EECS Undergraduate Experience Survey

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Abstract

Cultural and structural barriers within MIT EECS can deter or prevent students from pursuing opportunities that should be available to them. We quantify this through a survey of 279 students, and make recommendations that faculty, department administrators, and students should act on to make the department more inclusive without sacrificing its creative energy.

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1 Introduction

In recent years, much attention has been drawn to the gender gap in electrical engineering and computer science: across industry and academia, the ratio of women to men is small. At MIT, the undergraduate enrollment of women in the EECS major was 36.7% as of the 2014 fall term [15], still higher than reported national averages (for example, approximately 13.7% of bachelor's degrees in EE and CS nationwide were awarded to women in 2014 [20]).

Although MIT appears to have a relatively high percentage of women in EECS, representation is spread unevenly across the department. Anecdotally, students in MIT's Undergraduate Student Advisory Group in EECS (USAGE) [1] had observed smaller proportions of women in classes that were commonly regarded as more difficult.

To assess this quantitatively, students in USAGE analyzed subject enrollment data with respect to the percentage of women enrolled and the student-reported difficulty of each subject (Figure 1). This data was collected for upper-level EECS subjects students generally take in their junior and senior years. The students found a negative correlation: subjects reported to be harder had fewer women.

This trend motivated us to conduct a survey of undergraduates in the department to investigate potential causes and to determine whether the department could take specific steps to improve students' experience in the EECS major. We provide an overview of the survey and major findings in section 2.

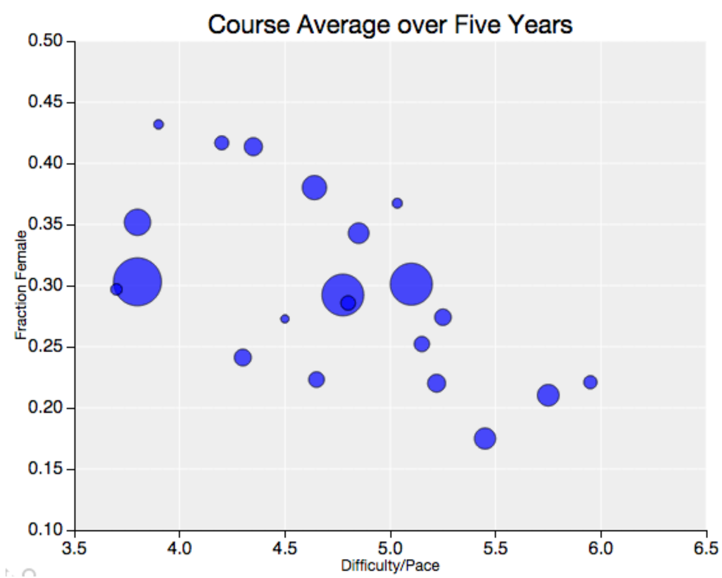


Figure 1: Average proportion of women enrolled in upper-level EECS subjects (generally taken in the third and fourth year) over five years (2008 through 2013). Each point is one subject; the area of the point is proportional to the average number of students enrolled in the subject. Difficulty ratings were collected from end-of-term subject evaluations; subjects are rated on a 7-point scale on which 1 is the lowest difficulty and 7 the highest.

[1]USAGE is a group of about 40 undergraduates in EECS who have volunteered to provide feedback to the department on departmental initiatives and curricular changes.

The survey revealed that, although high school preparation is similar between men and women in EECS, a larger proportion of women doubt their capabilities. Additionally, women and men alike noted specific aspects of EECS student and department culture that could be improved. Based on the survey responses, we suggest aspects of the EECS major that contribute to these issues in section 3, including the structure of introductory subjects and student culture, and provide actionable recommendations in section 4. We would like to note that starting to change these characteristics is beneficial for everyone, not just women – it will make the Course 6 community more welcoming and supportive for all.

1.1 Related work

Investigations into the experience of women computer science undergraduates have been conducted at a number of other universities. A series of papers by researchers at Carnegie Mellon [8, 12, 13, 14], starting in 1995, led to the publication of the well-known book *Unlocking the Clubhouse* [11] in 2002. Stanford documented its efforts to increase representation of women in computer science in the early 2000s [9, 18]. UC Berkeley has studied gender differences in attrition in introductory computer science subjects [10]. Harvey Mudd's initiatives are notable for having quadrupled the percentage of women in the computer science major to forty percent in four years [4, 5] by focusing on increasing both enrollment and retention of first-year undergraduates. More recently, a 2013 study quantitatively analyzed gender dynamics in the Stanford undergraduate computer science program through survey and transcript data [17].

These efforts have generally focused on identifying the causes of relatively low enrollment and high attrition rates of women in CS departments. In this report, we focus only on the undergraduate experience of the students who *are* enrolled in EECS at MIT. Nevertheless, these studies identify the same issues we found in this survey and pose similar solutions, and demonstrate the success of implementing those solutions.

Similar studies for electrical engineering undergraduates are scarce, perhaps reflecting the relatively small number of EECS departments in the U.S. MIT EECS is dominated by computer science majors, and we therefore take care to note that our analysis may not generalize to EE as well as we would like it to.

The studies at Carnegie Mellon identify aspects of international students' experiences and motivations that differ from those of U.S. students [8]. We did not have a large enough sample size to perform a similar comparison, so the perspective supplied by the Carnegie Mellon studies should be kept in mind when interpreting our results.

Notably, the "EECS Women Undergraduate Enrollment Committee" at MIT conducted surveys similar to ours, and published a report similar to this one, in 1995 [3]. The conclusions the committee reached are much the same as those we reach in this survey, twenty years later. We hope that a follow-up survey at MIT – sooner than twenty years from now – will reach very different conclusions.

2 Survey

In an effort to quantify factors that affect students' experiences in the EECS major, we designed a survey in conjunction with MIT Institutional Research. The survey was open for responses from May 5, 2014 through June 16, 2014 – that is, from three weeks before the end of term until three weeks after. The survey was distributed to students registered as sophomores, juniors, and seniors in EECS (most MIT students do not declare a major until the end of their first year). No incentives were offered for completing the survey.

1057 students received the survey, out of which 279 students completed some part (a 26.4% response rate). Respondents were distributed roughly equally across class year, and there were roughly equal numbers

	Female	Male
Freshman	4.8%	3.9%
Sophomore	34.9%	30.7%
Junior	34.1%	35.3%
Senior	26.2%	30.1%
Number of respondents	126	153

Table 1: Gender and year distribution of respondents

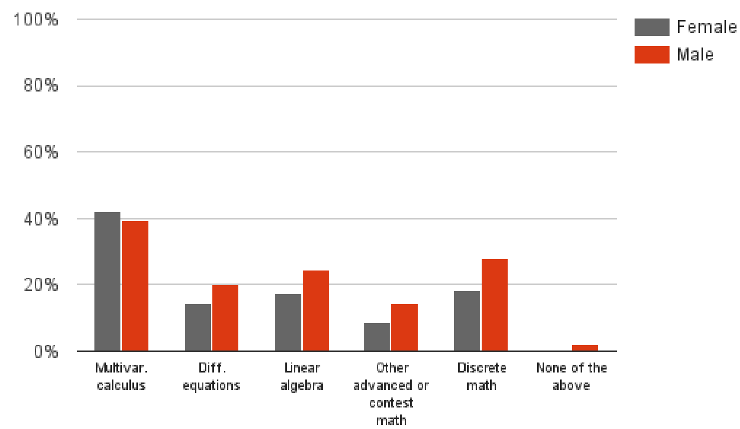
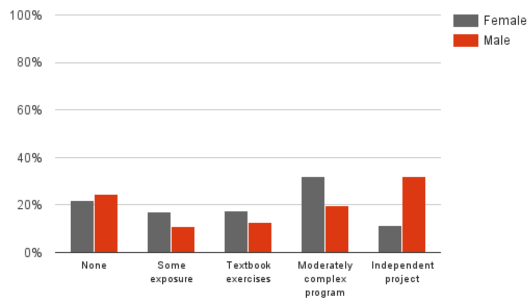


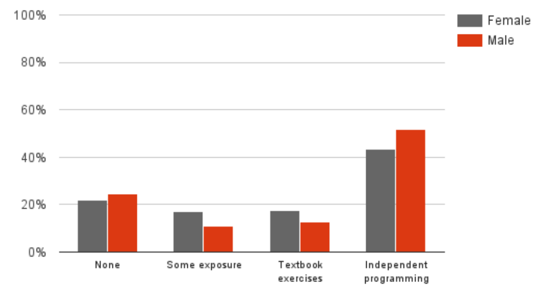
Figure 2: Math preparation by gender. 98.6% of male respondents and 97.3% of female respondents reported having taken single-variable calculus, so those numbers are omitted from this graph.

of female and male respondents. (Table 1). MIT allows some freshmen to declare sophomore standing in their second semester; thus, a small percentage of responses came from freshmen registered as sophomores.

The survey was framed as "a short survey to gather information about how EECS students choose the subjects they take each semester." None of the questions in the survey explicitly addressed gender, except for one question on the final page of the survey that asked students to identify their gender. A small number of students identified themselves as a gender different from the gender indicated by information from the Registrar. To preserve anonymity, we report here results using the gender data from the Registrar. While using the student-provided data would not have changed the conclusions we draw here, we acknowledge that that data would have been a more accurate reflection of our survey population. Additionally, although we focused on gender disparities in this survey, examining other areas of diversity would constitute valuable future work.[2]



(a) Programming preparation by gender.



(b) Programming preparation by gender, with "Moderately complex program" and "Independent project" combined.

Figure 3: Self-reported highest level of programming experience, by gender. Figure 3b combines the options "Moderately complex program" and "Independent project," since the distinction is ambiguous.

2.1 Major findings

2.1.1 Prior preparation

One explanation for the gender disparity in upper-level classes might be that women enter MIT with less preparation for the major than do men. To examine this hypothesis, the survey included questions about students' high school preparation.

To assess math preparation, we asked the question,

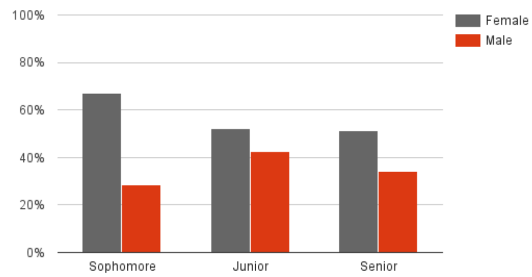
> Which of the following areas of math had you studied before you came to MIT? (Select all that apply.)
>
> 1. Single-variable calculus
> 2. Multivariable calculus
> 3. Differential equations
> 4. Linear algebra
> 5. Other advanced or contest math
> 6. None of the above

Responses to this question are shown in Figure 2. Almost all respondents indicated that they had studied single-variable calculus, and the proportion of men and women who had taken multivariable calculus was approximately equal. Greater percentages of men than women reported having studied math subjects more advanced than multivariable calculus. However, we observe that even among men, under 30% of respondents report having studied those advanced subjects.

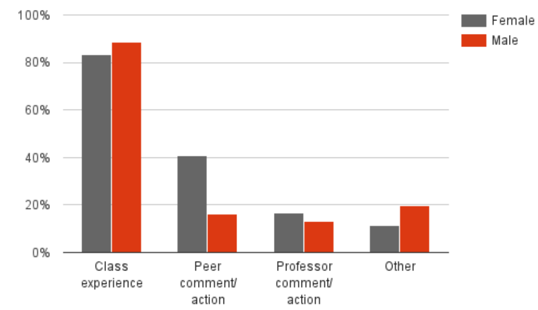
Similarly, we assessed programming background with the question:

> How would you characterize your programming/computer science experience before coming to MIT? (Choose the highest level.)

[2] It is worth noting that, even if we had intended to examine other aspects of diversity including race and nationality, we would not have been able to do so with the results of the current survey, as the sample sizes of certain subgroups would have been too small to preserve anonymity.



(a) Percentage of "yes" responses by year and gender.



(b) Responses to the question, "What made you doubt your ability to be a successful Course 6 major?" (This question was only shown to those who indicated that they had doubted their ability to be successful.)

Figure 4: Responses to the question, "Have you ever doubted that you have the ability to be a successful Course 6 major?"

1. No programming/computer science experience
2. Exposure to one or more languages, but not enough to write a program
3. Basic knowledge of one or more languages, enough to complete textbook exercises
4. Ability to write a moderately complex program
5. Had written code that would constitute an independent project or significantly impact an existing project

The responses to this question are shown in Figure 3a. More women than men reported having experience at each level through "moderately complex programming"; however, a much larger proportion of men than women reported that the highest level of preparation they had was experience with an "independent project". The difference between numbers of men and women reporting experience with an indpendent project is significant ($p < 0.0001$, Fisher's exact test). However, we note that the distinction between a "moderately complex program" and an "independent project" is largely a matter of individual judgement, and the difference in reported experience may simply reflect personal perceptions of skill. We also show the results with these two experience levels combined, in Figure 3b. In the combined data, the prior experience of men and women is similar.

From these results, we note that the disparity at any level of programming experience is no greater than 7%; furthermore, 21.8% of women and 24.7% of men reported having no prior programming experience. This suggests that curricular changes to accommodate varying levels of prior experience are likely to be equally helpful for women and men.

2.1.2 Doubting Course 6

Students' degree of confidence in their academic abilities can affect how conservative they are in choosing to take difficult subjects. To assess students' confidence, we asked,

> Have you ever doubted that you have the ability to be a successful Course 6 major?[3]

[3]The EECS major is referred to as "Course 6" at MIT, and "EECS" and "Course 6" were used interchangeably in the survey.

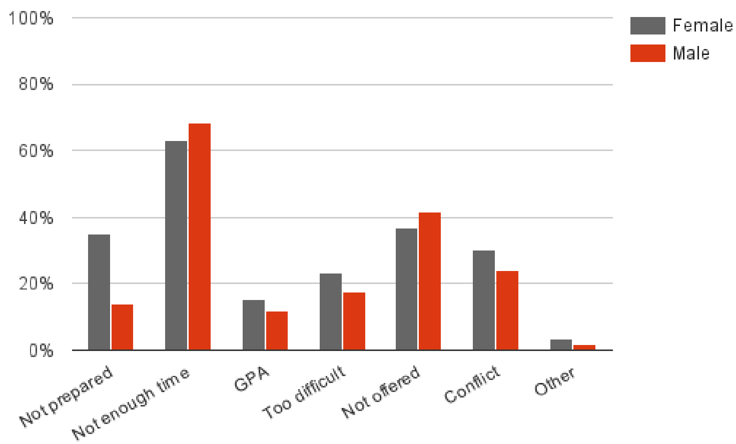


Figure 5: Reasons that students do not take EECS subjects that they would otherwise like to take.

The responses, divided by gender and class year, are shown in Figure 4a. Across class years, more women indicated that they had doubted their abilities to be successful as a Course 6 major. However, the disparity between men and women is most noticeable in the sophomore class, where 67.3% of women responded "yes," compared to 28.3% of men – a significant difference ($p < 0.01$, Fisher's exact test). Although we cannot extrapolate a general trend from a single year's survey data, these numbers support the intuition that support from advisors, peers, and classes is particularly important during the first year of the major.

Respondents who answered "yes" to the question asking whether they had doubted their ability to be Course 6 were presented with the question,

> Did any of the following factors contribute to your feeling that Course 6 wasn't the right major for you? (Select all that apply.)
>
> 1. An experience in a Course 6 subject
> 2. Something a Course 6 student said or did
> 3. Something a Course 6 professor or TA said or did
> 4. Another experience

Responses to this question are shown in Figure 4b.

Of the possible contributing factors, "Something a Course 6 student said or did" had the greatest disparity in response between men and women: 41% of women selected this option compared to only 16.4% of men, indicating that the existing student culture has a disproportionately negative effect on women. (The difference is statistically significant, with $p < 0.05$, using Fisher's exact test). We discuss this further in Section 3.1.

2.1.3 Decisions about subjects

Several questions in the survey specifically addressed the factors that students consider when deciding which subjects to enroll in. One question whose results were particularly salient asked,

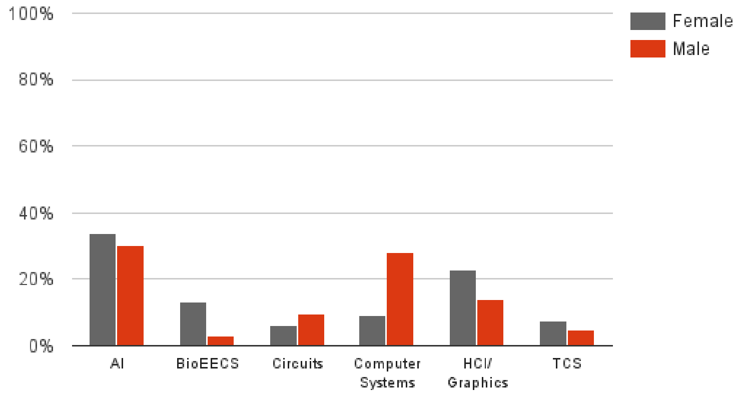


Figure 6: First-choice concentration areas. Six out of 12 areas had under 5% interest from students and are not shown here.

> Are there any EECS subjects that you want to take, but will not be able to? If so, please mark the reasons you will not be able to take that EECS subject. (Select all that apply.)
>
> 1. I'm not prepared
> 2. I don't have enough time before I graduate
> 3. I'm worried about the impact the subject(s) will have on my GPA
> 4. The subject is too difficult
> 5. I have been/will be able to take all the subjects I want
> 6. Subject not offered
> 7. Subject conflicts with another subject

Responses to this question are shown in Figure 5. Of all possible responses, the greatest disparity is in the option "I'm not prepared": 35% of women marked this option compared to only 14% of men, a 21% difference. This difference is greater than any disparity in high school preparation as measured by the responses in Section 2.1.1 and is statistically significant ($p < 0.01$, Fisher's exact test). It is difficult to draw a concrete relationship between these two metrics, particularly as students' self-perception of preparation for EECS subjects may be affected by numerous factors other than their high school preparation. Therefore, this statistic should be investigated further, in particular to determine whether there are systematic barriers within the department that might lead women to be less prepared.

2.1.4 Concentration areas

The M.Eng. in EECS, a fifth-year master's option, requires students to choose a concentration area from a list of 12 areas. Students are required to complete a set of three subjects from the concentration, two of which can be satisfied by subjects designated as Advanced Undergraduate Subject (AUS). Therefore, a student's concentration area might affect the AUS subjects they enroll in. We asked students,

> From the following areas, please choose the top 3 areas that interest you most.

Students were presented with a list of the 12 concentration areas and asked to rank their first, second, and third choices. The results for the *first choice* only are in Figure 6. (Differences in the second and third choice areas were less prominent.) Areas with notable gender disparity are BioEECS (the first choice of 13.0% of women vs. 3.1% of men) and Computer Systems (the first choice of 9.2% of women vs. 28.2% of men).

We stress that it is possible that these disparities are caused by students' individual preferences, but that the department should more closely examine whether this is in fact the case, or whether students are being discouraged from choosing particular concentration areas due to structural problems (e.g., a lack of introductory or intermediate subjects leading to the AUS level).

3 Contributing factors

Several survey questions included space for free-response answers, from which we drew cultural and structural factors that might contribute to the gender disparities in the survey data. Italicized quotes are derived from these (anonymized) student responses, particularly from free-response comments on the question discussed in Section 2.1.2 regarding students doubting their abilities to be successful in the EECS major.

3.1 Student culture

The results in section 2.1.1 suggest that prior experience, while not strikingly different between men and women, nevertheless varies widely among students. This is reflected strongly in the free responses, where many students reported feeling an insurmountable sense of inadequacy:

> *Everybody seems to know a bunch of languages and comp sci theory that I've never heard of, so I figure that you must have to be some sort of computer genius previously to survive course 6.*
>
> *There are so many people here who have had experience and are really good at programming already, so it sometimes feels like starting now is too late.*
>
> *[The] experience level of other students can feel threatening at times – the extreme discrepancy can discourage those who feel stupid or inexperienced compared to their peers.*

We believe that this sense of inadequacy affects students at MIT in general; however, of the respondents who indicated that they doubted their ability to be Course 6, 41% of women compared to 16.4% of men reported that "something a Course 6 student said or did" contributed to their feeling that Course 6 was not the right major for them. This statistic is troublesome before breaking it out by gender, and even more alarming afterwards.

Many of the free-response answers, from both men and women, echoed this sense of inadequacy, citing incidents related to one-upmanship, poor group partners, and arrogance.

As discussed a recent report on MIT culture [6], students at MIT participate in a "culture of suffering," which encourages heavy workloads. In EECS, this problem manifests specifically in that students feel pressured to take on EECS side projects or additional EECS classes, which can discourage them from exploring other interests or interdisciplinary work. This sentiment was communicated in some of the free response answers:

> *Students who focus on EECS to the exclusion of everything else often have made me feel (often still do make it feel) as though it's difficult to be exceptional in EECS while maintaining a balanced lifestyle.*

Other comments from peers are effectively brags that contribute to struggling students keeping quiet. No one wants to be viewed as less knowledgeable than their peers.

Seeing other students breeze by while I struggled [and] hearing other students say 6.01 was easy while I scored below average [made me doubt my ability to be Course 6].

Insecurity can lead to a need to establish intellectual dominance, which often manifests in arrogance, condescension, and excessive use of jargon.

Some classes are really hard. Some students like to talk very loudly about how easy those classes are for them.

One EE student specifically noted this attitude in CS peers:

My peers often make comments (sometimes jokingly) about skill I have because I'm an "EE." . . . I have also felt some attitudes of superiority and condescension from more computer science oriented students.

Students also participate in subtle one-upmanship through discussions of research projects and internships. Opportunities for practical experience, such as internships, are highly prized among many students; internships at well-known companies are particularly prestigious. These internships can become a benchmark for competence, as evidenced by students' comments:

Before the summer after my junior year, I had not contributed to any major projects. . . . I . . . have never attended [a hackathon] even though I would want to if I felt more confident. I have been rejected by many companies for internship opportunities. I have never received an internship or job offer from a "high profile" company like Google, Facebook, or Amazon.

I don't have a portfolio of coding projects, I don't go to hackathons, I'm not one of the people in the class who understands things quickly, I don't have background knowledge on computer systems, I'm not nearly as qualified for course 6 internships as some of my classmates are. I like course 6 material; the problems come when I compare myself to others.

. . . Many students were capable of getting some wonderful internships on [sic] course 6 related companies, and I wouldn't even be considered since I don't have any experience.

Programming internships, through their supposedly objective interview process, provide students with a concrete measure to compare themselves against their peers, regardless of the true merit of this criterion.

3.2 Department culture

Students at MIT emulate faculty and put a high value on their approval [6]:

"Students may fear that they will not live up to faculty expectations— whether or not faculty feel this way—unless they excel among their peers. This fear can lead to an unhealthy spiral. . . ."

16.7% of female students and 13.1% of male students listed "Professor comment or action" as a factor contributing to their doubt of their ability to be Course 6. The perspective and comments of TAs and professors do affect their students. Simple comments like saying that a problem or concept is 'trivial' or 'easy' can be discouraging: often even basic concepts can be confusing until explained in the right way or until a student has had time to fully think through the idea.

I feel like I can't go to office hours because the TAs or professors will judge me for not understanding the basics behind what is going on. Other course 6 students and professors have previously said things like "this is trivial," or "this should be easy," or "you should know this already," or "this was explained during lecture" about things that I found complicated.

My TA made fun of me [for] attending too many office hours. . . .

Such responses suggest that faculty and course staff should not underestimate the impact their comments and actions have on students.

3.3 Class construction

A large number of students reported that specific classes, often introductory-level classes, contributed to their self-doubt or lack of confidence. Most strikingly, 83.3% of female students and 88.5% of male students marked “Class experience” as a contributing factor to their doubt of their ability to be Course 6. Many free-response comments echoed these concerns, and in particular there were several comments about gender.

Especially relevant are pair programming and group project experiences. One female student writes,

> *Regarding TAs and professors I do not feel any preference toward males or females; however, between students (like for teams and other group work) there is a lot of prejudice and low expectations for female students.*

And another female student:

> *Not all of my male classmates are difficult to work with, and not all of my female classmates are perfect group-project partners, but the trend of frustrating and demoralizing male group-project partners is strong enough that I actively warn younger female students away from some classes...*

The wide range of prior experience levels in classes often leads to unbalanced project groups. More experienced students might be condescending towards or choose to ignore less experienced partners, doing most of the work themselves in order to get the project done faster. More assertive students might take for themselves the project tasks perceived to be most desirable or interesting.

The informal prerequisites for a course can be quite different from the formal prerequisites: for example, knowledge of a particular programming language for a programming-intensive course. This can mean that a student spends significantly more time on the course if they have not acquired the informal prerequisites through non-academic channels, such as side projects or internships. As a result, many classes take far more time than their stated units, but professors are either unaware of the time students are taking on their classes or consider it acceptable since some small subset of students are able to finish the work more quickly.

> *In all, the programming intensive classes can honestly feel really impossible when one doesn't have prior knowledge of the programming language in question.... I sometimes felt like I would never be able to make progress on my own, no matter how much time or effort I put into programming/debugging.*

We note that some students consider the competitive climate in EECS and at MIT to be positive and even essential in their education, as evidenced by discussions in the USAGE student committee and survey anecdotes.

> *6.006 [Introduction to Algorithms] was one of the most fun, challenging and beautiful classes I have ever taken. They made me fall in love with course 6 and obviously, the world of Algorithms.*

> *I do think course 6 classes are some of the most well-run in the institute, because of the number of resources we have and just having instructors who actually care about making students understand....*

> *I'm glad that Course 6 provided a competitive environment to encourage me to develop self-confidence.*

4 Recommendations

We hope that this report will inspire different organizations within EECS and throughout the institute to consider their role in correcting gender inequities. These recommendations were compiled with feedback from the Undergraduate Student Advisory Group in EECS.

4.1 Student initiatives

In parallel with writing this report, we began a few initiatives to start addressing the contributing factors that we noticed. These initiatives were run by the MIT chapter of Eta Kappa Nu (HKN).

4.1.1 Initiatives in progress

HKN Outreach organized a number of initiatives in the 2014-15 school year.

1. Intro to the Command Line Workshops: these workshops, attended by a total of about 60 students, trained students on how to use the command line, a key skill not covered thoroughly in the undergraduate curriculum.
2. Class study breaks: at the beginning of spring semester, HKN Outreach ran study breaks for different classes/sets of classes to help students find pset partners. Due to snow and other scheduling issues, these were poorly attended.
3. Soldering workshop: HKN ran a soldering workshop, attended by around 25 students, that taught the basics of soldering with three example projects.
4. Common interest lunches: at the end of fall semester, 3 groups of students were sponsored to get lunch together in groups based on shared academic interests in order to develop new connections. Due to the proximity to the end of the school year and some scheduling issues, not all of these lunches were well attended; however, students who attended considered them to be useful.
5. Assertiveness training: over IAP, HKN had a guest Psychology PhD give an assertiveness training to a group of about 20 women. This event was highly oversubscribed but had to be limited attendance in order to be most effective. In future years, holding more instances of this could help meet the demand but may require finding additional instructors.
6. Negotiation Workshop: HKN coordinated a negotiation workshop led by Larry Susskind, attended by about 50 students.
7. Technical Interview Tips Panel: HKN organized a panel on technical interviewing the week before the Fall Career Fair, giving students advice on navigating the Career Fair, talking to recruiters, and handling the interview questions and process.

4.1.2 Future initiatives

In the 2015-16 school year, HKN plans to continue these initiatives and improve them based on feedback. There are plans to start new initiatives, including a mentoring program and more resources for EE students. Other new planned initiatives include a panel on the different branches of EECS and a grad school panel.

4.2 Recommendations to the department

We recommend that the department evaluate its progress in correcting the inequities we have identified by re-running a survey with the same purpose as this one once every three or four years. There is also data that is already being collected (such as GPA, class grades, signing bonus, number of offers, class retention) that, if broken out by gender or race, can illustrate inequities. This evidence can lead to effective department or institute action.

The recommendations below are not exhaustive, and the department would also benefit from reviewing recommendations in a number of earlier reports. For example, [7] contains an extensive list of recommendations for department-level initiatives, which are primarily intended for graduate students but are also relevant for undergraduates. [19] discusses support for minority students in computer science. [16] is an example of social guidelines intended to foster a welcoming technical community. As noted in Section 1.1, our report echoes studies from other universities, each of which also suggests steps for improvement.

4.2.1 Class construction

We see an opportunity to improve training of Lab and Teaching Assistants (LAs and TAs). Currently, TAs do receive some level of training, but this training does not appear to address well-studied concerns such as implicit bias, the tendency for men to interrupt women more often than other men, and the general influence of traditional gender roles on the way students interact. Course staff are particularly well-positioned to intervene in negative peer interactions and to help change the prevailing student culture.

Class instructors should consider designing short self-assessments that students can use to decide which class they will take.[4] Students should be able to use the self-assessment to ascertain their level of preparation for a class. As such, the assessments should be representative of the skills students should have before undertaking the class. The self-assessment score would be made available only to the student and would not be used to prevent entry into a subject. These self-assessments would complement formal pre-requisites, but it is possible for the self-assessment to be finer-grained than a list of pre-requisites. Self-assessments would encourage students who are qualified to take a class, but are discouraged by advisors, peers, or the reputed difficulty of the class.

Class instructors should ensure that the actual workload does not deviate far from the number of hours specified by the units of the class. This is especially important (and has been typically troublesome) in classes that have many labs requiring extensive programming and debugging. EECS currently has a workload committee investigating these issues.

The department should closely examine the curriculum to address practical gaps in the progression to the AUS level in each concentration area. For example, some subjects at the introductory level currently assume working knowledge of the command line, debugging skills, or basic mathematical maturity; and at the advanced level, more specialized knowledge – for example, useful techniques for mathematical proofs or familiarity with systems programming languages.

Another way to address gaps in the curriculum is to provide more opportunities for practical experience to incoming students with little prior experience. Finding the first of these opportunities can be frustrating, as companies and research labs alike prefer students who already have experience. The department can intervene in this cycle by providing less experienced students with introductory research opportunities akin to the "SuperUROP" program for more advanced students.

Both faculty and students have expressed interest in an anonymous mechanism for students to privately provide feedback to faculty about incidents in class that made them uncomfortable (for instance, an offhand remark by the lecturer). Such a mechanism would help students to discreetly express their concerns and help well-meaning faculty to improve the environment in their classes.

4.2.2 Advising

Faculty advisors at MIT, from their position as experienced scientists removed from student culture, have an opportunity to correct misperceptions about EECS and encourage students to persevere. Informal peer-advising is a beneficial and important part of EECS, but advice from peers can also be influenced by stereotypes and false perceptions of ability. Thus, faculty advisors can encourage advisees to view peer advice

[4] We received this idea from Manolis Kellis during our presentation to faculty on December 8, 2014.

	Single lecturer	Multiple lecturers
All men	306	100
At least one woman	20	45

Table 2: Number of single-lecturer and multiple-lecturer undergraduate course offerings over six years with only male lecturers or at least one female lecturer. Data based on EECS ”Who’s Teaching What” [1]. Data for Fall 2011 was not available at the time of writing.

critically, and also help their advisees to have a realistic perception of their own abilities.

Students, especially at MIT, can feel empowered by stories of failure. Faculty can help students by being honest and open about the struggles, frustrations, and failures they experienced before acquiring faculty positions. Such stories from faculty are living proof that these events are ultimately inconsequential.

Advisors can also make students aware of the breadth of possible career trajectories in EECS. Although students might feel pressured to pursue “pure” EECS opportunities in large companies, start-ups, finance, or academia, EECS has a large number of important interdisciplinary applications, as well as opportunities for careers including teaching, non-profit work, or public service.

4.2.3 Visibility of women faculty and lecturers

From Fall 2009 to Spring 2015, there were 471 offerings of 95 MIT EECS undergraduate subjects. The breakdown of lecturers by gender is shown in Table 2. 326 MIT EECS undergraduate subject offerings had an individual lecturer, as opposed to multiple lecturers jointly teaching the subject. Of these subject offerings, only 20 had women lecturers (6.1%). Of the 145 subject offerings with multiple lecturers, 45 included one woman lecturer (31.3%), and only four had two women lecturers (2.7%). These proportions closely mirror the percentage of women PIs in the EECS department [2], and do not suggest underrepresentation. Nevertheless, these numbers indicate that undergraduates will rarely have the opportunity to connect with and learn from women faculty members through courses.

Rather than suggest that women faculty should take on a greater burden of teaching undergraduate subjects, we suggest that the department should be responsible for making their research and accomplishments visible to students through other channels – networking events, for example, or invited lectures in classes.

5 Final remarks

MIT maintains a vibrant culture, not least among the undergraduates of the EECS department, and we want to emphasize that our suggestions are not intended to dilute MIT’s creative, challenging, and ambitious environment. However, we believe that upholding a competitive culture at the cost of making a more hostile environment for students, especially those from underrepresented demographics, is not an acceptable tradeoff. Members of the MIT community are driven to understand the world, and they need to apply this drive to understanding the biases and the social contexts that prevent underrepresented groups from accessing the full breadth of opportunity at MIT. It is our firm belief that creativity, achievement, and ambition can be fostered alongside respect and support.

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