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More Often or Longer? The Effects of the Academic Schedule on Postsecondary Academic Outcomes

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One of the most common scheduling decisions in higher education is the determination of biweekly or triweekly classes. On the surface, these two formats are equivalent in terms of the number of minutes in a course (75 minutes twice a week or 50 minutes three times a week). However, the two structures may have different pros and cons for both students and faculty and it is ambiguous which course format should yield better student outcomes. We leverage more than a decade's worth of administrative transcript data from a large public university in the Midwest to examine the effects of the academic schedule on postsecondary student outcomes. Across a range of model specifications employing department, faculty, course, and student fixed effects, we find that when a student enrolls in a triweekly class, they earn lower grades and are less likely to take a subsequent course in that same field. These effects are especially pronounced in the STEM fields, where we also find negative effects of the triweekly schedule on students' eventual choice of major.

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More Often or Longer? The Effects of the Academic Schedule on Postsecondary Academic Outcomes *

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Abstract

One of the most common scheduling decisions in higher education is the determination of biweekly or triweekly classes. On the surface, these two formats are equivalent in terms of the number of minutes in a course (75 minutes twice a week or 50 minutes three times a week). However, the two structures may have different pros and cons for both students and faculty and it is ambiguous which course format should yield better student outcomes. We leverage more than a decade's worth of administrative transcript data from a large public university in the Midwest to examine the effects of the academic schedule on postsecondary student outcomes. Across a range of model specifications employing department, faculty, course, and student fixed effects, we find that when a student enrolls in a triweekly class, they earn lower grades and are less likely to take a subsequent course in that same field. These effects are especially pronounced in the STEM fields, where we also find negative effects of the triweekly schedule on students' eventual choice of major.

Keywords: academic schedule, postsecondary schedule, biweekly classes, postsecondary outcomes

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1 Introduction

The importance and benefits of a college degree are well documented (Ma, Pender, and Welch 2019), and yet, many postsecondary students struggle to succeed in their college courses, and less than half of students obtain their bachelor's degree on time (Henderson et al. 2022). Within their college careers, students must also make the crucial decision of what field to major in, which can have long-term implications for labor market outcomes (Altonji, Arcidiacono, and Maurel 2016). As such, a growing body of literature aims to understand the inputs to college major choice and to eventual successful graduation. One set of factors that has received little attention until recently are the institutional decisions about when and how to offer undergraduate courses.

These seemingly unimportant scheduling details can have significant impacts on student outcomes in both the short- and long-run. For instance, Bostwick, Fischer, and Lang (2022) show that an academic calendar broken into quarters rather than semesters improves student GPA in the short-run and eventual time-to-degree in the long-run. The timing of when courses are offered within a student's college career can also be surprisingly impactful, influencing students' choice of major (Patterson, Pope, and Feudo 2021). Similarly, course timing within the day and the frequency (or lack thereof) of course offerings across semesters have been shown to impact student grades, major choices, and dropout behavior (Yim 2024; Mumford, Patterson, and Yim 2024).

We consider another course scheduling decision that is common across many universities: the determination of biweekly or triweekly class meetings. On the surface, the number of minutes in a course in either format remains the same in a given week (75 minutes twice a week or 50 minutes three times a week). However, the different structure may have different appeals and costs for students, faculty, and administrators (Daniel 2000). For administrators, the shift from triweekly classes to biweekly classes may allow them to reduce operational costs. For faculty, teaching twice a week may be preferable to three times a week since it can provide them with longer blocks of time to conduct research. For students, biweekly classes may be easier to fit in their schedule, and potentially giving them more flexibility for other academic, social, and employment opportunities.

Ex ante, it is ambiguous which course format should yield better student outcomes. A course that meets for fewer, longer lectures may allow for more in-depth discussion of material, but it may also lead to fatigue and declining attention spans among students. On the other hand, a course that meets more often may allow students more opportunities to absorb and review materials, but may induce some students to come to class less often.

Early associational work suggests that frequency of meeting time is related to academic outcomes, but it is unclear how important it is and to what extent (Logan and Geltner 2000).

We leverage more than a decade worth of transcript data from a large public university in the Midwest to estimate a student fixed effects model of the impact of course schedule on academic outcomes. We find that, when a student enrolls in a triweekly class, their grade is 0.025 grade points lower than when they enroll in a biweekly class (a 1% decline at the mean). This negative grade effect is concentrated at the top of the spectrum of student performance: the triweekly course schedule decreases a student's probability of earning an "A" by 4% but has no discernible effect on the probability of failing or dropping out of the class.[1] These main findings are robust to the inclusion of an array of fixed effects including: student-specific, course-specific, and instructor-specific fixed effects.

Heterogeneity analysis by course characteristics reveals key nuance to our findings. The negative impact of the triweekly course schedule on student grades is almost entirely driven by course-taking in the STEM (science, technology, engineering, and mathematics) fields and in upper-level classes (300-level or higher). Students who enroll in a class that is either an upper-level course or in a STEM field earn grades that are 2% lower if that course is offered on the triweekly schedule (as compared to the biweekly schedule). In contrast, students perform slightly (0.01 grade points) better in non-STEM, introductory courses that are conducted on the triweekly schedule. This pattern is consistent, regardless of the student's academic rank (i.e. freshmen and seniors alike perform worse on the triweekly schedule in STEM or upper-level courses), and suggests that the content and/or the delivery of more complex or quantitative materials is a better fit for the biweekly schedule. These findings may indicate that the longer lectures offered on the biweekly schedule are needed in order for students to learn more challenging course content.

We next restrict the estimation sample to first-time freshmen students in order to capture the potentially formative impact of a student's first exposure to a triweekly or biweekly schedule, especially in STEM subjects. We estimate the effect of taking a course as a freshman in the triweekly format on the probability of future course-taking in that same field of study. We find that, when an initial course within a STEM field is taken on the triweekly schedule, freshmen are then 6.4 percentage points (pp) less likely to follow up with another course in that same field within the following 3 semesters. This pattern

[1] Heterogeneity analysis by student characteristics reveals that these negative grade impacts of the triweekly schedule are consistent across student gender and ability level (as measured by ACT scores).

then continues on into the student's choice of major. Freshmen whose first STEM course is taken on the triweekly schedule are then 1.3pp less likely to choose a major in that field. Thus, course scheduling can have meaningful impacts on the whole trajectory of students' college careers. This finding points to a potentially useful tool for university administrators to employ in their efforts to encourage majoring and persistence in the STEM fields.

Despite the ubiquity of the use of triweekly and biweekly academic schedule, little research has examined the effects of these two different structures on student outcomes.[2] To date, there have only been a few quantitative studies providing estimates on the effects of this academic structure. In a small-scale randomize study of 725 students, Joyce et al. (2015) compare test outcomes for students in a biweekly section of Principles of Microeconomics course with a once-a-week section and find that students in the compressed section did slightly worse on the midterm, but performed no differently on the final exam. Dills and Hernández-Julián (2008) find that students earn higher grades in triweekly classes compared to biweekly classes. This study is limited, however, to only two semesters of data at one university. A more recent study by Diette and Raghav (2018) addresses this limitation, using longitudinal data from a private, selective, liberal arts college. They find no statistically significant difference in students' course GPA between triweekly and biweekly classes. While our model is quite similar to that in Diette and Raghav (2018), our findings are quite different. This may be attributable to the different context, course offerings, and student composition at a private liberal arts institution vs. a large public university.

Our study adds to this literature, using over 10 years of administrative data from a large public institution to examine both proximal and distal effects of the academic schedule on postsecondary outcomes. In addition to course grade, including earning an "A" or failing to pass the course, we also examine longer-term academic outcomes, including follow-up course enrollment decisions and choice of major. We are also able to examine the extent to which the effects may vary course type (e.g., STEM versus non-STEM classes) or student type (e.g. high ability versus lower ability) and reveal important heterogeneity in effects across course characteristics. To our knowledge, we are the first

[2]Studies at the K-12 level have found mixed results for student achievement under a block schedule (meeting twice a week) compared to schedules with sections that meet four or five times a week. Some studies find students' GPA as well as school climate are higher under block scheduling (Zepeda and Mayers 2006; Hughes 2004; Veal and Schreiber 1999). On the other hand, other studies find opposite effects (Lewis et al. 2005; Rice, Croninger, and Roellke 2002; Lawrence and McPherson 2000).

to provide plausibly causal estimates of the effects of academic schedule on such a wide range of important postsecondary outcomes.

This study also contributes to a growing literature on the impacts of academic scheduling and organization on postsecondary student outcomes. Patterson, Pope, and Feudo (2021) show that when students are randomly assigned to take a mandatory course in the same semester when they must declare a major, those students are then more likely to pick a major in that course's subject area. Course timing within the day can similarly have large effects. Yim (2024) shows that undergraduate students who are randomly assigned to early morning sections of STEM courses receive lower grades and are deterred from majoring in a related field. Mumford, Patterson, and Yim (2024) investigate the effects of course shut-outs, which can be caused by infrequently offered or oversubscribed courses. They find that when students are shut out of oversubscribed courses, there are long-run detrimental effects on dropout behavior, STEM major choice, and cumulative GPA (but, interestingly, this holds for female students only). Finally, Bostwick, Fischer, and Lang (2022) show that college students perform better under a quarterly academic calendar (rather than the more common semester calendar). They find that the semester calendar leads to lower grades, delays in major choice, and longer time-to-degree.[3]

The remainder of the paper is organized as follows. We describe the data in Section 2 and the empirical strategy in Section 3. Section 4 presents the main results on both short- and longer-term academic outcomes as well as heterogeneity analyses. Section 5 offers concluding remarks.

2 Data and Descriptive Statistics

The data come from administrative transcript records from Kansas State University covering all undergraduate students enrolled between the Spring semester of 2010 and the Fall semester of 2021. This data includes course- and section-level information on every class taken by an undergraduate student during that time as well as student-level information on demographics and academic outcomes such as course grades, major choice, and degrees completed. We limit the estimation sample to include only full-time, degree-seeking

[3]This study also relates to a broader literature aimed at understanding the optimal way to structure academic calendars at the elementary and secondary levels. Studies have investigated the effects of a year-round academic calendar (Depro and Rouse 2015; McMullen and Rouse 2012; Graves 2010), a four-day school week (Fischer and Argyle 2018; Anderson and Walker 2015), and earlier or later school start times (Bostwick 2018; Edwards 2012; Hinrichs 2011; Carrell, Maghakian, and West 2011).

students with non-missing demographic information. We exclude from the sample all courses that are ungraded, hybrid modality, that meet "by appointment only", or that occur during the Covid-19 pandemic (Spring 2020-Fall 2021). The final estimation sample is comprised of 833,936 student-by-course observations, representing approximately 39,000 unique students. Summary statistics for this sample are shown in Table 1 and Table 2.

Table 1: Summary Statistics on Students

	Mean	Std. Dev	Min	Max
Individual Characteristics:$^+$				
Female	0.49	0.50	0	1
Age	19.9	1.58	15	54
Living On Campus	0.23	0.42	0	1
First-Time Freshman	0.84	0.36	0	1
Credits Enrolled (per term)	13.5	2.21	1	28
Composite ACT Score	24.6	4.25	7	36
Race:				
White	0.85	0.36	0	1
Black	0.03	0.17	0	1
Hispanic	0.06	0.24	0	1
Asian	0.01	0.11	0	1
Other Race	0.05	0.21	0	1
Initial Major:				
Agriculture	0.15	0.36	0	1
Architecture	0.03	0.17	0	1
Business	0.14	0.34	0	1
Education	0.02	0.13	0	1
Health & Human Sciences	0.08	0.27	0	1
Humanities & Social Sciences	0.15	0.36	0	1
Other	0.03	0.16	0	1
Science and Engineering	0.28	0.45	0	1
Unknown/Undeclared	0.13	0.34	0	1
Main Outcome Variables:				
Course Grade	3.06	1.11	0	4
Earns "A"	0.45	0.50	0	1
Does Not Pass	0.10	0.30	0	1

$^+$ Calculated using 833,936 student-by-course observations for the sample of full-time, degree-seeking undergraduates enrolled between Spring 2010-Fall 2019.

The sample of K-State students is 49% female, 85% White, and has an average age of 20 years-old. The students are predominantly traditional, non-transfer students and have an average ACT score of 24.6. The most common initial majors are Science and Engineering (28%), followed by the Humanities and Social Sciences (15%), Agriculture (15%), and Business (14%). The average course grade is a "B" and the modal grade is an "A."[4] The sample of courses taken are 26% in STEM fields and 21% at the introductory level.[5] The typical course-section in our sample is only 36 students, but this masks a high level of variability. The smallest section in the sample has only 1 student and the largest has 466 students. In terms of course scheduling, 28% of the observations in the sample come from courses on a biweekly schedule and 39% from the triweekly schedule.[6]

3 Empirical Strategy

We examine the effects of class meeting schedule on students' course grade by employing the following regression model:

$$Grade_{isdt} = \beta_1 Triweekly_{st} + \beta_2 AltSchedule_{st} + X'_{it}\nu + Z'_{sdt}\mu + D_t + D_i + D_{d(l)} + \epsilon_{isdt}. \quad (1)$$

The outcome variable is the course grade for student i enrolled in course-section s offered by department d in term t. Both $Triweekly_{st}$ and $AltSchedule_{st}$ are categorical variables that indicate the meeting schedule for each course-section. The omitted category is a biweekly class, which meets twice a week for 75 minutes each meeting. The main variable of interest is $Triweekly_{st}$, which indicates a section that meets 3 times per week for 50 minutes each meeting. The $AltSchedule_{st}$ variable indicates any other possible schedule (e.g. classes that meet only once a week). The vector X_{it} contains a host of student characteristics including: gender, age, age-squared, race/ethnicity, ACT composite score, initial major choice, on/off campus living choice, an indicator for whether the student first enrolled as a freshman, the total number of credits currently enrolled in, and current academic rank (e.g. freshman, sophomore) in term t. The vector Z_{sdt} contains course characteristics including: time of day the section meets, the total number of sections offered in that course in that semester, an indicator for whether the course includes a lab

[4]The university only allows integer number grades between 0 and 4. It is not possible for a student to earn a grade of 3.5, for example. The grades are as follows: A=4; B=3; C=2; D=1; and F=0. Appendix Figure A.1 plots the distribution of course grades.

[5]Introductory = courses numbered 0-299; Upper-level = 300-699; and Graduate = 700+. https://catalog.k-state.edu/content.php?catoid=60&navoid=12091

[6]We discuss the overlap of courses offered on both schedules in more detail in Section 3.

Table 2: Summary Statistics on Courses

	Mean	Std. Dev	Min	Max
Course-level Characteristics:+				
Number of Sections	1.79	2.66	1	58
Credit Hours	2.76	0.72	1	4
STEM Department	0.26	0.44	0	1
Attached Lab Section	0.15	0.35	0	1
Course Level:				
Introductory	0.21	0.41	0	1
Upper-Level	0.71	0.45	0	1
Graduate	0.07	0.26	0	1
Section-level Characteristics:++				
Start Time (minutes)	712	151	375	1170
Class Size	35.6	39.9	1	466
Treatment Variables:++				
Biweekly Schedule	0.28	0.45	0	1
Triweekly Schedule	0.30	0.46	0	1
Other Schedule	0.42	0.49	0	1
Enrollment-Weighted Treatment Variables:+++				
Biweekly Schedule	0.28	0.45	0	1
Triweekly Schedule	0.39	0.49	0	1
Other Schedule	0.32	0.47	0	1

+ Calculated using 19,636 unique course-by-term observations.
++ Calculated using 34,333 unique section-by-term observations.
+++ Calculated using 833,936 student-by-course observations.

or ungraded component, the class size, class size squared, the number of credit-hours the course is worth, and the detailed level of the course[7]. We estimate standard errors that are clustered at the student-level to allow for unobserved shocks within student that impact all of their course grades.

We include several dimensions of fixed effects to account for unobservable factors that may influence student outcomes. D_t represents semester fixed effects to account for term-specific differences in grading, including the possibility of grade inflation over time. D_d represent departmental fixed effects to account for unobserved differences in grading norms and disciplinary standards across departments. In our preferred specifications, we include student fixed effects, D_i, to control for unobserved student characteristics that

[7]This is measured using indicator variables for the leading digit of the course number – e.g., ECON120 and ENG101 are both "100-level" classes.

may result in students sorting to different course schedules. Note that, in specifications that include D_i, all time-invariant components of X_{it} are absorbed by the individual fixed effects.

Ideally, we would further control for course-specific fixed effects in our analysis. This would help alleviate concerns that, within a department, courses that are offered on the triweekly schedule are systematically easier or harder than the courses offered on the biweekly schedule (even after controlling for the observable course characteristics such as class size and course-level). However, there is a significant cost to including these fixed effects, which is that identifying variation would then only come from courses that offer multiple sections, with some of those sections being on a triweekly schedule and others being on the biweekly schedule (or courses that switch between the schedules over time). This induces what Miller, Shenhav, and Grosz (2023) term Selection Into Identification (SI) bias. The main implication of SI is that the fixed effects estimator is no longer representative of the Average Treatment Effect (ATE) for the full sample. The estimate of β_1 would instead identify a quantity similar to a Local ATE, but specifically for the sub-sample of "switcher" courses that are offered on both schedules. In our estimation sample, these "switchers" comprise only 41% of the student-by-course observations and only 18% of the unique course-offerings.[8] A simple balance test reveals that these switcher courses are also not representative of the overall sample in terms of observables. In Appendix Table A.1, we show that switcher courses are larger, more likely to attract Freshmen and Sophomore students, and are much less likely to be in STEM fields than the average course in our sample. Thus, any difference in the estimates between models with and without course-specific fixed effects will reflect not only potential bias in the "without" model, but also SI bias in the "with" model.

Similarly, the inclusion of instructor-specific fixed-effects limits identifying variation to those instructors who teach on both schedules (only 26% of instructors). As it is likely that any given instructor has a preferred schedule, these switcher-instructors may be concentrated among younger, less experienced faculty, non-tenure track faculty, and graduate student instructors who have less bargaining power within their department to negotiate one schedule over the other. Unfortunately, our data does not include instructor characteristics to further probe this hypothesis.

To address these selection issues, we propose an intermediate solution, which removes

[8] Including student fixed effects does not induce this type of selection as 99% of students take courses across both schedule types.

much of the potential course-level bias without inducing as much potential bias from SI. That is, we replace the department-level fixed effects with department-by-course-level fixed effects, $D_{d(l)}$.[9] In this specification, identifying variation is coming from comparisons between courses offered within the same department and at the same level (e.g. Intermediate Microeconomics, ECON520, to Intermediate Macroeconomics, ECON510) but on different weekly schedules. In Appendix Table A.1, we show that the sample of courses contributing to identifying variation in this specificatoin (i.e. courses that have at least 1 other course within the same department and level on the opposite schedule — biweekly vs. triweekly) is much more representative of the estimation sample as a whole. Furthermore, this subset of the data includes more than 85% of student-by-course observations and more than 80% of unique course-offerings.

Thus, our preferred specification includes semester, student, and department-by-course-level fixed effects. As a robustness check, we also estimate specifications including course fixed effects and including instructor fixed effects.[10] These estimates are reported along with the preferred specification in Table 3 and Table 4.

4 Results

Estimates of Equation 1 with course grade as the dependent variable are shown in Table 3. Across all specifications, the estimated coefficients indicate that taking courses on a triweekly schedule has a negative impact on students' final course grade. In column (1), we include only the schedule indicators, student and course characteristics, and semester fixed effects. This estimate of β_1 indicates that, compared to those on a biweekly meeting schedule, students who enroll in a section that meets triweekly receive grades that are 0.115 grade points lower. In column (2) we add department fixed effects. This shrinks the estimate considerably, suggesting that differences in grading norms and/or course difficulty across departments can account for some of the negative estimated effect.

Columns (3) and (4) show two alternate specifications, which (as discussed in Section 3) are likely to suffer from Selection Into Identification bias. We present the results here for the sake of transparency, but note that these estimates are unlikely to represent the true Average Treatment Effect. In column (3), we include instructor fixed effects. The

[9]Here we use aggregated course-levels: Introductory = courses numbered 0-299; Upper-level = 300-699; and Graduate = 700+.

[10]Note that specifications including instructor fixed effects cannot also include department fixed effects, as faculty almost never teach across multiple departments in the data.

Table 3: Effect of Course Schedule on Student Grades

	Outcome: Final Course Grade					
	(1)	(2)	(3)	(4)	(5)	(6)
Triweekly+	-0.1152***	-0.0447***	-0.0575***	-0.0102***	-0.0408***	-0.0251***
	(0.0030)	(0.0030)	(0.0039)	(0.0039)	(0.0030)	(0.0025)
Observations	833,936	833,935	833,857	833,809	833,933	833,889
R^2	0.178	0.218	0.270	0.261	0.224	0.528
Student & Course Characteristics	Y	Y	Y	Y	Y	Y++
Semester Fixed Effects	Y	Y	Y	Y	Y	Y
Department Fixed Effects	-	Y	-	-	-	-
Instructor Fixed Effects	-	-	Y	-	-	-
Course Fixed Effects	-	-	-	Y	-	-
Dept X Course-Level Fixed Effects	-	-	-	-	Y	Y
Student Fixed Effects	-	-	-	-	-	Y

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

+ Omitted category is 2 meetings/wk for 75 mins each.

++ This specification only includes time-varying student characteristics: academic level, and total number of credits enrolled.

Student Characteristics: female indicator, age, age-squared, race indicators, composite ACT score, initial major choice, academic level (freshman, sophomore, etc), first-time Freshman indicator, living on campus indicator, total number of credits enrolled in this semester. Course Characteristics: start time, class size, class size squared, number of sections offered, number of credit hours, indicator for attached lab section, and indicators for detailed course-level. Standard Errors are estimated allowing for clustering at the student level.

estimate in this specification is somewhat larger and more negative, however that may be driven by SI bias. If, as hypothesized in Section 3, less experienced instructors are more likely to teach on both biweekly and triweekly schedules, and those instructors are particularly unsuited to teaching on the triweekly schedule, then the estimate of β_1 when controlling for instructor fixed effects could be biased downward. Next, in column (4), we incorporate course-number fixed effects. This estimate is much smaller but remains negative and statistically significant. This specification is again, however, highly susceptible to SI bias. Identifying variation comes only from those courses that offer multiple sections across both the triweekly and biweekly schedules. As shown in Appendix Table A.1, those courses tend to be disproportionately larger, non-STEM classes that enroll a high fraction of Freshmen students. If these types of courses also tend to be better suited to the triweekly schedule than the average course, the estimate of β_1 in this specification could be biased upward.[11]

[11] In fact, we show in Section 4.2 that there is heterogeneity in the effects of class scheduling across course characteristics. Specifically, that students perform worse on the triweekly schedule if a course is either an upper-level course or if it is in a STEM subject. But in introductory-level, non-STEM courses students

To mitigate the issue of Selection Into Identification, in column (5) we replace the course fixed effects with department-by-course-level fixed effects. And finally, in column (6) we present our preferred specification, which includes individual student fixed effects to account for unobserved differences across students that might lead to sorting into triweekly or biweekly sections. In this within-student specification, we estimate that when a student enrolls in a triweekly class, their grade is 0.025 grade points lower than when they enroll in a biweekly class. At the mean grade (3.00), this is approximately equivalent to a 1% decline. In sum, in our most restrictive model, we observe a small but statistically significant difference in student grades that indicates that students benefit from the biweekly course schedule.

Table 4: Effect of Course Schedule on Student Pass/Fail Outcomes

	Outcome: Final Course Grade					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Earns an "A" grade						
Triweekly^{+}	-0.0583***	-0.0244***	-0.0268***	-0.0063***	-0.0217***	-0.0168***
	(0.0014)	(0.0013)	(0.0017)	(0.0017)	(0.0013)	(0.0012)
Panel B: Does not pass class						
Triweekly^{+}	0.0128***	0.0031***	0.0069***	-0.0006	0.0029***	-0.0003
	(0.0008)	(0.0009)	(0.0011)	(0.0011)	(0.0009)	(0.0008)
Observations	833,936	833,935	833,857	833,809	833,933	833,889
Student & Course Characteristics	Y	Y	Y	Y	Y	Y^{++}
Semester Fixed Effects	Y	Y	Y	Y	Y	Y
Department Fixed Effects	-	Y	-	-	-	-
Instructor Fixed Effects	-	-	Y	-	-	-
Course Fixed Effects	-	-	-	Y	-	-
Dept X Course-Level Fixed Effects	-	-	-	-	Y	Y
Student Fixed Effects	-	-	-	-	-	Y

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$
$^{+}$ Omitted category is 2 meetings/wk for 75 mins each.
$^{++}$ This specification only includes time-varying student characteristics: academic level, and total number of credits enrolled.
Student Characteristics: female indicator, age, age-squared, race indicators, composite ACT score, initial major choice, academic level (freshman, sophomore, etc), first-time Freshman indicator, living on campus indicator, total number of credits enrolled in this semester. Course Characteristics: start time, class size, class size squared, number of sections offered, number of credit hours, indicator for attached lab section, and indicators for detailed course-level. Standard Errors are estimated allowing for clustering at the student level.

We next investigate whether this negative effect on grades impacts students at all parts

actually fare slightly better on the triweekly schedule.

of the grade distribution. Specifically, we examine nonlinearities in the grade effect by replacing our continuous outcome variable with indicator variables that measure the probability of achieving an "A" grade in the course and the probability of failing to pass the course. In Panel A of Table 4, we estimate Equation 1 with an indicator for earning a grade of 4.0 as the dependent variable. In Panel B, we replace the dependent variable with an indicator variable that equals one if the student earns a grade of "D", "F", "Incomplete", "No Credit", or withdraws from the class. These results show that, in our preferred specification including student fixed effects, column (6), the triweekly course schedule decreases the probability of earning an "A" by 1.68 percentage points (a 4% reduction from the mean). This effect at the top of the grade distribution is noticeably larger than the overall effect on average course grades. The estimates for the impact of the triweekly schedule on failing a course are very small and not statistically significant in our preferred model. These results demonstrate that course schedule impacts student grades, primarily at the high end of the achievement distribution.[12]

4.1 Heterogeneity Across Student Characteristics

In Table 5, we examine the effects of course scheduling by gender using our preferred specification with student-specific fixed effects. We find that both male and female students taking triweekly classes earn lower grades than when they take biweekly courses (columns (1) and (2)). The negative impact of the triweekly schedule is just slightly larger for male students (by 0.0087 grade points), however that difference is statistically significant at the 10% level. If we consider that male students tend to have lower grades on average, this also translates into a larger shift down from the mean — 1% for men vs. 0.7% for women.

We next examine the effects of course scheduling separately for higher and lower ability students, as measured by the student's pre-college ACT scores in columns (3) and (4) of Table 5. We observe that students with low ACT and high ACT scores earn similarly lower grades when enrolled in triweekly classes. The difference in the coefficients between these two groups is very small and is not statistically different from zero. Finally, we separate the student sample by race. Because the K-State population is predominantly white (85%), we simply split the sample into "white" and "all other race/ethnicities." The results in columns (5) and (6), show again, that while the negative effect of the triweekly

[12] The overall distribution of grades is shown in Appendix Figure A.1. The modal grade in the sample is an "A", with 45% of observations.

Table 5: Effect of Course Schedule on Student Grades - By Student Characteristics

	Outcome: Final Course Grade					
	By Gender		By Ability		By Race	
	Male (1)	Female (2)	Low ACT (3)	High ACT (4)	White (5)	Other Race (6)
Triweekly^{+}	-0.0296***	-0.0209***	-0.0298***	-0.0231***	-0.0233***	-0.0349***
	(0.0036)	(0.0034)	(0.0036)	(0.0033)	(0.0026)	(0.0070)
Mean Outcome	2.923	3.196	2.832	3.296	3.104	2.789
Observations	424,097	409,775	429,961	403,912	708,408	125,464

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

$^{+}$ Omitted category is 2 meetings/wk for 75 mins each.

Low ACT = composite score $\leq$ median score of 24. High ACT = composite score $>$ 24.

All columns include: semester fixed effects, student fixed effects, and department-by-course level fixed effects as well as student characteristics (academic level and total number of credits enrolled in this semester) and course characteristics (start time, class size, class size squared, number of sections offered, number of credit hours, indicator for attached lab section, and indicators for detailed course-level). Standard Errors are estimated allowing for clustering at the student level.

schedule on grades is slightly larger for the other-race group, that difference is small and statistically insignificant. Thus, we conclude that, while the estimates may be slightly larger for male students, overall we find that the deleterious effects of taking triweekly classes on course grade are quite consistent across different student characteristic groups.

4.2 Heterogeneity Across Course Characteristics

We next investigate whether the impact of the academic schedule on student grades might vary across different course characteristics. It is possible that some types of courses may be a better fit for the shorter, more frequent, triweekly schedule while others are better suited to the longer lectures of the biweekly schedule. We examine this possibility in Table 6.

We first separate the sample by course subject matter — STEM vs. non-STEM.[13] The resulting estimates, shown in columns (1) and (2) of Table 6, make evident that the negative impacts of triweekly scheduling are almost entirely driven by students' performance in STEM-based classes. The negative effect of the triweekly schedule is nearly ten times larger in STEM courses than in non-STEM courses. Students taking a STEM course on the

[13]We assign each course code to a subject (e.g. ECON101 to economics) and then map those subjects into general field groupings. The full list of subjects and field groups are shown in Appendix Table A.2.

Table 6: Effect of Course Schedule on Student Grades - By Course Characteristics

	Outcome: Final Course Grade			
	By Course Subject		By Course Level	
	Non-STEM (1)	STEM (2)	Intro (3)	Upper (4)
Triweekly+	-0.0071**	-0.0621***	0.0115***	-0.0577***
	(0.0028)	(0.0058)	(0.0037)	(0.0033)
Mean Outcome	3.141	2.892	2.930	3.192
Observations	563,184	265,157	421,121	409,041

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

+ Omitted category is 2 meetings/wk for 75 mins each.

Intro-level = courses numbered 0-299. Upper-level = courses numbered 300+.

All columns include: semester fixed effects, student fixed effects, and department-by-course level fixed effects as well as student characteristics (academic level and total number of credits enrolled in this semester) and course characteristics (start time, class size, class size squared, number of sections offered, number of credit hours, indicator for attached lab section, and indicators for detailed course-level). Standard Errors are estimated allowing for clustering at the student level.

triweekly schedule earn grades that are 0.062 grade points lower, which represents a 2% reduction at the mean. This finding implies that the triweekly schedule is not conducive to either the content and/or delivery of STEM materials. One possible explanation is that students may require longer, uninterrupted lectures in order to absorb complex quantitative or scientific ideas.

In columns (3) and (4) of Table 6, we see that there is also significant heterogeneity in the impact of the weekly schedule across different course levels. The negative impact of the triweekly schedule is very pronounced in upper-level courses. Students taking upper-level courses on the triweekly schedule earn grades that are 0.058 grade points lower, which represents a 2% reduction at the mean. In introductory courses, on the other hand, the effect is completely reversed and students appear to actually perform somewhat *better* on the triweekly schedule.

This heterogeneity in the treatment effects could be driven by differences in the materials or style of upper-level courses being less suited to the triweekly schedule (as with STEM courses), or it could reflect that introductory classes are taken mostly by freshmen students. It may be the case that first-year students are more accustomed to the shorter, more frequent, class meetings common in high school settings, and therefore perform slightly better in triweekly classes. As they progress through their college careers, their attention spans and study habits might adapt to the biweekly schedule.

Table 7: Effect of Course Schedule on Student Grades - By Course Level and Academic Standing

	Outcome: Final Course Grade							
	Freshmen		Sophomores		Juniors		Seniors	
	Intro Course (1)	Upper Course (2)	Intro Course (3)	Upper Course (4)	Intro Course (5)	Upper Course (6)	Intro Course (7)	Upper Course (8)
Triweekly^{+}	0.0176***	-0.0980***	0.0162**	-0.0631***	0.0219*	-0.0327***	-0.0016	-0.0565***
	(0.0054)	(0.0291)	(0.0070)	(0.0087)	(0.0124)	(0.0059)	(0.0192)	(0.0050)
Mean Outcome	2.864	3.027	2.992	3.142	2.958	3.158	3.057	3.253
Observations	218,547	11,271	124,300	78,639	45,508	137,469	19,393	170,564

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$
$^{+}$ Omitted category is 2 meetings/wk for 75 mins each.
All columns include: semester fixed effects, student fixed effects, and department-by-course level fixed effects as well as student characteristics (total number of credits enrolled in this semester) and course characteristics (start time, class size, class size squared, number of sections offered, number of credit hours, indicator for attached lab section, and indicators for detailed course-level). Standard Errors are estimated allowing for clustering at the student level.

Table 7 addresses this hypothesis. We further separate the data by both course level and by students' academic rank. We find that the positive response to introductory classes taken on the triweekly schedule is largely consistent across students who are freshmen, sophomores, and juniors.[14] We also observe that the negative impact of the triweekly schedule in upper-level courses is consistent across students at all academic ranks. This suggests that it is not that the students' learning styles are adapting over their academic careers, but rather that the materials in upper-level courses are better suited to the biweekly schedule, reflecting our findings on STEM courses.

Putting these two sources of heterogeneity together, we next divide the data by both STEM/non-STEM content and by course level. The results, shown in in Table 8, reveal that students perform worse on a triweekly schedule if the course is *either* an upper-level class or in a STEM field. The small positive impact of the triweekly schedule is only present within the sub-sample of introductory-level, non-STEM classes. These results strongly suggest that harder course materials are better suited to the biweekly schedule. It seems likely that the longer class times in the biweekly schedule are providing students

[14]There is no effect of the academic schedule for senior students in introductory classes, but this may simply reflect the fact that less than 13% of senior course-taking is at the introductory level.

with the additional time that they need to grasp more complicated course content.

Table 8: Effect of Course Schedule on Student Grades - By Course Level and Subject

	Outcome: Final Course Grade			
	Non-STEM Course		STEM Course	
	Intro (1)	Upper (2)	Intro (3)	Upper (4)
Triweekly^{+}	0.0102** (0.0044)	-0.0425*** (0.0038)	-0.0440*** (0.0092)	-0.0480*** (0.0082)
Mean Outcome	3.027	3.255	2.763	3.048
Observations	272,568	285,070	141,222	114,317

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$
$^{+}$ Omitted category is 2 meetings/wk for 75 mins each.
All columns include: semester fixed effects, student fixed effects, and department-by-course level fixed effects as well as student characteristics (total number of credits enrolled in this semester) and course characteristics (start time, class size, class size squared, number of sections offered, number of credit hours, indicator for attached lab section, and indicators for detailed course-level). Standard Errors are estimated allowing for clustering at the student level.

4.3 Future Course-taking Outcomes

Do these deleterious effects of the triweekly schedule in harder, more quantitative courses translate into students' decisions concerning future course-taking? Given that students experience these negative outcomes from taking STEM (and upper-level) classes on the triweekly schedule, we might expect that they avoid similar classes in future semesters. This could manifest as an unwillingness to take future classes in the same subject matter. To investigate this possibility, we restrict the estimation sample to courses taken in the first school-year of enrollment by first-time freshmen students in order to better capture the potentially formative impact of a student's initial exposure to the triweekly or biweekly schedule. We replace the outcome variable in Equation 1 with a series of indicator variables for whether the students takes a subsequent class in the same department within 1, 2, or 3 semesters of the initial enrollment term.

Column (1) of Table 9 shows the effect of taking a course as a freshman in the triweekly schedule on the probability of enrolling in another course in the same department in the very next semester. Using our preferred specification, we find that, when a course is taken

Table 9: Effect of Course Schedule on Future Course-Taking & Majoring

	Enrolls in Subsequent Course in Department Within:				Majors in Same Field By Year 3	
	1 Term	2 Terms	3 Terms			
	(1)	(2)	(3)	(4)	(5)	(6)
Triweekly+	-0.0173***	-0.0201***	-0.0238***	-0.0147***	0.0021	0.0059***
	(0.0027)	(0.0029)	(0.0029)	(0.0033)	(0.0017)	(0.0020)
Triweekly×STEM				-0.0491***		-0.0193***
				(0.0074)		(0.0040)
Effect of Triweekly in STEM Courses				-0.0637***		-0.0133***
				(0.0066)		(0.0034)
Mean Outcome	0.284	0.363	0.399	0.399	0.103	0.103
Observations	213,944	213,944	213,944	213,944	156,536	156,536

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$
+ Omitted category is 2 meetings/wk for 75 mins each.
All columns include: semester fixed effects, student fixed effects, and department-by-course level fixed effects as well as student characteristics (total number of credits enrolled in this semester) and course characteristics (start time, class size, class size squared, number of sections offered, number of credit hours, indicator for attached lab section, and indicators for detailed course-level). Standard Errors are estimated allowing for clustering at the student level.

on the triweekly schedule, freshmen students are then 1.7 percentage points less likely to follow up with another course in that same field in the following term (a 6% reduction at the mean). This negative effect is even larger when we we expand the window to look at 2 and 3 semesters after the initial freshman experience (columns (2) and (3)).

At first pass, this feels contradictory to the fact that most freshmen course-taking is in introductory classes (91%) and we have seen (in Table 6) that students actually do slightly better in triweekly, introductory classes. However, if we again allow for heterogeneity by course material, we see that this negative impact on future course-taking is largely driven by course-taking within the STEM fields (consistent with the findings in Table 8). In column (4) of Table 9, we interact the course schedule variables with an indicator for if the course is in a STEM subject.[15] Students whose first STEM course is taken on the triweekly schedule are 6.4pp less likely to take a subsequent course in that STEM field.[16]

[15]In this analysis we do not sub-sample by course subject as the sample is already restricted to courses taken in each student's first year of enrollment. With the inclusion of student fixed effects, sub-sampling to STEM courses would necessarily drop all observations for any student who did not take 2 or more STEM course in his or her first year.

[16]The total effect of the triweekly schedule on future course-taking, conditional on being in a STEM field,

If we then replace the dependent variable with an indicator variable for if the student is observed with a declared major in the same field as the first-year course (columns (5) and (6) of Table 9), we see that, not only does the course schedule impact student course-taking behavior, it also impacts the student's choice of major. Again, these effects are heterogeneous across course subject. Students whose first course in a non-STEM subject is taken on the triweekly schedule are slightly more likely to major in that field (measured at the beginning of the 3rd year of enrollment). However, students whose first STEM course is taken on the triweekly schedule are 1.3pp less likely to major in that field.

These findings are striking: the weekly scheduling of a student's initial set of college courses appears to exert a substantial influence on subsequent decisions to enroll in additional courses and ultimately impacts their choice of major. Given the importance placed on cultivating interest in STEM fields, this result warrants careful consideration in efforts to encourage greater persistence and participation in these majors.

5 Discussion and Conclusion

Our results indicate that the triweekly course schedule, overall, has detrimental effects on students' postsecondary short-run outcomes. Specifically, students taking triweekly courses relative to biweekly courses earn lower grades on average and are significantly less likely to earn an "A" grade in the course. These main findings are robust to the inclusion of a battery of fixed effects including: student-specific, course-specific, instructor-specific, and department-by-level-specific fixed effects.

We also uncover important heterogeneity in these effects across course-level characteristics. Namely, we find that the negative grade impacts of the triweekly schedule are driven by course-taking in STEM fields and in upper-level courses. These results are consistent with the hypothesis that more complicated, in-depth, or quantitative course material is better matched to the longer lectures offered on the biweekly schedule.

Finally, we investigate whether the negative grade outcomes, specifically in STEM courses, lead to longer-term effects on students' course enrollment decisions and major choices. We find that freshmen students who experience a first-year STEM course on the triweekly schedule are significantly less likely to take a subsequent course in that field and are less likely to major in that subject. Given the large amount of public interest in

is the sum of the coefficient on the uninteracted triweekly indicator and the coefficient on the interaction term between the triweekly and STEM indicators: $-0.0147 + -0.0491 = -0.0637^{***}$.

encouraging the pursuit of STEM majors, this result merits further investigation. Future work might implement an experimental framework to validate these results or might pursue replication in other higher education settings.

Additional work is also needed to further understand the mechanisms behind these detrimental effects of the triweekly schedule. Our results provide suggestive evidence that the triweekly course schedule may not be a good fit for courses where the harder materials call for longer lectures. It is also possible that the biweekly schedule provides more flexibility for some students to optimally structure their weeks, resulting in better academic outcomes. On the other hand, perhaps the triweekly schedule induces some students to come to class less often (particularly on Fridays), resulting in worse outcomes. Unfortunately, we are not able to observe students' class attendance or their work and social behaviors to examine these mechanisms. It is also possible that the biweekly schedule may provide more time and incentives for faculty to engage with students. As Carrell and Kurlaender (2023) demonstrate, faculty engagement can have substantial effects on students' postsecondary outcomes.

An alternative explanation is that the biweekly schedule develops more "cognitive endurance" in college students relative to the triweekly schedule, which is particularly relevant for harder materials found in STEM and upper-level courses. Recent research on cognitive endurance, the skill of maintaining focus over time, has shown that it is associated with college attendance, college graduation, and wage outcomes (Reyes 2023). Relatedly, field experiments have shown that increasing cognitive endurance may increase student ability to accumulate traditional human capital (Alan, Boneva, and Ertac 2019; Brown et al. 2022), which would explain the academic outcomes we observe. To this point, we do find suggestive evidence that taking once-weekly courses has positive effects relative to taking twice-weekly courses.[17]

Overall, our results add to the growing literature that examines non-student interventions at the postsecondary level of education that may have short- and longer-run effects. As colleges explore "light touch" interventions such as changing faculty engagement (e.g., Carrell and Kurlaender (2023)) or shifting from quarters to semesters (e.g., Bostwick, Fischer, and Lang (2022)), colleges and universities should also consider shifting from triweekly classes to biweekly classes to improve student academic performance and to potentially encourage majoring in the STEM fields.

[17] Results available upon request.

References

Alan, Sule, Teodora Boneva, and Seda Ertac. 2019. "Ever Failed, Try Again, Succeed Better: Results from a Randomized Educational Intervention on Grit." *The Quarterly Journal of Economics* 134 (3): 1121–1162.

Altonji, J.G., P. Arcidiacono, and A. Maurel. 2016. "Chapter 7 - The Analysis of Field Choice in College and Graduate School: Determinants and Wage Effects," edited by Eric A. Hanushek, Stephen Machin, and Ludger Woessmann, 5:305–396. Handbook of the Economics of Education. Elsevier.

Anderson, Mark D., and Mary Beth Walker. 2015. "Does Shortening the School Week Impact Student Performance? Evidence from the Four-Day School Week." *Education Finance and Policy* 10 (3): 314–349.

Bostwick, Valerie, Stefanie Fischer, and Matthew Lang. 2022. "Semesters or Quarters? The Effect of the Academic Calendar on Postsecondary Student Outcomes." *American Economic Journal: Economic Policy* 14 (1): 40–80.

Bostwick, Valerie K. 2018. "Saved by the Morning Bell: School Start Time and Teen Car Accidents." *Contemporary Economic Policy* 36 (4): 591–606.

Brown, Christina L., Supreet Kaur, Greeta Kingdon, and Heather Schofield. 2022. "Cognitive Endurance as Human Capital." *NBER Working Paper Series* June (wp30133).

Carrell, Scott E, and Michal Kurlaender. 2023. "My Professor Cares: Experimental Evidence on the Role of Faculty Engagement." *American Economic Journal: Economic Policy* 15 (4): 113–141.

Carrell, Scott E., Teny Maghakian, and James E. West. 2011. "A's from Zzzz's? The Causal Effect of School Start Time on the Academic Achievement of Adolescents." *American Economic Journal: Economic Policy* 3 (3): 62–81.

Daniel, Eileen L. 2000. "A review of time-shortened courses across disciplines." *College Student Journal* 34 (2): 298–309.

Depro, Brooks, and Kathryn Rouse. 2015. "The effect of multi-track year-round academic calendars on property values: Evidence from district imposed school calendar conversions." *Economics of Education Review* 49:157–171.

Diette, Timothy M., and Manu Raghav. 2018. "Do GPAs Differ Between Longer Classes and More Frequent Classes at Liberal Arts Colleges?" *Research in Higher Education* 59 (4): 519–527.

Dills, Angela K., and Rey Hernández-Julián. 2008. "Course scheduling and academic performance." *Economics of Education Review* 27 (6): 646–654.

Edwards, Finley. 2012. "Early to rise? The effect of daily start times on academic performance." *Economics of Education Review* 31 (6): 970–983.

Fischer, Stefanie, and Daniel Argyle. 2018. "Juvenile crime and the four-day school week." *Economics of Education Review* 64:31–39.

Graves, Jennifer. 2010. "The academic impact of multi-track year-round school calendars: A response to school overcrowding." *Journal of Urban Economics* 67 (3): 378–391.

Henderson, Mihaela, Mary Drummond, Erin Thomsen, Shauna Yates, and Jennifer Cooney. 2022. "Baccalaureate and Beyond (B&B:16/20): A First Look at the 2020 Employment and Education Experiences of 2015–16 College Graduates." *National Center for Education Statistics.*

Hinrichs, Peter. 2011. "When the Bell Tolls: The Effects of School Starting Times on Academic Achievement." *Education Finance and Policy* 6 (4): 486–507.

Hughes, Woodrow W. 2004. "Blocking student performance in high school?" *Economics of Education Review* 23 (6): 663–667.

Joyce, Ted, Sean Crockett, David A. Jaeger, Onur Altindag, and Stephen D. O'Connell. 2015. "Does classroom time matter?" *Economics of Education Review* 46:64–77.

Lawrence, William W., and Danny D. McPherson. 2000. "A Comparative Study of Block Scheduling and Traditional Scheduling on Academic Achievement." *Journal of Instructional Psychology* 27 (3): 178–82.

Lewis, C. W., J. J. Dugan, M. A. Winokur, and R. B. Cobb. 2005. "The Effects of Block Scheduling on High School Academic Achievement." *NASSP Bulletin* 89 (645): 72–87.

Logan, Ruth, and Peter Geltner. 2000. "The Influence of Session Length On Student Success." *RP Group Proceedings.*

Ma, Jennifer, Matea Pender, and Meredith Welch. 2019. "Education Pays 2019: The Benefits of Higher Education for Individuals and Society." *College Board Trends in Higher Education Series.*

McMullen, Steven C., and Kathryn E. Rouse. 2012. "The Impact of Year-Round Schooling on Academic Achievement: Evidence from Mandatory School Calendar Conversions." *American Economic Journal: Economic Policy* 4 (4): 230–52.

Miller, Douglas L, Na'ama Shenhav, and Michel Grosz. 2023. "Selection into Identification in Fixed Effects Models, with Application to Head Start." *Journal of Human Resources* 58 (5): 1523–1566.

Mumford, Kevin J., Richard W. Patterson, and Anthony Yim. 2024. "College Course Shutouts." *EdWorkingPapers.com.*

Patterson, Richard W., Nolan G. Pope, and Aaron Feudo. 2021. "Timing Matters: Evidence from College Major Decisions." *Journal of Human Resources* 58 (4): 1347–1384.

Reyes, Germán. 2023. "Cognitive Endurance, Talent Selection, and the Labor Market Returns to Human Capital."

Rice, Jennifer King, Robert G. Croninger, and Christopher F. Roellke. 2002. "The Effect of Block Scheduling High School Mathematics Courses on Student Achievement and Teachers' Use of Time: Implications for Educational Productivity." *Economics of Education Review* 21 (6): 599–607.

Veal, William R., and James Schreiber. 1999. "Effects of Block Scheduling." *Education Policy Analysis Archives* 7 (0): 29.

Yim, Anthony Lokting. 2024. "How Early Morning Classes Change Academic Trajectories: Evidence from a Natural Experiment." *EdWorkingPapers.com.*

Zepeda, Sally J., and R. Stewart Mayers. 2006. "An analysis of research on block scheduling." *Review of Educational Research* 76 (1): 137–170.

Table A.1: Summary Statistics For Schedule-"Switchers"

	All Courses	Courses Offered Both Schedules	Courses in Dept-Levels Including Both Schedules*
Course-level Characteristics			
Number of Sections	1.79	2.36	1.82
Attached Lab Section	0.15	0.05	0.15
Class Size	62.28	101.98	66.10
Course Level:			
Introductory	0.21	0.26	0.19
Upper-Level	0.71	0.70	0.74
Graduate	0.07	0.05	0.07
Subject Field:			
Agriculture	0.12	0.05	0.11
Architecture	0.04	0.01	0.05
Business	0.06	0.09	0.06
Education	0.06	0.02	0.01
Health and Human Sciences	0.06	0.03	0.07
Humanities and Social Sciences	0.36	0.59	0.38
Science and Engineering	0.26	0.17	0.28
Other	0.03	0.03	0.04
Obs	19,636	4,997	15,834
Student-level Characteristics			
Female	0.49	0.50	0.48
Age	19.88	19.73	19.89
First-Time Freshman	0.84	0.86	0.84
Composite ACT Score	24.61	24.22	24.67
Academic Level:			
Freshman	0.29	0.33	0.28
Sophomore	0.25	0.28	0.25
Junior	0.23	0.21	0.23
Senior	0.23	0.18	0.24
Obs	833,936	345,076	711,302

* This column includes all courses within any department and level (e.g. Introductory-level Biology courses) that includes at least one course-offering on the biweekly schedule and at least one course-offering on the triweekly schedule.

Figure A.1: Distribution of Course Grades

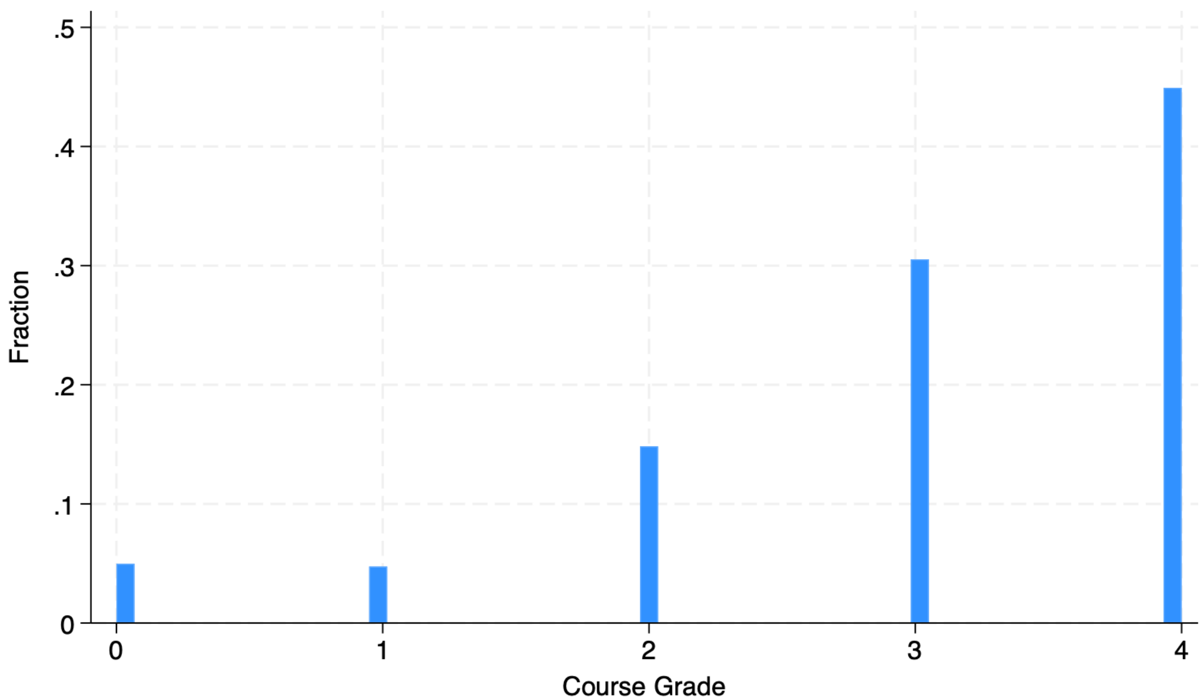

Table A.2: Course Subjects and STEM Designations

Subject	Field Group	Subject	Field Group
Agric Comm & Journalism	Agriculture	French	Humanities and Social Sciences
Agricultural Education	Agriculture	Gender Women Sexuality Stdy	Humanities and Social Sciences
Agricultural Technology Mgmt	Agriculture	History	Humanities and Social Sciences
Agriculture	Agriculture	Mass Communications	Humanities and Social Sciences
Agronomy	Agriculture	Modern Languages	Humanities and Social Sciences
Animal Sciences and Industry	Agriculture	Music	Humanities and Social Sciences
Food Science And Industry	Agriculture	Philosophy	Humanities and Social Sciences
Horticulture	Agriculture	Political Science	Humanities and Social Sciences
Park Mgmt & Conservation	Agriculture	Psychology	Humanities and Social Sciences
Wildlife & Outdoor Ent Mangt	Agriculture	Sociology	Humanities and Social Sciences
Architectural Engineering	Architecture	Spanish	Humanities and Social Sciences
Architecture & Design	Architecture	Theatre	Humanities and Social Sciences
Environmental Design	Architecture	Women's Studies	Humanities and Social Sciences
Industrial Design	Architecture	Apparel and Textiles	Other
Interior Arch & Product Dsgn	Architecture	Computer Systems Technology	Other
Interior Architecture	Architecture	Fashion Studies	Other
Landscape Architecture	Architecture	Hospitality Management	Other
Accounting	Business	Interior Design	Other
Entrepreneurship & Innovation	Business	Leadership Studies	Other
Finance	Business	Personal Financial Plan	Other
General Business Admin	Business	Professional Pilot	Other
Management	Business	Unmanned Aircraft Syst	Other
Marketing	Business	Aerospace Studies	Science and Engineering
Mgmt Information Systems	Business	Biochemistry	Science and Engineering
Prof Strategic Selling	Business	Biological Systems Engg	Science and Engineering
Early Childhood Education	Education	Biology	Science and Engineering
Education	Education	Biomedical Engineering	Science and Engineering
Elementary Education	Education	Chemical Engineering	Science and Engineering
Secondary Educ PreProfess	Education	Chemistry	Science and Engineering
Athletic Training	Health and Human Sciences	Civil Engineering	Science and Engineering
Comm Sciences & Disorders	Health and Human Sciences	Computer Science	Science and Engineering
Conflict Resolution	Health and Human Sciences	Construction Sci & Mgmt	Science and Engineering
Family Studies & Human Serv	Health and Human Sciences	Electrical Engineering	Science and Engineering
Human Dev & Fam Science	Health and Human Sciences	Engineering	Science and Engineering
Human Ecology	Health and Human Sciences	Entomology	Science and Engineering
Integrative Physiology	Health and Human Sciences	Geography	Science and Engineering
Kinesiology	Health and Human Sciences	Geology	Science and Engineering
Social Work	Health and Human Sciences	Industrial Engineering	Science and Engineering
American Ethnic Studies	Humanities and Social Sciences	Mathematics	Science and Engineering
Anthropology	Humanities and Social Sciences	Mechanical Engineering	Science and Engineering
Art	Humanities and Social Sciences	Medical Laboratory Science	Science and Engineering
Classical Studies	Humanities and Social Sciences	Natural Resources & Envir Sci	Science and Engineering
Communication Studies	Humanities and Social Sciences	Physical Sciences	Science and Engineering
Dance	Humanities and Social Sciences	Physics	Science and Engineering
Economics	Humanities and Social Sciences	Statistics	Science and Engineering
English	Humanities and Social Sciences	Veterinary Medicine	Science and Engineering

All courses on subjects within the Science and Engineering field group are considered STEM courses in our analyses. All other subjects are considered non-STEM.