2026 ASEE ANNUAL CONFERENCE June 21–24, 2026 | Charlotte Convention Center, NC
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ASEE AMERICAN SOCIETY FOR ENGINEERING EDUCATION
Paper ID #51282

Are Transfer Students Thriving? An Analysis of Academic Success of Transfer Students in the First Year Engineering Program

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Abstract

This evidence-based practice paper examines the success of students who transfer into the First-Year Engineering Program (FEP) within the College of Engineering (CoE) at the University of Arkansas. Transfer students represent an important and growing segment of undergraduate engineering programs nationwide. Upon transferring to a new college or university, these students may encounter challenges such as adapting to a different institutional culture, navigating unfamiliar academic systems, and managing the complexities of credit transfer. Such challenges can contribute to lower retention and graduation rates compared to students who begin as first-time, full-time freshmen at four-year universities. However, with adequate academic support, a strong sense of belonging, and clearly defined goals, transfer students can achieve persistence and graduation outcomes comparable to their first-time freshman peers.

Unlike traditional first-year engineering students who complete a two-course, in-person introductory course sequence, transfer students at our University enroll in an accelerated online Introduction to Engineering course designed to facilitate their timely transition into their respective engineering departments. This study will analyze retention and graduation rates of these transfer students to better understand patterns of persistence and progression.

Since the establishment of the FEP in 2007, approximately 33% of engineering students have graduated within four years, with five- and six-year graduation rates approaching 50%. This study seeks to compare the academic outcomes of transfer students with those of traditional FEP students to identify factors that influence transfer student success and persistence. Some variables of interest include the number of transferable credits, enrollment status within the College, and term of admittance. The findings will provide valuable insights for academic advisors, program administrators, and faculty as they assess the need for enhanced support structures, advising interventions, and targeted programming to facilitate the transition and promote the success of transfer students within the College of Engineering.

Introduction

Transfer students represent a substantial and growing segment of the undergraduate engineering population. This group includes students who begin their postsecondary education at community colleges as well as those who transfer laterally between four-year institutions. National data indicate that fewer than one-third of first-time-in-college students who began at a community college in Fall 2017 transferred to a four-year institution within six years (31.6%). Among those who transferred, slightly less than half completed a bachelor's degree (49.7%). These outcomes are consistent with trends observed in the preceding entering cohort, following several years of modest increases [1].

Prior research has documented disparities in retention and graduation rates between transfer students and traditional first-year, first-time students [2]. However, these outcomes can vary substantially depending on the amount of coursework completed prior to transfer [4]. In addition,

commonly used measures of success do not fully account for the experiences of nontraditional learners, that is, those whose academic goals and pathways may not follow the same linear four-year graduation timeline typical of traditional first-year students [5]. For students transferring from two-year institutions, Ogilvie found that the primary motivations for starting at a community college included financial considerations, academic flexibility, and personal commitments outside of academics [6]. Students who transfer laterally between four-year institutions do so for a variety of reasons, including changes in academic major, institutional fit, financial considerations, or geographic constraints. Although a new institution offers advantages in these areas, transfer students commonly encounter challenges during the transition process, including difficulties with credit transfer, increased tuition and fee costs, and the need to adapt to new academic expectations and institutional cultures [4, 7].

First-year engineering programs have been widely implemented to support students' transition into engineering education. These programs aim to ease the shift to college-level rigor, support early development of engineering identity and belonging, improve retention through structured academic support, and introduce core engineering skills beyond foundational math and science, including design thinking, teamwork, communication, and problem-solving. Although these goals are relevant for both traditional first-year and transfer students, the instructional approaches used in first-year programs may not fully align with transfer students' prior experiences. Transfer students often enter with college-level learning skills but lack the prerequisites needed for discipline-specific engineering courses, which can make traditional first-year models feel misaligned or redundant.

The First-Year Engineering Program (FEP) at the University of Arkansas was established in 2007 as a required two-semester foundational program for incoming engineering freshmen. The program is designed to provide students with the academic foundation, support structures, and experiential learning needed for success in engineering, while also enabling them to make an informed decision about their intended major. Students enter the program as Engineering First-Year Students and complete a common curriculum across both semesters before formally declaring an engineering major near the end of the spring term. The most common first-year curriculum includes Introduction to Engineering I and II, Calculus I and II, Chemistry, Physics, a science elective, Composition I and II, and a core elective. Instruction in the introductory engineering courses include twice-weekly in-person lectures, a weekly discussion session, and weekly one-on-one peer mentoring meetings. This curriculum structure was not an ideal fit for the needs of most incoming transfer students. Therefore, FEP established a Spring only course (GNEG 1103) for transfer students which consolidated the content of Introduction to Engineering I and II.

In 2013, FEP adapted this course as a half-semester (8 week) asynchronous online course designed to also accommodate students who wish to begin progress toward their engineering degree prior to arriving on campus. The learning outcomes for this course include:

- develop fundamental skills necessary to solve basic engineering problems;
- demonstrate an ability to manipulate and present data with spreadsheets;
- apply a structured, engineering problem solving approach;
- utilize the engineering design process to solve open-ended problems;

- differentiate disciplines within the College of Engineering,
- recognize academic requirements and opportunities associated with being a University of Arkansas engineering student;
- identify of the resources available to University of Arkansas students for maintaining all aspects of personal wellness; and
- demonstrate independence, responsibility and effectiveness toward learning with the necessary skills and mindset to succeed academically in future educational endeavors.

The coursework and learning objectives are equivalent to that of the in-person Introduction to Engineering course sequence, but it excludes the hands-on, active-learning team projects that comprise approximately half of both the fall and spring semesters.

By Fall 2014, FEP began offering the course each semester, Fall, Spring and Summer. The accelerated format allows transfer students to enter their chosen engineering major more quickly, facilitating earlier development of discipline-specific identity and integration into departmental communities and curricula. The purpose of this paper is to compare the performance, persistence, and success of transfer students at the University of Arkansas with those of traditional first-year engineering students.

Research Questions

Q1: How do academic performance outcomes in GNEG 1103 differ between transfer students and students completing the traditional first-year engineering course sequence?

Q2: How does term of enrollment (fall, spring, or summer) relate to academic performance outcomes for students completing GNEG 1103?

Q3: What are the longer-term academic outcomes of students who complete GNEG 1103, including graduation within engineering, graduation outside engineering, or non-completion?

Methods

This study utilizes institutional records from the First-Year Engineering Program (FEP) and university-wide graduation data systems. The dataset included students enrolled in the accelerated GNEG 1103 Introduction to Engineering course for transfer students between the 2015–2016 and 2021–2022 academic years. Academic years included summer, fall, and spring terms.

A total of 968 students enrolled in GNEG 1103 across all sections during the seven-year period. Section 902, which serves primarily STEM preparation students currently enrolled at community colleges or other Universities in our state which do not offer engineering, was excluded from this analysis since these students are not necessarily expected to complete a degree at the University of Arkansas. After removing that section, 877 students remained. Of these, 76 subsequently withdrew from the course, resulting in a final analytic cohort of 801 transfer students who completed the GNEG 1103 course.

Evaluating student outcomes in GNEG 1103 is challenging because transfer students enter the course with a wide range of prior experiences and levels of preparation (Table 1). Some students have completed few engineering related courses and may not be calculus ready, while others are already well into their degree programs and take the course only to fulfill the Introduction to Engineering graduation requirement. Table 1 shows the classification of these cohort students when they took GNEG 1103. The number of credit hours used for classification includes credits that may not count toward the engineering degree. In addition, the fully online, asynchronous format may be unfamiliar to some students, which can influence how they engage with the course and perform academically.

Table 1. Classification of engineering students who completed GNEG 1103 from 2015 through 2022, n =801.

Classification when taking GNEG 1103	% of students
Freshmen (less than 30 credits)	31.5%
Sophomore (30-59 credits)	40.2%
Junior (60-89 credits)	18.5%
Senior (>= 90 credits)	9.9%

At the time of enrollment in GNEG 1103, the academic plans of these students were distributed across engineering and non-engineering pathways: 261 were categorized as Engineering First-Year Students (ENGD), 475 indicated an intended major in an engineering department, and 65 were enrolled in other (non-engineering) academic units.

Results and Discussion

The overall course completion and graduation outcomes for GNEG 1103 were analyzed and the results are shown in Figure 1. Among the 801 students who completed GNEG 1103 between 2015–2016 and 2021–2022, 323 students (40.3%) graduated with a degree from the College of Engineering. From this same population, 128 students (16.0%) completed a degree in another academic college at the University of Arkansas, and 349 students (43.6%) did not complete a degree at the institution.

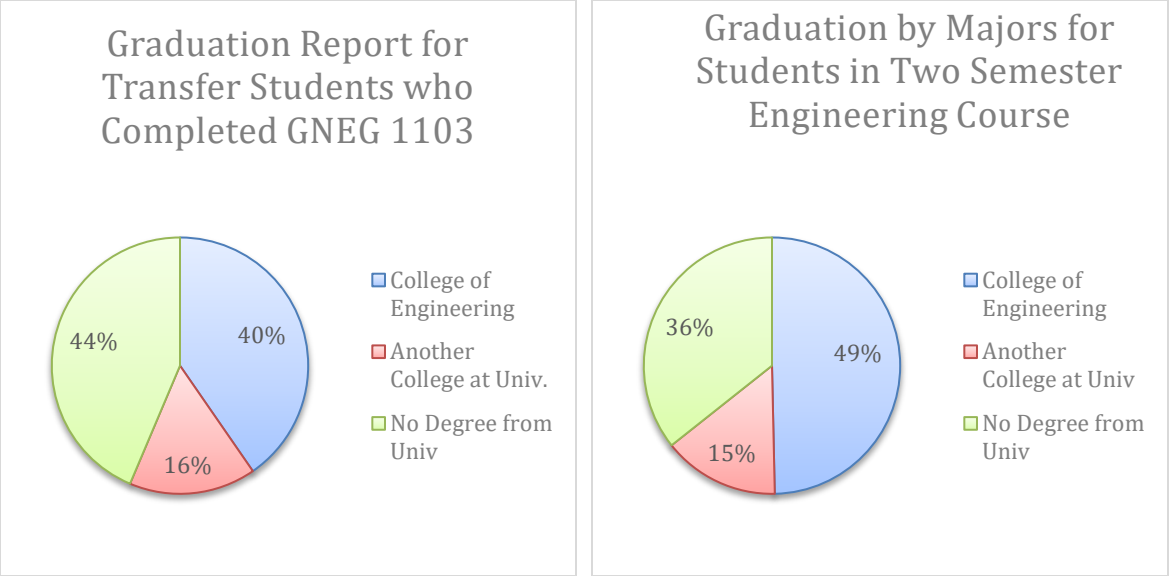

Figure 1: Graduation report for the 801 students who completed GNEG 1103 between 2015–2022 compared with the graduation report for students who completed the two-semester engineering course during that same period.

As seen by comparison of Figure 1, traditional first-year students had a higher rate of graduation from the College of Engineering 49% with a similar amount completing an alternate degree at the university.

Additional data available for first-semester, full-time engineering students highlights important limitations in tracking transfer students. Institutional data systems are typically structured around traditional first-year cohorts, making it easier to capture standardized metrics such as first-term GPA, credit completion, and early retention for these students. In contrast, transfer students often enter at varying points in the curriculum, with different enrollment statuses and prior academic histories, which complicates consistent data collection and longitudinal tracking. As a result, commonly used first-year success indicators may not fully capture transfer student pathways, progression, or outcomes, limiting the ability to make direct comparisons between transfer and traditional first-year students.

Table 2. Annual Enrollment and Graduation Patterns for the 801 students for completed GNEG 1103 course during 2015 – 2022.

Academic Year	Terms	# of Students who Completed the Course	% of Students who graduated from College of Engineering	% of Students who graduated with a non-engineering degree	% of Students who did not complete a degree at this university
2015-2016	Summer	9	33%	22%	44%
	Fall	68	43%	13%	43%
	Spring	62	48%	19%	32%
2016-2017	Summer	16	50%	25%	25%
	Fall	50	46%	12%	42%
	Spring	52	56%	19%	25%

2017-2018	Summer	13	54%	8%	38%
	Fall	54	43%	11%	46%
	Spring	69	51%	19%	30%
2018-2019	Summer	13	62%	23%	15%
	Fall	45	38%	11%	51%
	Spring	40	30%	13%	58%
2019-2020	Summer	5	40%	20%	40%
	Fall	51	41%	24%	35%
	Spring	42	52%	19%	29%
2020-2021	Summer	10	50%	10%	40%
	Fall	47	23%	17%	60%
	Spring	48	31%	10%	58%
2021-2022	Summer	10	10%	30%	60%
	Fall	59	24%	15%	61%
	Spring	38	21%	13%	66%

Table 2 summarizes enrollment and degree outcomes for the 801 students who completed GNEG 1103 between 2015 and 2022. Across academic years and terms, a substantial proportion of these students ultimately graduated from the College of Engineering, whereas others completed degrees outside engineering or did not earn a degree from the institution. Students who did not earn a degree may have left the university or may still be enrolled and progressing toward degree completion. These outcomes illustrate the diverse academic pathways of students enrolled in the course and highlight its role as an entry point for transfer students with varying levels of academic preparation, educational goals, and time-to-degree trajectories.

Enrollment in GNEG 1103 occurred across summer, fall, and spring terms, with fall and spring semesters consistently enrolling the largest number of students. Graduation outcomes varied by cohort and term, with no single term demonstrating consistently higher engineering graduation rates. Additionally, a notable number of students either transitioned out of engineering or did not complete a degree at the university, highlighting the importance of using multiple measures of success when evaluating transfer student outcomes.

Because transfer students enter the course at varying stages in their academic careers and often pursue individualized pathways following course completion, graduation outcomes may not occur for several years and, in some cases, may occur outside the College of Engineering. As a result, while Table 3 provides a descriptive summary of enrollment and degree outcomes, it does not fully reflect the complexity of transfer student progression. Factors such as delayed graduation, part-time enrollment, changes in major, or departure from the institution are not fully captured in these aggregate data.

Table 3. Degree completion of GNEG 1103 students 2015-2021 by entrance credits.

	% of that classification (801 students)		
Classification when taking GNEG 1103	Did not earn a degree	Non- ENGR degree	ENGR degree
Freshman (less than 30 credits)	46.0%	13.1%	40.9%

Sophomore (30-59 credits)	47.5%	15.8%	36.6%
Junior (60-89 credits)	42.6%	11.5%	45.9%
Senior (>= 90 credits)	22.8%	34.2%*	43.0%
Grand Total	**43.7%**	**16.0%**	**40.3%**

*26.6% (21/79) of "Seniors" already had a non-engineering degree and did not earn an additional degree.

Table 4 provides additional insight into the time between course enrollment and degree completion. The most common time to graduation is three to four years, which is consistent with the profile of many students entering the course with completed general education requirements but limited or no engineering coursework. The data also indicate that several students entered with senior standing yet required more than one year to graduate, suggesting variability in credit applicability, sequencing of required courses, or other individual academic circumstances. Together, these findings underscore the non-linear and highly individualized nature of transfer student pathways.

Table 4. Duration of time from course completion to graduation divided by entrance classification for the 323 students who took GNEG 1103 and graduated with an engineering degree.

	Duration between GNEG 1103 to Graduation							
Classification when taking GNEG 1103	Less than 1 year	1 to 2 years	2 to 3 years	3 to 4 years	4 to 5 years	5 to 6 years	6 or more years	Grand Total
Freshman (less than 30 credits)			4	70	19	4	6	103
Sophomore (30-59 credits)			22	68	18	7	3	118
Junior (60-89 credits)		3	28	27	7	2	1	68
Senior (>= 90 credits)	8	8	8	7	2	1		34
Grand Total	8	11	62	172	46	14	10	323

Students, who enrolled in GNEG 1103 and subsequently graduated, selected majors spanning the full range of engineering disciplines offered at the University of Arkansas as illustrated in Figure 2. The distribution of major selections among transfer students closely mirrored that of students who entered through the traditional first-year engineering pathway. This similarity suggests that the online course content effectively exposes transfer students to both well-known and lesser-known disciplines, such as biological and industrial engineering, despite their more limited opportunities for direct departmental engagement prior to declaring a major.

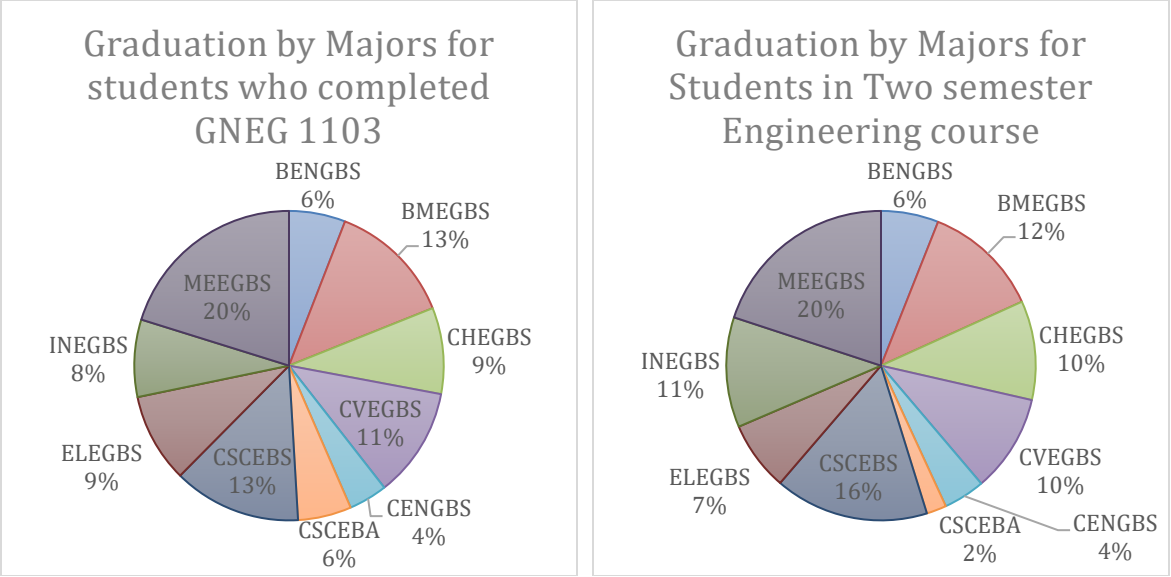

Figure 2. Engineering degrees awarded by major for the 323 students who completed GNEG 1103 between Summer 2015 and Spring 2022 and graduated from the College of Engineering compared to major selection for traditional first year engineering students during the same time range. BS (Bachelor of Science) BENGBS (Biological Engineering), BMEGBS (Biomedical Engineering), CHEGBS (Chemical Engineering), CVEGBS (Civil Engineering), CSCEBA (Computer Science/Computer Engineering Bachelor of Arts) CSCEBA (Computer Science/Computer Engineering Bachelor of Science), CENGBS (Computer Engineering), ELEGBS (Electrical Engineering), INEGBS (Industrial Engineering), MEEGBS (Mechanical Engineering).

Although course grades do not capture all aspects of student learning or persistence, they provide a practical measure of academic performance across multiple cohorts. Figure 3 presents grade distributions for GNEG 1103 by academic year. Across the years shown, grades are consistently concentrated in the A and B ranges, with smaller and relatively stable proportions of C, D, F, NC, and W grades. No clear upward or downward trends are observed over time, and grade distributions remain largely consistent across academic years.

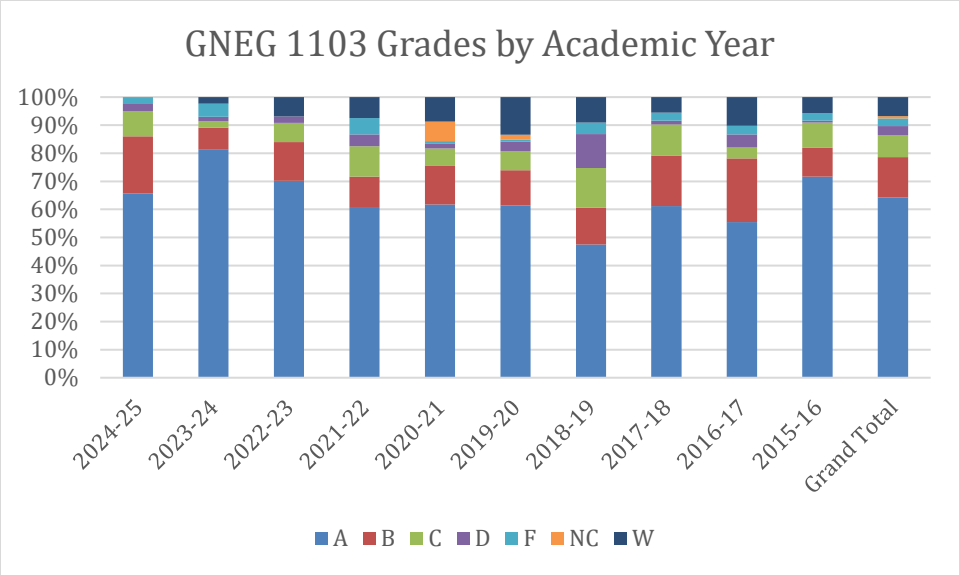

Figure 3. Distribution of grades earned in GNEG 1103 across academic years 2015-2016 through 2024-2025. NC= No credit

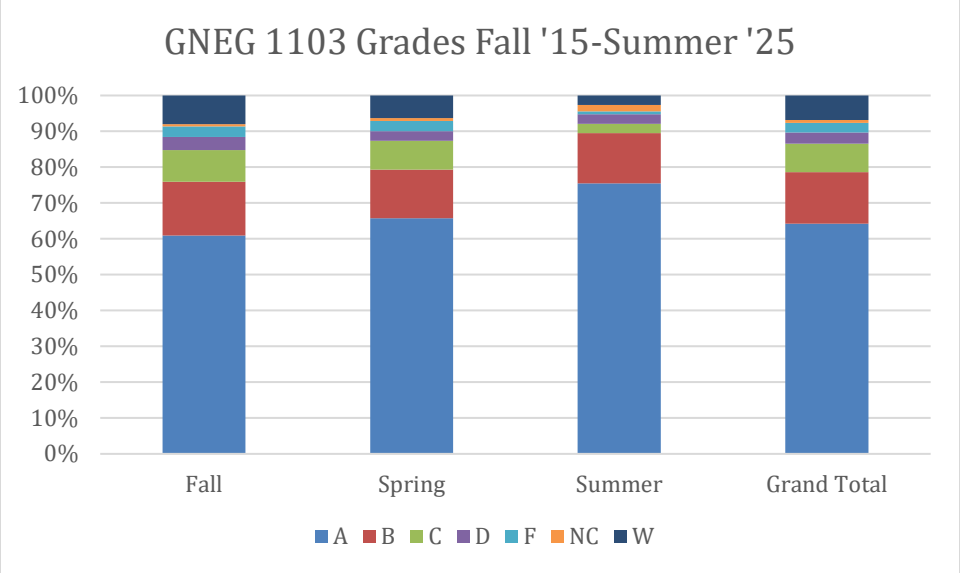

Figure 4. Distribution of final grades in GNEG 1103 by academic term, Fall 2015 through Summer 2025.

Figure 4 compares grade distributions in GNEG 1103 by term across Fall 2015 through Summer 2025. Overall, student performance appears to improve across the academic year, with fall cohorts exhibiting lower proportions of A and B grades and higher proportions of lower grades and withdrawals compared to spring and summer cohorts. However, a chi-square test comparing pass fail rates between semesters shows there is not a significant statistical difference between semester pass rates ($p > 0.05$). Summer terms show the highest concentration of A grades and the lowest proportions of lower grades; however, these terms also have the smallest enrollments.

The mean GPAs for the fall, spring, and summer terms were 3.37, 3.46, and 3.64, respectively, with corresponding standard deviations of 1.05, 1.00, and 0.78. Fall semesters consistently enroll the largest number of students and display the widest spread of grades. In contrast, spring enrollments are more moderate and show improved grade distributions, while summer cohorts, though smaller, demonstrate the strongest overall performance. These differences may reflect variation in student readiness, timing of transfer, course load, or external commitments across terms, though causal relationships cannot be determined from these data.

Conclusions

Although this study examined academic performance and graduation outcomes for students completing GNEG 1103, the findings underscore important constraints: transfer students and traditional students may not represent directly comparable populations. As stated previously, this population of engineering students add complexity with diverse academic trajectories, prior coursework, external obligations, and timeline to degree completion, which may influence both short- and long-term outcomes in ways not captured by conventional metrics such as graduation rates, academic performance and course outcomes.

Among the 2020–2025 cohorts, transfer students enrolled in GNEG 1103 experienced significantly higher DFW rates than non-transfer students in the traditional Introduction to Engineering course sequence. Specifically, the DFW rate for transfer students was 13.3%, compared with 8.2% for non-transfer students, representing a statistically significant difference of 5.1 percentage points ($z = 4.55$, $p < 0.0001$). This pattern indicates that transfer students may encounter greater barriers to academic success in the course and supports the need for additional targeted interventions and resources to strengthen retention and degree completion.

In examining differences by student pathway, we find that transfer students graduate from engineering at a lower rate (40%) than students who begin as full-time students in the traditional two-semester first-year engineering course sequence (49%). While this difference points to reduced persistence among transfer students, it should be interpreted within the context of these differing pathways.

With respect to term of enrollment, although some differences in grades were observed across fall, spring, and summer offerings of GNEG 1103, pass/fail rates were not significantly different by enrollment semester, suggesting relatively consistent course outcomes regardless of timing.

Longer-term outcomes further illustrate the challenges associated with transfer pathways. Even for students entering GNEG 1103 with “senior” standing based on accumulated credit hours, graduation typically took approximately three additional years on average. This finding points to the constraints created by prerequisite sequencing in engineering curricula and reinforces the importance of clearly communicating realistic graduation timelines and degree pathways to students when they enter the program.

Despite these limitations, it is notable that 40% of transfer students who complete GNEG 1103 do go on to graduate from the College of Engineering at the University of Arkansas. Additionally, the distribution of declared majors among GNEG 1103 participants mirrors that of

the broader engineering student population, suggesting similar patterns of major selection across cohorts.

Importantly, recent iterations of the course have incorporated additional targeted support, including peer mentoring and a dedicated course assistant. Based on the findings of this paper, future efforts should also include direct Academic Coaching support and earlier involvement of the College of Engineering Triage Team. The authors plan to consult with the Triage Team, including members of the Academic Coaching staff, to identify specific intervention strategies that can be implemented to better support this population. Future research will follow subsequent cohorts to examine whether these enhanced supports are associated with improved persistence and graduation rates within the College of Engineering.

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