generalizable skill in doing anything math or CS, and will prepare you for more math or CS courses in the future (CS 124 is the clearest example). Math 22 is a new course that assumes no experience with proofs, while Math 23, 25, and 55 assume more previous knowledge.

Foundational Physics

- AP 50 a/b - *Applied Intro Physics*
- Physics 12a/b - *Physics w/o Calculus*
- Physics 15a/b - *Physics w/ Calculus*

You only need a **pair of physics classes** - one in **mechanics** (the “a” side) and one in **electromagnetism** (the “b” side). AP 50 is a hands-on course, with a focus on learning physics through projects done in lab sessions. Physics 12 gets a bit deeper into physics, with more emphasis on problem sets and occasional programming labs, and it is often recommended you take the AM 10 intro to python coding course concurrently. Physics 15 is the traditional introductory freshman physics course, with extra topics such as special relativity. Again, shopping will do wonders for deciding between classes, and you should take the time to look at the syllabus and ask around for advice on each course.

In general, it’s definitely possible to take physics (even Physics 15) in freshman year. None of these courses are a cakewalk, but any rudimentary physics in high school will be enough for AP 50 and Physics 12 in freshman year.

Foundational CS

- CS 50 - *Intro to CS (this is CS50)*
- CS 61 - *System Level Programming*
- AM 10 - *Computing for Science and Engineering*

Definitely consider taking CS freshman fall. CS is so deeply integrated in so many areas, that any experience with CS will be a door-opener to countless STEM classes (and a couple in humanities and social sciences too).

CS 50 is your massive freshman introduction to computer science, a 600-person gorilla of a class that rivals Ec10 in size and marketing power. It

goes through a list of basic computer science skills useful anywhere - basic coding in C and Python, a bit of web development, and some basic algorithms. This is presented with all the slickness and business acumen of a global marketing campaign that does teach you things.

CS 61 is systems programming, and it studies the lower-level programming that actually controls computers. Many CS concentrators (and quite a few EE students) swear by it, and if you have previous experience with the C language or just experience with programming in general, you should consider taking it. If you're an EE, you should probably take this course at some point for an elective course.

AM 10 is a newer course offered in the Applied Math department. It involves scientific computing methods, as well as a good overview of basic programming methods.

Foundational Science

- LS 1a/b - *Intro Biology*
- PS 10/11 - *Intro Chemistry*
- Physics 15c - *Wave Physics*
- Physics 143a/b - *Intro Quantum Mechanics*
- ***Many other STEM courses!!!***

Foundational science courses are **necessary for SB majors only**, but they might offer some interesting opportunities to all students. LS 1 is the introductory biology course, and is known for being very difficult and frequented by premed students chasing the GPA. If you happen to be a premed student or someone interested in biology, definitely check it out - but it is known to be hard.

PS 10/11 are introductory chemistry courses that teach basic chemistry skills useful for all engineering majors. **PS 11 approaches chemistry from an applied view**, and covers most of the more generally chemistry topics like a

bit of **thermodynamics** and understanding reactions, while **PS 10 looks from a more physics-based view** and skirts the edges of quantum mechanics. Both are quite solid courses.

One last common option is Physics 15c and Physics 143a/b, which are higher level physics courses. They will be challenging, but both are very rewarding classes with quite good course reviews. Don't be scared off from taking those classes - shop them and try it out!

On top of this, there are long lists of interesting science courses that vary by concentration and interests (Physics 125, Chem 160, etc.). Check with a concentration advisor before taking some of these courses - **not all courses are allowed for all disciplines**. Read below and ask classmates about those other options!

B. Biomedical Engineering (BME)

Here's the generic schedule:

Freshman Fall Foundational Math LS1a/LPSa	**Freshman Spring** Foundational Math Physics LS1b (if BME AB)
Sophomore Fall ES53 Foundational Math (if needed) Physics	**Sophomore Spring** Foundational Math (if needed) Physics (if needed) Engineering

But there are quite a few ways of changing this schedule up:
You could take **CS50** freshman or sophomore fall; if you're a pre-med student, **AB in BME overlaps more with pre-med requirements** than SB (so classes, such as LS1b, that are required for AB but not SB, could be a good class to take freshman spring). You can take ES53 freshman year, but we recommend waiting for sophomore year because it's a great way to meet

other sophomore BMEs (only 1 freshman took ES53 this year). It's also **helpful to have some math or CS (MATLAB) background before taking ES53** but it's not needed.

Sophomore spring is a good time to try some electives if you have the space, since there are 2-4 elective requirements depending on the AB or SB track. Electives include ES221, BE128, BE130, and many more. If you are thinking about taking the **SB, you can't wait to take the biology and chem requirements until the end of your engineering requirements** (in case you decide to get the AB). You can also petition to take Phys 143a, Chem 160, Phys 125, Phys 151, or Phys 153 instead of the standard LS1A, LPSA, LS1b, PS10, PS11 to fulfill the requirement.

C. Mechanical Engineering

Here's the generic schedule:

Freshman Fall Foundational Math CS 50/AM 10 or ES 51**	**Freshman Spring** Foundational Math ES 54 or ES 51** Physics
Sophomore Fall Foundational Math (if needed) CS 50/AM 10 or ES 51** Physics	**Sophomore Spring** Foundational Math (if needed) ES 120 ES 54

** **ES 51** - This course is **extremely project based**, with many hands on skills that you learn in the workshop (i.e. machining). Seeing how all courses are remote this semester, it may be **beneficial to push this class off** until lab courses like these are in person.

With Mechanical Engineering, the only major guideline to starting on this concentration is that you should have **ES51 and Physics 12a/15a done by the end of sophomore fall.** As important foundational courses, it opens up ES120 and beyond for you by sophomore spring, and it looks great on a resume if you're thinking about internships after sophomore year. If possible,

CS50/AM10 and ES54 should also be done during the first two years - they're good courses, and also serve as foundational courses for Computer Science and Electrical Engineering if you're undecided on a concentration.

What you can do differently

If you're intent on being a mechanical engineer, you could take **ES123 in sophomore spring** to help you get ahead of your requirements and get a good foundation in partial differential equations (which are used in other classes). This is a way of **front-loading difficult classes** so you don't have to take them while doing thesis or other higher level requirements later on.

Alternatively you could take **ES183 in sophomore spring**. **ES 125 and ES 181** are good advanced courses to frontload in sophomore fall if you are comfortable. It's also recommended to take ES96 in the fall because it has historically been a smaller class size and has had a more interesting client, such as the Dana Farber Cancer Institute.

D. Electrical Engineering

Freshman Fall Foundational Math CS50/AM10	**Freshman Spring** Foundational Math Physics (12a) ES 50/54
Sophomore Fall Foundational Math (if needed) ES 155 or ES 152 Physics (12b)	**Sophomore Spring** Foundational Math (if needed) CS 141 ES 156

This standard schedule **clears 3 out of 4 core courses** by the end of sophomore year (though this is not required, and an S.B. pathway is still feasible so long as progress has been made toward finishing GenEd requirements). Many students start with foundational math and physics courses. It's recommended that you've taken one of the **electromagnetism**

courses (Physics 12b or 15b) before taking ES 152 (Circuits), and linear algebra (Math 21b) is helpful (but by no means necessary) for ES 155.

Do note that Physics 12a is taught in the spring, while Physics 12b is taught in the fall. Physics 15a/b are taught both semesters, but Physics 15a is best taken in the fall and Physics 15b in the spring.

What you can do differently

The 4 core classes of EE are all challenging courses that may be easier with some prerequisite knowledge. **ES 152 and CS 141** are easier with some **circuitry experience** and **low-level programming** (think CS 61), and **ES 155 and ES 156 are math-heavy courses** that are better with an understanding of calculus and linear algebra (though they will cover the basics in class). ES 54 is an introduction to circuits, and will count across all engineering majors as an elective (or even requirement). However, **don't be discouraged** - **definitely shop higher level courses to see if you're comfortable** with the requirements of the class, and consider taking them early if you have the skills necessary!

CS 61 is a great course for EE's in general. Most people will take it in **sophomore fall after completing CS 50**, but if you're comfortable with C programming you can **consider taking it in freshman fall** (with much difficulty).

In addition, note that **ES 150 is the only class fulfilling the statistics requirement for Electrical Engineers**, not Stat 110. Stat 110 is harder and more suited for CS applications; ES 150 is easier and contains more material on statistics rather than probability, but if you happen to take it while exploring classes it ***MAY be counted for credit, with a lot of grumbling.

***EE is taking a pretty hard stance against counting stat 110 from here on out!

E. Environmental Science and Engineering

Here's the generic schedule:

Freshman Fall Foundational Math CS50 (Computer Science)	**Freshman Spring** Foundational Math ESE 6 (Core)
Sophomore Fall Foundational Math (if needed) PS 12b (Physics) PS 10/LS1a (Chemistry)	**Sophomore Spring** Foundational Math (if needed) PS 12a (Physics) PS 11 (Chemistry)

In these first two years, you can get ahead on several basic ESE requirements by taking foundational math, chemistry, and physics courses. You might even want to **get CS50 done early**, because those coding skills may be useful in future coursework.

ESE 6 is a highly recommended introductory course for freshmen and sophomores. By the end of the semester you'll get to complete a team project of your choice and present your work at the SEAS Design Fair. Previous students have studied how to eliminate food waste in the dining halls, designed bioretention areas in the Yard and by the Charles River, and estimated how much solar power could be produced by installing panels on Maxwell Dworkin. This course schedule sets you up for the course requirements.

What you can do differently

There are **lots of ways to fulfill the chemistry requirement** - take the time to consider all the options that you have!

- **LS1a** and **LPS A** are popular for students on the **pre-medical** track.

- PS11 has received high praise from former ESE concentrators for its effective application of physical principles to understanding environmental phenomena and problems.
- PS10 lays the quantum and statistical foundations of chemistry, relying extensively on calculus.
- Chemistry 17 and 20 are organic chemistry classes popular among chemistry concentrators

The **SB track does not do joint concentrations** because it has so many required courses already, but you can petition for a **cross-disciplinary SB Engineering Sciences degree:** some of your predecessors have pursued Bio-Environmental, Mechanical-Environmental, and Electrical-Environmental degrees.

- Check out the environmental sciences guide for more details: https://eps.harvard.edu/files/eps/files/harvardenvscihandbook.pdf

IV. Engineering Curriculum Information

A. AB vs SB

Students interested in concentrating in engineering can pursue one of **two options**: Bachelor of Arts (A.B.) or Bachelor of Science (S.B.). Choosing between the two pathways will depend mainly on what courses you want to take and your career goals.

Course Requirements

Students in either degree program take many of the same upper-level courses specific to the engineering discipline of their choice; however, the **A.B. degree requires 14-16 courses** (dependent on math placement), while the **S.B. degree programs require a minimum of 20 courses**. Due to the lesser number of required classes, the A.B. program offers more flexibility for you to explore classes in other disciplines outside of engineering. On the other hand, the additional course requirements in the S.B. program provide greater depth in your chosen area of engineering. **Two courses unique to the S.B. program** are a team-based design course (typically **ES 96** taken junior year) and a year-long capstone design course (**ES 100hf**) in which you design and prototype a solution to an engineering problem of your choice, which counts as your senior design thesis.

Career Goals

The A.B. degree allows for more flexibility to apply engineering in other disciplines. Typically, **A.B. students** continue their studies in graduate programs for engineering or other professions (finance, business, law, medicine, etc.). A good example of applying an A.B. degree in engineering would be a student interested in working in environmental law, aiming for an A.B. degree in Environmental Engineering and later applying to law school. On the other hand, the S.B. degree provides a level of technical depth comparable to accredited engineering programs at other major universities. The **S.B. degree** is typically recommended for students looking to work in

the engineering industry, with or without graduate education. A good example of applying an S.B. degree would be a student interested in working in car design and manufacturing, aiming for an S.B. degree in Mechanical Engineering and applying to work in the industry or for a graduate program upon graduation.

Making a Decision

Deciding between the two degree paths is largely dependent on what you aim to do after graduation, but it's okay not to know right away! Most will advise you to **follow the S.B. track during freshman year**, because it requires more courses and you can **always decide to go the A.B. route afterwards**. Use this time to really see how you feel in engineering courses and if it's something you would like to spend most of your time in, or if exploring courses in other disciplines while staying in engineering is something you would prefer. There's also plenty of help available to you in making your choice. **Talk to your academic advisor** about meeting with an engineering specific advisor about your decision. Another good way to facilitate your decision is by getting involved in engineering clubs on campus (like HCES), where there are plenty of upperclassmen who have already decided on their degree path and can offer you valuable advice based on their experiences.

B. Writing a Thesis

A thesis is often the culmination of an engineering student's work over the past 4 years, and a great way to put all the skills learned into use. There are many different ways to plan and write a thesis, and we'll review the two main paths engineers can take to creating one, but remember - everyone can approach a thesis in a different way.

Most engineers begin planning their thesis work towards the **end of junior year**. A thesis IS a lot of work, so it's best to have an idea of what your

project will be early on and prepare accordingly (eg. finding professors in that field willing to guide you).

ES 100hf

ES 100hf is required for all Engineering SB degrees. ES 100hf is a two-semester course built to guide senior engineers through a design project, where they pick an engineering problem and design and implement a solution. Before taking this class, you're required to take ES 96 or ES 227, which are group design projects where engineers from different backgrounds are guided through the process of building a solution to a design problem.

If you're an **AB, going down this technical track may still be useful** for the structured thesis work and research experience that these classes offer. However, these classes are known for having a fair amount of "required" paperwork and documentation separate from the engineering component of the class - after all, the goal is to characterize a design problem as well as creating a solution.

AB Thesis

An AB thesis is much less structured than a SB thesis - there's no required courses or prereqs needed to go about writing one. If you're pursuing an AB engineering degree, you don't need to write a thesis; however, there are numerous benefits to doing so. To be considered for High and Highest Honors, you must have written an "excellent or outstanding thesis," and a thesis in general is very **useful when applying for jobs or graduate studies**.

The **main point of contact** for an AB thesis is the Undergraduate Academic Program Manager (**Kathy Lovell** as of 2020). You must contact them by a specified date in early December of senior year with your intention to write a thesis, including the names of your thesis adviser and readers and your contact information. The thesis is usually due in late March or early April,

when your adviser and readers will rate your thesis work. For more information, talk to or email the Program Manager or your academic advisor.

C. Other Concentration Options

Engineering is not just limited to the AB and SB concentrations - there are many more options that allow you to personalize your engineering studies at Harvard.

AB/SM (or Concurrent Masters)
****Note: The information below is true for class of 22 and earlier. Harvard College is currently changing AB/SM requirements for the Class of 2023 and beyond. Talk to your advisor(s) and the Office of Undergraduate Education for more details.*

The **Advanced Standing program** grants you an **AB and MS** degree - normally a 5-year process - through a 4 year course of study, or also allows you to graduate in 3 years with an AB. It's undeniably tough - students seriously considering Advanced Standing should **start planning for it in freshman year.** To qualify, you need a certain number of AP or IB credits (has to be all AP or all IB credits) as listed by the Advanced Standing office.

Advanced Standing is not a common course of study - only a few dozen of the 6,500 undergrads at Harvard choose to pursue an AB/SM, and a small handful will pursue it in engineering. It will require a packed course schedule with some very challenging courses. **Don't do Advanced Standing for the extra degree;** instead, do it if you think you will be taking many graduate-level courses anyways.

For students in the Class of 2023 or later, there is the **Concurrent Masters** program, which is very different from Advanced Standing. It allows you to **double count up to 4 courses** (16 credits) to both your undergraduate and

graduate degree. Again, **don't do Concurrent Masters for the extra degree;** instead, do it if you'll be taking many graduate courses anyways, and you want to invest deeply in the subject.

For all of these programs, **talk to your concentration advisor and the Office of Undergraduate Education** for more details.

Cross-Disciplinary SB

The Cross-Disciplinary SB is a **self-designed engineering concentration** that allows a student to blend several engineering disciplines in one major. It has many of the same basic requirements as other SB programs - math up to the Math 21 level (and potentially higher), two physics courses, and two other science courses. However, the engineering requirements are much more flexible. A student must choose 3 courses in a single engineering discipline, 3 courses in 3 different engineering disciplines, and 3 engineering electives. These courses should have a **general theme uniting all of them**, as expressed in a one-page essay the student must submit along with the Plan of Study form.

If you find that you're interested in the **interaction between several different engineering disciplines**, this is a great concentration - for example, the combination of mechanical and electrical engineering skills used in robotics. But there are a few pitfalls to be wary of when declaring this major. You have less freedom in changing what courses you can take, and you can't declare for the Cross-Disciplinary degree until junior year (and after a lot of talking with your advisor). In addition, your resume will read that you graduated with an Engineering Sciences SB, which may be limiting in certain industries that explicitly want a certain type of engineer. If you're considering this concentration, **talk to your advisor early** and look carefully at the Plan of Study Form to see if this is the right concentration for you.

D. Common Secondary Fields

Computer Science

The CS department has a list as long as this guide on all the courses and things to take. But there are some notable points:

- One of **CS 50, 51 or 61** is **required for all engineers**. That being said, CS 51 is in a language that most CS majors never use, and although CS 61 is a very interesting class, prior experience in C/C++ is very valuable before taking it. CS50 may be slow and time-consuming, but it'll give you a nice set of skills you'll need in engineering and in life. (Note - if you're considering EE, CS 61 will be very helpful because it also fulfills an elective slot.)
- If you're considering anything related to **algorithms and robotics** (and even if not), **CS 124** is a go-to class. It's hard and mathy but well taught, and the algorithms you learn are central to any programmer's toolkit.

Mathematical Sciences (Applied Math)

- **AM 205** is a class on numerical methods - it's useful for **modeling** and **simulation applications** important across all of engineering.
- **AM 121 (and AM 221)** are the undergrad and grad courses for **optimization**. While mathematically challenging, optimization is a powerful design tool that finds its way into many different applications in engineering.
- As a side note, depending on your comfort with math, grad-level AM courses, while challenging, are more organized and applicable sometimes. Feel free to shop and consider these courses.

Physics

- **Physics 12a/12b/15a/15b/16** - you **have to take two** of them! Talk with classmates to find which course level would be best suited to your physics background. In the past, the 12 series has been more geared

towards engineers, but the 15 series has been a staple for many MEs. Physics 16 is for students who have a strong background at the AP Physics C level and are interested in theoretical physics, but you definitely have to put in the time for this course. Morin (Physics 15a) is a great lecturer, and the class is quite interesting.

- **Physics 15c** - Great if you're interested in waves (Note - you can fulfill the science requirements with 15c and 143a if you don't want to take a bio/chem course)
- **Physics 143a/b** - Quantum is a good set of classes, especially if you're interested in materials science/ electronic devices
- **Physics 153** - More E&M, great class to take if you enjoy 15b; this class can also be taken instead of 15b if you are already comfortable in E&M
- **Physics 175** - Optics has cool demos and goes into waves and lasers

V. General Advice/Tips and Tricks

Courses to take

- **Take CS50 for a grade in freshman fall** - it's useful for applying to internships and becomes a prerequisite for upper level courses. Check out AM 10 as well if you're interested.
- Take ES6 freshman year if you're interested in Environmental Engineering
- If you're going to take Physics 15a, take it freshman fall because Morin teaches it and it gives you a good amount of flexibility in courses you can take in the Spring
- If you're looking to get an **SB degree, try to take ES96 in junior fall** when you'll be more willing to put in the work (as opposed to junior spring). This year is **very** different however - talk to advisors about it.
- Use freshman and sophomore year to **get Math and Physics requirements and intro engineering courses out of the way** before the core engineering curriculum starts to pick up.
- **Join engineering student groups!** (Like HCES, the wonderful organization that brought you this guide) It's a great way to become a part of the community of engineers on campus and connect with upperclassmen that can offer you useful advice. You can find the whole list of engineering clubs at this website: https://www.seas.harvard.edu/student-club-list
- Try not to take 3 lab classes at the same time. **Lab courses are a huge time commitment**, so it's best to spread them out over several semesters.
- Graduate level courses are available to you as an undergraduate and are recommended if you're interested in a certain topic not offered in undergraduate courses. Otherwise, there are already so many credits to fulfill through undergraduate classes, it may not be ideal for you.

- **Stock up on GEMs** for when you're taking more **advanced engineering courses** (junior year) and need easy classes that will fulfill Gen-Ed requirements.

Connecting with Professors

- **Professors** typically love to have students **attend their office hours**. Even if you don't have a question on a certain pset, it's a great way to get one-on-one time with them. An easy way to get the conversation started is asking them about their research.
- Go to **talks sponsored by SEAS**! They're pubbed everywhere and a great opportunity to hear from and possibly meet professors outside of the ones teaching your classes.
- Once you've declared an engineering concentration, you'll have a **faculty advisor** for the next 3 years. They're a great way for you to interact and get to meet more faculty. Some will reach out to schedule a meeting with you **- pay attention and respond to your advisor emails, or be proactive and reach out to them!**

Prepping for Internships

- **Start early**! If you're looking for a summer internship, it's a good idea to apply during winter break so you'll have enough time before applications are due to get any rec letters you need from professors.
- **Use your existing connections**. It's always a good idea to reach out to professors, TFs, upperclassmen, or even family friends you know in the industry. There's also an entire database of Harvard alumni (alumni.harvard.edu) that you can definitely use to find a connection wherever you're applying to.
- Linkedin is a great way to stay connected with classmates, coworkers, and other existing connections.
- There are great summer programs for getting involved in research over the summer, such as **PRISE**, that many freshmen take advantage of.

It's a great learning experience for future research/internships and is highly recommended!

- Get to know the **Active Learning Lab Staff** and the machine shops. They are very willing to help you gain some technical skills in the ALL and even offer some **formal trainings** for certain classes that you can put on your resume.

Balancing a Social Life with Engineering

- Form study groups! Nothing forms a greater bond between engineers than staying up late to work on 3 different psets together! (also a great way to get your pset grades up by collaborating with other students in the class)
- The engineering clubs on campus also host several community events where you get to connect with other engineers and just have a good time. Subscribe to email lists (especially HCES!) and keep an eye out for them.
- **Set up a Google Calendar** or other calendar, and be pretty religious about keeping it up to date. It'll save you the shame of missing that important meeting you had with your professor right before finals. Sooner or later, you'll be saying, "let me check my GCal" before you schedule any future meetings.

VI. Coronavirus Tips and Resources

Before we start going into some detailed advice, there is one general theme that everyone will suggest - ***please ask for help***. Professors and students alike are spending more time than ever at home, so don't be afraid to reach out with questions!

Academic Info

- Shopping week will look different from class to class, so look at Canvas sites early and often for updates.
- The **syllabus will be *extremely* important this semester**, as it will contain information about the course load, expectations professors have of students, and grading styles. Make sure you read each syllabus carefully, so that you know what you are signing up for.
- Reach out to professors if you have questions, especially during shopping week! **Ask upperclassmen and student advisors** if you would like help crafting emails or contacting professors - we were nervous about it once too!
- Keep an eye out for study sessions hosted by SEAS and many other engineering groups throughout the semester. It will be a good chance to interact and work with other students on psets or classes
- **Form group chats with your classes** for easy communication and ability to form study groups (eg. large GroupMe or Messenger chats). Ping the chat whenever you want to work on the material with someone else. You'd be surprised at how many classmates also need pset buddies to cram with for the pset due tomorrow.
- There are lots of virtual resources available around Harvard to continue building at home. Reach out to the Active Learning Labs (ALL) staff for (virtual) resources or advice for projects at home.

Dealing with Zoom (and other good tools)

- Do all your work (psets, take home exams, etc.) on blank pieces of

paper. This makes it really easy to scan and upload to canvas (or show scratch work during office hours).
- Getting an iPad or touch screen device is helpful for taking notes or sharing your work online. It also is helpful for whiteboarding sessions with other classmates! It's definitely not required, but useful to have.
- Force yourself to **turn on your camera**, so you don't doomscroll on your phone during class.
- Keeping your camera on also shows the professor that you're paying attention, and gives them visual feedback on if you're understanding the material. This is the extra edge you need to get that borderline grade bumped up!
- **Zoom captions for recorded lectures** sometimes help for taking notes; if you're listening to a recorded lecture x2 speed is also helpful for quick note taking.

Good Habits

- Try to have a **daily routine** and **consistent sleep schedule**, which is even more important when you're studying on your own.
- Pretend you're at school - move your laptop away from your bed, take your notes etc. Be deliberate about working during set times in the day.
- **Keep your class attendance consistent**, whether that is attending Zoom or watching recorded lectures at the same time every week.
- Just as you are scheduling work, **schedule times to do non-school related things**. But make sure they are scheduled and deliberate - good ideas could be a game night with friends once a week or a phone call with a friend scheduled after class.

This is a developing section without clear precedent anywhere else. Everyone from professor emeritus to the newest first-year is approaching entirely virtual learning and teaching for the first time, and students have a unique opportunity to define what future learning looks like. Find the habits and advice that works best for you, and reach out to us if you have any new suggestions you'd like to see on this guide in the future!

VII. Outside the Classroom

Academics aren't the only thing that's important for an engineer. Personal projects and work you do outside of the classroom can be just as valuable for learning engineering skills. We've included some of the main points of advice below.

A. Research - How to Say "Hello" to Profs

Research can be an important part of a student's academic career in college. Pursuing research allows you to experience the side of academia and learn about subjects you would never really encounter in class, as well as apply the skills you've learned to something important.

However, it can be intimidating looking for your first research position, especially if you haven't been exposed to a research environment. There's a couple of key points to note when looking at doing research:

- Be clear on what expectations your professor has of your work and what you are trying to get out of your research experience. Good research happens when everyone is on the same page with what roles they will be doing.
- Be ready to put in time on research. Research isn't something that you can skip and skimp on (like your classwork).
- Don't be afraid to cold-email professors. If you think a professor's research is interesting, reach out and ask if you can talk to them about what they do. More likely than not, they will be willing to talk to you about their research and any open positions they might have in their lab.
- If you are seriously looking to work in their lab, send them a well-written and informed email to show them that you have read

through some of their research papers and have a specific project you would like to work on.
- Have others read your email before you send it. Your friends and classmates might find things that you've overlooked, or have suggestions for how to tweak the email to sound better.

Talk to your advisor or upperclassmen engineers for more advice. They may even have openings or professors in your field of interest, and at the very least can give you a better sense for what you might find in a research environment. Don't be discouraged by your first research experience - different fields and different professors have different research styles, and a new project might turn out to be great!

B. Internships - When, Where, and How to Get Them

Internships are a great way to get an understanding of **how your field interacts with the world** - how your industry turns science and engineering into products. It can be very rewarding for an opportunity to work on something with a real human impact, but it will take time and effort to land one, especially in your freshman or sophomore year.

Lots of different internship opportunities will appear throughout the year. In general, larger companies post their internship openings earlier in the year, while startups generally hire on a need-for basis. It's not too early to start looking for opportunities on company websites in September/October!

Recruiting Process

Though not the same for every company, here is the general steps and timeline for the recruiting process (RP).

1. Submit application (resume + cover letter)

2. Attend recruiting events (if available) - resume drop, mingle with recruiters, leave an impression so that you can
3. **Follow up with recruiters** - with that funny/interesting/impactful story that the recruiter hopefully remembers you by
4. Resume screening
5. Phone/Skype interview
6. In-person interview (on-site)
7. Follow up with interviewer with a well-written, personal thank you note

Tips/Tricks

- Make sure your **resume is up-to-date**. You never know when you'll need it. Keep some copies in your backpack so you can whip them out when someone asks for it on the streets.
- Cover letter? Who reads that nowadays? You should still write those though, it'll show them you're an engineer who can write. (You might need for consulting/banking applications…)
- Explore interesting formats but *do*n't *d*o t**his** *pl*ea*se*
- Fine-tune those margins, spaces, empty lines, font sizes, etc… you know the drill
- Before or after you submit, **see if you can land some referrals**. Some companies allow full-time/interns to refer other candidates, so take advantage of them (you never thought that quiet dude in the corner of your class can help you out here, huh)
- Keep a good relationship with the recruiters you meet at different events - they can be the ones who can help you with the 4th step in RP
- Find some commonalities to **build a relationship with the recruiters**, engage with interesting stories and experiences, wow them with your tales and stories - at the end of the day, after they've met hundreds of applicants, they don't remember your face or your name. But they will remember your stories (if they were interesting enough!)
- Smile a lot, for God's sake. No need to advertise on your face that you're a miserable engineer who just came from Pierce basement.

- Soft skills? Who needs that? Catching people's interest/attention during your 30 second interaction with strangers + making yourself memorable? Can engineers even do that? Please try.
- Some companies start searching during the summer (I know it sounds crazy to be hunting that early - more than a year in advance - you might be interning at a competitor!). Be on the lookout for job postings. Maybe, it's a good time to hit the recruiter up to tell him/her about your fantastic summer and how you look forward to engaging with him/her soon to start the RP?!
- Recruiters surprisingly appreciate a thank you email about your encounter - use it as an opportunity to remind them about yourself.
- Resume screening is half the game - we all know they won't take close looks in their piles of resumes. **Referrals** can definitely help here, as well as your relationship with the recruiters who might be able to push your resume upstream.
- To pass the screening, make sure you look at the job description and **use the keywords from the descriptions**. Use action words.
- Focus on past experiences and projects. As students, we don't have many opportunities to showcase our skills. Past experiences and projects (both in and out of classrooms) should be addressed and well-explained on your resume.
- **Never lie on your resume.**
- If I wake you up at 3am and ask you about one of the entries on your resume, your response better be ready and complete - practice makes perfect.
- Phone interviews can be difficult because it's hard to read body language or the interviewers' reactions.
- Speak slowly (we speak way too fast when we get nervous) and throw in some keywords/buzzwords for them.
- Focus on yourself - your commitment, your struggles, your achievements, your leadership, your excellence.
- If it helps, clarify the question - "So to clarify, you're asking me about…"

    - If the question is “tell me about a time when…”, your response can start with “Let me tell you about the time when…” etc
- React - nod, shake heads, body language, verbal cues.
- Once you’re on the site, remember they are judging every part of you - it might become the most unpleasant lunch but always remember you’re being evaluated.
- **“Thank you” - it’ll take you a long way.**
- Ask interesting, meaningful questions.
- If possible, send follow-up emails, specifically thanking them for their time and summarizing what you talked about in the interview.

Goals for an Internship

Before you go searching for internships, it’s important to articulate to yourself what you are aiming to get out of an internship. There are a couple different factors you should consider when evaluating an internship:

- Does this match what I’m interested in?
- Can I fit in or mesh with the company culture?
- Will the work I do be meaningful for me?

Preparation and Resources

One of the first things you should do (in general, not just as an engineer) is to **create a resume**, a one-page summary of all the important things you’ve done in life. You should also try writing a cover letter, which complements your resume by allowing you to highlight and explain the work you’ve done. This is something they unfortunately don’t teach you in high school, and there’s no better way to learn than by doing. The OCS (see below) has several templates on their website to help you get started, and come by an HCES advising event to let upperclassmen engineers help you with editing it!

There are lots of resources around Harvard to help you with the process of finding internships. Your first and best resource will be the **SEAS career counselor** (as of 2020, the one and only **Keith Karasek**). Send them an

email with any questions you have about internships, and keep an out for their weekly engineering emails (which lists lots of career opportunities both within and outside of SEAS).

The Office of Career Services (OCS) is a very important resource as well. Although they serve all of Harvard, they will usually have engineering related postings on the Crimson Careers website. In addition, they are great for general resume and cover letter advice - they maintain a set of templates on their website, and you can always get your letters checked during OCS Office Hours. Finally, OCS often hosts workshops and talks by companies. These events are a great chance to talk to engineers about what they do.

https://ocs.fas.harvard.edu/resumes-cvs-cover-letters
https://ocs.yale.edu/get-prepared/resources-undergraduates#toc5

C. Advising - Peers, Professors, and More

If you're looking for advice, whether that's in engineering or not, you should try to **constantly ask questions**. Talk to the students around you and professors after class, and don't hesitate to reach out and email someone a question. We (referring to students, faculty, TFs, ALL staff, etc.) are always interested in helping - let us know what you're concerned about!

Another general thing to keep in mind is that **engineering and non-engineering advising will take strong and different stances on taking pset courses** (generally STEM courses based around weekly assignments, in contrast to essay courses in humanities). Most non-engineering advisors would limit freshmen to a maximum of two pset courses, while most engineering advisors would recommend that freshmen take three pset courses by the spring semester (although four is definitely stretching it even for upperclassmen). The reason for this is the **higher number of requirements** engineering concentrations have - by fulfilling

some of these requirements earlier not only have you fulfilled most basic requirements for any STEM major, you've also **lessened your academic burden** in later years.

Director/Assistant Director of Undergraduate Studies
The DUS is responsible for overseeing the concentration and reviewing petitions to the course curriculum. They are full professors who often set the general focus and structure of the concentration and are nominally the first point of contact for potential concentrators. Each of the engineering concentrations has a DUS, which rotates every 2 years.

However, for detailed concentration advice **the ADUS is the more appropriate person to contact**. They don't rotate every few years and so have seen a large number of students pursue countless variations of the concentration. Because of this, the ADUS is much more familiar with the concentration requirements and the optimal order to fulfill them in, as well as common variations. As of 2020, the ADUSs are **Chris Lombardo** for **Mechanical and Electrical** Engineering, **Patrick Ulrich** for **Environmental** Science and Engineering, and **Linsey Moyer** for **Biomedical** Engineering.

You aren't required to interact with the ADUS until you declare your concentration in sophomore fall, at which point he/she will work with you to fill out a plan of study form for your next three years. However, it's best to **talk to an ADUS earlier rather than later**, especially for engineering. Because of the high number of requirements engineering has, it's much easier if you spread your concentration requirements across your 4 years as much as possible. An ADUS can help you fulfill as many of those requirements as possible while still keeping your concentration options open.

Other Faculty Advisors
As a freshman, your main advisor may be your proctor. They are excellent sources of information for most of your questions, especially with the

General Education requirements and other exploratory classes. However, if your proctor isn't focused in STEM, you should look to talk to a faculty member in SEAS or find other student engineers for more details about concentrating in engineering.

If you've entered freshman year marked as an engineer, you might have a member of the SEAS administrative staff as your advisor. While they might not be able to answer all your technical or academic questions, they can help you form connections with faculty that can answer those questions. For example, if you're interested in working with a particular professor, **your advisor might be able to introduce you and start a conversation.**

Student Advising

Some pieces of advice are best given by **your fellow upperclassmen** - after all, they've taken the same classes you're considering and know exactly what it's like to go through Harvard engineering. A good first method is track down any upperclassman that might be hanging in your engineering class (whether student or TF) and sneak a question or two in before they have to run to their next class. In general, find upperclassmen and make them our advisor - as underclassmen we've benefited from our elder's advice, and we're always happy to pass that advice on!

To provide peer advising in a more coherent manner, **HCES has a dedicated Mentorship committee** responsible for organizing advising events aimed for underclassmen. Yours truly sponsors initiatives ranging from **BigE/LittleE study breaks** focused on bringing together freshmen and upperclassmen to the very document you're reading right now. Find your nearest HCES representative to learn more, or email us with any of your questions!

Another awesome resource are **Engineering Peer Concentration Advisors (PCA)**. Engineering PCAs students currently in engineering who provide their perspectives on the concentration and providing their experience. They

support various advising events, mentoring underclassmen, and serving as a general connection to information about engineering at Harvard. PCAs were in your shoes once - definitely ask them everything!

Finally, your **PAF** is a good though slightly general resource. As students, even if they aren't engineers they may know one, and will also have a good understanding of how challenging a potential course load may be. However, be sure to talk to an engineer - they will have the best perspective on engineering courses.

Career Advising
All of the resources listed above are also great for questions about careers in engineering, whether that's finding the first internship or discussing what's important in engineering today. However there is one (very special) resource you should also know about - the **Director of Experiential and Career Development**, (as of 2020) **Keith Karasek**. He is the de facto career counselor of SEAS, serving as a clearinghouse of advice and opportunity outside of Harvard.

Keith manages the weekly engineering email, which lists lots of relevant activities and events for engineers - hackathons, interesting talks, and career fairs to name a few. He also updates a running list of open technical internships and jobs. If you're looking for personalized career advice, schedule a meeting with him - and if he asks you at Friday lunch what you're doing over the summer or what you're interested in, don't panic, because he is a good resource to help you find something.

D. Diversity, Inclusion and Belonging at SEAS

There are several resources for diversity around Harvard SEAS specifically, ranging from student affinity groups to the Office of Diversity, Inclusion and Belonging (DIB) in SEAS. This section will list some of the resources that will

have more information about DIB resources - reach out to student organizations or fellow classmates for details!

Student Affinity Groups

This is a (abbreviated) list of several student affinity groups around Harvard SEAS

Women in Computer Science (WiCS)
Harvard University SEAS Society of Women Engineers (SWE)
The Harvard Society of Black Scientists and Engineers (HSBSE)
Harvard SEAS Society of Hispanic Professional Engineers (SHPE)

You can find much more information by looking at the Office of Diversity, Inclusion and Belonging website for SEAS. More student affinity groups are listed there, along with SEAS-wide initiatives and reports from the past several years.

VIII. The Science and Engineering Complex (SEC)

At Harvard, SEAS has been one of the fastest growing departments since its inception over a decade ago. To accommodate this growth, Harvard is opening a new building in Allston, the Science and Engineering Complex (SEC). Colloquially known as the **Allston campus**, this building has over 4 times the square footage of Northwest Labs, most of which will be occupied by SEAS-affiliated labs and offices. The SEC will be fully open and hosting classes by the spring of 2021 (fingers crossed).

The SEC represents a new set of challenges and opportunities for Harvard. Its location across the river near the Harvard Business School (HBS) makes it about a 20-minute walk **from the bulk of Harvard buildings** and opens up plenty of logistical challenges. But this area is locationally advantageous, in **close proximity to HBS** and the **Harvard Innovation Labs (iLabs)**, Harvard's startup incubator. Plus, it comes with many perks - plenty of space for Harvard faculty and students to expand their operations, a massive backyard lawn (the Engineering Yard), and an aesthetically pleasing, state-of-the-art building.

In this special section, we'll focus on the challenges that the SEC brings, and possible solutions that have been currently identified by talking to students, faculty and staff - transportation, academics, and food. In addition, you can find plenty of information from SEAS at [link].

A. Academics

First, the SEC will not only host engineering classes and students. Several major Harvard courses in social studies and humanities are also making the jump to Allston, taking advantage of the massive auditoriums in the SEC basement (more on that later). SEAS will only use about 50% of the classroom space in Allston.

With the SEC, SEAS will consolidate most engineering lab space currently spread across Harvard into one major building. Faculty will be relocating along with their equipment, graduate students, and classes into the SEC.
The departments that are moving are:

- All of Bioengineering, Computer Science, Data Science, and Computational Science and Engineering
- Most of Electrical Engineering and Mechanical Engineering (excluding some hardware labs)
- Most SEAS administrative and Active Learning Lab staff

Skeleton crews will probably remain around Pierce and MD during the first few years. Importantly, Environmental Engineering and Applied Math will be staying in Cambridge to remain close with the Math and Earth and Planetary Science departments respectively.

B. Transportation

The SEC is clearly quite far from most of Harvard's original buildings, being located next to some of Harvard's athletic facilities. From the Science Center, there are a few options to walk there, limited by where you can cross the Charles River: along JFK St near Eliot House (Anderson Bridge), over the pedestrian walkway next to Leverett House (Weeks Bridge), or past Mather along Western Ave (Western Ave Bridge). [INSERT IMAGE]

All three paths take about the same time - it is, according to Google Maps, approximately:

- 20 minutes walking from Quincy House (0.85 miles)
- 25 minutes walking from Science Center (1.3 miles)
- 28 minutes walking from Pierce Hall/Maxwell-Dworkin (1.5 miles)
- 32 minutes walking from SOCH (1.6 miles)

If you don't feel like walking there is an **Allston shuttle route**, running a loop around Maxwell-Dworkin (MD), the SEC, Johnson Gate, and back to MD, with buses arriving approximately every 15 minutes. There will also be a dedicated shuttle line for the Quad, currently in development.

Bikes would also be useful by shortening the travel time in half or more, although the pedestrian bridge near Leverett (Weeks Bridge) has stairs to discourage biking through Harvard Business School (HBS). Boston also has the Blue Bike system, where users can rent and park bikes at designated stations across the city. Conveniently, the SEC will have a large Blue Bike station, along with covered bike parking for >400 bikes.

Late Night Travel

Engineers tend to work late and long hours, and walking home at 2 am is never a comfortable time. There are **late night shuttles** that can handle some student pickups, but those may have inconsistent schedules at night. Worst case scenario, the couches at the SEC are really nice.

C. Food

Now, the important section: food. As a Harvard engineering student, you have access to numerous dining options. Some are located within the SEC, such as a hot food cafe, and others include the endless choices of restaurants and supermarkets close by to the Allston Campus.

The SEC Cafe is operated by Harvard University Dining Services (HUDS), offering a number of hot and cold food stations. Options include:

- Grill station
- Deli
- Hot Soup

- Salad Bar
- Pre-made food bowls
- Smoothies & Desserts

Which all can be paid through **BoardPlus**, a component of the undergraduate meal plan ($65 dollars given to students per semester for spicing up some food options). However, hours are only between 7 AM to 3 PM, so make sure you get there on time! Breakfast hours are from 7AM to 11:30AM, and lunch is from 11:30AM to 2:30 PM.

Another option for food available at the SEC is **Flyby+**, located on the ground floor of the SEC. This is similar to the previous Flyby option included in the upperclassmen meal plan for bagged meals from Annenberg. You can also visit the vending machines around the SEC if you just want a quick snack.

If those options don't vibe with you, or you missed the hours at the SEC cafe, there are many other local dining options around the neighborhood!

<u>5 minute walk or less:</u>
Our Fathers - Love Deli or some contemporary Jewish cuisine? Definitely visit here.
Trader Joe's - They have amazing mochi ice cream here. And pies.
Swissbäkers - European pastries. Must I say more?
Dunkin' - Engineers run on Dunkin.

<u>5-10 minute walk:</u>
Breakfast Club - Some awesome old school breakfast, burgers, and sandwiches.
Subway - Subway, eat fresh! Engineers please take note.
Spring Shabu Shabu - Hot Pot. Please try it, it will change your life.
Star Market - Groceries if you want to whip up something at your dorm!

Harvard Business School Spangler Food Court - They open for dinner, and why not take a tour of the beautiful business school campus while you're at it?

D. Perks and Plans

Still not convinced? What other cool new things will be there for us engineers?

First of all, the SEC is one of the newest and largest buildings added to Harvard's campus (in a generation)! Along with the sleek new facilities, the building will feature:

- **Greenery**: The atrium spans eight levels, looking out onto a terrace of lawn, plantings, and an interim nursery that will supply trees for future development in the area!
- **Maker space** and **Teaching labs**: There is lots of student machining and project space around the SEC, including a dedicated maker space.
- **Library**: Located on the second floor atrium, the SEC Library has bookable study rooms available as well as a quiet area that has access to an outdoor terrace. Work from SEAS faculty and students are displayed on visualization walls, and the library will be a hub for engineering and applied science research in Allston.
- **Dedicated space for student organizations**: Student organization have dedicated storage and meeting rooms in the student areas of the SEC, a huge upgrade from current basement storage in Pierce.
- **Extensive common spaces**: The space within the SEC is designed to encourage collaboration, with multiple lounges, meeting rooms, roof decks, community kitchens, and shared core research spaces.

The SEC also is designed to follow **LEED Gold** and possibly **Platinum** standards (the highest level of sustainability under the worldwide green building certification program). Being one of the most environmentally and human-friendly science buildings in the world, the building is designed to have plenty of natural light and even the artificial lighting follows circadian design.

Ultimately, the SEC represents Harvard's future, both in its academic investment in SEAS and in physical infrastructure in Allston over the next decades. It is designed to be the newest "hub" for Harvard, anchoring future buildings and encouraging interaction with the Innovation Lab. The next couple years will be absolutely exciting as people develop and understand the role of the SEC in the future.

For a deeper look, check out the SEAS website for its details (and pretty photos!).

IX. Appendix

A. Advising Contact Information

APPLIED MATHEMATICS

Steven Gortler
Co-Director of Undergraduate Studies
Email: sjg@seas.harvard.edu
Office Phone: (617) 495-3751

Margo Levine
Co-Director of Undergraduate Studies
Email: mlevine@seas.harvard.edu
Office Phone: (617) 496-8129

Sarah Iams
Co-Director of Undergraduate Studies
Email: siams@seas.harvard.edu

BIOMEDICAL ENGINEERING

Demba Ba
Director of Undergraduate Studies
Email: demba@seas.harvard.edu
Office Phone: (617) 496-1228

Linsey Moyer
Associate Director of Undergraduate Studies
Office: 206C Pierce Hall
Email: lmoyer@seas.harvard.edu
Office Phone: (617) 496-2840

COMPUTER SCIENCE

Stephen Chong
Co-Director of Undergraduate Studies
Email: chong@seas.harvard.edu
Office Phone: (617) 496-6382
Office Fax: (617) 495-2489

Boaz Barak
Co-Director of Undergraduate Studies
Email: boaz@seas.harvard.edu
Office Phone: (617) 496-6257

Adam Hesterberg
Assistant Director of Undergraduate Studies
Email: ahesterberg@g.harvard.edu

ENGINEERING SCIENCES

Zhiming Kuang
Director of Undergraduate Studies
Email: kuang@fas.harvard.edu
Office Phone: (617) 495-2354
Office Fax: (617) 495-7660

Chris Lombardo
Associate Director of Undergraduate Studies
Email: lombardo@seas.harvard.edu
Office Phone: (617) 496-5185

ELECTRICAL ENGINEERING

Gu-Yeon Wei
Director of Undergraduate Studies
Email: guyeon@seas.harvard.edu
Office Phone: (617) 384-8131
Office Fax: (617) 496-6404

Chris Lombardo
Associate Director of Undergraduate Studies
Email: lombardo@seas.harvard.edu
Office Phone: (617) 496-5185

MECHANICAL ENGINEERING & MATERIAL SCIENCES

Katia Bertoldi
Director of Undergraduate Studies
Email: bertoldi@seas.harvard.edu

Chris Lombardo
Associate Director of Undergraduate Studies
Email: lombardo@seas.harvard.edu
Office Phone: (617) 496-5185

ENVIRONMENTAL SCIENCE & ENGINEERING

Elsie Sunderland
Director of Undergraduate Studies
Email: ems@seas.harvard.edu
Office Phone: (617) 496-0858

Patrick Ulrich
Acting Associate Director of Undergraduate Studies
Email: pulrich@seas.harvard.edu
Office Phone: (617) 496-0542

ADMINISTRATORS

Zhiming Kuang
Undergraduate Engineering Committee, Chair
Email: kuang@fas.harvard.edu
Office Phone: (617) 495-2354
Office Fax: (617) 495-7660

Kathy Lovell
Undergraduate Academic Programs Administrator
Office Phone: (617) 496-1524

Tricia Jacome
Staff Assistant
Office Phone: (617) 495-2833

B. Useful Links

My.Harvard - The source of truth for what courses are happening
https://my.harvard.edu/

Harvard Q Guide - Course evaluation data for all Harvard courses
https://q.fas.harvard.edu/qguide.htm

Harvard SEAS Website - News, Forms, and more for SEAS
https://www.seas.harvard.edu/

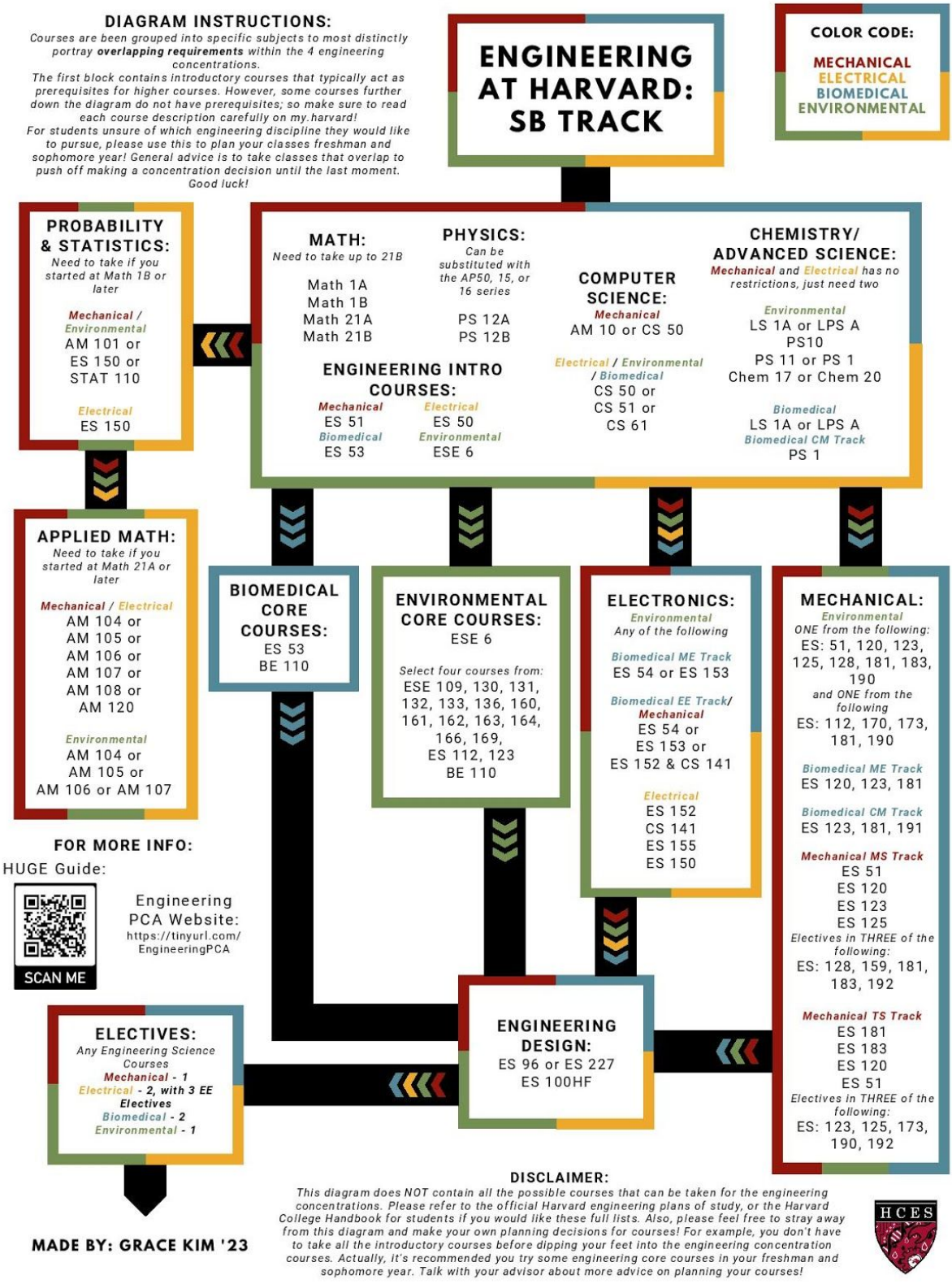
Coursicle - Pretty nifty course organizer
https://www.coursicle.com/harvard/

Harvard Registrar Coronavirus Updates - Undergraduate coronavirus updates from the FAS
https://registrar.fas.harvard.edu/news/coronavirus-information-and-resources

Harvard Coronavirus Updates - Central Harvard coronavirus updates
https://www.harvard.edu/covid-19-moving-classes-online-other-updates

Research Reboot - Research related coronavirus updates, with useful information for students in science and SEAS
https://projects.iq.harvard.edu/coronavirus/research-reboot

C. The Ultimate Engineering Diagram



X. Acknowledgments

2019-20 HCES Board Members, especially
David Andrade
Soy Choi
Fraser Darling
Joshua Ng
Emmy Semprun
Eric Sun
Jaylen Wang

SEAS Students, especially
Caroline Ko

Written by Grace Kim and Victor Qin