Enhancing the MIT First-Year Experience

Fall 2019 Updates

Ian A. Waitz
Vice Chancellor for Undergraduate and Graduate Education

Kate Weishaar
First Year Experience Coordinator, Office of the Vice Chancellor

A step in a longer MIT community discussion

>150 Faculty involved during AY17-18

>40 meetings/ presentations during AY18-19

The Vision

The first-year (including the role of the GIRs) is a fundamental, core part of an MIT experience.

Our undergraduate students deserve the best first year experience on the planet.

A Process Grounded in Values

Student-Focused

Data-Informed

Community-Driven

Experiment-Based

Decades of Faculty Calling for Bold Experiments

"We believe that the Institute should boldly undertake new experiments in education and new explorations into the unknown."

-1949 Committee on Educational Survey (Lewis Committee)

Warren K. Lewis, Prof. of Chemical Engineering

"To enable the future of MIT education, we must engage in bold experiments that will help us learn about both the positive and negative aspects of pedagogical and curricular innovations. This is critical to ensuring MIT's leadership position at a time of disruptive change."

- 2014 Institute-wide Task Force on the Future of MIT Education

Goals

1. Further a vibrant community-wide conversation on educational innovation
2. Promote exploration and more informed choice of major
3. Enhance first-year advising
4. Alleviate undue academic pressure
5. Inspire our students and cultivate a lifelong love of learning

Credit for Science Core Affects Number of Science Core GIRs Students Take FY Fall

Advanced Credits	Sci core GIRs Taken FY FA17				
	0	**1**	**2**	**3**	**4**
0 (27% of class)	0%	0%	4%	91%	5%
1 (43% of class)	0%	0%	6%	90%	3%
2 (17% of class)	0%	3%	36%	62%	0%
3+ (14% of class)	14%	33%	45%	9%	0%
Total	**2%**	**5%**	**16%**	**74%**	**3%**

Overview of Experiments

Pass/No Record for science core GIRs, revised credit limits, First-Year Discovery Subjects

Phase One

Students can take up to 3 Science Core GIRs P/NR *after* the first semester

Phase Two

Continue up to three deferred P/NR science core GIR opportunities
Discovery units *separate* from credit limit
Credit limit adjustments and major advising opportunities to replace ESS
Fall: 48 + 9 Discovery Spring: 60 + 9 Discovery

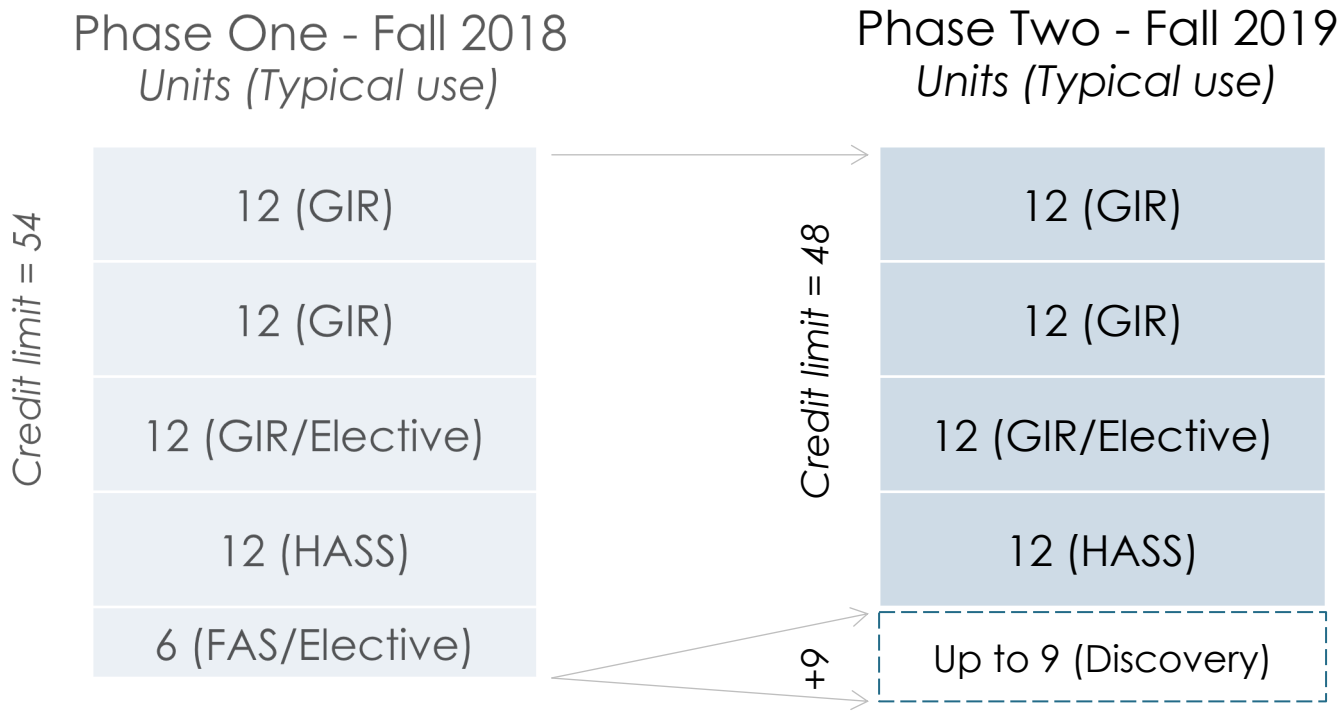
Enable/encourage *both* "Exploration" and/or "Discovery" in the First Year

Increased confidence and satisfaction in major selection?

Improved First Year student experience?

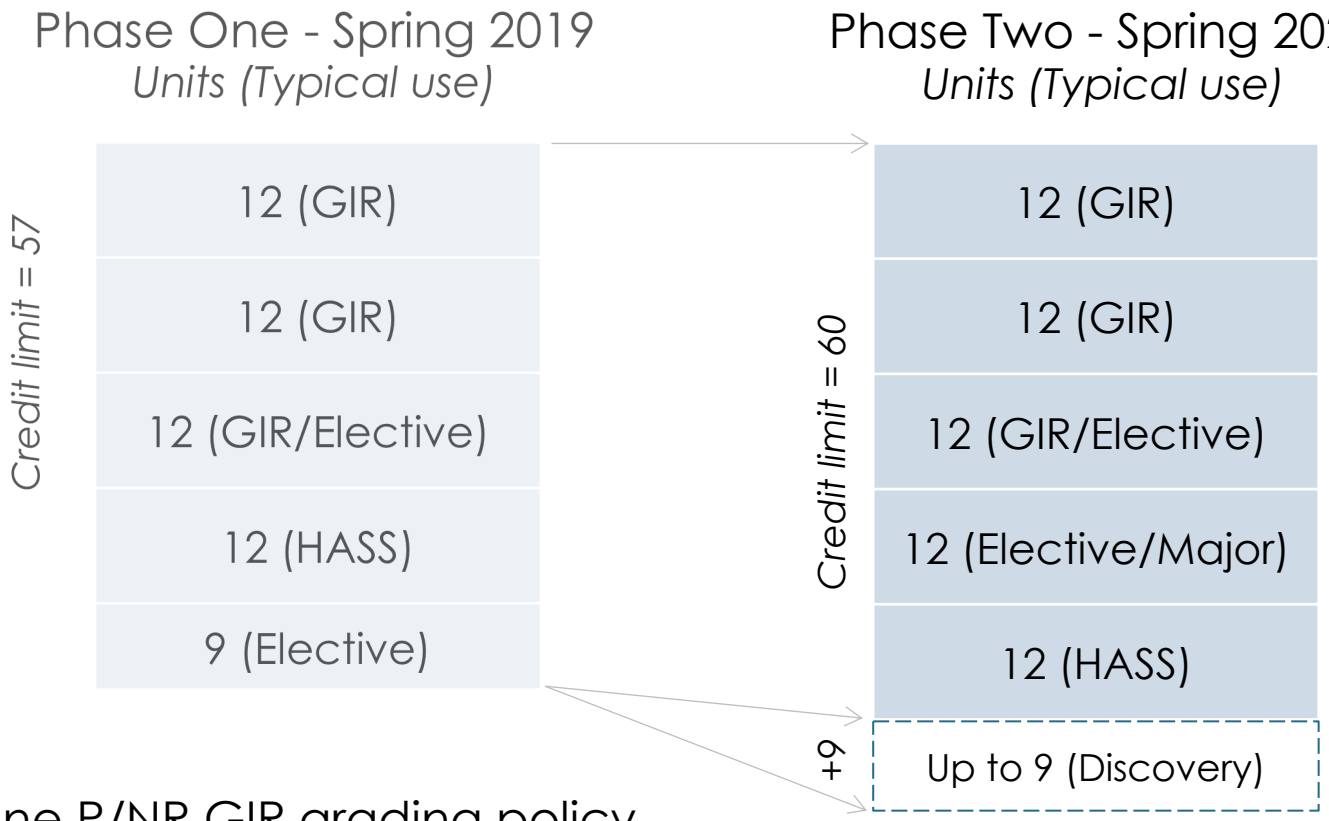
Improved long-term educational outcomes?

Phase Two Fall Credit Limits



1. Repeat Phase One grading policy (3 science core GIRs P/NR)
2. Fall semester credit limit modifications:
   A. Reduce general credit limit to 48 units
   B. Allow up to 9 additional "Discovery" units not counted against general credit limit for FYD, FAS, UROP subjects generally *not* eligible to satisfy degree requirements

Phase Two Spring Credit Limits



1. Repeat Phase One P/NR GIR grading policy
2. Spring semester credit limit modifications:
   A. Increase general credit limit to 60 units
   B. Allow up to 9 additional "Discovery" units
3. Replace Early Sophomore Standing (ESS) with option available to all First Year students to have extra advising in major

What does P/NR mean?

A passing grade on P/NR corresponds to an A, B, or C

The Faculty Rules and Regulations define a C as "Adequate performance, demonstrating an adequate understanding of the subject matter, an ability to handle relatively simple problems, and **adequate preparation for moving on to more advanced work in the field**."

Methods

- Formal interview protocols
- Surveys (existing and new)
- Collection of objective data
- Statistical analysis

Data sources

Registration Data

- Discovery and Exploration Subjects
- Science core GIR completion timing
- Distribution of subjects taken
- Science core GIRs on P/NR vs. on grades
- Number/timing of HASS subjects
- Number/timing of subject in declared major
- Add/Drop patterns
- Advanced credit for science core subjects

Choice of Major

- Field of interest on admissions application
- Field declared
- Timing
- Change of major

Surveys

- Surveys duplicating aspects of CUP Study on Undergraduate Majors Selection
- Survey of New Students
- Enrolled Student Survey
- Student Quality of Life Survey

Grades/Performance

- Science core subjects
- Subject with science core as pre-requisites
- HASS subjects
- Overall GPA
- "No Record" rates
- CAP actions

Interviews/Focus Groups

- Students – first-year Fall
- Students – first-year Spring
- Science core instructors and TAs – SP19

Other

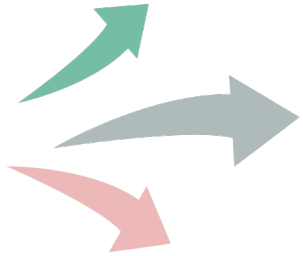
- Demographic data including gender, URM status, first-gen status, citizenship, and family income (if reported)
- UROP participation
- Volume data from Student Support Services
- Subject eval data for science core

Changes Observed So Far

Increased opportunity to explore

Decrease in major-related stress

No change in feeling prepared to choose



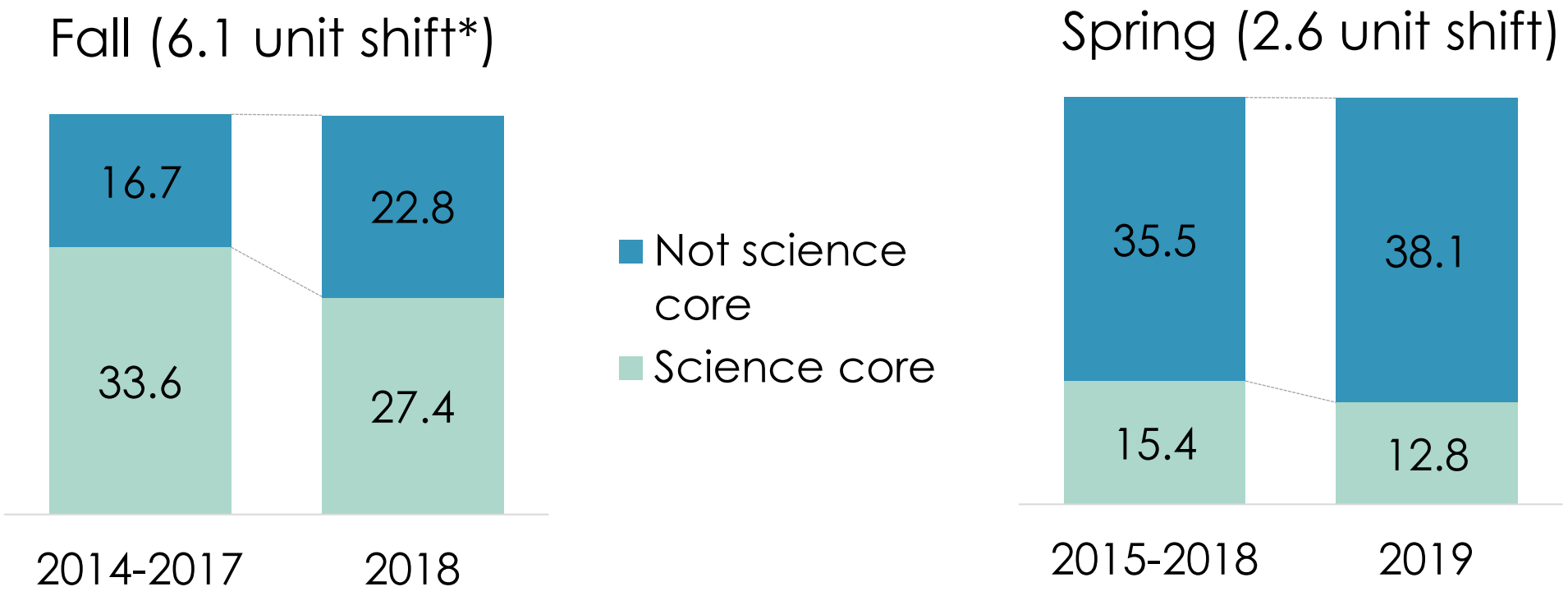
No change in overall GPA

Decreases in some science core GIR grades

Increase in HASS GIR grades

More Opportunity to Explore

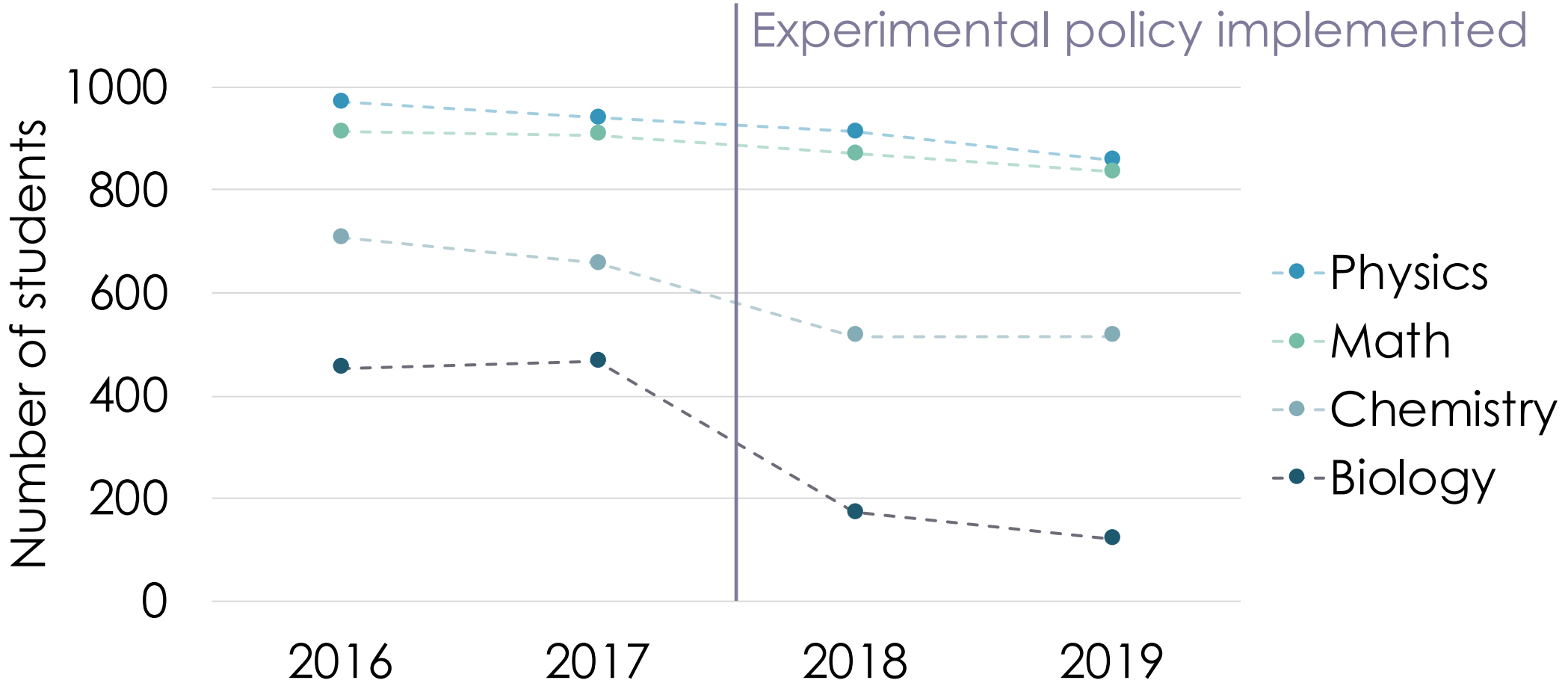
On average for the class as a whole, about 2/3rds of the students took one fewer Science core GIRs in their first year.



Average units taken by first-year students

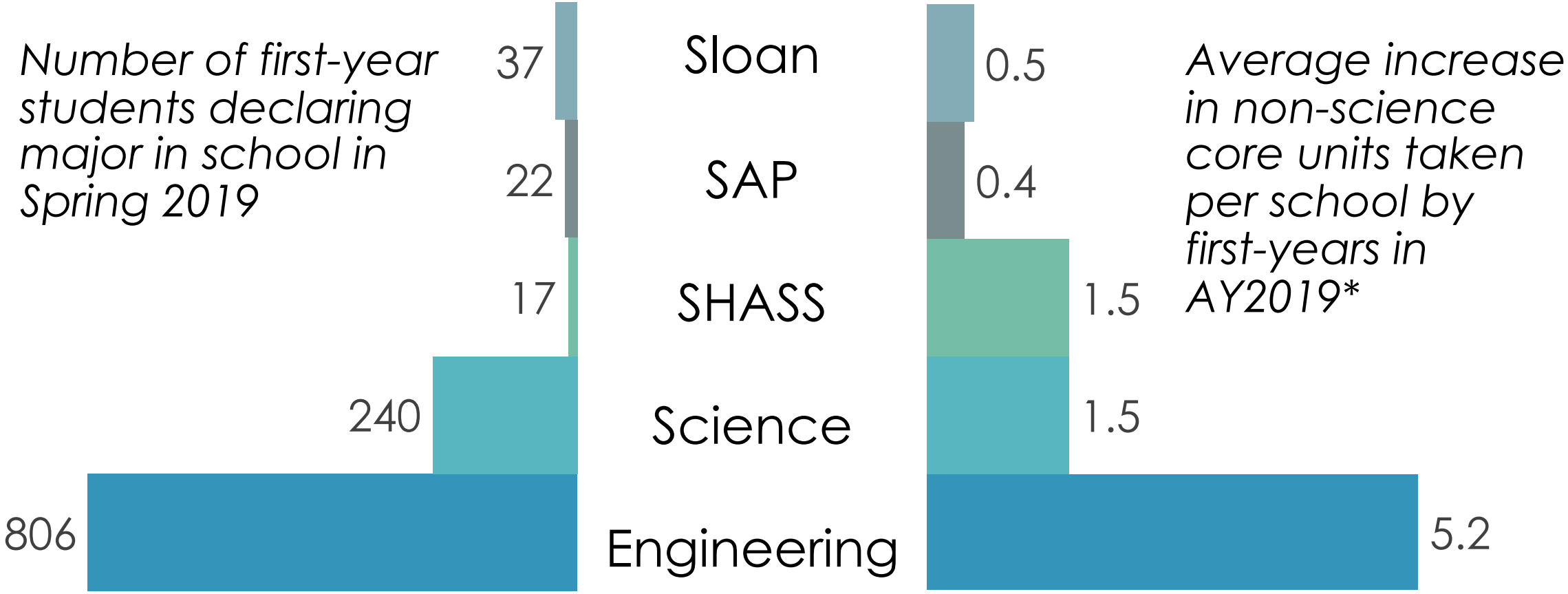
**FY students took 0.1 fewer units on average in Fall 2018 than previous years*

First-year Fall Science Core Enrollments



What did they explore?

Number of unique subjects = +14% Fall, +7% Spring



*Compared to average of previous four first-year classes

Students told us…

"If I didn't have [the P/NR policy], I probably would not have taken 6.00 last semester, but replaced it with a biology, so that it could still be P/NR. And then I wouldn't have like realized, through 6.00, that I was not meant to be Course 6. Yeah, it's been helpful."

"I probably would have taken my GIRs on P/NR which would have pushed other classes later. And then I might have ended up declaring a different major. And then planning on that major. And then realizing too late, 'Oh, this isn't actually what I want to do!', and then having that extra stress of trying to figure out what I want to do."

Quotations from Spring 2019 interviews of first-year students

Science Core GIRs Taken FY Fall By Advanced Credit

Advanced Credits	Fall 2017					Fall 2018					Fall 2019				
	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4
0	0%	0%	4%	91%	5%	0%	2%	31%	67%	1%	0%	1%	32%	66%	1%
1	0%	0%	6%	90%	3%	1%	2%	44%	53%	0%	1%	4%	50%	46%	0%
2	0%	3%	36%	62%	0%	1%	17%	50%	32%	0%	5%	20%	47%	28%	0%
3+	14%	33%	45%	9%	0%	38%	33%	26%	3%	0%	45%	34%	20%	0%	0%
Total	2%	5%	16%	74%	3%	6%	10%	39%	44%	0%	9%	11%	38%	41%	0%

How did Phase 1 students behave along the focused-open spectrum?

	Focused	Focused/ Open	Open	Did not answer survey
% of fall subjects in Application major	14%	14%	9%	13%
% of fall subjects matching Early Sophomore major	23%	27%	19%	30%
# Incoming GIRs (avg)	1.6	1.5	1.2	1.4
# Fall GIRs (avg)	2.1	2.2	2.5	2.1
# Fall exploration subjects (avg)	1.1	1.2	1	1.2
# Spring GIRS (avg as of add date)	1	1	1.2	1
# GIRs remaining after FY (avg, estimated)	1.3	1.3	1.1	1.4

"GIR" above means science core GIR
Categories based on SNS 2018 responses
All data are for the first experimental cohort (entered fall 2018)

How have Phase 2 students behaved so far?

		Focused	Focused/ Open	Open	Did not answer survey
Phase 1	% of fall subjects in Application major	14%	14%	9%	13%
	# Incoming GIRs (avg)	1.6	1.5	1.2	1.4
	# Fall GIRs (avg)	2.2	2.3	2.5	2.2
Phase 2	% of fall subjects in Application major	17%	14%	9%	15%
	# Incoming GIRs (avg)	1.7	1.4	1.0	1.4
	# Fall GIRs (avg)	2.1	2.3	2.5	2.2
	First-Year Discovery Subjects* (avg)	0.4	0.5	0.5	0.5

"GIR" above means science core GIR
Categories based on SNS 2018 and 2019 responses
*Does not include First-Year Advising Seminars (>650 registrants)

FYD Enrollments (as of 5th week)

Total first-year enrollment = 524

- Avg first-year enrollment = 40
- Enrollment range = [2,124]

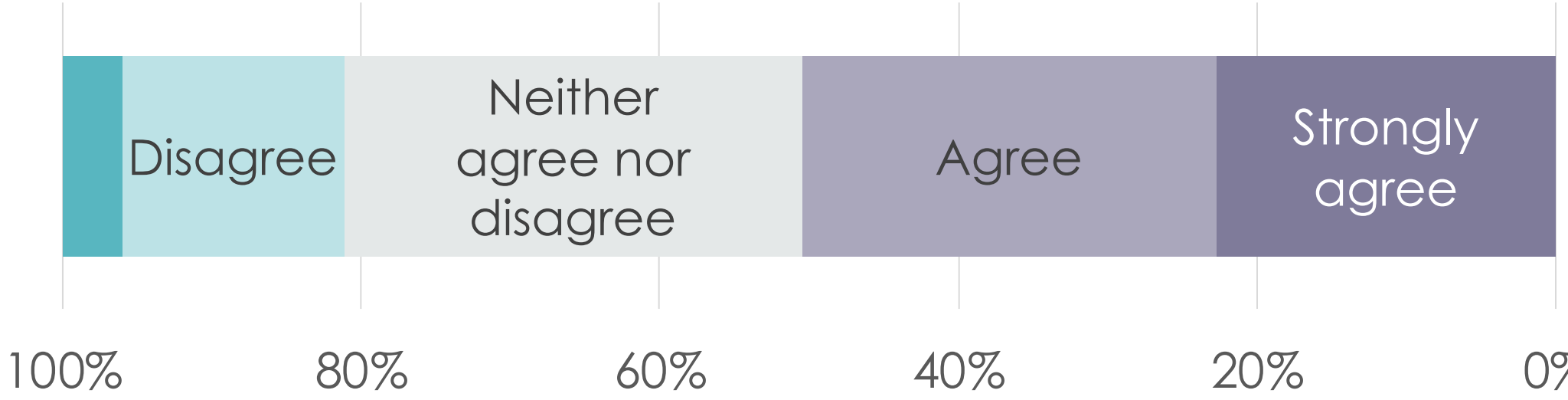
Drops from1st week to 5th week

- Maximum = -39%
- Average = -18%

Fall 2019 data courtesy of Registrar's Office

Students Want Even More Discovery Options

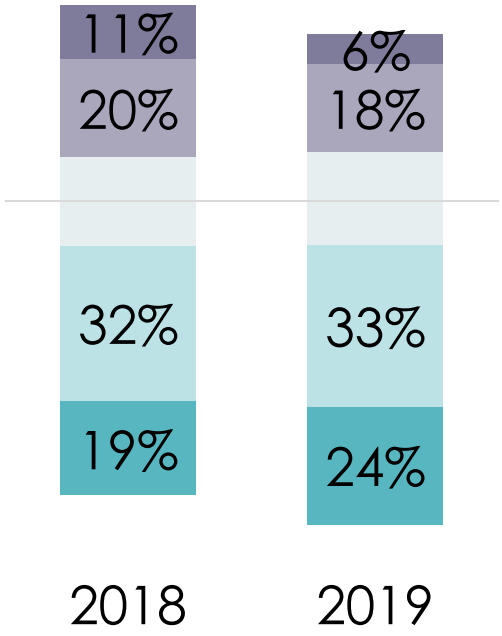
"I would have liked more first-year discovery subjects from which to choose."



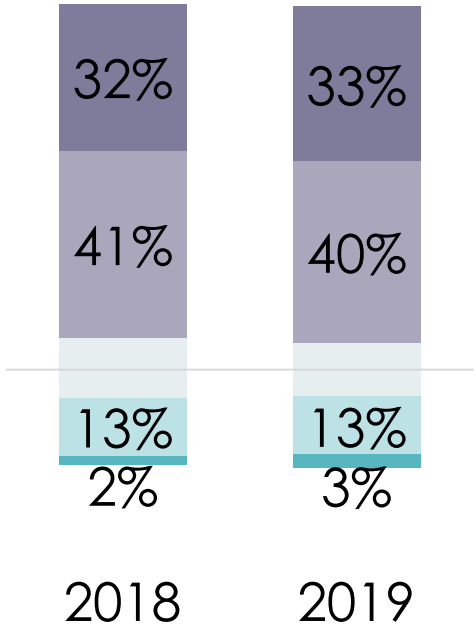
First Year Arrival & Orientation Survey, 2019

Drop in Major-related Stress, No Change in Feeling Prepared

"I found the major selection decision-making process stressful."



"I felt prepared to choose my major."



Strongly Agree

Strongly disagree

2018 data from CUP Choice of Major Survey 5

2019 data from FYX Major Declaration Survey

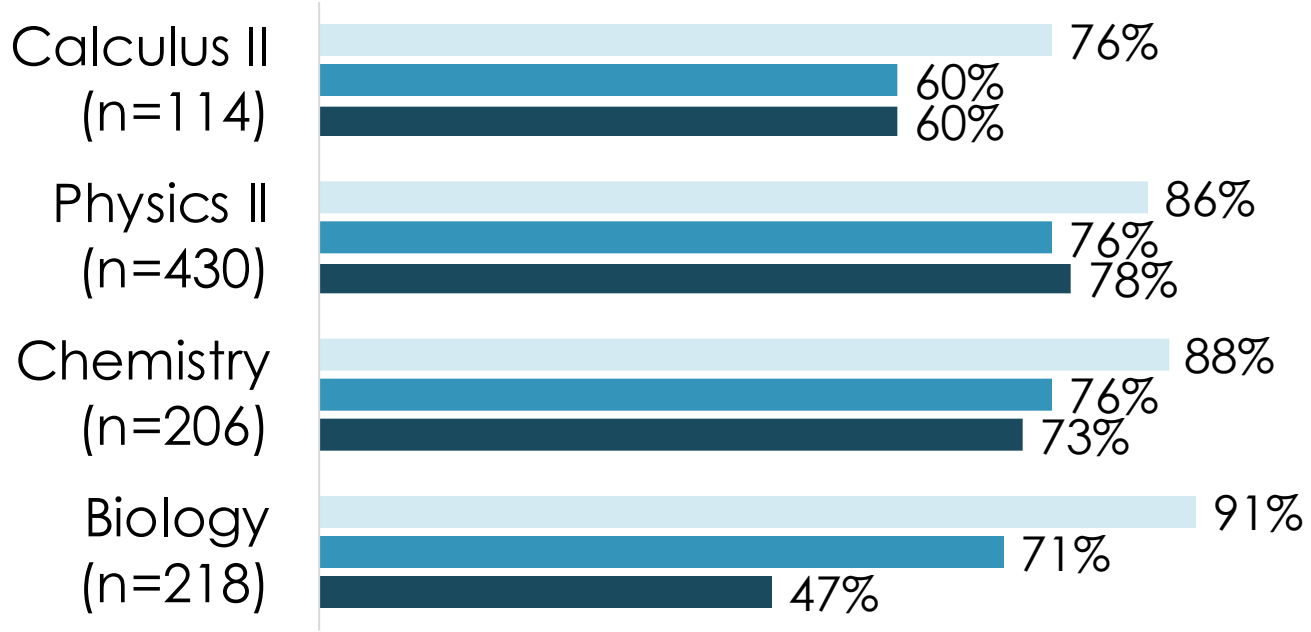
Many Reasons for Electing P/NR vs. Grades

- Interest or perceived value
- Believe subject will lower GPA
- Believe subject will raise GPA
- Desire to alleviate grade-related stress
- Desire to focus energy elsewhere
- Plan to apply to medical school

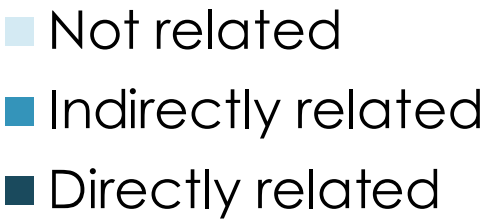
Based on Spring 2019 Student Interviews

Students are more likely to use P/NR on subjects unrelated to their major

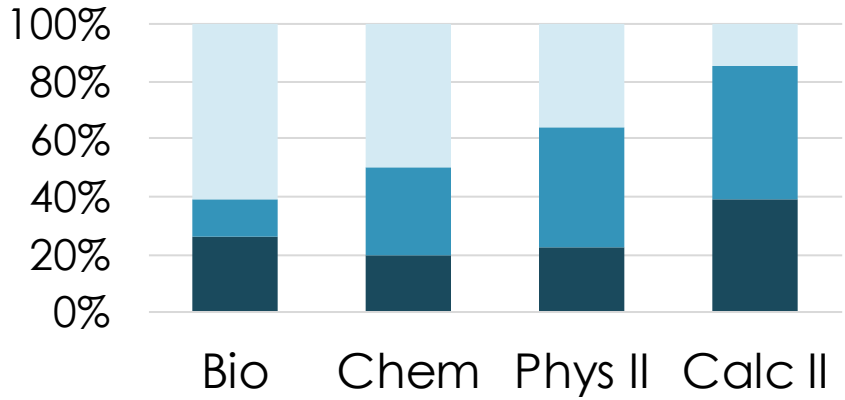
Percent taking subject P/NR versus how related they believe it is to their major



Based on FYX Fall 2019 survey, among students who took subject in FY spring and/or are currently taking it

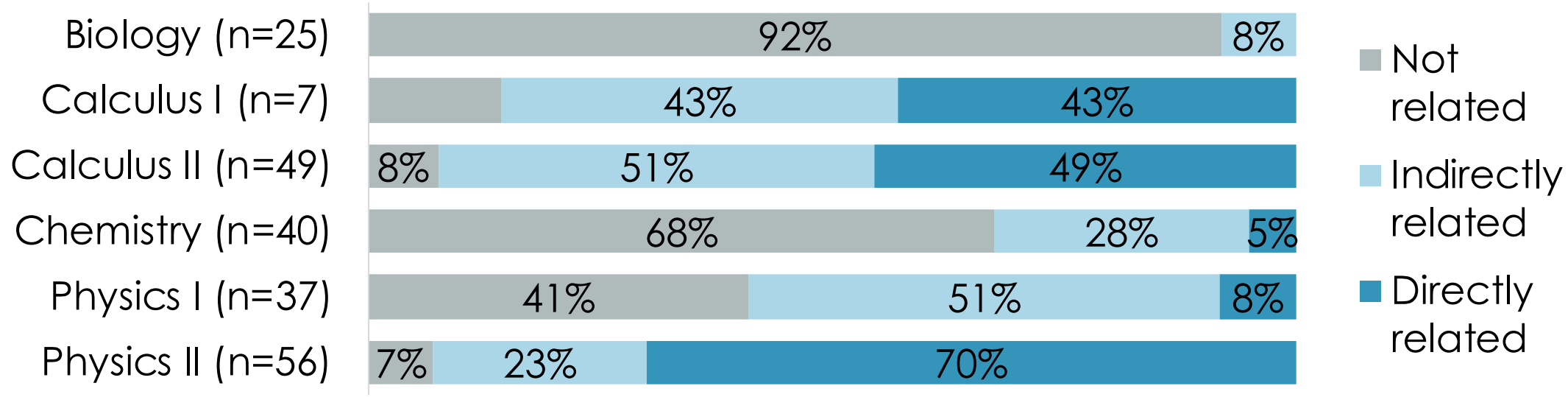


How students believe different GIRs relate to their major



Even within a major, student perceptions of "related" GIRs can vary (6-2 example)

"For each subject, how does the content relate to your current primary major?"



Based on FYX Fall 2019 survey, only asked of sophomores, and respondents were only asked to rate GIRs they indicated they have taken or are currently taking

A Note on Comparisons

Within each subject, **students self-segregate into grading types** (P/NR versus grades) based on a variety of reasons; these reasons may also impact performance.

- Background preparation, overall academic strength, perceived value of/interest in subject

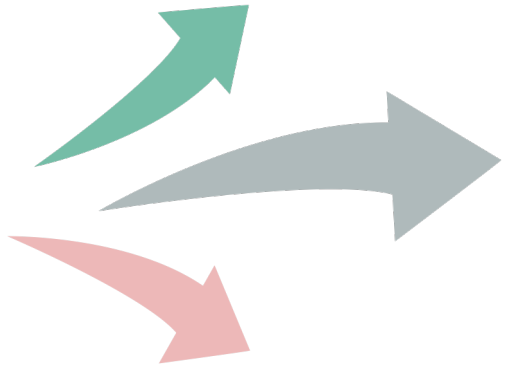
Therefore, we do not compare students on P/NR to students on grades in the same subject. We use well-controlled cohort-wide comparisons of the control group (Class of 2021) to the experimental cohort (Class of 2022).*

* although not a randomized trial, we have seen that the classes are well-balanced

Changes in Full Year Grades

Full Year GPA Changes (including hidden grades)

Overall	**+0.01**
Science core GIRs	-0.05*
HASS GIRs	+0.07***
In declared major	+0.03

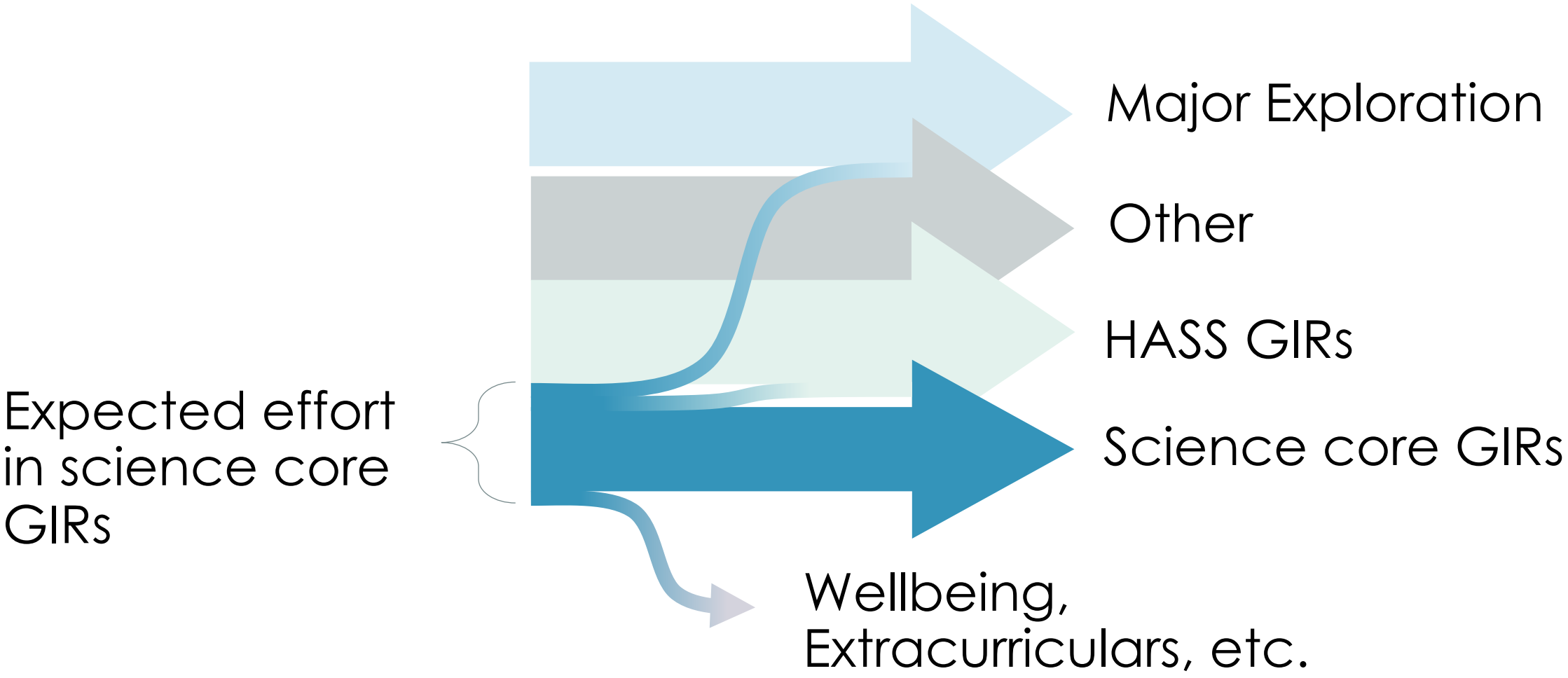


Sample is undergraduate classes of 2018 through 2022, changes based on regression analysis

*p < 0.05 **p < 0.01 ***p < 0.001

Redistribution of Effort

Performance (GPA) x Workload (Units) ~ Constant



Changes in GPA by Semester

	Fall	Spring	Full Year
Science core GIRs	+0.06*	-0.36***	-0.05*
HASS GIRs	+0.06**	+0.08**	+0.07***
Subjects in declared major	+0.08	+0.06*	+0.03
Overall	**+0.06****	**-0.05***	**+0.01**

Sample is undergraduate classes of 2018 through 2022, changes based on regression analysis
*p < 0.05 **p < 0.01 ***p < 0.001

Changes in Spring Science Core Grades

Individual Subject changes

Physics 2	-0.51***
Other sci. core	No significant change+

Frequency of "No Record"

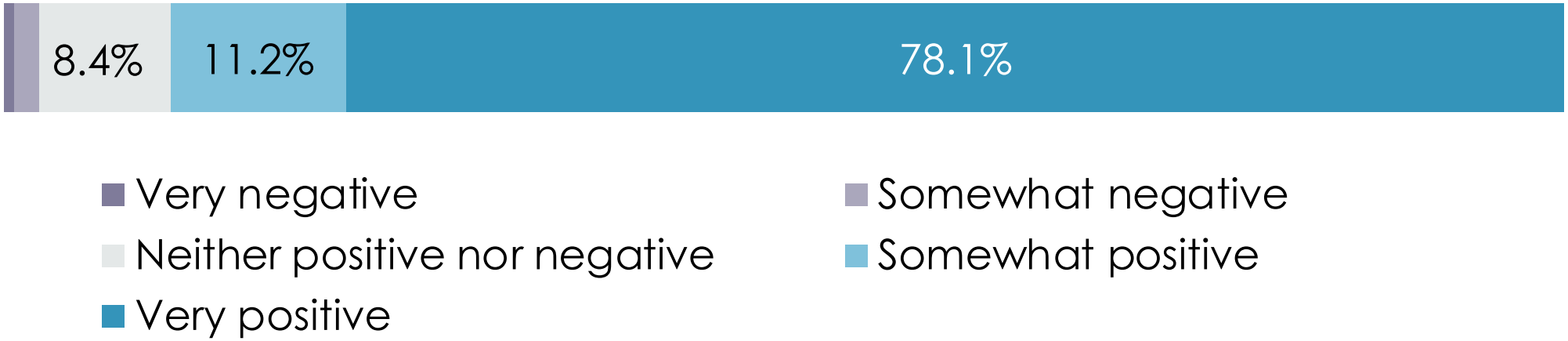
Physics 2	0.037*** ++
Chemistry	-0.029**
Calc 2, Biology	No significant change

Sample is undergraduate classes of 2018 through 2022, changes based on regression analysis
*p < 0.05 **p < 0.01 ***p < 0.001

+ So far. Almost the entire class has completed Calc1, Calc2, Phys1, Phys2, but about half the class has not completed Biology or Chemistry yet.
++ 3.7% more than the baseline of 2%-4%

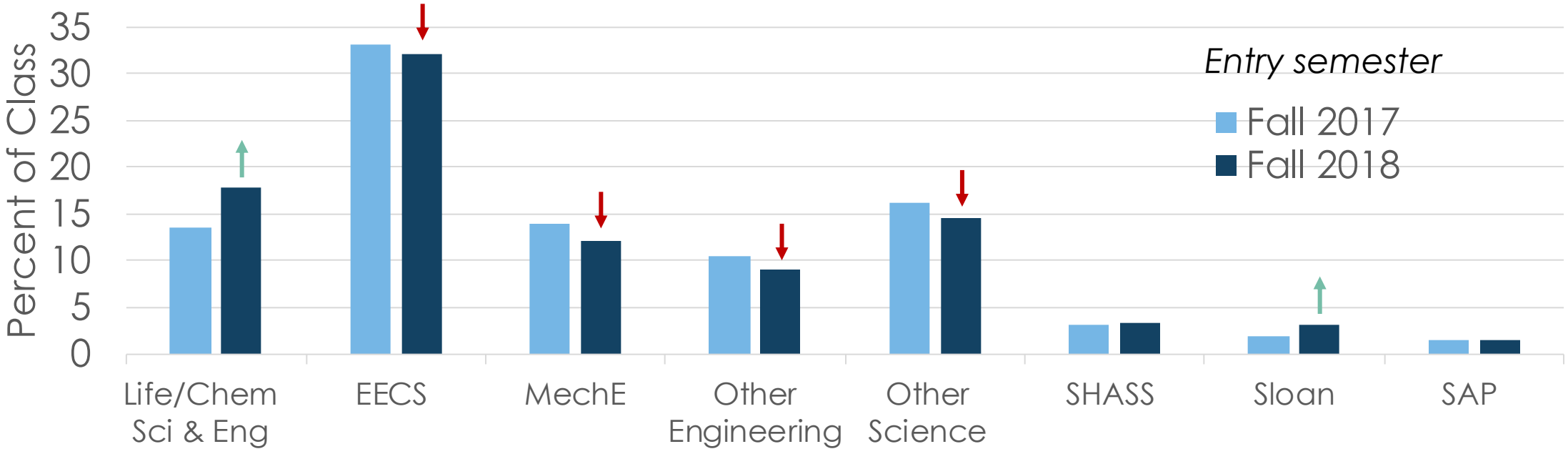
Majority of sophomores very positive about experimental grading policy

"In general, how would you describe the experimental grading policy which allows you to designate up to three science core GIRs to be graded on a P/NR basis after the first term?"



FYX Fall 2019 Survey, sophomore students, n = 644

Major selection – by broad field



Arrows indicate change of at least 1%. Enrollment in joint majors divided between categories.

Concerns Raised

Regardless of whether the experiment exacerbated or alleviated these issues, it has drawn attention to opportunities for improvement

Questions and Concerns Shared

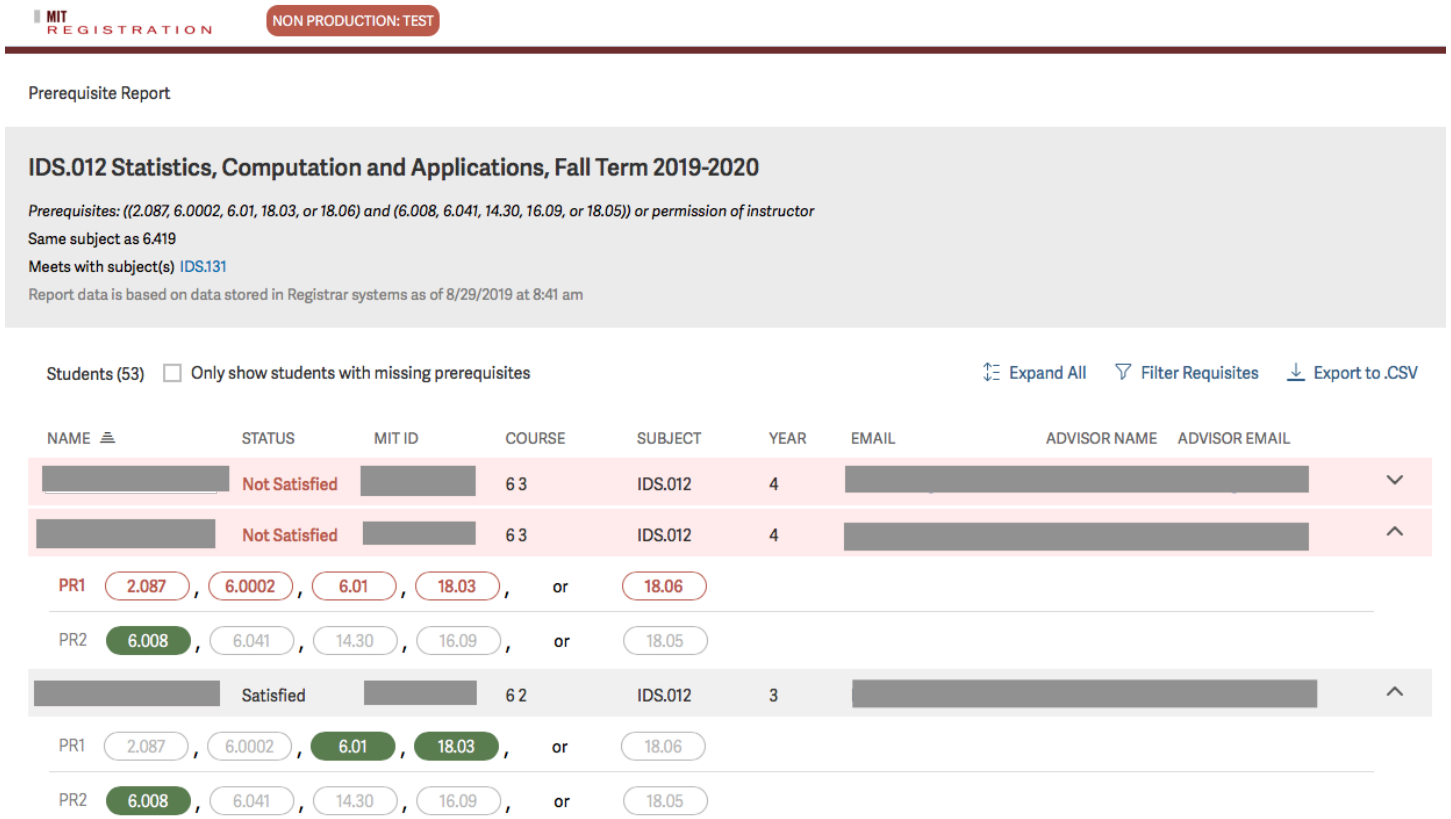
- Students are exploring by taking subjects without completing the prerequisites
- Students are not completing necessary science core GIRs that are prerequisites for sophomore subjects
- Experiments are too bold or are moving too fast
  - Conversely, change is happening too slowly and should be bolder
- Students are just “getting ahead” rather than exploring
- Students are receiving information (either explicit or implicit) that the GIRs are not valuable

Pre-requisites and Exploration

Concern: Students are exploring by taking subjects without completing the prerequisites

Actions: Encouraged faculty to enforce prerequisites

New self-service prerequisite reports available on WebSIS



Starting Majors Without Pre-reqs

Concern: Students not completing necessary science core GIRs that are prerequisites for sophomore subjects

Data show: **Satisfaction of pre-reqs increased for some majors** (e.g. Bio completion for Course 20), **decreased for others** (Calc2 completion for Course 16). All changes were at the level of 6 or fewer students. We are evaluating this further to understand the statistical significance of any changes

Actions: Pre-major advising coordinated through Office of the First Year, clearer roadmaps for majors, strong messaging during orientation to consider prerequisites

Varying Definitions of "Exploration"

Students want to try out their intended major before declaring.

"I wanted to take more Course 6 heavy classes that weren't necessarily the, I mean the I guess harder classes in terms of Course 6 classes go to see if it was actually something that interested me and if it was something that I wanted to continue pursuing."

-First-Year Student, fall interviews

But some instructors view that as just "getting ahead".

"They were taking classes in their predetermined major and still taking a few science GIRs, but they didn't care about the science GIRs because they were getting pass/no record and so they were focusing on their major. So they weren't using it for exploration, they were using it to get started on their major classes."

-Science core instructor, spring interviews

Where Do We Go from Here?

Returning to the community to define next steps

Upcoming Data and Questions

- How did the experimental cohort perform in subjects with science core GIRs as prerequisites? How did sophomores perform in science core subjects taken on P/NR this term?
- How do the experimental credit limits impact first-year student grades and stress levels?
- Discovery vs. Exploration vs. Advising: How do students understand the many mechanisms for navigating their MIT world and how can we improve the quality and selection of these offerings?

Decisions Impacting Class of 2024

- Should we return to offering Early Sophomore Standing?
- What should the credit limits look like? Does a separate "discovery limit" provide value?
- Should we continue to offer 3 P/NR slots for science core subjects? Reduce to 2 P/NR slots? Some other variation? Or revert back to 0 P/NR slots?
- Or something else entirely?

Longer Term Efforts

How can we use our First-Year Learning Communities as incubators for educational change?

How can we improve advising and mentoring in the first year?

How can we continue to innovate on the content, structure, and pedagogy of the GIRs?

Many ways you can help

- **Stay engaged** and knowledgeable about the work
- Give us your **feedback** on efforts so far and ideas for the future
- Create or participate in a **first-year discovery subject**
- Use new **advisor training** on MITx to improve your advising skills
- Adopt **evidence-based teaching practices** in intro courses to improve student learning
- Make sure your **department roadmaps and website** have clear information for first-years
- Enforce your **prerequisites** and encourage colleagues to do the same