



Effects of Types of Early College Courses on Student Outcomes

OFFICE OF STRATEGIC PLANNING AND ANALYSIS

Dr. Lawrence J. Redlinger
Dr. Su Chuan Rita He
spa@utdallas.edu
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EXECUTIVE SUMMARY

The implementation of early college courses is a popular initiative to prepare and promote college readiness of high school students to enter postsecondary educational institutions. The various early college course offerings range from advanced placement (AP) courses, International Baccalaureate (IB) courses, to college-level courses as well as technical courses. Few studies compare the relative efficacy of dual-credit courses to exam-based courses such as AP or IB. The purpose of this study is to explore if the impact of early college courses varies by student background characteristics and to investigate the effect of types of early college courses on student postsecondary outcomes measured by first year GPA, fall to fall retention and college attainment.

The dataset is comprised of first-time-in-college (FTIC) students enrolling in the fall semesters from 2010 to 2015 (N=12,188) at The University of Texas at Dallas (UTD). A series of cross tabulation chi-square tests was utilized to examine if the impact of early college courses varies by student background characteristics. Multiple regression and logistic regression were conducted to investigate the effect of types of early college courses on student postsecondary outcomes measured by first year GPA, fall to fall retention and college attainment, controlling for student characteristics and academic ability.

Data were categorized into four groupings: students who took both exam-based (AP/IB) and dual-credit coursework; students who took only exam-based coursework; student who took only dual-credit coursework; and students presenting no early college coursework. Females were more likely to take dual credit courses or a combination of dual credit courses and exam-based courses while males were more likely to take exam-based courses or not take any early college courses. Asian Americans were more likely to take early college courses than other ethnic groups

regardless of types of course offering, especially taking a combination of exam-based courses and dual credit courses. African American, Hispanic, and American Indian students were less likely to take early college courses. Whites were more likely to take exam-based courses.

Students in the 'both-type' group performed the best, followed by 'exam-only' group, 'DC-only' group, and the 'No AP/IB or DC' group performed the worst. The academic performance of those four groups on the first year GPA, first year retention, 4-year graduation, and 6-year graduation does not vary by student background characteristics.

African Americans, Hispanics, and Whites who did not take any early college courses had the lower first year retention rate and graduation rate. Students who did not successfully take early college coursework and are undeclared are at a greater risk of not being academically successful. Focusing on the major of students by early college group, students who did not have early start were less likely to complete the degree in 4 years for some STEM majors, particular in engineering and neuroscience.

The results of regression analyses confirm that students who took early college courses outperform peers who did not take any early college courses with respect to postsecondary outcomes even after controlling for academic ability. Students in the 'both-type' group were more likely to be successful, followed by the 'exam-only' and 'DC-only.' The effect of AP/IB courses was stronger than dual credit courses.

Regardless of the focus on the entire sample of FTIC, or the sub-samples of minority students, Dual Credits only students, or by high school ISD sub-samples, being female made it more likely to have a higher first year GPA than being male. Having merit based scholarships was another influential predictor of the first year GPA because the scholarship recipients must maintain at least a 3.0 minimum cumulative GPA at UTD.

With regard to the first year retention, the first year GPA was the most salient predictor of returning in the following fall semester for the entire sample or the sub-group samples. Students who took early college coursework were more likely to be retained. Early college coursework can be seen to have two effects. First it prepares students for more rigorous coursework and secondly, it reduces the number of semester credit hours, primarily in general education areas that the student must complete in order to graduate.

INTRODUCTION AND PURPOSE

The implementation of early college courses is a popular initiative to prepare and promote college readiness of high school students to enter postsecondary educational institutions. Options for earning college credit while enrolled in high school, within the state of Texas in particular, have developed rapidly in the past several years. The various early college course offerings range from advanced placement (AP) courses, International Baccalaureate (IB) courses, to college-level courses as well as technical preparation courses. Both AP and IB classes culminated in an exam, and depending on the score, students may be able to earn college credits. The Texas Higher Education Coordinating Board (THECB) defines dual credit as a process by which a high school junior or senior enrolls in a college course and receives simultaneous academic credit for the course from both the college and the high school. Dual credit courses include both academic courses and technical courses.

Numerous studies suggest that students who took dual-credit courses outperformed peers who did not take any dual-credit courses with respect to postsecondary outcomes such as persistence and graduation rates (Cowan & Goldhaber, 2014; Allen & Dadgar, 2012; Allen, 2010). Researchers have found that career-focused dual enrollment programs can benefit underachieving students (Hughes, Rodriguez, Edwards, & Belfied, 2012). Others argue that participation in an AP exam better prepared students for the more rigorous academic demands of college-level work (Mattern, Shaw & Xiong, 2009). However, few studies compare the relative efficacy of dual-credit coursework to exam-based coursework such as AP or IB. The purpose of this study is to explore if the impact of early college courses varies by student background characteristics and to investigate the effect of types of early college courses on student postsecondary outcomes measured by first year GPA, fall to fall retention and college attainment.

METHODOLOGY

The data included all first-time-in-college (FTIC) students starting in the fall semesters from 2010 to 2015 at the University of Texas at Dallas. A database was created using Texas Higher Education Coordinating Board CBM001 reports to include 12,188 FTIC students across six years along with student characteristics, early college courses taken, and academic performance. Student characteristics variables are gender, ethnicity, SAT test score, high school, merit scholarship status, Pell grant status, and UT Dallas major. The academic performance outcomes are measured by GPA, retention, and graduation.

A series of cross tabulation chi-square tests was utilized to examine if the impact of early college courses varies by student background characteristics. Multiple regression and logistic regression were conducted to investigate the effect of types of early college courses on student postsecondary outcomes measured by first year GPA, fall to fall retention and college attainment, controlling for student characteristics and academic ability. In addition to parameterizing early college courses as a dichotomous variable (Yes or No), this study further categorized students into 4 groups by types of early college courses and examines the number of courses students complete as a variable that could affect the likelihood of their academic success.

The alpha level is the probability of making a Type I error which is the possibility of finding an effect that is not there. Effects are easier to detect in larger samples. Researchers have suggested that the threshold p-value should be adjusted downwards as the sample size grows larger (Leamer 1978; Greene 2003). In this study, the total sample size is 12,188 cases (FTIC population for six years). We decided that for the tests utilizing the entire sample, we would use $p=.0001$ level as a measure of statistical significance.

However, for sub-group analyses, the sample sizes were smaller. For The Dual-Credit only sample the N equaled 3,047 students and the sample was 2,440 for minority students. For these analyses we adopted a significance threshold p-value ($p=.01$) as is generally suggested common practice. That is, all statistical tests for minority students' sub-sample and Dual-Credit only (DC) students sub-sample were conducted at the $p=.01$ significance level.

The data was grouped into four groups shown in Table 1. The 'exam-only' group ($n=3,565$) was comprised of students who took advanced placement (AP) courses ($n=3,300$) or international baccalaureate (IB) courses ($n=100$) or a combination of AP and IB courses ($n=165$). The second group, labelled 'DC-only' included students who took dual credit courses only to earn college credits while in high school ($n=3,047$). Students who took both exam-based (AP and/or IB) and dual-credit courses were placed in the 'both-type' group ($n=2,443$). The last group was comprised of students who did not take any early college courses in high school. The percent of each group ranges from 20% to 30%. *At UT Dallas, over 74% of FTIC took some forms of dual credit or exam-based courses (i.e. AP or IB courses) while in high school. Only 26% of FTIC students did not earn any early college course credits.*

Table 1 Distribution of Population by Type of Early College Coursework

GROUP	FREQ	%
Both-type	2,443	20.04%
DC-only	3,047	25.00%
Exam-only	3,565	29.25%
NO AP/IB or DC	3,133	25.71%
TOTAL	12,188	100.00%

In addition to analyzing the effects of types of early college coursework on the entire sample we present analyses of two sub-groups: minority students and students who took dual credit courses. The first section of this paper presents the overall student demographics, characteristics, and regression findings for first-time-in-college students starting in the fall semesters from 2010 to 2015. The analyses and findings for minority students and student who took dual credit courses follow.

FIRST-TIME-IN-COLLEGE STUDENTS

Student Characteristics

Out of 12,188 students, 41.57% were female and 58.43% were male. Table 2 below compares the overall gender demographics of the population to the gender characteristics of each group. One can see that there are significant gender differences. Taken as a whole, 21.8% of females, compared to 28.5% of males presented no early college coursework credits –a 6.7% difference. There were within group differences also. Twenty-three and ½ percent of the females fell into the ‘both-type’ category compared to 17.6% of males (a 6% difference) and 28.4% of females were in the ‘DC-only’ category compared to 22.6% of males (a 5.8% difference). In contrast, 31.3% of males were in the ‘exam-only’ category compared to 26.3% of females (a 5% difference) and 28.5% of males were ‘no AP or DC’ compared to only 21.8% for females-a 6.7% difference. Thus,

- *Females were more likely to take dual credit courses or a combination of dual credit courses and exam-based courses while in high school.*
- *Male were more likely to take exam-based courses or not take any early college courses.*

Table 2 Distribution of Early College Groups by Gender

GROUP	FEMALE		MALE	
	FREQ	%	FREQ	%
Both-type	1,192	48.79%	1,251	51.21%
DC-only	1,437	47.16%	1,610	52.84%
Exam-only	1,333	37.39%	2,232	62.61%
NO AP/IB or DC	1,104	35.24%	2,029	64.76%
TOTAL	5,066	41.57%	7,122	58.43%
$\chi^2 (3, n=12188)=169.0350, p<.0001; \text{Cramer's } V=0.1178$				

Ethnicity was recoded into ‘Asian American’, ‘White’, ‘Minority’ and ‘Others’. The minority grouping included ‘African American’, ‘Hispanic’, ‘Native Hawaiian’, and ‘American Indian’. The ‘Others’ grouping included the categories of ‘International’, ‘Two or more races’, and ‘Unknown’. Out of 12,188 students, 35.49% were White, 34.30% were Asian American, 20.02% were minority students, and 10.19% were students from other ethnic groups.

Table 3 and Table 4 provide two slightly different views of the data. For ‘both-type’ students 41.87% were Asian American compared to 16.13% Minority, 9.05% Others and 32.95% White (Table 3). Viewing the same data in Table 4, we can see that 24.47% of Asian American students were ‘both-type’ compared to 16.15% Minority, 17.79% Others, and 18.61% White. Table 3b also reveals that about one-third of ‘minority’ and ‘others’ students arrive with no AP or Early College Credits. There are multiple reasons for this result—one being the availability of coursework. In any case the lack of such courses, as we shall see, handicaps these students.

- *Asian Americans were more likely to take early college courses regardless of type of course, especially taking a combination of exam-based courses and dual credit courses.*

- African American, Hispanic, Native Hawaiian, and American Indian students were less likely to take advantage of early college courses program and if they did, they took dual credit courses.
- Students from the ‘Others’ group were more likely to not take any early college courses.
- Whites were more likely to take exam-based courses.

Table 3 Distribution of Early College Groups by Ethnicity

GROUP	ASIAN AMERICAN		MINORITY		OTHERS		WHITE	
	FREQ	%	FREQ	%	FREQ	%	FREQ	%
Both-type	1023	41.87%	394	16.13%	221	9.05%	805	32.95%
DC-only	1052	34.53%	652	21.40%	266	8.73%	1077	35.35%
Exam-only	1254	35.18%	595	16.69%	329	9.23%	1387	38.91%
NO AP/IB or DC	851	27.16%	799	25.50%	426	13.60%	1057	33.74%
TOTAL	4180	34.30%	2440	20.02%	1242	10.19%	4326	35.49%

X^2 (9, n=12188)=243.7386.0602, p<.0001; Cramer's V=0.0816

Table 4 Distribution of Early College Groups by Ethnicity

GROUP	ASIAN AMERICAN		MINORITY		OTHERS		WHITE	
	FREQ	%	FREQ	%	FREQ	%	FREQ	%
Both-type	1023	24.47%	394	16.15%	221	17.79%	805	18.61%
DC-only	1052	25.17%	652	26.72%	266	21.42%	1077	24.90%
Exam-only	1254	30.00%	595	24.39%	329	26.49%	1387	32.06%
NO AP/IB or DC	851	20.36%	799	32.75%	426	34.30%	1057	24.43%
TOTAL	4180	100.00%	2440	100.00%	1242	100.00%	4326	100.00%

X^2 (9, n=12188)=243.7386.0602, p<.0001; Cramer's V=0.0816

Table 5 below provides descriptive data for the four groups. *Students in the ‘both-type’ group performed the best as measured by 1st fall, 1st year GPA and retention even though the average SAT score was slightly lower than the SAT of the ‘exam-only’ group. Compared to the other groups, the ‘both-type’ group had:*

- the highest first semester GPA of 3.46
- the highest first year GPA of 3.42
- the highest fall to fall retention rate of 95.05%.

On the contrary, students in the ‘No AP/IB or DC’ group performed the worst as measured by 1st fall, 1st year GPA and retention. Students in the ‘No AP/IB or DC’ group had subsequently the highest post-matriculation work at community colleges. Compared to the other groups, the ‘No AP/IB or DC’ group had:

- *the lowest first semester GPA of 2.58*
- *the lowest first year GPA of 2.49*
- *the lowest fall to fall retention rate (71.25%).*

Over 67% of students in the ‘both-type’ and ‘exam-only’ group majored in the STEM program and were less likely to have a Pell grant.

Table 5 Academic Characteristics & Performance by Early-College Groups

GROUP	SAT MV*	ACT COMP*	SAT**	AP SCH***	IB SCH***	DC SCH***	POST MATRI. SCH****	1ST FA GPA	1ST YR GPA	FALL TO FALL RETENTION	STEM MAJOR	PELL GRANT
Both-type	1295.53	28.75	1311.64	10.55	10.15	11.49	8.55	3.46	3.42	95.05%	67.83%	23.91%
DC-only	1196.99	26.41	1213.93			26.05	9.79	3.05	3.01	86.51%	61.63%	30.52%
Exam-only	1323.11	29.53	1339.04	12.54	10.11		8.61	3.35	3.28	90.46%	67.35%	21.09%
NO AP/IB or DC	1202.24	26.16	1212.37				12.62	2.58	2.49	71.27%	56.62%	28.25%
TOTAL	1256.12	27.79	1269.76	11.74	10.12	19.59	9.58	3.10	3.04	85.46%	63.26%	25.85%

* Some students don't have the score on file.

** ACT converted to SAT equivalent-if student had both scores highest score used.

***Advancement placement (AP), International Baccalaureate (IB), or Dual Credit (DC) semester credit hours earned while in high school

****Community college semester credit hours earned after students entered UT Dallas

Scholarship Status

Table 6 examines the relationship between merit scholarships and the four groups.

Students in the ‘both-type’ and ‘exam-only’ groups were significantly more likely to have full scholarships or partial scholarships than students in the other groups. For students in the ‘DC-only’ group, only 19.53% got an award of full scholarship and 69.45% were not awarded any merit scholarships. For students in the ‘No AP/IB or DC’ group, only 11.91% were awarded full scholarships while 78.74% were not awarded any merit scholarships.

Table 6 Scholarship Status by Early-College Groups

GROUP	Full Scholarship		Partial Scholarship		No Scholarship		Total	
	FREQ	%	FREQ	%	FREQ	%	FREQ	%
Both-type	993	40.65%	449	18.38%	1,001	40.97%	2,443	100.00%
DC-only	595	19.53%	336	11.03%	2,116	69.45%	3,047	100.00%
Exam-only	1,630	45.72%	561	15.74%	1,374	38.54%	3,565	100.00%
NO AP/IB or DC	373	11.91%	293	9.35%	2,467	78.74%	3,133	100.00%
TOTAL	3,591	29.46%	1,639	13.45%	6,958	57.09%	12,188	100.00%

X^2 (6, n=12188)=1628.6396, $p < .0001$; Cramer's $V = 0.2585$

High School Rank

With regard to high school rank, there were 5,930 students in the dataset with no high school rank recorded; these students were excluded from the data in Table 7. Over two-thirds of the students in the ‘both-type’ group were in the Top 10% and 64.24% of the ‘exam-only’ group were in the Top 10%. Viewed from a slightly different point of view, of the Top 10% students (n=3,750) the ‘exam-only’ students comprised 36.69% followed by the ‘both-type’ students at 28.45% and ‘DC-only’ students at 21.71%. The ‘No AP/IB or DC’ group had the lowest percent of students who ranked top 10%. In later analyses, class rank was omitted because of the missing values (over 48% of the sample).

Table 7 High School Rank by Early College Groups (Excluding those with no rank)

GROUP	TOP 10%		TOP 15%		TOP 20%		Total	
	FREQ	%	FREQ	%	FREQ	%	FREQ	%
Both-type	1,067	67.45%	289	18.27%	226	14.29%	1,582	100.00%
DC-only	814	57.49%	370	26.13%	232	16.38%	1,416	100.00%
Exam-only	1,376	64.24%	456	21.29%	310	14.47%	2,142	100.00%
NO AP/IB or DC	493	44.06%	357	31.90%	269	24.04%	1,119	100.00%
TOTAL	3,750	59.91%	1,472	23.52%	1,037	16.57%	6,259	100.00%

GROUP	TOP 10%		TOP 15%		TOP 20%		Total	
	FREQ	%	FREQ	%	FREQ	%	FREQ	%
Both-type	1,067	28.45%	289	19.63%	226	21.79%	1,582	25.28%
DC-only	814	21.71%	370	25.14%	232	22.37%	1,416	22.62%
Exam-only	1,376	36.69%	456	30.98%	310	29.89%	2,142	34.22%
NO AP/IB or DC	493	13.15%	357	24.25%	269	25.94%	1,119	17.88%
TOTAL	3,750	100.00%	1,472	100.00%	1,037	100.00%	6,259	100.00%

*Some high schools don't rank students. Home-schooled students do not have a class rank. Thus, there are 5,930 missing for this variable.

Time to Degree

The 'time to degree' calculation was based on the latest THECB graduation year methodology. In the 2010 cohort, there were 1,377 FTIC students. As one can see, *students in the 'both-type' and 'exam-only' had significantly higher 4, 5, and 6 graduation rates.¹*

¹ One student from the 'No AP/IB or DC' group graduated in 2 years because there were 25 credit hours from other institutions transferred back to UT Dallas after the student enrolled at UT Dallas. In addition, the student took 27 credit hours for 3 semesters.

The 'dual-only' group and 'No AP/IB or DC' group continue to lag into the sixth year (Table 8).

Table 8 Graduation Rate by Early-College Groups for FTIC 2010 Cohort

FTIC-2108 (N=1377)						
GROUP	# Students	GRAD. IN 2 YRS	GRAD. IN 3 YRS	GRAD. IN 4 YRS	GRAD. IN 5 YRS	GRAD. IN 6 YRS
Both-type	183	0.00%	11.48%	68.85%	80.87%	85.25%
DC-only	304	3.62%	11.51%	44.74%	60.53%	66.12%
Exam-only	429	0.00%	6.06%	70.86%	82.75%	84.15%
NO AP/IB or DC	461	0.22%	0.22%	26.90%	41.87%	45.12%
TOTAL	1,377	0.87%	6.03%	50.11%	63.91%	67.25%

Table 9 presents aggregate 4-year graduation data for the 2010-2011-2012 cohorts. *The aggregate data presents a consistent picture: students with both-type of early college credit had the highest 4-year graduation rates, followed by the 'exam-only' group. Those with no early college credit performed the worst. Overall, the six year graduation rate for the 2010 fall cohort was 67.25% and the average four year graduation rate for the 2010, 2011, and 2012 fall cohorts was 52.40% (2468 out of 4710).*

Table 9 Graduation Rate by Early-College Groups for FTIC 2010, 2011, 2012 Cohorts (n=4,710)

GROUP	# Students	GRAD. IN 2 YRS	GRAD. IN 3 YRS	GRAD. IN 4 YRS
Both-type	927	0	0.00%	83
DC-only	1,258	24	1.91%	156
Exam-only	1,346	2	0.15%	86
NO AP/IB or DC	1,179	1	0.08%	4
TOTAL	4,710	27	0.57%	329

Student Retention, 4-year & 6-year Performance Interaction Effects

The interaction between the categorical groups and gender, ethnicity, and scholarship status with three outcome variables is presented in Table 10. Overall, *female and Asians outperformed their peers on the first year retention rate and graduation rates. The combination of early college courses taken and merit scholarship significantly raises the first year retention rate and graduation rate.*

African Americans, Hispanics, American Indians, American Hawaiian, and Whites who didn't take any early college courses had the lower first year retention rate and graduation rate. Students who didn't receive a merit scholarship and didn't take any early college courses had a low 4-year graduation rate compared to other groups. Those students should be considered to be more at-risk and the university may want to establish appropriate mechanisms to best serve those students.

Table 10 Academic Performance of Early College Groups by Gender, Ethnicity & Scholarship Status

	Fall to Fall Retention					Graduated in 6 Yr 2010FA Only					Graduated in 4 Yr 2010FA, 2011FA, 2012FA				
	Both-type	DC-only	Exam-only	No AP/IB/DC	TOTAL	Both-type	DC-only	Exam-only	No AP/IB/DC	TOTAL	Both-type	DC-only	Exam-only	No AP/IB/DC	TOTAL
Female	95.39%	89.07%	92.72%	72.28%	87.86%	90.80%	69.12%	90.48%	44.58%	71.63%	77.48%	58.12%	76.45%	29.31%	61.39%
Male	94.72%	84.22%	89.11%	70.72%	83.75%	80.21%	63.69%	80.08%	45.42%	64.27%	65.42%	44.58%	58.45%	21.86%	46.03%
Asian	95.21%	92.78%	91.79%	82.37%	90.96%	85.94%	75.53%	86.76%	57.65%	77.31%	71.58%	56.14%	68.19%	26.45%	58.96%
Minority	94.16%	83.28%	89.58%	64.69%	80.57%	95.65%	57.14%	82.61%	35.43%	56.74%	67.48%	40.66%	59.26%	14.67%	40.11%
Others	93.21%	89.10%	90.88%	80.28%	87.28%	92.31%	58.33%	86.96%	62.50%	72.11%	74.71%	47.22%	65.63%	48.07%	56.94%
White	95.78%	81.71%	89.55%	63.48%	82.39%	80.72%	65.04%	82.02%	40.00%	64.50%	71.22%	52.23%	65.38%	20.39%	51.69%
Full Scholarship	96.07%	92.27%	94.72%	77.75%	92.93%	83.51%	82.86%	86.42%	53.33%	79.69%	78.67%	72.20%	75.34%	41.46%	71.48%
No Scholarship	93.61%	85.21%	85.44%	70.17%	81.12%	90.00%	60.89%	82.11%	42.32%	57.17%	59.80%	43.12%	47.65%	18.30%	37.36%
Partial Scholarship	95.99%	84.52%	90.37%	72.35%	87.49%	84.78%	61.82%	78.26%	46.15%	65.73%	71.79%	53.29%	64.93%	33.75%	57.30%

Independent School District

Approximately 49% of FTIC students in our population were from high schools in greater Dallas metroplex. The high schools were re-organized into adjacent Independent School Districts (ISD), Collegiate Schools, TAMS, Islamic Schools, Home Schooled, and others (Table 10). The adjacent ISDs were defined as within 15 miles away from UT Dallas. They are Plano ISD, Allen ISD, Carrollton ISD, Coppell ISD, Dallas ISD, Frisco ISD, Garland ISD, Irving ISD, Richardson ISD, Cedar Hill ISD, Highland Park ISD, Lewisville ISD, Lovejoy ISD, Mesquite ISD, and Wylie ISD. The list of schools under each ISD is attached in Appendix. Within the adjacent ISDs, *Plano ISD (13.92%) is the top feeder ISD for UT Dallas, followed by Lewisville ISD (4.90%) and Garland ISD (4.73%).*

The types of early college courses among adjacent ISDs varied depending on ISD characteristics. Table 10 shows the distribution of early college groups by ISDs which was ordered by UT Dallas enrollment numbers. Five ISDs had less than 100 students who enrolled in UT Dallas across 6 years.

For ISDs with over 100 students enrolled in UT Dallas, more than 40% of students from Plano ISD and Lewisville ISD took exam-based courses while 38% of students from Dallas ISD didn't take any early college courses (Table 11). Carrollton ISD had a highest percent of students took a combination of exam-based courses and dual credit courses. Students from collegiate schools, TAMS, and Islamic schools primary took dual credit courses only to earn college credits while in high school.

Table 11 High School by Early College Groups

HS Category	Both-type		DC-only		Exam-only		No AP/IB/DC		Total		
	Freq	% of ISD	Freq	% of ISD	Freq	% of ISD	Freq	% of ISD	Freq	% against ISD	% against Total Enrl
Others	1,217	19.56%	1,501	24.13%	1,753	28.18%	1,750	28.13%	6,221	100%	51.04%
Plano_ISD	382	22.51%	208	12.26%	725	42.72%	382	22.51%	1,697	100%	13.92%
Lewisville_ISD	121	20.27%	72	12.06%	247	41.37%	157	26.30%	597	100%	4.90%
Garland_ISD	109	18.92%	149	25.87%	161	27.95%	157	27.26%	576	100%	4.73%
Dallas_ISD	81	16.40%	109	22.06%	115	23.28%	189	38.26%	494	100%	4.05%
Frisco_ISD	110	23.61%	58	12.45%	168	36.05%	130	27.90%	466	100%	3.82%
Richarson_ISD	121	31.68%	77	20.16%	88	23.04%	96	25.13%	382	100%	3.13%
Allen_ISD	86	24.71%	70	20.11%	119	34.20%	73	20.98%	348	100%	2.86%
Coppell_ISD	59	24.48%	69	28.63%	53	21.99%	60	24.90%	241	100%	1.98%
Collegiate Schools	2	0.91%	216	98.63%	0	0.00%	1	0.46%	219	100%	1.80%
TAMS	16	8.94%	163	91.06%	0	0.00%	0	0.00%	179	100%	1.47%
Carrollton_ISD	48	34.04%	44	31.21%	32	22.70%	17	12.06%	141	100%	1.16%
Home Schooled	10	8.20%	82	67.21%	4	3.28%	26	21.31%	122	100%	1.00%
Islamic Schools	3	2.59%	113	97.41%	0	0.00%	0	0.00%	116	100%	0.95%
Mesquite_ISD	25	22.73%	39	35.45%	22	20.00%	24	21.82%	110	100%	0.90%
Wylie_ISD	20	20.20%	29	29.29%	21	21.21%	29	29.29%	99	100%	0.81%
Irving_ISD	21	24.42%	33	38.37%	15	17.44%	17	19.77%	86	100%	0.71%
Lovejoy_ISD	8	14.81%	9	16.67%	27	50.00%	10	18.52%	54	100%	0.44%
HighlandPark_ISD	3	8.82%	2	5.88%	15	44.12%	14	41.18%	34	100%	0.28%
CedarHill_ISD	1	16.67%	4	66.67%	0	0.00%	1	16.67%	6	100%	0.05%
Total	2,443	20.04%	3,047	25.00%	3,565	29.25%	3,133	25.71%	12,188	100%	100.00%

Table 12 shows the ethnicity distribution by high school/ISD. Twelve out of 20 high school categories had very high percentage of Asian American students. In contrast, *Dallas ISD* had significantly lower percentage of Asian American students (9.31%) and significantly higher percentage of minority students (73.08%). The majority of students from the ‘Others’ (43.02%), ‘Home Schooled’ (71.31%), ‘Lovejoy ISD’ (70.37%) and ‘Highland Park ISD’ (76.47%) category were Whites.

Table 12 High School by Ethnicity

HS Category	Asian		Minority		Others		White		Total	
	Freq	% of ISD	Freq	% of ISD	Freq	% of ISD	Freq	% of ISD	Freq	% against ISD
Others	1,534	24.66%	1,285	20.66%	726	11.67%	2,676	43.02%	6,221	100%
Plano_ISD	917	54.04%	179	10.55%	162	9.55%	439	25.87%	1,697	100%
Lewisville_ISD	300	50.25%	69	11.56%	51	8.54%	177	29.65%	597	100%
Garland_ISD	234	40.63%	148	25.69%	48	8.33%	146	25.35%	576	100%
Dallas_ISD	46	9.31%	361	73.08%	32	6.48%	55	11.13%	494	100%
Frisco_ISD	228	48.93%	74	15.88%	38	8.15%	126	27.04%	466	100%
Richarson_ISD	160	41.88%	77	20.16%	24	6.28%	121	31.68%	382	100%
Allen_ISD	147	42.24%	47	13.51%	25	7.18%	129	37.07%	348	100%
Coppell_ISD	150	62.24%	19	7.88%	28	11.62%	44	18.26%	241	100%
Collegiate Schools	99	45.21%	39	17.81%	16	7.31%	65	29.68%	219	100%
TAMS	114	63.69%	6	3.35%	11	6.15%	48	26.82%	179	100%
Carrollton_ISD	67	47.52%	22	15.60%	17	12.06%	35	24.82%	141	100%
Home Schooled	11	9.02%	6	4.92%	18	14.75%	87	71.31%	122	100%
Islamic Schools	52	44.83%	7	6.03%	17	14.66%	40	34.48%	116	100%
Mesquite_ISD	38	34.55%	35	31.82%	11	10.00%	26	23.64%	110	100%
Wylie_ISD	35	35.35%	23	23.23%	7	7.07%	34	34.34%	99	100%
Irving_ISD	36	41.86%	32	37.21%	6	6.98%	12	13.95%	86	100%
Lovejoy_ISD	8	14.81%	5	9.26%	3	5.56%	38	70.37%	54	100%
HighlandPark_ISD	3	8.82%	3	8.82%	2	5.88%	26	76.47%	34	100%
CedarHill_ISD	1	16.67%	3	50.00%	0	0.00%	2	33.33%	6	100%
Total	4,180	34.30%	2,440	20.02%	1,242	10.19%	4,326	35.49%	12,188	100%

Table 13 presents the interaction between categorical groups and high schools with three outcome variables. For ISDs with over 100 students enrolled in UT Dallas, *students from Dallas ISD had the lowest fall to fall retention rate at 78.54%, the lowest 6-year graduation rate at 47.89% and the lowest 4-year graduation rate at 31.60%* compared to students from other groups. *Students from Brighter Horizons Academy, IANT Quranic Academy, and Islamic School of Irving outperformed their peers, followed by students from TAMS.* Students from those two groups had the higher retention rates at 96.55% and 96.09% respectively. *In general, students who did not take any early college courses had poorer academic performance regardless of high schools of origin.*

Table 13 Academic Performance of Early College Groups by High School

HS Category	Fall to Fall Retention					Graduated in 6 Yr 2010FA Only					Graduated in 4 Yr 2010FA, 2011FA, 2012FA				
	Both-type	DC-only	Exam-only	No AP/IB/DC	TOTAL	Both-type	DC-only	Exam-only	No AP/IB/DC	TOTAL	Both-type	DC-only	Exam-only	No AP/IB/DC	TOTAL
Others	94.25%	83.01%	88.82%	69.28%	83.01%	83.81%	62.79%	83.50%	47.66%	66.52%	72.09%	44.97%	63.15%	26.26%	50.12%
Plano_ISD	94.76%	89.90%	91.72%	76.18%	88.69%	87.50%	72.00%	87.00%	36.54%	72.14%	73.83%	47.67%	68.59%	20.16%	57.55%
Lewisville_ISD	93.39%	95.83%	92.71%	78.34%	89.45%	100.00%	33.33%	70.37%	45.45%	60.66%	55.26%	33.33%	56.70%	28.33%	45.78%
Garland_ISD	94.50%	89.26%	94.41%	76.43%	88.19%	85.71%	58.82%	88.57%	63.33%	74.16%	55.26%	39.71%	76.19%	27.69%	50.98%
Dallas_ISD	96.30%	86.32%	89.57%	52.22%	78.54%	80.00%	42.86%	81.82%	30.56%	47.89%	50.00%	22.00%	68.42%	14.44%	31.60%
Frisco_ISD	98.18%	87.93%	92.26%	81.54%	90.13%	80.00%	100.00%	90.91%	50.00%	73.33%	69.44%	25.00%	71.11%	22.86%	53.13%
Richardson_ISD	98.35%	88.31%	93.18%	75.00%	89.27%	88.89%	70.00%	70.00%	37.50%	62.22%	81.36%	51.43%	54.29%	25.00%	56.97%
Allen_ISD	96.51%	94.29%	90.76%	75.34%	89.66%	100.00%	28.57%	92.31%	43.75%	61.54%	75.00%	53.13%	77.27%	20.00%	59.20%
Coppell_ISD	96.61%	89.86%	98.11%	75.00%	89.63%	100.00%	100.00%	100.00%	0.00%	80.00%	70.59%	43.48%	70.00%	14.29%	48.44%
Collegiate Schools	100.00%	89.81%		100.00%	89.95%		67.86%			67.86%	100.00%	70.71%			71.00%
TAMS	100.00%	95.71%			96.09%	100.00%	84.62%			85.71%	100.00%	86.67%			87.34%
Carrollton_ISD	93.75%	84.09%	93.75%	70.59%	87.94%	80.00%	66.67%	66.67%	0.00%	66.67%	81.25%	56.25%	44.44%	0.00%	59.09%
Home Schooled	100.00%	90.24%	75.00%	80.77%	88.52%		100.00%		60.00%	77.78%	33.33%	82.35%		54.55%	72.92%
Islamic Schools	100.00%	96.46%			96.55%		100.00%			100.00%		95.00%			95.00%
Mesquite_ISD	96.00%	87.18%	86.36%	87.50%	89.09%	66.67%	69.23%	100.00%	25.00%	63.64%	83.33%	53.85%	90.00%	30.77%	60.66%
Wylie_ISD	100.00%	68.97%	95.24%	48.28%	74.75%		75.00%	75.00%	33.33%	57.14%	75.00%	33.33%	62.50%	5.88%	31.82%
Irving_ISD	95.24%	72.73%	93.33%	64.71%	80.23%	100.00%	33.33%	100.00%	100.00%	75.00%	91.67%	7.69%	66.67%	25.00%	48.57%
Lovejoy_ISD	100.00%	88.89%	88.89%	70.00%	87.04%			100.00%		100.00%	50.00%	33.33%	40.00%		41.67%
HighlandPark_ISD	100.00%	50.00%	80.00%	42.86%	64.71%	100.00%	0.00%	100.00%	50.00%	60.00%	50.00%	0.00%	80.00%	28.57%	46.67%
CedarHill_ISD	100.00%	100.00%		0.00%	83.33%	100.00%	100.00%			100.00%	100.00%	100.00%		0.00%	83.33%
Total	95.05%	86.51%	90.46%	71.27%	85.46%	85.25%	66.12%	84.15%	45.12%	67.25%	71.20%	50.87%	65.38%	24.43%	52.40%

Dallas Independent School District

Table 11 & Table 12 reveal that 38.3% of students from Dallas ISD didn't take any early college courses and 78.03% of students from Dallas ISD were minority students. In addition, Table 13 shows that students from Dallas ISD underperformed their peers. Thus, we conducted further analysis to explore the interaction among early college groups, student's characteristics and academic performance.

Table 14 provides tabular data for DISD Students by types of early college courses and gender, ethnicity, scholarship status and Pell Grant status. Of the 494 students from Dallas ISD, 47.77% were female and 52.23% were male (Table 13). Forty-one percent of females fell into the 'No AP/IB or DC' group compared to 36% of males (a 4.63% difference). For the 'Dual-Credit only' group gender differences are more substantial: 27.54% of females presented 'DC-only' compared to 17.05% of males (a 10.49% difference). In high contrast, 30.23% of males were in the 'exam-only' group compared to 15.68% of females (a 14.55% difference).

Regardless of gender, students from Dallas ISD were more likely not take any early college

courses. Even if they did, females were more likely to take only dual credit courses and male were more likely to take exam-based courses.

Table 14 Distribution of Gender, Ethnicity & Scholarship Status for Dallas ISD Students

	# Students from Dallas ISD		by Early College Groups				TOTAL
	Freq	Percent	Both-type	DC-only	Exam-only	No AP/IB/DC	
Female	236	47.77%	16.10%	27.54%	15.68%	40.68%	100.00%
Male	258	52.23%	16.67%	17.05%	30.23%	36.05%	100.00%
Asian	46	9.31%	28.26%	19.57%	26.09%	26.09%	100.00%
Minority	361	73.08%	14.13%	24.10%	19.67%	42.11%	100.00%
Others	32	6.48%	15.63%	12.50%	43.75%	28.13%	100.00%
White	55	11.13%	21.82%	16.36%	32.73%	29.09%	100.00%
Full Scholarship	60	12.15%	36.67%	3.33%	48.33%	11.67%	100.00%
No Scholarship	391	79.15%	11.25%	26.34%	17.39%	45.01%	100.00%
Partial Scholarship	43	8.70%	34.88%	9.30%	41.86%	13.95%	100.00%
Pell Grant	305	61.74%	20.63%	11.64%	33.33%	34.39%	100.00%
No Pell Grant	189	38.26%	13.77%	28.52%	17.05%	40.66%	100.00%
TOTAL	494		16.40%	22.06%	23.28%	38.26%	

Over three-fourth of DISD students didn't receive any merit scholarships. Out of 391 students who didn't receive any merit scholarships, 45.01% didn't take any early college courses.² Approximately sixty-two percent of Dallas ISD students were awarded a Pell grant. Out of students who were awarded a Pell grant, 34.39% did not take any early college courses (Table 14).

Table 15 disaggregates the DISD data. As can be seen, 19.43% of Dallas ISD students who enrolled in UT Dallas were from Townview Science & Engineering Magnet School, followed by North Dallas High School (8.50%) and Talented and Gifted Magnet School (8.30%). The percentages for four early college groups were calculated individually for each high school. For the high schools sending 10 or more students to UTD, North Dallas High School had the highest percentage of students who didn't take any college courses (71.43% or 30 out of 42).

² This is not surprising given the relationships between class rank, test scores and successful completion of early college credit coursework, especially exam-based coursework.

Out of 31 Dallas ISD high schools, 16 high schools had forty or more percent of students who didn't take any early college courses before they entered UT Dallas. Admittedly, this is a sample of DISD students that may not be representative of the entire populations. However, the data suggest that early college opportunities or encouragement to try early college coursework may be unevenly textured across DISD.

Table 15 Distribution of High School for Dallas ISD Students

	# Students from		By Early College Groups			
	Freq	Percent	Both-type	DC-only	Exam-only	No AP/IB/DC
Townview Science & Engr Magnet	96	19.43%	29.17%	12.50%	34.38%	23.96%
North Dallas High School	42	8.50%	0.00%	19.05%	9.52%	71.43%
Talented and Gifted Magnet Sch	41	8.30%	29.27%	9.76%	46.34%	14.63%
Skyline High School	34	6.88%	8.82%	29.41%	8.82%	52.94%
Hillcrest High School	28	5.67%	17.86%	7.14%	35.71%	39.29%
W T White High School	24	4.86%	12.50%	12.50%	29.17%	45.83%
Bryan Adams High School	23	4.66%	0.00%	12.74%	8.70%	69.57%
Sunset High School	23	4.66%	4.35%	8.70%	34.78%	52.17%
Molina High School	15	3.04%	0.00%	20.00%	20.00%	60.00%
Thomas Jefferson High School	15	3.04%	13.33%	40.00%	6.67%	40.00%
Townview School of Health Prof	15	3.04%	20.00%	60.00%	20.00%	0.00%
Woodrow Wilson High School	15	3.04%	0.00%	6.67%	53.33%	40.00%
Townview Schl/Govt Law & Enfor	14	2.83%	35.71%	35.71%	21.43%	7.14%
Booker T Washington HS Arts	13	2.63%	30.77%	23.08%	23.08%	23.08%
Seagoville High School	11	2.23%	0.00%	9.09%	27.27%	63.64%
Townview Schl/Educ/Soc Service	10	2.02%	40.00%	40.00%	0.00%	20.00%
Townview School/Business & Mgt	10	2.02%	20.00%	60.00%	0.00%	20.00%
W H Adamson High School	10	2.02%	10.00%	40.00%	10.00%	40.00%
Irma Lerma Rangel Young	9	1.82%	33.33%	44.44%	0.00%	22.22%
James Madison High School	8	1.62%	12.50%	12.50%	25.00%	50.00%
Trinidad Garza Early College	8	1.62%	0.00%	100.00%	0.00%	0.00%
H Grady Spruce High School	7	1.42%	42.86%	14.29%	14.29%	28.57%
Franklin D Roosevelt Hs	4	0.81%	25.00%	50.00%	0.00%	25.00%
South Oak Cliff High School	4	0.81%	0.00%	0.00%	0.00%	100.00%
A Maceo Smith High School	3	0.61%	0.00%	33.33%	0.00%	66.67%
Dr. Wright Lassiter Jr. Early	3	0.61%	0.00%	100.00%	0.00%	0.00%
Justin F Kimball High School	3	0.61%	0.00%	0.00%	0.00%	100.00%
L G Pinkston High School	3	0.61%	0.00%	0.00%	0.00%	100.00%
Barack Obama Male Leadership A	1	0.20%	0.00%	100.00%	0.00%	0.00%
Lincoln High School	1	0.20%	0.00%	0.00%	100.00%	0.00%
W W Samuell High School	1	0.20%	0.00%	0.00%	0.00%	100.00%
Total	494	100.00%	16.40%	22.06%	23.28%	38.26%

Examining this data from a different angle via Table 16, 61.74% or 305 out of 494 students took early college courses and 38.26% didn't take any early college courses. Out of 305 Dallas ISD students who took early college courses, 23.93% were from Townview Science & Engineering School and Talented and 11.48% were from Talented and Gifted Magnet School. Out of 189 Dallas ISD students who didn't take any early college courses, 15.87% were from North Dallas High School.

Only two Dallas ISD high schools had students who were awarded IB credits. Four schools did not have students who took any early college courses (i.e. South Oak Cliff High School, Justin F. Kimball High School, L.G. Pinkston High School, and W.W. Samuell High School) and consequently had very low GPA as well as 4-year & 6-year graduation rates. The majority of average dual credit hours through Dallas ISD schools were below 15 credit hours except two Early College schools (Trinidad Garza & Dr. Wright Lassiter Jr.). All students from Trinidad Garza Early College graduated in 4 years (Table 16).

North Dallas High School was one of top three feeder schools within DISD to UT Dallas. However, the student characteristics and academic performance were significantly different from the two magnet schools. Out of 42 students from North Dallas High School, only 12 students (28.57%) took early college courses compared to 76.04% for Townview Science & Engineering Magnet school and 85.37% for Talented and Gifted Magnet school (Table 15). For students from North Dallas High School, the average SAT was 933.33 which was at least 330 points lower compared to the two magnet schools and 192 points lower than the DISD average even though 74.36% of the students were ranked top 10% (Table 16). The 1st fall and 1st year GPA were relatively low at 2.11 and 2.09. Only 24 students or 54.76% returned in the following fall semester.

Table 16 Academic Performance by Dallas ISD High School

	# Students	Early College Courses	No Early College Courses	Top 10% (exclude no record)	SAT*	ACT*	AP**	IB**	DC**	POST MATH SCH***	IST FALL GPA	IST YEAR GPA	1ST YR RETEN.	4-YR GRAD.- 2010 only	6-YR GRAD.- 2010-2012
Townview Science & Engr Magnet	96	23.93%	12.17%	26.32%	1263.13	26.68	14.19		10.68	7.77	3.03	2.95	87.50%	48.48%	72.73%
North Dallas High School	42	3.93%	15.87%	74.36%	933.33	18.00	6.25		8.38	11.38	2.11	2.09	54.76%	16.00%	42.86%
Talented and Gifted Magnet Sch	41	11.48%	3.17%	57.14%	1302.31	28.00	22.79		10.25	8.71	3.38	3.20	95.12%	50.00%	100.00%
Skyline High School	34	5.25%	9.52%	73.53%	1029.67	21.00	5.75		11.46	11.50	2.76	2.66	76.47%	25.00%	33.33%
Hillcrest High School	28	5.77%	5.82%	41.67%	1063.46	21.38	10.93		15.57	3.00	2.51	2.55	82.14%	33.33%	33.33%
W T White High School	24	4.26%	5.82%	66.67%	1154.78	24.44	8.43		10.00	9.00	2.48	2.55	83.33%	12.50%	20.00%
Bryan Adams High School	23	2.30%	8.47%	66.67%	1052.35	21.07	4.50		15.00	9.00	2.27	2.24	52.17%	30.00%	100.00%
Sunset High School	23	3.61%	6.35%	72.73%	1017.50	23.47	7.38	9.00	8.67	10.67	2.64	2.53	73.91%	50.00%	66.67%
Molina High School	15	1.97%	4.76%	80.00%	982.14	20.09	3.00		12.00	3.00	2.73	2.69	80.00%	0.00%	0.00%
Thomas Jefferson High School	15	2.95%	3.17%	61.54%	1019.33	20.27	7.00		10.63	7.00	2.51	2.49	80.00%	10.00%	50.00%
Townview School of Health Prof	15	4.92%	0.00%	58.33%	1136.43	23.83	5.60		12.67	6.00	3.12	3.00	80.00%	14.29%	50.00%
Woodrow Wilson High School	15	2.95%	3.17%	30.00%	1206.92	25.83	8.14		6.00		2.66	2.64	86.67%	25.00%	
Townview Schl/Govt Law & Enfor	14	4.26%	0.53%	12.50%	1169.23	25.00	9.13		10.30	9.00	3.14	3.11	85.71%	50.00%	0.00%
Booker T Washington HS Arts	13	3.28%	1.59%	71.43%	1231.82	25.17	17.50		11.43		2.81	2.82	84.62%	40.00%	100.00%
Seagoville High School	11	1.31%	3.70%	66.67%	1096.00	21.29	10.00		13.00	9.00	2.11	2.34	81.82%	33.33%	0.00%
Townview Schl/Educ/Soc Service	10	2.62%	1.06%	33.33%	1038.89	24.50	5.25		8.38	5.75	3.21	3.02	100.00%	50.00%	66.67%
Townview School/Business & Mgt	10	2.62%	1.06%	60.00%	1088.00	21.00	7.00		7.63	18.33	2.83	2.79	90.00%	14.29%	75.00%
W H Adamson High School	10	1.97%	2.12%	60.00%	931.00	17.71	3.00		14.60	9.00	2.09	2.49	70.00%	11.11%	33.33%
Irma Lerma Rangel Young	9	2.30%	1.06%	25.00%	1152.22	23.50	9.50		13.86	6.00	3.30	3.32	100.00%	0.00%	0.00%
James Madison High School	8	1.31%	2.12%	60.00%	1260.00	17.50	16.00		9.50	12.00	3.16	3.17	62.50%	100.00%	100.00%
Trinidad Garza Early College	8	2.62%	0.00%	14.29%	1116.25	23.00			61.00	9.00	2.57	3.01	75.00%	100.00%	
H Grady Spruce High School	7	1.64%	1.06%	85.71%	1131.67	26.00	10.00		8.75		2.16	1.85	71.43%		
Franklin D Roosevelt Hs	4	0.98%	0.53%	100.00%	945.00	17.00	6.00		28.00	6.00	2.21	2.47	50.00%	50.00%	50.00%
South Oak Cliff High School	4	0.00%	2.12%	100.00%	896.67	20.00					2.03	2.15	50.00%	0.00%	0.00%
A Maceo Smith High School	3	0.33%	1.06%	100.00%	1110.00	23.50			3.00		1.39	1.47	33.33%	0.00%	
Dr. Wright Lassiter Jr. Early	3	0.98%	0.00%	50.00%	1196.67	26.67			66.33		3.06	3.16	100.00%		
Justin F Kimball High School	3	0.00%	1.59%	66.67%	946.67						1.90	2.65	0.00%	0.00%	0.00%
L G Pinkston High School	3	0.00%	1.59%	100.00%	893.33	17.00					1.66	1.62	33.33%	0.00%	0.00%
Barack Obama Male Leadership A	1	0.33%	0.00%		1120.00	23.00			12.00		3.62	3.25	100.00%		
Lincoln High School	1	0.33%	0.00%		1270.00	27.00		3.00			3.94	3.97	100.00%	100.00%	
W W Samuel High School	1	0.00%	0.53%	100.00%	1010.00						1.45	1.86	100.00%		
Total	494	100.00%	100.00%	60.68%	1125.34	23.32	12.89	6.00	14.16	9.02	2.72	2.70	78.54%	31.60%	47.89%

* Some students don't have the score on file.

** Advancement placement (AP), International Baccalaureate (IB), or Dual Credit (DC) semester credit hours earned while in high school

*** Community college semester credit hours earned after students entered UT Dallas

These data and other data in this study and elsewhere confirm the positive effects of early college coursework on subsequent academic performance. The effects could be due to the challenge of the course work, the fact that students realize they can do college-level work, the quality of instruction *and/or* the way in which early college courses teach students study skills— in effect helping them to become college ready. Thus, holding all other variables constant, the

DISD data suggest that the students without that experience are at a disadvantage compared to other students with early college credits.

Plano Independent School District

Table 17 provides tabular data for Plano ISD students by types of early college courses and gender, ethnicity, scholarship status and Pell Grant status. Of the 1,697 students from Plano ISD, 42.02% were female and 57.98% were male. The percentages for students who took early college courses varied by gender. Approximately 41.23% of females fell into the ‘exam-only’ group and 43.80% of males. Only 14.59% of females and 10.57% of males fell into the ‘DC-only’ group. Twenty-seven percent of females took a combination of exam-based and dual credit courses compared to 19.4% of males—a 7.38% difference. *For the ‘No AP/IB/DC’ group gender difference is more substantial: 17.39% of females compared to 26.22% of males (an 8.83% difference). Regardless of gender, students from Plano ISD were more likely take exam-based early college courses.*

Table 17 Distribution of Gender, Ethnicity & Scholarship Status for Plano ISD Students

	# Students from Plano ISD		by Early College Groups				TOTAL
	Freq	Percent	Both-type	DC-only	Exam-only	No AP/IB/DC	
Female	713	42.02%	26.79%	14.59%	41.23%	17.39%	100.00%
Male	984	57.98%	19.41%	10.57%	43.80%	26.22%	100.00%
Asian	917	54.04%	22.68%	14.07%	42.86%	20.39%	100.00%
Minority	179	10.55%	15.64%	12.29%	43.58%	28.49%	100.00%
Others	162	9.55%	25.31%	11.11%	40.12%	23.46%	100.00%
White	439	25.87%	23.92%	8.88%	43.05%	24.15%	100.00%
Full Scholarship	492	28.99%	26.63%	2.24%	66.26%	4.88%	100.00%
No Scholarship	955	56.28%	18.12%	18.53%	29.11%	34.24%	100.00%
Partial Scholarship	250	14.73%	31.20%	8.00%	48.40%	12.40%	100.00%
Pell Grant	399	23.51%	21.55%	13.78%	40.35%	24.31%	100.00%
No Pell Grant	1,298	76.49%	22.80%	11.79%	43.45%	21.96%	100.00%
TOTAL	1,697		22.51%	12.26%	42.72%	22.51%	

Over half of Plano ISD students were Asian Americans. Out of 917 Asian Americans, only 20.39% did not take any early college courses. Out of 179 minority students, 28.49% did not take any early college courses. *Regardless of ethnicity, students from Plano ISD were more likely to take exam-based early college courses.* Out of 955 students who did not receive any merit scholarships, 34.24% didn't take any early college courses. Approximately 24% of Plano ISD students were awarded a Pell grant. Out of students who were awarded a Pell grant, 24.31% did not take any early college courses (Table 17).

Table 18 disaggregates the Plano ISD data. As can be seen, 37.01% of Plano ISD students who enrolled in UT Dallas were from Plano Senior High School, followed by Plano East Senior High School (35.06%) and Plano West Senior High School (27.93%). The percentages for four early college groups were calculated individually for each high school. The percentages of the 'DC-only' group were the lowest consistently for all three Plano ISD high schools while the 'exam-only' group were the highest. *Regardless of high school of origin, the majority of students in Plano ISD took exam-based early college courses.*

Table 18 Distribution of High School for Plano ISD Students

	# Students from Plano ISD		By Early College Groups			
	Freq	Percent	Both-type	DC-only	Exam-only	No AP/IB/DC
Plano Senior High School	628	37.01%	23.41%	10.67%	46.97%	18.95%
Plano East Senior High School	595	35.06%	20.67%	11.60%	43.53%	24.20%
Plano West Senior High School	474	27.93%	23.63%	15.19%	36.08%	25.11%
Total	1,697	100.00%	22.51%	12.26%	42.72%	22.51%

The students from Plano ISD are homogeneous in student characteristics and academic performance as evidenced by SAT score, ACT score, number of AP and DC taken, 1st fall GPA, 1st year GPA, fall to fall retention, and graduation rate (

Table 19).

Table 19 Academic Performance by Plano ISD High School

	# Students	Top 10% (exclude no record)	SAT*	ACT*	AP**	IB**	DC**	POST MATRI SCH***	1ST FALL GPA	1ST YEAR GPA
Plano Senior High School	628	44.32%	1299.60	28.84	13.82		11.27	10.45	3.22	3.17
Plano East Senior High School	595	48.91%	1281.41	28.64	11.58	9.78	10.39	9.58	3.25	3.19
Plano West Senior High School	474	34.35%	1294.31	28.59	12.35		10.85	9.24	3.16	3.11
Total	1,697	44.82%	1291.61	28.70	12.68	9.78	10.85	9.85	3.21	3.16
* Some students don't have the score on file.										
** Advancement placement (AP), International Baccalaureate (IB), or Dual Credit (DC) semester credit hours earned while in high school										
*** Community college semester credit hours earned after students entered UT Dallas										

Chi-Square tests were conducted to further examine if there was a statistically significant difference on fall to fall retention, 4-year graduation and 6-year graduation between early college groups for students from PISD. There was a statistically significant difference on fall to fall retention between four early college groups, $X^2(3, n=1697) = 80.6040, p < .0001$, with a Cramer's V value of 0.2179. Table 20 shows 94.76% of students in the 'both-type' were returned in the following fall semester while only 76.18% of students who didn't take any early college courses were retained.

Table 20 Fall to Fall Retention by Early College Groups

Early College Groups	#	%	#	%	#	%
Both-type	362	94.76%	20	5.24%	382	100.00%
DC-only	187	89.90%	21	10.10%	208	100.00%
Exam-only	665	91.72%	60	8.28%	725	100.00%
No AP/IB/DC	291	76.18%	91	23.82%	382	100.00%
Total	1,505	88.69%	192	11.31%	1697	100.00%
$X^2(3, n=1697) = 80.6040, p < .0001, \text{Cramer's } V = 0.2179$						

For the data in Table 21 below (n= 636), there was a statistically significant difference on 4-year graduation between four early college groups, $X^2(3, n=636) = 104.3665, p < .0001$, with a medium effect size at Cramer's V value of 0.4051. Approximately 73.83% of students in the 'both-type' graduated in 4 years while only 20.16% of students who didn't take any early college courses graduated in 4-years.

Table 21 4-Year Graduation by Early College Groups

Table 21. 4-Year Graduation by Early College Groups						
Early College Groups	Graduated		Not Graduated		Total	
	#	%	#	%	#	%
Both-type	110	73.83%	39	26.17%	149	100.00%
DC-only	41	47.67%	45	52.33%	86	100.00%
Exam-only	190	68.59%	87	31.41%	277	100.00%
No AP/IB/DC	25	20.16%	99	79.84%	124	100.00%
Total	366	57.55%	270	42.45%	636	100.00%
$X^2 (3, n=636) = 104.3665, p<.0001, \text{Cramer's } V=0.4051$						

Table 22 below presents data on 6-year graduation rates by groups (n= 201). A test for 6-year graduation was found statistically significant between four early college groups, $X^2 (3, n=201) = 46.5971, p<.0001$, with a medium effect size at Cramer’s V value of 0.4815. Over 87.50% of students in the ‘both-type’ graduated in 6 years while only 36.54% of students who didn’t take any early college courses graduated in 6-years.

Table 22 6-Year Graduation by Early College Groups

Early College Groups	Graduated		Not Graduated		Total	
	#	%	#	%	#	%
Both-type	21	87.50%	3	12.50%	24	100.00%
DC-only	18	72.00%	7	28.00%	25	100.00%
Exam-only	87	87.00%	13	13.00%	100	100.00%
No AP/IB/DC	19	36.54%	33	63.46%	52	100.00%
Total	145	72.14%	56	27.86%	201	100.00%
$X^2 (3, n=201) = 46.5971, p<.0001, \text{Cramer's } V=0.4815$						

Students from Plano ISD embraced the similar learning environment and academic standard. Three high schools also shared similar student characteristics and academic background. *The findings from Chi-Square tests confirm that students who took early college courses outperformed peers who did not take any early college courses with respect to postsecondary outcomes measured by first year retention and graduation rates when we only examined homogenous Plano ISD students.*

High School of Origin

Table 23 presents data on the top high schools in our sample. They were Plano Senior High School, Plano East Senior High School, Plano West Senior High School, Allen High School, Hebron High School, Westwood High School, Coppell Senior High School, Richland Collegiate High School, and Texas Academy Math & Science (TAMS). Those schools are within 20 miles distance except TAMS with a distance of 37 miles.

There were 187 (1.53% of the total sample) graduates from foreign high schools (approximately two-thirds from Vietnam and India) enrolled from multiple countries as FTIC students in the sample. Over seventy-three percent of these students arrived with no early college work.

Table 23 FTIC Enrollment by High School

FTIC 2010 - 2015 Cohorts			
HIGH SCHOOL	FREQ	%	Distance/Mile
Plano Senior High School	628	5.15%	4.4
Plano East Senior High School	595	4.88%	10.2
Plano West Senior High School	474	3.89%	8.9
Allen High School	348	2.86%	12.4
Hebron High School	270	2.22%	10.5
Westwood High School	230	1.89%	8.0
Coppell Senior High School	221	1.81%	19.4
Richland Collegiate Hs	214	1.76%	5.7
Foreign High Schools	187	1.53%	
Texas Academy Math & Science	179	1.47%	36.6
Liberty High School	164	1.35%	14.8
North Garland High School	157	1.29%	8.2
Richardson High School	147	1.21%	3.4
Flower Mound High School	142	1.17%	26.8
Lloyd V Berkner High School	139	1.14%	6.0
Garland High School	134	1.10%	9.8
Centennial High School	126	1.03%	12.6
Texas Home Schooled	122	1.00%	
McNeil High School	109	0.89%	200.0
Townview Science & Engr Magnet	96	0.79%	21.3

Table 24 provides data on high school of origin for early college groups. As one can see high schools in Plano ISD ranked one, two and three for ‘both-type’ and ‘exam-only’ groups as well as the ‘no AP/IB/DC’ group. However, the high schools of students in the dual-only early college group were quite different from the other three groups. Collegiate schools, TAMS, home schooled and Islamic schools ranked top four in dual credit courses for students to earn college credits while in high school.

Table 24 FTIC 2010-2015 Enrollment by Early College Groups by High School

Both-type			DC-only		
HIGH SCHOOL	FREQ	%	HIGH SCHOOL	FREQ	%
Plano Senior High School	147	6.02%	Richland Collegiate Hs	211	6.92%
Plano East Senior High School	123	5.03%	Texas Academy Math & Science	163	5.35%
Plano West Senior High School	112	4.58%	Texas Home Schooled	82	2.69%
Westwood High School	86	3.52%	Brighter Horizons Academy	72	2.36%
Allen High School	86	3.52%	Plano West Senior High School	72	2.36%
Hebron High School	65	2.66%	Allen High School	70	2.30%
Coppell Senior High School	56	2.29%	Plano East Senior High School	69	2.26%
Richardson High School	54	2.21%	Plano Senior High School	67	2.20%
North Hills School	45	1.84%	Coppell Senior High School	57	1.87%
Centennial High School	43	1.76%	North Garland High School	46	1.51%
Lloyd V Berkner High School	43	1.76%	Lakeview Centennial Hs	44	1.44%
North Garland High School	40	1.64%	Sunnyvale High School	37	1.21%
Creekview High School	38	1.56%	IANT Quranic Academy	36	1.18%
Liberty High School	35	1.43%	Lloyd V Berkner High School	34	1.12%
McNeil High School	34	1.39%	Foreign High School	34	1.12%
Garland High School	28	1.15%	Richardson High School	32	1.05%
Townview Science & Engr Magnet	28	1.15%	Hebron High School	30	0.98%
Flower Mound High School	28	1.15%	McNeil High School	27	0.89%
R L Turner High School	26	1.06%	Wylie High School	26	0.85%
Round Rock High School	21	0.86%	Naaman Forest High School	25	0.82%
Exam-only			No AP/IB/DC		
HIGH SCHOOL	FREQ	%	HIGH SCHOOL	FREQ	%
Plano Senior High School	295	8.27%	Plano East Senior High School	144	4.60%
Plano East Senior High School	259	7.27%	Foreign High School	137	4.37%
Plano West Senior High School	171	4.80%	Plano Senior High School	119	3.80%
Allen High School	119	3.34%	Plano West Senior High School	119	3.80%
Hebron High School	108	3.03%	Allen High School	73	2.33%
Westwood High School	73	2.05%	Hebron High School	67	2.14%
Flower Mound High School	64	1.80%	Coppell Senior High School	56	1.79%
Liberty High School	58	1.63%	Liberty High School	49	1.56%
Garland High School	57	1.60%	Westwood High School	48	1.53%
Coppell Senior High School	52	1.46%	Garland High School	37	1.18%
Centennial High School	43	1.21%	North Garland High School	35	1.12%
Edward S Marcus High School	39	1.09%	Flower Mound High School	34	1.09%
North Garland High School	36	1.01%	Lloyd V Berkner High School	31	0.99%
McKinney Boyd High School	35	0.98%	Frisco High School	30	0.96%
Townview Science & Engr Magnet	33	0.93%	Richardson High School	30	0.96%
Richardson High School	31	0.87%	North Dallas High School	30	0.96%
Lloyd V Berkner High School	31	0.87%	Sachse High School	28	0.89%
Carroll Senior High School	30	0.84%	Texas Home Schooled	26	0.83%
McNeil High School	30	0.84%	Jesuit College Preparatory Sch	25	0.80%
Rockwall High School	30	0.84%	J J Pearce High School	24	0.77%

Academic Unit of Choice

Table 25 presents data on the academic unit and academic plan FTIC students were in at time of first fall registration. If a student began in a major and was retained (even if they switched majors) they are represented in the major at time of first fall registration. The top four academic units were: 30% in Erik Jonsson School of Engineering and Computer Science (ENCS), 25% in School of Natural Sciences and Mathematics (NSMT), 14% in Naveen Jindal School of Management (MGMT), and 11% in School of Behavioral and Brain Sciences (BBSC).

The distribution of four early college groups varied by school. Students in ENCS were more likely to take exam-based early college courses and less likely to take a combination of dual credit and exam-based courses. Students in NSMT were more likely to take exam-based courses while students in MGMT were more likely to not have taken any early college coursework. *While only 18% of students in BBSC did not present early college courses, 39.2% of undeclared students arrived with no early college coursework, 36% in ATEC and 33% in Arts and Humanities.*

Table 25 Academic Unit by Early College Groups

	Both-type		DC-only		Exam-only		No AP/IB/DC		Total	
	(% against Unit)		(% against Unit)		(% against Unit)		(% against Unit)		(% against Total)	
ENCS	725	19.82%	807	22.06%	1,204	32.91%	922	25.21%	3,658	30.01%
NSMT	671	22.35%	777	25.88%	891	29.68%	663	22.09%	3,002	24.63%
MGMT	351	20.41%	467	27.15%	408	23.72%	494	28.72%	1,720	14.11%
BBSC	314	24.47%	366	28.53%	368	28.68%	235	18.32%	1,283	10.53%
ARHM	110	14.01%	185	23.57%	230	29.30%	260	33.12%	785	6.44%
UGRD	95	12.67%	178	23.73%	183	24.40%	294	39.20%	750	6.15%
EPPS	94	20.57%	96	21.01%	162	35.45%	105	22.98%	457	3.75%
GENS	58	16.81%	123	35.65%	72	20.87%	92	26.67%	345	2.83%
ATEC	25	13.30%	48	25.53%	47	25.00%	68	36.17%	188	1.54%
Total	2,443	20.04%	3,047	25.00%	3,565	29.25%	3,133	25.71%	12,188	100.00%

Table 26 compares student outcomes by early college groups and academic unit. The School of Arts and Technology (ATEC) at UT Dallas was formed in 2015, thus, graduation data

are not available. Previously, students in ATEC were in Arts and Humanities (ARHM). Students who didn't take any early college coursework and didn't declare their majors (UGRD) had the lowest first year retention rate of 60.88% and lowest 4-year graduation rate of 17.76% (see Table 26 below). BBSC students who didn't take any early college courses had the lowest 6 year graduation rate. The 4-year graduation rate for students who were in School of Arts and Humanity and didn't take any early college courses was also very low (17.86%).

The findings indicate that students who did not successfully take early college coursework and are undeclared are at a greater risk of not being academically successful.³ Those students who did not take any early college courses and majored in School of Behavioral and Brain Sciences (particularly Neuroscience) are also at risk of not graduating in 4 or 6 years.

Table 26 Academic Performance by Early College Groups by Academic Unit

	Fall to Fall Retention					Graduated in 6 Yr 2010FA Only					Graduated in 4 Yr 2010FA, 2011FA, 2012FA				
	Both-type	DC-only	Exam-only	No AP/IB/DC	Total	Both-type	DC-only	Exam-only	No AP/IB/DC	Total	Both-type	DC-only	Exam-only	No AP/IB/DC	Total
ARHM	95.45%	79.46%	90.87%	70.00%	81.91%	80.00%	68.97%	90.91%	37.78%	61.32%	78.00%	49.44%	64.71%	17.86%	47.88%
ATEC	100.00%	79.17%	87.23%	77.94%	83.51%										
BBSC	96.82%	86.61%	89.40%	70.21%	86.91%	86.96%	75.76%	76.60%	23.08%	67.44%	81.98%	61.11%	71.83%	23.61%	63.54%
ENCS	94.48%	86.25%	88.79%	70.39%	84.72%	84.78%	60.23%	79.44%	48.12%	64.44%	64.20%	40.38%	56.00%	22.02%	44.69%
EPPS	85.11%	88.54%	87.04%	71.43%	83.37%	76.92%	80.00%	86.67%	70.00%	77.36%	63.83%	69.39%	64.86%	38.30%	59.91%
GENS	93.10%	89.43%	90.28%	65.22%	83.77%	100.00%	50.00%	100.00%	75.00%	75.00%	76.47%	42.86%	70.59%	27.78%	53.42%
MGMT	93.16%	88.65%	88.24%	78.95%	86.69%	85.00%	66.67%	86.54%	60.87%	74.32%	76.58%	60.40%	71.14%	38.41%	60.03%
NSMT	97.02%	87.90%	94.05%	72.40%	88.34%	84.21%	64.37%	87.41%	42.11%	69.08%	71.19%	52.06%	69.27%	23.02%	55.17%
UGRD	95.79%	82.02%	94.54%	60.88%	78.53%	100.00%	75.00%	85.00%	38.36%	62.34%	67.92%	44.55%	67.96%	17.76%	43.52%
Total	95.05%	86.51%	90.46%	71.27%	85.46%	85.25%	66.12%	84.15%	45.12%	67.25%	71.20%	50.87%	65.38%	24.43%	52.40%

Biology accounts for 13.61% of all FTIC students across six years (Table 27). The second popular major was Computer Science, followed by Mechanical Engineering. Approximately 6% of FTIC students, when entering, have not declared a major, 5.6% majored in Arts and Technology, and 5.4% majored in Neuroscience.

³ The combination of no advanced credits and being undeclared places an added at-risk burden on these students, see, for example, Redlinger and Zhao (2016, 2015, and 2014).

Table 27 Top 20 Majors at UT Dallas

FTIC 2010-2015 Cohort		
UTD MAJOR	FREQ	%
Biology	1,659	13.61%
Computer Science	1,215	9.97%
Mechanical Engineering	758	6.22%
Undecided	750	6.15%
Arts and Technology	688	5.64%
Neuroscience	653	5.36%
Biochemistry	518	4.25%
Biomedical Engineering	504	4.14%
Electrical Engineering	489	4.01%
Computer Engineering	441	3.62%
Business Administration	436	3.58%
Psychology	374	3.07%
Accounting	337	2.77%
Finance	336	2.76%
Healthcare Studies	263	2.16%
Software Engineering	232	1.90%
Chemistry	231	1.90%
Marketing	208	1.71%
Global Business	169	1.39%
Physics	160	1.31%

Students majoring in Biology were more likely to have a combination of exam-based and dual-only courses or dual-only courses to gain college credits (Table 28). Students majoring in Computer Science were more likely to take exam-based courses to gain college credits. Students who haven't decided their majors or majored in Arts and Technology were more likely to not have any early college credits. Student who majored in Neuroscience were more likely to have a combination of exam-based and dual-only courses to gain college credits.

Table 28 Top 20 Majors at UT Dallas by Early College Groups

Both-type			DC-only		
UTD MAJOR	FREQ	%	UTD MAJOR	FREQ	%
Biology	381	15.60%	Biology	467	15.33%
Computer Science	225	9.21%	Computer Science	225	7.38%
Neuroscience	175	7.16%	Mechanical Engineering	201	6.60%
Biomedical Engineering	135	5.53%	Undecided	178	5.84%
Biochemistry	127	5.20%	Neuroscience	170	5.58%
Electrical Engineering	125	5.12%	Arts and Technology	166	5.45%
Mechanical Engineering	112	4.58%	Biomedical Engineering	125	4.10%
Undecided	95	3.89%	Business Administration	124	4.07%
Arts and Technology	86	3.52%	Psychology	112	3.68%
Business Administration	85	3.48%	Electrical Engineering	109	3.58%
Accounting	84	3.44%	Accounting	107	3.51%
Computer Engineering	76	3.11%	Biochemistry	100	3.28%
Finance	72	2.95%	Healthcare Studies	99	3.25%
Psychology	68	2.78%	Computer Engineering	88	2.89%
Chemistry	50	2.05%	Finance	71	2.33%
Software Engineering	47	1.92%	Marketing	58	1.90%
Healthcare Studies	44	1.80%	Chemistry	55	1.81%
Speech-Language Path and A	40	1.64%	Software Engineering	54	1.77%
Marketing	35	1.43%	Speech-Language Path and A	46	1.51%
Global Business	31	1.27%	Mathematics	36	1.18%
Exam-only			No AP/IB/DC		
UTD MAJOR	FREQ	%	UTD MAJOR	FREQ	%
Computer Science	490	13.74%	Biology	349	11.14%
Biology	462	12.96%	Undecided	294	9.38%
Mechanical Engineering	229	6.42%	Computer Science	275	8.78%
Neuroscience	207	5.81%	Arts and Technology	251	8.01%
Arts and Technology	185	5.19%	Mechanical Engineering	216	6.89%
Undecided	183	5.13%	Computer Engineering	155	4.95%
Biochemistry	177	4.96%	Business Administration	137	4.37%
Electrical Engineering	152	4.26%	Biochemistry	114	3.64%
Biomedical Engineering	151	4.24%	Electrical Engineering	103	3.29%
Computer Engineering	122	3.42%	Neuroscience	101	3.22%
Psychology	103	2.89%	Finance	99	3.16%
Finance	94	2.64%	Biomedical Engineering	93	2.97%
Business Administration	90	2.52%	Psychology	91	2.90%
Chemistry	71	1.99%	Accounting	85	2.71%
Accounting	61	1.71%	Software Engineering	76	2.43%
Political Science	58	1.63%	Marketing	70	2.23%
Software Engineering	55	1.54%	Healthcare Studies	69	2.20%
Physics	52	1.46%	Global Business	57	1.82%
Healthcare Studies	51	1.43%	Chemistry	55	1.76%
Global Business	49	1.37%	Physics	46	1.47%

Table 29 presents the interaction between early college groups, UT Dallas majors and rates of retention, 4-year graduation, and 6-year graduation. The top 15 FTIC majors are presented individually and the rest of majors were organized into “Others.” The 6-year graduation data for Biomedical Engineering and Healthcare Studies were not available because those two majors did not exist in the fall semester of 2010.

Students who didn’t take any early college courses and didn’t declare a major had the lowest first year retention rate (60.88%) and very low 4-year graduation rate (17.76%). Students who majored in Neuroscience had the average 6-year graduation of 78.85%; however, Neuroscience students who didn’t take any early college courses had the lowest 6-year graduation rate of 16.67%. Similarly, for Biochemistry, the average 6-year graduation rate was 58.57% but was 15.79% for students who didn’t take any early college courses.

The findings demonstrate that students who did not have early start were less likely to complete the degree in 4 years. Given the student population, those students who did not take any early college courses can be seen to be at-risk –more so if they haven’t declared a major in their first year. In some majors (e.g., Neuroscience and Biochemistry), the effects of lack of early college work are dramatic and students should be considered to be at risk.

Table 29 Academic Performance by Early College Groups by Major

UT Dallas Major	First Year Retention					Graduated in 6 Yr 2010FA Only					Graduated in 4 Yr 2010FA, 2011FA, 2012FA				
	Both-type	DC-only	Exam-only	No AP/IB/DC	Total	Both-type	DC-only	Exam-only	No AP/IB/DC	Total	Both-type	DC-only	Exam-only	No AP/IB/DC	Total
Accounting/ Accounting & Information Mgt	95.35%	90.60%	91.30%	78.72%	88.80%	100.00%	80.00%	75.00%	88.89%	82.76%	84.00%	63.16%	70.97%	36.67%	62.90%
Arts and Technology	96.51%	77.71%	93.51%	75.30%	83.43%	71.43%	82.35%	100.00%	37.93%	62.90%	73.33%	47.37%	68.52%	20.51%	46.58%
Biochemistry	96.85%	85.00%	93.79%	78.07%	89.38%	61.54%	58.33%	88.46%	15.79%	58.57%	75.47%	53.33%	67.12%	19.23%	55.16%
Biology	97.90%	88.65%	95.24%	73.93%	89.51%	92.86%	68.00%	85.53%	54.24%	73.71%	71.35%	52.52%	72.22%	29.17%	57.52%
Biomedical Engineering	100.00%	88.80%	92.72%	77.42%	90.87%						60.00%	26.47%	38.71%	17.65%	40.16%
Business Administration	92.94%	87.10%	82.22%	73.72%	83.03%	84.62%	69.23%	92.86%	53.57%	74.39%	71.43%	59.52%	78.57%	37.50%	58.47%
Computer Engineering	89.47%	86.36%	86.89%	67.10%	80.27%	71.43%	38.46%	77.78%	51.43%	57.53%	76.00%	40.38%	61.36%	14.10%	39.20%
Computer Science	95.11%	83.11%	86.94%	71.27%	84.20%	90.00%	50.00%	78.95%	40.63%	61.54%	66.67%	42.25%	60.45%	26.51%	49.71%
Electrical Engineering	93.60%	92.66%	89.47%	72.82%	87.73%	84.62%	75.00%	76.47%	68.75%	75.76%	60.42%	39.68%	54.69%	24.49%	45.09%
Finance	94.44%	83.10%	86.17%	81.82%	86.01%	75.00%	50.00%	77.78%	50.00%	65.22%	66.67%	51.61%	52.63%	34.62%	50.86%
Healthcare Studies	97.73%	90.91%	94.12%	69.57%	87.07%						80.00%	83.33%	50.00%	0.00%	66.67%
Mechanical Engineering	92.86%	81.59%	89.52%	67.13%	81.53%	100.00%	75.00%	82.14%	42.50%	65.26%	61.54%	42.25%	56.10%	22.22%	43.22%
Neuroscience	96.57%	89.41%	92.27%	75.25%	90.05%	92.31%	76.92%	90.00%	16.67%	78.85%	83.08%	55.38%	79.41%	14.81%	65.78%
Others	92.01%	88.78%	89.75%	70.42%	85.07%	85.11%	61.19%	86.17%	46.81%	68.21%	72.69%	57.67%	68.19%	27.34%	55.78%
Psychology	97.06%	81.25%	82.52%	63.74%	80.21%	66.67%	61.54%	66.67%	26.67%	53.85%	72.00%	56.82%	67.44%	20.69%	55.32%
Undecided	95.79%	82.02%	94.54%	60.88%	78.53%	100.00%	75.00%	85.00%	38.36%	62.34%	67.92%	44.55%	67.96%	17.76%	43.52%
Total	95.05%	86.51%	90.46%	71.25%	85.45%	85.25%	66.12%	84.15%	45.12%	67.25%	71.20%	50.87%	65.38%	24.43%	52.40%

Early College Coursework Awarded by Major

The courses awarded by types of early college courses are presented in Table 30. English, History, Government, Macroeconomics and Algebra were five main subjects in which students took dual credit courses. AP coursework presents a slightly different array: History, Government, English were the main subjects but in addition, Differential Calculus and Psychology appear. For students who took international baccalaureate courses, Literature, Language, Biology, Social Sciences, and Art were five main subjects.

Table 30 Top 10 Subjects Awarded by UT Dallas

DC Subject Awarded by UTD			AP Credits Subject Awarded by UTD			IB Credits Subject Awarded by UTD		
UTD COURSE_DESCR	# Students	%	UTD COURSE_DESCR	# Students	%	UTD COURSE_DESCR	# Students	%
CCN:COMPOSITION I	2,387	6.40%	US HIST SURVEY TO CIVIL WAR	3,536	15.21%	MASTERPIECES OF WORLD LITERATU	325	21.80%
US HIST SURVEY FROM CIVIL WAR	2,346	6.29%	US HIST SURVEY FROM CIVIL WAR	1,755	7.55%	BEGINNING SPANISH II	112	7.51%
RHETORIC	2,186	5.86%	RHETORIC	1,753	7.54%	HIST LWR LVL TRANSFER ELECTIVE	95	6.37%
US HIST SURVEY TO CIVIL WAR	2,116	5.67%	AMERICAN NATIONAL GOVERNMENT	1,303	5.61%	INTERMEDIATE SPANISH II	91	6.10%
PRINCIPLES OF MACROECONOMICS	1,923	5.15%	DIFFERENTIAL CALCULUS	1,275	5.49%	CCN:BIولوجY FOR NON-SCI MJRS I	60	4.02%
AMERICAN NATIONAL GOVERNMENT	1,747	4.68%	CCN:COMPOSITION I	910	3.92%	CCN:BIولوجY I LAB/NONMJR	57	3.82%
STATE AND LOCAL GOVERNMENT	1,103	2.96%	INTRODUCTION TO PSYCHOLOGY	898	3.86%	INTRODUCTION TO PSYCHOLOGY	57	3.82%
CCN:AMER GOVT I (FED/TX CONST)	1,085	2.91%	PRINCIPLES OF MACROECONOMICS	804	3.46%	PRINCIPLES OF MACROECONOMICS	55	3.69%
COLLEGE ALGEBRA	873	2.34%	CCN:AMER GOVT II (FED/TX TOPC)	713	3.07%	UNDERSTANDING ART	53	3.55%

Four most frequent taken subjects (History, Government, English and Mathematics) are further examined to investigate if there is any relationship(s) between students' majors and early college courses subjects.

History

Table 31 shows the consistent history-related courses across DC, AP and IB courses.

Table 32 reveals the top 15 majors at UT Dallas for those students who took at least one history-related early college course. Out of 2,633 students who took at least one history-related dual credit course, 16.75% or 441 majored in Biology, followed by Computer Science (7.79%) and Neuroscience (6.38%). For students who took at least one AP history-related course, 16.14% majored in Biology, 9.86% majored in Computer Science and 7.46% majored in Neuroscience. Only 97 students who took at least one IB history-related course while in high school. Out of 97 students, 18.56% majored in Biology, 12.37% majored in Computer Science and 7.22% majored in Biochemistry.

Table 31 History-Related Courses by Types of Early College Courses

DC History-related courses	AP History-related courses	IB History-related courses
HIST LWR LVL TRANSFER ELECTIVE	HIST LWR LVL TRANSFER ELECTIVE	HIST LWR LVL TRANSFER ELECTIVE
HIST UPR LVL TRANSFER ELECTIVE	US HIST SURVEY FROM CIVIL WAR	
US HIST SURVEY FROM CIVIL WAR	US HIST SURVEY TO CIVIL WAR	
US HIST SURVEY TO CIVIL WAR		

Table 32 Top 15 Majors for Students Who Took History-Related Courses

DC				AP				IB			
	Major	# Students	%		Major	#	%		Major	#	%
1	Biology	441	16.75%	1	Biology	573	16.14%	1	Biology	18	18.56%
2	Computer Science	205	7.79%	2	Computer Science	350	9.86%	2	Computer Science	12	12.37%
3	Neuroscience	168	6.38%	3	Neuroscience	265	7.46%	3	Biochemistry	7	7.22%
4	Mechanical Engineering	139	5.28%	4	Biochemistry	205	5.77%	4	International Political Econ	6	6.19%
5	Biomedical Engineering	128	4.86%	5	Mechanical Engineering	202	5.69%	5	Neuroscience	5	5.15%
6	Arts and Technology	122	4.63%	6	Biomedical Engineering	173	4.87%	6	Undecided	5	5.15%
7	Accounting	108	4.10%	7	Undecided	171	4.82%	7	Biomedical Engineering	4	4.12%
8	Undecided	104	3.95%	8	Electrical Engineering	159	4.48%	8	Computer Engineering	4	4.12%
9	Biochemistry	101	3.84%	9	Arts and Technology	128	3.61%	9	Mechanical Engineering	4	4.12%
10	Business Administration	101	3.84%	10	Computer Engineering	116	3.27%	10	Business Administration	3	3.09%
11	Electrical Engineering	101	3.84%	11	Business Administration	104	2.93%	11	Economics	3	3.09%
12	Healthcare Studies	91	3.46%	12	Finance	98	2.76%	12	Electrical Engineering	3	3.09%
13	Psychology	83	3.15%	13	Psychology	94	2.65%	13	Accounting	2	2.06%
14	Computer Engineering	81	3.08%	14	Chemistry	73	2.06%	14	Arts and Technology	2	2.06%
15	Finance	61	2.32%	15	Accounting	71	2.00%	15	Geosciences	2	2.06%

Table 33 tabulates the percentage of students who took at least one history-related **dual credit** course out of total FTIC students by major. Approximately 21.6% of FTIC students who took at least one history-related dual credit course. Only five majors had the percent of students who took at least one history-related dual credit course lower than 10%. For the majors having over 300 FTIC students across 6 years, 108 out of 366 or 29.51% Accounting-major students took history-related dual credit course, followed by Biology at 26.58% and Neuroscience at 25.73%. The 'Historical Studies' major had 8.51% (4 out of 47).

Table 34 presents the percentage of students who took at least one history-related **AP** course out of total FTIC students by major. Overall, 29.13% of FTIC students who took at least one history-related AP course. Over 40% of students majored in Neuroscience took history-related AP courses, 39.58% for students majored in Biochemistry, and 34.54% for students majored in Biology. In contrast to dual credit coursework, 27 or 57.45% of students who majored in Historical Studies took history-related AP courses.

Table 35 shows the percentage of students who took at least one history-related **IB** course out of total FTIC students by major. Only 97 out of 12,188 FTIC students took history-related IB courses. The International Political Economy major had the highest percentage of students who took IB history-related courses.

Table 33 Percent of Students Who Took History-Related Dual Credit Courses by Major

	Major	Total FTIC	# Students Took DC	%
1	Biology	1,659	441	26.58%
2	Computer Science	1,215	205	16.87%
3	Neuroscience	653	168	25.73%
4	Mechanical Engineering	758	139	18.34%
5	Biomedical Engineering	504	128	25.40%
6	Arts and Technology	688	122	17.73%
7	Accounting	366	108	29.51%
8	Undecided	750	104	13.87%
9	Biochemistry	518	101	19.50%
10	Business Administration	436	101	23.17%
11	Electrical Engineering	489	101	20.65%
12	Healthcare Studies	263	91	34.60%
13	Psychology	374	83	22.19%
14	Computer Engineering	441	81	18.37%
15	Finance	336	61	18.15%
16	Chemistry	231	52	22.51%
17	Software Engineering	232	50	21.55%
18	Marketing	208	47	22.60%
19	Speech-Language Path and Aud	129	42	32.56%
20	Political Science	160	32	20.00%
21	Global Business	169	30	17.75%
22	Mathematics	146	29	19.86%
23	Molecular Biology	115	29	25.22%
24	Physics	160	27	16.88%
25	Actuarial Science	77	24	31.17%
26	Child Learning and Development	63	23	36.51%
27	Emerging Media and Communication	97	22	22.68%
28	Interdisciplinary Studies	78	17	21.79%
29	Management Information Systems	57	17	29.82%
30	Cognitive Science	64	14	21.88%
31	Criminology	78	14	17.95%
32	Economics	91	14	15.38%
33	Information Technology Systems	66	14	21.21%
34	Art and Performance	71	12	16.90%
35	Supply Chain Management	45	12	26.67%
36	Literary Studies	57	11	19.30%
37	Public Affairs	20	9	45.00%
38	International Political Econ	77	8	10.39%
39	DbI Maj - B.S. BIO & BA	13	7	53.85%
40	Geosciences	46	6	13.04%
41	Healthcare Management	26	6	23.08%
42	Sociology	18	6	33.33%
43	Applied Mathematics	20	5	25.00%
44	Historical Studies	47	4	8.51%
45	Arts and Humanities	13	3	23.08%
46	Mathematical Sci - Statistics	7	3	42.86%
47	Geospatial Information Science	5	2	40.00%
48	Telecommunications Engineering	19	2	10.53%
49	DbI Maj - B.S. HCMG & BIO	5	2	40.00%
50	American Studies	4	1	25.00%
51	DbI Maj - B.A. in BIO & CRIM	7	1	14.29%
52	DbI Maj - B.S. Fin & Econ	13	1	7.69%
53	DbI Maj - B.S. MB & HCMG	1	1	100.00%
54	DbI Maj - B.S. MB & HCMG	1	0	0.00%
55	DbI Maj - B.S. MB and BA	1	0	0.00%
56	Geography	1	0	0.00%
		12,188	2,633	21.60%

Table 34 Percent of Students Who Took History-Related AP Courses by Major

	Major	Total FTIC	# Students Took AP	%
1	Biology	1,659	573	34.54%
2	Computer Science	1,215	350	28.81%
3	Neuroscience	653	265	40.58%
4	Biochemistry	518	205	39.58%
5	Mechanical Engineering	758	202	26.65%
6	Biomedical Engineering	504	174	34.52%
7	Undecided	750	171	22.80%
8	Electrical Engineering	489	159	32.52%
9	Arts and Technology	688	128	18.60%
10	Computer Engineering	441	116	26.30%
11	Business Administration	436	104	23.85%
12	Finance	336	98	29.17%
13	Psychology	374	94	25.13%
14	Chemistry	231	73	31.60%
15	Accounting	366	71	19.40%
16	Political Science	160	64	40.00%
17	Healthcare Studies	263	58	22.05%
18	Marketing	208	57	27.40%
19	Global Business	169	48	28.40%
20	Molecular Biology	115	48	41.74%
21	Physics	160	43	26.88%
22	Mathematics	146	43	29.45%
23	Software Engineering	232	40	17.24%
24	International Political Econ	77	40	51.95%
25	Economics	91	37	40.66%
26	Speech-Language Path and Aud	129	30	23.26%
27	Historical Studies	47	27	57.45%
28	Literary Studies	57	26	45.61%
29	Emerging Media and Communicati	97	21	21.65%
30	Information Technology Systems	66	21	31.82%
31	Cognitive Science	64	20	31.25%
32	Art and Performance	71	17	23.94%
33	Management Information Systems	57	16	28.07%
34	Criminology	78	15	19.23%
35	Interdisciplinary Studies	78	15	19.23%
36	Actuarial Science	77	12	15.58%
37	Geosciences	46	12	26.09%
38	Child Learning and Development	63	9	14.29%
39	Supply Chain Management	45	9	20.00%
40	DbI Maj - B.S. Fin & Econ	13	8	61.54%
41	Telecommunications Engineering	19	6	31.58%
42	Healthcare Management	26	5	19.23%
43	Public Affairs	20	4	20.00%
44	Sociology	18	3	16.67%
45	DbI Maj - B.S. BIO & BA	13	3	23.08%
46	Applied Mathematics	20	2	10.00%
47	Arts and Humanities	13	2	15.38%
48	DbI Maj - B.A. in BIO & CRIM	7	2	28.57%
49	Mathematical Sci - Statistics	7	1	14.29%
50	DbI Maj - B.S. in BIO & HCMG	5	1	20.00%
51	American Studies	4	1	25.00%
52	DbI Maj - B.S. in IPEC & GLBS	1	1	100.00%
53	Geospatial Information Science	5	0	0.00%
54	DbI Maj - B.S. MB & HCMG	1	0	0.00%
55	DbI Maj - B.S. MB and BA	1	0	0.00%
56	Geography	1	0	0.00%
		12,188	3,550	29.13%

Table 35 Percent of Students Who Took History-Related IB Courses by Major

	Major	Total FTIC	# Students Took IB	%
1	Biology	1,659	18	1.08%
2	Computer Science	1,215	12	0.99%
3	Biochemistry	518	7	1.35%
4	International Political Econ	77	6	7.79%
5	Undecided	750	5	0.67%
6	Neuroscience	653	5	0.77%
7	Mechanical Engineering	758	4	0.53%
8	Biomedical Engineering	504	4	0.79%
9	Computer Engineering	441	4	0.91%
10	Electrical Engineering	489	3	0.61%
11	Business Administration	436	3	0.69%
12	Economics	91	3	3.30%
13	Arts and Technology	688	2	0.29%
14	Accounting	366	2	0.55%
15	Global Business	169	2	1.18%
16	Geosciences	46	2	4.35%
17	Psychology	374	1	0.27%
18	Finance	336	1	0.30%
19	Chemistry	231	1	0.43%
20	Physics	160	1	0.63%
21	Political Science	160	1	0.63%
22	Mathematics	146	1	0.68%
23	Speech-Language Path and Aud	129	1	0.78%
24	Molecular Biology	115	1	0.87%
25	Emerging Media and Communicati	97	1	1.03%
26	Criminology	78	1	1.28%
27	Interdisciplinary Studies	78	1	1.28%
28	Art and Performance	71	1	1.41%
29	Cognitive Science	64	1	1.56%
30	Literary Studies	57	1	1.75%
31	Historical Studies	47	1	2.13%
32	Healthcare Studies	263	0	0.00%
33	Software Engineering	232	0	0.00%
34	Marketing	208	0	0.00%
35	Actuarial Science	77	0	0.00%
36	Information Technology Systems	66	0	0.00%
37	Child Learning and Development	63	0	0.00%
38	Management Information Systems	57	0	0.00%
39	Supply Chain Management	45	0	0.00%
40	Healthcare Management	26	0	0.00%
41	Applied Mathematics	20	0	0.00%
42	Public Affairs	20	0	0.00%
43	Telecommunications Engineering	19	0	0.00%
44	Sociology	18	0	0.00%
45	Arts and Humanities	13	0	0.00%
46	Dbl Maj - B.S. BIO & BA	13	0	0.00%
47	Dbl Maj - B.S. Fin & Econ	13	0	0.00%
48	Dbl Maj - B.A. in BIO & CRIM	7	0	0.00%
49	Mathematical Sci - Statistics	7	0	0.00%
50	Dbl Maj - B.S. in BIO & HCMG	5	0	0.00%
51	Geospatial Information Science	5	0	0.00%
52	American Studies	4	0	0.00%
53	Dbl Maj - B.S. in IPEC & GLBS	1	0	0.00%
54	Dbl Maj - B.S. MB & HCMG	1	0	0.00%
55	Dbl Maj - B.S. MB and BA	1	0	0.00%
56	Geography	1	0	0.00%
		12,188	97	0.80%

Government

Table 36 shows the consistent government-related courses between DC and AP. There were no equivalent IB Government courses. Table 37 reveals the top 15 majors at UT Dallas for those students who took at least one government-related early college course. Out of 3,409 students who took at least one government-related dual credit course, 16.54% or 564 majored in Biology, followed by Computer Science (8.15%) and Neuroscience (6.48%). For students who took at least one AP government-related course, 14.62% majored in Biology, 10.80% majored in Computer Science and 7.68% majored in Neuroscience.

Table 36 Government-Related Courses by Types of Early College Courses

DC Government-related courses	AP Government-related courses
HIST LWR LVL TRANSFER ELECTIVE	HIST LWR LVL TRANSFER ELECTIVE
HIST UPR LVL TRANSFER ELECTIVE	US HIST SURVEY FROM CIVIL WAR
US HIST SURVEY FROM CIVIL WAR	US HIST SURVEY TO CIVIL WAR
US HIST SURVEY TO CIVIL WAR	

Table 37 Top 15 Majors for Students Who Took Government-Related Courses

DC				AP			
	Major	# Students	%		Major	# Students	%
1	Biology	564	16.54%	1	Biology	295	14.62%
2	Computer Science	278	8.15%	2	Computer Science	218	10.80%
3	Neuroscience	221	6.48%	3	Neuroscience	155	7.68%
4	Mechanical Engineering	172	5.05%	4	Biochemistry	123	6.10%
5	Biomedical Engineering	164	4.81%	5	Mechanical Engineering	113	5.60%
6	Accounting	144	4.22%	6	Biomedical Engineering	103	5.10%
7	Undecided	143	4.19%	7	Undecided	94	4.66%
8	Arts and Technology	141	4.14%	8	Electrical Engineering	81	4.01%
9	Business Administration	140	4.11%	9	Arts and Technology	72	3.57%
10	Biochemistry	139	4.08%	10	Computer Engineering	57	2.82%
11	Electrical Engineering	134	3.93%	11	Chemistry	49	2.43%
12	Psychology	118	3.46%	12	Psychology	49	2.43%
13	Healthcare Studies	116	3.40%	13	Political Science	48	2.38%
14	Computer Engineering	95	2.79%	14	Business Administration	47	2.33%
15	Finance	83	2.43%	15	Accounting	46	2.28%

Table 38 tabulates the percentage of students who took at least one government-related **dual credit** course out of total FTIC students by major. Approximately 28% of FTIC students took at least one government-related dual credit course. For the majors having over 300 FTIC

students across 6 years, 144 out of 366 or 39.34% Accounting-major students took government-related dual credit course, followed by Biology at 34.00% and Neuroscience at 33.84%.

Table 39 presents the percentage of students who took at least one government-related **AP** course out of total FTIC students by major. Overall, 16.56% of FTIC students who took at least one government-related AP course. For the majors having over 300 FTIC students across 6 years, 123 out of 518 or 23.75% Biochemistry-major students took government-related AP course, followed by Neuroscience at 23.74% and Biomedical Engineering at 20.44%.

For the government-related courses, more students took dual credit courses instead of AP courses. This is likely an effect of the available menu of offerings on the high school campuses.

Table 38 Percent of Students Who Took Government-Related Dual Credit Courses by Major

	Major	Total FTIC	# Students Took DC	%
1	Biology	1,659	564	34.00%
2	Computer Science	1,215	278	22.88%
3	Neuroscience	653	221	33.84%
4	Mechanical Engineering	758	172	22.69%
5	Biomedical Engineering	504	164	32.54%
6	Accounting	366	144	39.34%
7	Undecided	750	143	19.07%
8	Arts and Technology	688	141	20.49%
9	Business Administration	436	140	32.11%
10	Biochemistry	518	139	26.83%
11	Electrical Engineering	489	134	27.40%
12	Psychology	374	118	31.55%
13	Healthcare Studies	263	116	44.11%
14	Computer Engineering	441	95	21.54%
15	Finance	336	83	24.70%
16	Chemistry	231	67	29.00%
17	Marketing	208	61	29.33%
18	Speech-Language Path and Aud	129	61	47.29%
19	Software Engineering	232	59	25.43%
20	Physics	160	39	24.38%
21	Mathematics	146	38	26.03%
22	Global Business	169	37	21.89%
23	Political Science	160	35	21.88%
24	Molecular Biology	115	31	26.96%
25	Emerging Media and Communicati	97	28	28.87%
26	Child Learning and Development	63	28	44.44%
27	Actuarial Science	77	27	35.06%
28	Criminology	78	23	29.49%
29	Management Information Systems	57	21	36.84%
30	Cognitive Science	64	20	31.25%
31	Interdisciplinary Studies	78	19	24.36%
32	Art and Performance	71	19	26.76%
33	Information Technology Systems	66	19	28.79%
34	Economics	91	16	17.58%
35	Supply Chain Management	45	15	33.33%
36	International Political Econ	77	11	14.29%
37	Historical Studies	47	9	19.15%
38	Geosciences	46	8	17.39%
39	Healthcare Management	26	8	30.77%
40	Telecommunications Engineering	19	8	42.11%
41	Dbl Maj - B.S. BIO & BA	13	8	61.54%
42	Literary Studies	57	7	12.28%
43	Public Affairs	20	7	35.00%
44	Sociology	18	6	33.33%
45	Arts and Humanities	13	6	46.15%
46	Applied Mathematics	20	5	25.00%
47	Mathematical Sci - Statistics	7	3	42.86%
48	Dbl Maj - B.S. HCMG & BIO	5	2	40.00%
49	Geospatial Information Science	5	2	40.00%
50	Dbl Maj - B.S. Fin & Econ	13	1	7.69%
51	Dbl Maj - B.A. in BIO & CRIM	7	1	14.29%
52	American Studies	4	1	25.00%
53	Dbl Maj - B.S. MB & HCMG	1	1	100.00%
54	Dbl Maj - B.S. in IPEC & GLBS	1	0	0.00%
55	Dbl Maj - B.S. MB and BA	1	0	0.00%
56	Geography	1	0	0.00%
		12,188	3,409	27.97%

Table 39 Percent of Students Who Took Government-Related AP Courses by Major

	Major	Total FTIC	# Students Took AP	%
1	Biology	1,659	295	17.78%
2	Computer Science	1,215	218	17.94%
3	Neuroscience	653	155	23.74%
4	Biochemistry	518	123	23.75%
5	Mechanical Engineering	758	113	14.91%
6	Biomedical Engineering	504	103	20.44%
7	Undecided	750	94	12.53%
8	Electrical Engineering	489	81	16.56%
9	Arts and Technology	688	72	10.47%
10	Computer Engineering	441	57	12.93%
11	Psychology	374	49	13.10%
12	Chemistry	231	49	21.21%
13	Political Science	160	48	30.00%
14	Business Administration	436	47	10.78%
15	Accounting	366	46	12.57%
16	Finance	336	44	13.10%
17	Physics	160	33	20.63%
18	Mathematics	146	33	22.60%
19	Economics	91	30	32.97%
20	Software Engineering	232	29	12.50%
21	International Political Econ	77	28	36.36%
22	Healthcare Studies	263	27	10.27%
23	Molecular Biology	115	25	21.74%
24	Marketing	208	22	10.58%
25	Global Business	169	22	13.02%
26	Speech-Language Path and Aud	129	18	13.95%
27	Literary Studies	57	18	31.58%
28	Historical Studies	47	17	36.17%
29	Interdisciplinary Studies	78	12	15.38%
30	Management Information Systems	57	12	21.05%
31	Information Technology Systems	66	11	16.67%
32	Cognitive Science	64	9	14.06%
33	DbI Maj - B.S. Fin & Econ	13	9	69.23%
34	Criminology	78	8	10.26%
35	Actuarial Science	77	8	10.39%
36	Art and Performance	71	8	11.27%
37	Emerging Media and Communicati	97	7	7.22%
38	Geosciences	46	6	13.04%
39	Supply Chain Management	45	6	13.33%
40	DbI Maj - B.S. BIO & BA	13	4	30.77%
41	Telecommunications Engineering	19	3	15.79%
42	Sociology	18	3	16.67%
43	DbI Maj - B.S. HCMG & BIO	5	3	60.00%
44	Child Learning and Development	63	2	3.17%
45	Healthcare Management	26	2	7.69%
46	Public Affairs	20	2	10.00%
47	DbI Maj - B.A. in BIO & CRIM	7	2	28.57%
48	Applied Mathematics	20	1	5.00%
49	Mathematical Sci - Statistics	7	1	14.29%
50	Geospatial Information Science	5	1	20.00%
51	American Studies	4	1	25.00%
52	DbI Maj - B.S. in IPEC & GLBS	1	1	100.00%
53	Arts and Humanities	13	0	0.00%
54	DbI Maj - B.S. MB and BA	1	0	0.00%
55	Geography	1	0	0.00%
56	DbI Maj - B.S. MB & HCMG	1	0	0.00%
		12,188	2,018	16.56%

English

Table 40 shows the consistent English-related courses across DC, AP, and IB. Table 41 reveals the top 15 majors at UT Dallas for those students who took at least one English-related early college course. The top three UT Dallas majors for students who took English-related early college courses were Biology, Computer Science, and Neuroscience. Out of 2,598 students who took at least one English-related dual credit course, 15.90% or 413 majored in Biology, followed by Computer Science (7.93%) and Neuroscience (6.16%). For students who took at least one AP English-related course, 13.56% majored in Biology, 11.93% majored in Computer Science and 7.94% majored in Neuroscience. For students who took at least one IB English-related course, 18.52% majored in Biology, 8.83% majored in Computer Science and 8.83% majored in Neuroscience.

Table 40 English-Related Courses by Types of Early College Courses

DC English-related courses	AP English-related courses	IB English-related courses
CCN:AMERICAN LITERATURE	CCN:COMPOSITION I	LIT LWR LVL TRANSFER ELECTIVE
CCN:AMERICAN LITERATURE I	ENGL LWR LVL TRANSFER ELECTIVE	MASTERPIECES OF WORLD LITERATU
CCN:AMERICAN LITERATURE II	LIT LWR LVL TRANSFER ELECTIVE	
CCN:BRITISH LITERATURE	MASTERPIECES OF WORLD LITERATU	
CCN:BRITISH LITERATURE I	RHET LWR LVL TRANSFER ELECTIVE	
CCN:BRITISH LITERATURE II	RHETORIC	
CCN:COMPOSITION I		
CCN:CREATIVE WRITING II		
CCN:CREATIVE WRITING WORKSHOP		
CCN:FORMS OF LITERATURE		
CCN:FORMS OF LITERATURE I		
CCN:FORMS OF LITERATURE II		
CCN:MUSIC LITERATURE		
CCN:MUSIC LITERATURE I		
CCN:MUSIC LITERATURE II		
CCN:TECH & BUSINESS WRITING		
CCN:WORLD LITERATURE		
CCN:WORLD LITERATURE I		
CCN:WORLD LITERATURE II		
ENGL LWR LVL TRANSFER ELECTIVE		
ENGL UPR LVL TRANSFER ELECTIVE		
LIT LWR LVL TRANSFER ELECTIVE		
LITERARY ANALYSIS		
MASTERPIECES OF WORLD LITERATU		
RHETORIC		

Table 41 Top 15 Majors for Students Who Took English-Related Courses

DC			AP			IB		
Major	# Students	%	Major	# Students	%	Major	# Student	%
1 Biology	413	15.90%	1 Biology	391	13.56%	1 Biology	65	18.52%
2 Computer Science	206	7.93%	2 Computer Science	344	11.93%	2 Computer Science	31	8.83%
3 Neuroscience	160	6.16%	3 Neuroscience	229	7.94%	3 Neuroscience	31	8.83%
4 Mechanical Engineering	140	5.39%	4 Mechanical Engineering	136	4.72%	4 Biochemistry	24	6.84%
5 Arts and Technology	134	5.16%	5 Biomedical Engineering	134	4.65%	5 Biomedical Engineering	15	4.27%
6 Undecided	125	4.81%	6 Biochemistry	133	4.61%	6 Business Administration	15	4.27%
7 Biomedical Engineering	113	4.35%	7 Undecided	128	4.44%	7 Undecided	15	4.27%
8 Business Administration	107	4.12%	8 Arts and Technology	112	3.88%	8 Electrical Engineering	12	3.42%
9 Electrical Engineering	107	4.12%	9 Electrical Engineering	106	3.68%	9 Accounting	11	3.13%
10 Biochemistry	93	3.58%	10 Computer Engineering	93	3.23%	10 Psychology	11	3.13%
11 Psychology	93	3.58%	11 Psychology	92	3.19%	11 Computer Engineering	10	2.85%
12 Accounting	92	3.54%	12 Business Administration	80	2.77%	12 Finance	10	2.85%
13 Healthcare Studies	89	3.43%	13 Finance	80	2.77%	13 Chemistry	9	2.56%
14 Computer Engineering	60	2.31%	14 Political Science	60	2.08%	14 Global Business	8	2.28%
15 Chemistry	59	2.27%	15 Accounting	58	2.01%	15 Healthcare Studies	8	2.28%

Table 42 tabulates the percentage of students who took at least one English-related **dual credit** course out of total FTIC students by major. Approximately 21.32% of FTIC students who took at least one English-related dual credit course. For the majors having over 300 FTIC students across 6 years, 92 out of 366 or 25.14% Accounting-major students took English-related dual credit course, followed by Biology at 24.89% and Psychology at 24.87%.

Table 43 presents the percentage of students who took at least one English-related **AP** course out of total FTIC students by major. Overall, 23.65% of FTIC students who took at least one English-related AP course. For the majors having over 300 FTIC students across 6 years, 229 out of 653 or 35.07% Neuroscience-major students took English-related AP course, followed by Computer Science at 28.31% and Biomedical Engineering at 26.59%.

Table 44 shows the percentage of students who took at least one English-related **IB** course out of total FTIC students by major. Three hundred fifty-one students or 2.88% took English-related IB courses. For the English-related courses, slightly more students took AP courses than dual credit courses.

Table 42 Percent of Students Who Took English-Related Dual Credit Courses by Major

	Major	Total FTIC	# Students Took DC	%
1	Biology	1,659	413	24.89%
2	Computer Science	1,215	206	16.95%
3	Neuroscience	653	160	24.50%
4	Mechanical Engineering	758	140	18.47%
5	Arts and Technology	688	134	19.48%
6	Undecided	750	125	16.67%
7	Biomedical Engineering	504	113	22.42%
8	Electrical Engineering	489	107	21.88%
9	Business Administration	436	107	24.54%
10	Biochemistry	518	93	17.95%
11	Psychology	374	93	24.87%
12	Accounting	366	92	25.14%
13	Healthcare Studies	263	89	33.84%
14	Computer Engineering	441	60	13.61%
15	Finance	336	59	17.56%
16	Chemistry	231	59	25.54%
17	Software Engineering	232	57	24.57%
18	Speech-Language Path and Aud	129	49	37.98%
19	Marketing	208	39	18.75%
20	Molecular Biology	115	31	26.96%
21	Political Science	160	27	16.88%
22	Child Learning and Development	63	27	42.86%
23	Physics	160	26	16.25%
24	Emerging Media and Communicati	97	26	26.80%
25	Global Business	169	25	14.79%
26	Mathematics	146	25	17.12%
27	Actuarial Science	77	21	27.27%
28	Criminology	78	20	25.64%
29	Interdisciplinary Studies	78	17	21.79%
30	Information Technology Systems	66	15	22.73%
31	Economics	91	13	14.29%
32	Cognitive Science	64	13	20.31%
33	Management Information Systems	57	13	22.81%
34	Art and Performance	71	10	14.08%
35	Literary Studies	57	10	17.54%
36	Supply Chain Management	45	10	22.22%
37	Historical Studies	47	9	19.15%
38	International Political Econ	77	8	10.39%
39	Applied Mathematics	20	7	35.00%
40	Public Affairs	20	7	35.00%
41	Sociology	18	7	38.89%
42	DbI Maj - B.S. BIO & BA	13	7	53.85%
43	Arts and Humanities	13	6	46.15%
44	Healthcare Management	26	5	19.23%
45	Geosciences	46	4	8.70%
46	Telecommunications Engineering	19	4	21.05%
47	Mathematical Sci - Statistics	7	3	42.86%
48	DbI Maj - B.A. in BIO & CRIM	7	2	28.57%
49	American Studies	4	2	50.00%
50	DbI Maj - B.S. Fin & Econ	13	1	7.69%
51	DbI Maj - B.S. HCMG & BIO	5	1	20.00%
52	Geospatial Information Science	5	1	20.00%
53	DbI Maj - B.S. in IPEC & GLBS	1	0	0.00%
54	DbI Maj - B.S. MB & HCMG	1	0	0.00%
55	DbI Maj - B.S. MB and BA	1	0	0.00%
56	Geography	1	0	0.00%
		12,188	2,598	21.32%

Table 43 Percent of Students Who Took English-Related AP Courses by Major

	Major	Total FTIC	# Students Took AP	%
1	Biology	1,659	391	23.57%
2	Computer Science	1,215	344	28.31%
3	Neuroscience	653	229	35.07%
4	Mechanical Engineering	758	136	17.94%
5	Biomedical Engineering	504	134	26.59%
6	Biochemistry	518	133	25.68%
7	Undecided	750	128	17.07%
8	Arts and Technology	688	112	16.28%
9	Electrical Engineering	489	106	21.68%
10	Computer Engineering	441	93	21.09%
11	Psychology	374	92	24.60%
12	Business Administration	436	80	18.35%
13	Finance	336	80	23.81%
14	Political Science	160	60	37.50%
15	Accounting	366	58	15.85%
16	Healthcare Studies	263	58	22.05%
17	Marketing	208	50	24.04%
18	Software Engineering	232	45	19.40%
19	Chemistry	231	41	17.75%
20	Speech-Language Path and Aud	129	40	31.01%
21	Molecular Biology	115	40	34.78%
22	Global Business	169	39	23.08%
23	Mathematics	146	37	25.34%
24	Physics	160	36	22.50%
25	International Political Econ	77	34	44.16%
26	Economics	91	31	34.07%
27	Cognitive Science	64	25	39.06%
28	Literary Studies	57	24	42.11%
29	Historical Studies	47	22	46.81%
30	Art and Performance	71	20	28.17%
31	Information Technology Systems	66	19	28.79%
32	Interdisciplinary Studies	78	18	23.08%
33	Criminology	78	16	20.51%
34	Child Learning and Development	63	15	23.81%
35	Management Information Systems	57	14	24.56%
36	Emerging Media and Communicati	97	11	11.34%
37	Geosciences	46	11	23.91%
38	Supply Chain Management	45	10	22.22%
39	Healthcare Management	26	10	38.46%
40	Public Affairs	20	9	45.00%
41	Actuarial Science	77	6	7.79%
42	Sociology	18	6	33.33%
43	Dbl Maj - B.S. Fin & Econ	13	5	38.46%
44	Telecommunications Engineering	19	3	15.79%
45	Arts and Humanities	13	2	15.38%
46	Dbl Maj - B.S. BIO & BA	13	2	15.38%
47	Dbl Maj - B.A. in BIO & CRIM	7	2	28.57%
48	Applied Mathematics	20	1	5.00%
49	Mathematical Sci - Statistics	7	1	14.29%
50	Dbl Maj - B.S. HCMG & BIO	5	1	20.00%
51	Geospatial Information Science	5	1	20.00%
52	American Studies	4	1	25.00%
53	Dbl Maj - B.S. in IPEC & GLBS	1	1	100.00%
54	Dbl Maj - B.S. MB & HCMG	1	0	0.00%
55	Dbl Maj - B.S. MB and BA	1	0	0.00%
56	Geography	1	0	0.00%
		12,188	2,883	23.65%

Table 44 Percent of Students Who Took English-Related IB Courses by Major

	Major	Total FTIC	# Students Took IB	%
1	Biology	1,659	65	3.92%
2	Computer Science	1,215	31	2.55%
3	Neuroscience	653	31	4.75%
4	Biochemistry	518	24	4.63%
5	Undecided	750	15	2.00%
6	Biomedical Engineering	504	15	2.98%
7	Business Administration	436	15	3.44%
8	Electrical Engineering	489	12	2.45%
9	Psychology	374	11	2.94%
10	Accounting	366	11	3.01%
11	Computer Engineering	441	10	2.27%
12	Finance	336	10	2.98%
13	Chemistry	231	9	3.90%
14	Mechanical Engineering	758	8	1.06%
15	Healthcare Studies	263	8	3.04%
16	Global Business	169	8	4.73%
17	Molecular Biology	115	8	6.96%
18	Marketing	208	7	3.37%
19	Arts and Technology	688	6	0.87%
20	International Political Econ	77	6	7.79%
21	Physics	160	5	3.13%
22	Mathematics	146	4	2.74%
23	Cognitive Science	64	4	6.25%
24	Software Engineering	232	3	1.29%
25	Art and Performance	71	3	4.23%
26	Speech-Language Path and Aud	129	2	1.55%
27	Emerging Media and Communicati	97	2	2.06%
28	Economics	91	2	2.20%
29	Criminology	78	2	2.56%
30	Management Information Systems	57	2	3.51%
31	Historical Studies	47	2	4.26%
32	Supply Chain Management	45	2	4.44%
33	Political Science	160	1	0.63%
34	Interdisciplinary Studies	78	1	1.28%
35	Child Learning and Development	63	1	1.59%
36	Literary Studies	57	1	1.75%
37	Geosciences	46	1	2.17%
38	Healthcare Management	26	1	3.85%
39	Sociology	18	1	5.56%
40	Dbl Maj - B.S. HCMG & BIO	5	1	20.00%
41	Actuarial Science	77	0	0.00%
42	Information Technology Systems	66	0	0.00%
43	Applied Mathematics	20	0	0.00%
44	Public Affairs	20	0	0.00%
45	Telecommunications Engineering	19	0	0.00%
46	Arts and Humanities	13	0	0.00%
47	Dbl Maj - B.S. BIO & BA	13	0	0.00%
48	Dbl Maj - B.S. Fin & Econ	13	0	0.00%
49	Dbl Maj - B.A. in BIO & CRIM	7	0	0.00%
50	Mathematical Sci - Statistics	7	0	0.00%
51	Geospatial Information Science	5	0	0.00%
52	American Studies	4	0	0.00%
53	Dbl Maj - B.S. in IPEC & GLBS	1	0	0.00%
54	Dbl Maj - B.S. MB & HCMG	1	0	0.00%
55	Dbl Maj - B.S. MB and BA	1	0	0.00%
56	Geography	1	0	0.00%
		12,188	351	2.88%

Math

Table 45 shows the consistent math-related courses across DC, AP, and IB. Table 46 reveals the top 15 majors at UT Dallas for those students who took at least one math-related early college course. Biology was in the top three majors regardless of types of early college courses. Out of 1,146 students who took at least one math-related dual credit course, 17.45% or 200 majored in Biology, followed by Computer Science (10.03%) and Mechanical Engineering (8.03%). For students who took at least one AP math-related course, 15.32% majored in Computer Science, 13.73% majored in Biology and 6.28% majored in Biomedical Engineering. For students who took at least one IB math-related course, 18.00% majored in Biology, 6% majored in Arts and Technology or did not declared a major.

Table 45 Math-Related Courses by Types of Early College Courses

DC Math-related courses	AP Math-related courses	IB Math-related courses
APPLIED CALCULUS I	APPLIED CALCULUS I	APPLIED CALCULUS I
APPLIED CALCULUS II	APPLIED CALCULUS II	APPLIED CALCULUS II
CALCULUS I	CALCULUS I	CALCULUS I
CALCULUS II	DIFFERENTIAL CALCULUS	CCN:ANALYTIC GEOMETRY
CALCULUS OF SEVERAL VARIABLES	INTEGRAL CALCULUS	COLLEGE ALGEBRA
CCN:ANALYTIC GEOMETRY	PRECALCULUS	DIFFERENTIAL CALCULUS
CCN:CALCULUS I		INTEGRAL CALCULUS
CCN:CALCULUS II		PRECALCULUS
CCN:CALCULUS III		
DIFFERENTIAL CALCULUS		
DIFFERENTIAL EQUATIONS W/APP		
INTEGRAL CALCULUS		
LINEAR ALGEBRA		
MATRICES, VECTORS & APPLICATION		
PARTIAL DIFFERENTIAL EQUATIONS		
PRECALCULUS		
THEORETICAL CONCEPTS OF CALCULUS		

Table 46 Top 15 Majors for Students Who Took Math-Related Courses

DC			AP			IB		
Major	# Students	%	Major	# Student	%	Major	# Student	%
1 Biology	200	17.45%	1 Computer Science	327	15.32%	1 Biology	18	18.00%
2 Computer Science	115	10.03%	2 Biology	293	13.73%	2 Arts and Technology	6	6.00%
3 Mechanical Engineering	92	8.03%	3 Biomedical Engineering	134	6.28%	3 Undecided	6	6.00%
4 Neuroscience	90	7.85%	4 Mechanical Engineering	131	6.14%	4 Biochemistry	5	5.00%
5 Biomedical Engineering	73	6.37%	5 Electrical Engineering	121	5.67%	5 Business Administration	5	5.00%
6 Electrical Engineering	63	5.50%	6 Biochemistry	120	5.62%	6 Healthcare Studies	5	5.00%
7 Biochemistry	50	4.36%	7 Arts and Technology	92	4.31%	7 Psychology	5	5.00%
8 Accounting	37	3.23%	8 Neuroscience	91	4.26%	8 Global Business	4	4.00%
9 Computer Engineering	37	3.23%	9 Undecided	84	3.94%	9 Neuroscience	4	4.00%
10 Healthcare Studies	36	3.14%	10 Computer Engineering	81	3.80%	10 Accounting	3	3.00%
11 Undecided	30	2.62%	11 Finance	60	2.81%	11 Art and Performance	3	3.00%
12 Arts and Technology	28	2.44%	12 Business Administration	57	2.67%	12 Chemistry	3	3.00%
13 Business Administration	26	2.27%	13 Chemistry	54	2.53%	13 Computer Science	3	3.00%
14 Chemistry	26	2.27%	14 Accounting	51	2.39%	14 Finance	3	3.00%
15 Finance	24	2.09%	15 Mathematics	40	1.87%	15 Historical Studies	3	3.00%

Table 47 tabulates the percentage of students who took at least one math-related **dual credit** course out of total FTIC students by major. Approximately 9.40% of FTIC students took at least one math-related dual credit course. For the majors having over 300 FTIC students across 6 years, 73 out of 504 or 14.48% Biomedical Engineering-major students took math-related dual credit course, followed by Neuroscience at 13.78% and Electrical Engineering at 12.88%.

Table 48 presents the percentage of students who took at least one math-related **AP** course out of total FTIC students by major. Overall, 17.51% of FTIC students who took at least one math-related AP course. For the majors having over 300 FTIC students across 6 years, 327 out of 1215 or 26.91% Computer Science-major students took math-related AP course, followed by Biomedical Engineering at 26.59% and Electrical Engineering at 24.74%.

Table 49 shows the percentage of students who took at least one math-related **IB** course out of total FTIC students by major. A hundred students or 0.82% took math-related IB courses. For the math-related courses, more students took AP courses than dual credit courses.

Table 47 Percent of Students Who Took Math-Related Dual Credit Courses by Major

	Major	Total FTIC Students	# Students Took DC Math-Related Courses	%
1	Biology	1,659	200	12.06%
2	Computer Science	1,215	115	9.47%
3	Mechanical Engineering	758	92	12.14%
4	Neuroscience	653	90	13.78%
5	Biomedical Engineering	504	73	14.48%
6	Electrical Engineering	489	63	12.88%
7	Biochemistry	518	50	9.65%
8	Computer Engineering	441	37	8.39%
9	Accounting	366	37	10.11%
10	Healthcare Studies	263	36	13.69%
11	Undecided	750	30	4.00%
12	Arts and Technology	688	28	4.07%
13	Business Administration	436	26	5.96%
14	Chemistry	231	26	11.26%
15	Finance	336	24	7.14%
16	Software Engineering	232	23	9.91%
17	Psychology	374	22	5.88%
18	Physics	160	18	11.25%
19	Molecular Biology	115	17	14.78%
20	Mathematics	146	16	10.96%
21	Marketing	208	15	7.21%
22	Speech-Language Path and Aud	129	12	9.30%
23	Actuarial Science	77	10	12.99%
24	Global Business	169	8	4.73%
25	Management Information Systems	57	8	14.04%
26	Economics	91	6	6.59%
27	Interdisciplinary Studies	78	5	6.41%
28	International Political Econ	77	5	6.49%
29	Information Technology Systems	66	5	7.58%
30	Cognitive Science	64	5	7.81%
31	Child Learning and Development	63	5	7.94%
32	Supply Chain Management	45	5	11.11%
33	Applied Mathematics	20	4	20.00%
34	Political Science	160	3	1.88%
35	Criminology	78	3	3.85%
36	Literary Studies	57	3	5.26%
37	Geosciences	46	3	6.52%
38	Dbl Maj - B.S. BIO & BA	13	3	23.08%
39	Art and Performance	71	2	2.82%
40	Historical Studies	47	2	4.26%
41	Healthcare Management	26	2	7.69%
42	Public Affairs	20	2	10.00%
43	Dbl Maj - B.A. in BIO & CRIM	7	2	28.57%
44	Emerging Media and Communicati	97	1	1.03%
45	Telecommunications Engineering	19	1	5.26%
46	Dbl Maj - B.S. Fin & Econ	13	1	7.69%
47	Mathematical Sci - Statistics	7	1	14.29%
48	Geospatial Information Science	5	1	20.00%
49	Sociology	18	0	0.00%
50	Arts and Humanities	13	0	0.00%
51	Dbl Maj - B.S. HCMG & BIO	5	0	0.00%
52	American Studies	4	0	0.00%
53	Dbl Maj - B.S. in IPEC & GLBS	1	0	0.00%
54	Dbl Maj - B.S. MB & HCMG	1	0	0.00%
55	Dbl Maj - B.S. MB and BA	1	0	0.00%
56	Geography	1	0	0.00%
		12,188	1,146	9.40%

Table 48 Percent of Students Who Took Math-Related AP Courses by Major

	Major	Total FTIC Students	# Students Took AP Math-Related Courses	%
1	Computer Science	1,215	327	26.91%
2	Biology	1,659	293	17.66%
3	Biomedical Engineering	504	134	26.59%
4	Mechanical Engineering	758	131	17.28%
5	Electrical Engineering	489	121	24.74%
6	Biochemistry	518	120	23.17%
7	Arts and Technology	688	92	13.37%
8	Neuroscience	653	91	13.94%
9	Undecided	750	84	11.20%
10	Computer Engineering	441	81	18.37%
11	Finance	336	60	17.86%
12	Business Administration	436	57	13.07%
13	Chemistry	231	54	23.38%
14	Accounting	366	51	13.93%
15	Software Engineering	232	40	17.24%
16	Mathematics	146	40	27.40%
17	Psychology	374	37	9.89%
18	Physics	160	37	23.13%
19	Healthcare Studies	263	34	12.93%
20	Molecular Biology	115	26	22.61%
21	Global Business	169	22	13.02%
22	Economics	91	18	19.78%
23	Marketing	208	17	8.17%
24	Speech-Language Path and Aud	129	14	10.85%
25	Political Science	160	13	8.13%
26	International Political Econ	77	12	15.58%
27	Actuarial Science	77	11	14.29%
28	Management Information Systems	57	11	19.30%
29	Emerging Media and Communicati	97	10	10.31%
30	Cognitive Science	64	10	15.63%
31	Literary Studies	57	9	15.79%
32	Interdisciplinary Studies	78	8	10.26%
33	Information Technology Systems	66	7	10.61%
34	Child Learning and Development	63	7	11.11%
35	Criminology	78	6	7.69%
36	Supply Chain Management	45	6	13.33%
37	Dbl Maj - B.S. Fin & Econ	13	6	46.15%
38	Art and Performance	71	5	7.04%
39	Geosciences	46	5	10.87%
40	Healthcare Management	26	5	19.23%
41	Historical Studies	47	4	8.51%
42	Applied Mathematics	20	4	20.00%
43	Dbl Maj - B.A. in BIO & CRIM	7	3	42.86%
44	Sociology	18	2	11.11%
45	Dbl Maj - B.S. BIO & BA	13	2	15.38%
46	Dbl Maj - B.S. HCMG & BIO	5	2	40.00%
47	Public Affairs	20	1	5.00%
48	Telecommunications Engineering	19	1	5.26%
49	Mathematical Sci - Statistics	7	1	14.29%
50	Dbl Maj - B.S. in IPEC & GLBS	1	1	100.00%
51	Geography	1	1	100.00%
52	Arts and Humanities	13	0	0.00%
53	Geospatial Information Science	5	0	0.00%
54	American Studies	4	0	0.00%
55	Dbl Maj - B.S. MB & HCMG	1	0	0.00%
56	Dbl Maj - B.S. MB and BA	1	0	0.00%
		12,188	2,134	17.51%

Table 49 Percent of Students Who Took Math-Related IB Courses by Major

	Major	Total FTIC Students	# Students Took IB Math-Related Courses	%
1	Biology	1,659	18	1.08%
2	Undecided	750	6	0.80%
3	Arts and Technology	688	6	0.87%
4	Biochemistry	518	5	0.97%
5	Business Administration	436	5	1.15%
6	Psychology	374	5	1.34%
7	Healthcare Studies	263	5	1.90%
8	Neuroscience	653	4	0.61%
9	Global Business	169	4	2.37%
10	Computer Science	1,215	3	0.25%
11	Accounting	366	3	0.82%
12	Finance	336	3	0.89%
13	Chemistry	231	3	1.30%
14	Marketing	208	3	1.44%
15	International Political Econ	77	3	3.90%
16	Art and Performance	71	3	4.23%
17	Historical Studies	47	3	6.38%
18	Physics	160	2	1.25%
19	Political Science	160	2	1.25%
20	Mathematics	146	2	1.37%
21	Criminology	78	2	2.56%
22	Mechanical Engineering	758	1	0.13%
23	Biomedical Engineering	504	1	0.20%
24	Electrical Engineering	489	1	0.20%
25	Speech-Language Path and Aud	129	1	0.78%
26	Molecular Biology	115	1	0.87%
27	Emerging Media and Communicati	97	1	1.03%
28	Interdisciplinary Studies	78	1	1.28%
29	Cognitive Science	64	1	1.56%
30	Literary Studies	57	1	1.75%
31	Geosciences	46	1	2.17%
32	Computer Engineering	441	0	0.00%
33	Software Engineering	232	0	0.00%
34	Economics	91	0	0.00%
35	Actuarial Science	77	0	0.00%
36	Information Technology Systems	66	0	0.00%
37	Child Learning and Development	63	0	0.00%
38	Management Information Systems	57	0	0.00%
39	Supply Chain Management	45	0	0.00%
40	Healthcare Management	26	0	0.00%
41	Applied Mathematics	20	0	0.00%
42	Public Affairs	20	0	0.00%
43	Telecommunications Engineering	19	0	0.00%
44	Sociology	18	0	0.00%
45	Arts and Humanities	13	0	0.00%
46	Dbl Maj - B.S. BIO & BA	13	0	0.00%
47	Dbl Maj - B.S. Fin & Econ	13	0	0.00%
48	Dbl Maj - B.A. in BIO & CRIM	7	0	0.00%
49	Mathematical Sci - Statistics	7	0	0.00%
50	Dbl Maj - B.S. HCMG & BIO	5	0	0.00%
51	Geospatial Information Science	5	0	0.00%
52	American Studies	4	0	0.00%
53	Dbl Maj - B.S. in IPEC & GLBS	1	0	0.00%
54	Dbl Maj - B.S. MB & HCMG	1	0	0.00%
55	Dbl Maj - B.S. MB and BA	1	0	0.00%
56	Geography	1	0	0.00%
		12,188	100	0.82%

In summary, the relationship between taken subjects of AP/IB/DC and student's major is not significantly tied. The majority of students took core early college courses to waive core course requirements mandated by THECB. At UT Dallas, students were more likely to take exam-based (AP/IB) early college courses than dual credit courses in the subjects of History and Math. With regard to the subject of English, 21.32% of students took dual credit courses while 23.65% took AP courses and 2.88% took IB courses. For Government courses, students were less likely to take AP early college courses than dual credit courses.

Table 50 shows the top three majors having a high percentage of students who took dual credit or AP courses for the majors having over 300 FTIC students across 6 years. As one can see, Accounting had the highest percentage of students who took **dual credit** history-related, government-related, and English-related courses. For the **dual credit** math-related courses, Biomedical Engineering, Neuroscience, and Electrical Engineering were top three majors.

The top three majors having the highest percentage of students who took **AP** history-related and government-related courses shifted to Neuroscience and Biochemistry as well as Biology or Biomedical Engineering. For **AP** English-related courses, the top one major was Neuroscience, followed by Computer Science and Biomedical Engineering. Three majors (Computer Science, Biomedical Engineering, & Electrical Engineering) in the Erik Jonsson School of Engineering and Computer Science had a higher percentage of students who took **AP** math-related courses.

Table 50 Summary of Early College Coursework Awarded by Major

<i>Top Three Majors (300+ FTIC students) Had a High Percentage of Students Who Took Courses</i>			
	Dual Credit Course	AP Course	% of Student took DC, AP or IB Courses
History	Accounting (29.51%) Biology (26.58%) Neuroscience (25.73%)	Neuroscience (40.58%) Biochemistry (39.58%) Biology (34.54%)	DC (21.60%) AP (29.13%) IB (0.80%)
Government	Accounting (39.34%) Biology (34.00%) Neuroscience (33.84%)	Biochemistry (23.75%) Neuroscience (23.74%) Biomedical Engineering (20.44%)	DC (27.97%) AP (16.56%)
English	Accounting (25.14%) Biology (24.89%) Psychology (24.87%)	Neuroscience (35.07%) Computer Science (28.31%) Biomedical Engineering (26.59%)	DC (21.32%) AP (23.65%) IB (2.88%)
Math	Biomedical Engineering (14.48%) Neuroscience (13.78%) Electrical Engineering (12.88%)	Computer Science (26.91%) Biomedical Engineering (26.59%) Electrical Engineering (24.74%)	DC (9.40%) AP (17.51%) IB (0.82%)

Regression Models

We employ regression analysis to examine the multidimensional nature of the variables that influence student retention and graduation rates. Multiple regression models allow for examination of the impact of several independent variables on the dependent variable. By controlling for these influences, a better assessment of the significance and strength of the underlying influences measured by the independent variables can be measured.

Four different models were constructed. The first model included the independent variables of gender, ethnicity, SAT, scholarship status, high school, and whether students took any accelerated courses (Y or N). ACT scores were converted to SAT scores using methods established by the College Board. If a converted ACT score was higher than the reported SAT for a student the converted ACT higher score was used. The second model replaced the dichotomous variable with the four early college groups. The third model added number of credit hours awarded through exam-based or dual credit courses into the regression. The last model included UT Dallas majors.

Dummy-coded of the Predictor Variables

Sex was dummy-coded with 1 for “female” and 0 for “male.” Pell grant also was dummy-coded with 1 for ‘Y’ and 0 for ‘N.’ Ethnicity was a categorical variable with four unranked categories: Asian, White, Minority, and Others. This variable was dummy-coded into three variables: Asian, White, and Others. The reference group for these three variables is Minority. Scholarship status was a categorical variable with three unranked categories: full scholarship, partial scholarship, and no scholarship. This variable was dummy-coded into two variables: full scholarship and partial scholarship with no scholarship as the reference group.

Early College Group is a categorical variable with 4 unranked categories: Exam-only, DC-only, Both-type, and No AP/IB/DC. This variable was dummy-coded into three variables: Exam-only, DC-only, Both-type with No AP/IB/DC as the reference group. The variable, high school, was dummy-coded into 6 variables: Collegiate schools, Islamic schools, TAMS, home schooled, Plano ISD and adjacent 15 miles ISD with others as the reference group. The variable of major was dummy-coded into 15 variables with others as the reference group. The 15 dummy-coded major variables were the top 15 undergraduate majors at UT Dallas.

Outcome Variable: First year GPA

This session utilized FITC students to run 4 multiple regression analyses (Table 51) to examine the relationship between first year GPA and various potential predictors. The first model only included student background characteristics in addition whether or not students took any early college courses. This multiple regression model with all 15 predictors produced $R^2=0.246$, indicating that 24.6% of variance in first year GPA was explained by the model. Being female, being Asian or other ethnic group, having full or partial scholarship, taking any

early college courses, and coming from Plano ISD contributed to this prediction, controlling other variables.

In the second model, the study dropped the variable of Pell grant status because there was no statistical significant effect from the first model. The SAT score variable was kept because SAT score is viewed as influential predictor of first year retention. The variable of whether taking any accelerated courses was further re-categorized as into “DC-only”, “exam-only”, “both-type” and “No AP/IB/DC.” The second multiple regression model with 16 predictors produced $R^2=0.256$, indicating that 25.6% of variance in first year GPA was explained by the model, which was stronger than the first model. Being female, being Asian or other ethnic group, having full or partial scholarship, taking any early college courses, and coming from Islamic schools and TAMS contributed to this prediction, controlling other variables. The statistical significant level of high school categories shifted from Plano ISD to Islamic schools and TAMS because the early college groups were articulated in detail.

The number of transferred credit hours including dual credit and exam-based courses students earned was added into the third model. The third multiple regression model with 17 predictors produced $R^2=0.260$, indicating that 26.0% of variance in first year GPA was explained by the model. The high school variable lost its statistically significant prediction because the overlapping effect from numbers of transferred credit hours. Thus, being female, being Asian or other ethnic group, having full or partial scholarship, taking any early college courses, and number of early college courses taken contributed to this prediction, controlling other variables.

The last model excluded the non-significant high school predictor and included the major variable to investigate the additional effect of majors on first year GPA. This regression model

with 26 predictors produced $R^2=0.271$, indicating that 27.1% of variance in first year GPA was explained by the model.

Table 51 Multiple Regression on 1st Year GPA for All FTIC Students

Parameter	Model 1		Model 2		Model 3		Model 4	
	Estimate	Pr > ChiSq	Estimate	Pr > ChiSq	Estimate	Pr > ChiSq	Estimate	Pr > ChiSq
Intercept	2.1173	<.0001***	2.3231	<.0001***	2.3635	<.0001***	2.2730	<.0001***
Female	0.2030	<.0001***	0.1959	<.0001***	0.1943	<.0001***	0.1591	<.0001***
Asian	0.1307	<.0001***	0.1287	<.0001***	0.1315	<.0001***	0.1290	<.0001***
White	0.0190	0.3571	0.0241	0.2340	0.0299	0.1391	0.0331	0.0986
Others	0.1604	<.0001***	0.1642	<.0001***	0.1686	<.0001***	0.1711	<.0001***
Full_Scholarship	0.5776	<.0001***	0.5591	<.0001***	0.5343	<.0001***	0.5287	<.0001***
Partial_Scholarship	0.3626	<.0001***	0.3397	<.0001***	0.3378	<.0001***	0.3381	<.0001***
Accelerated	0.5411	<.0001***						
Pell_Grant	0.0139	0.4102						
SAT_final	0.0001	0.1773	-0.0001	0.4012	-0.0001	0.1971	0.0000	0.7858
Collegiate_School	-0.0147	0.7829	0.1142	0.0347	-0.1924	0.0032		
Islamic_School	0.1685	0.0192	0.3019	<.0001***	0.1068	0.1600		
TAMS	0.0986	0.0939	0.2431	<.0001***	-0.0020	0.9760		
Homed_School	0.1148	0.1029	0.208	0.0032	0.1414	0.0457		
Plano_ISD	0.0993	<.0001***	0.0812	0.0002	0.0819	0.0001		
Public_15 miles	0.0155	0.3450	0.0018	0.9125	0.0010	0.9511		
Exam-only			0.5701	<.0001***	0.5136	<.0001***	0.5353	<.0001***
DC-only			0.4113	<.0001***	0.3105	<.0001***	0.3222	<.0001***
Both-type			0.6991	<.0001***	0.5901	<.0001***	0.6099	<.0001***
Transfer_SCH					0.0056	<.0001***	0.0049	<.0001***
Major_Biology							0.0230	0.3344
Major_ComputerScience							-0.2015	<.0001***
Major_Neuroscience							-0.0837	0.0114
Major_BiomedicalEngineering							-0.1384	0.0002
Major_Biochemistry							-0.0023	0.9491
Major_ElectricalEngineering							-0.0557	0.1356
Major_MechanicalEngineering							-0.1590	<.0001***
Major_Undecided							-0.0096	0.7582
Major_ArtsandTechnology							0.1048	0.0012
Major_BusinessAdministration							0.0816	0.0364
Major_ComputerEngineering							-0.1734	<.0001***
Major_Finance							0.1796	<.0001***
Major_HealthcareStudies							0.0388	0.4279
Major_Psychology							-0.0715	0.0871
Major_Accounting							0.1949	<.0001***
R²	0.246		0.256		0.260		0.271	

***p=0.0001

Model 1: Variable Gender, Ethnicity, Scholarship status, Pell grant status, Whether or not taking early college courses, SAT score, High school of origin are included for analysis

Model 2: Variable Gender, Ethnicity, Scholarship status, SAT score, High school of origin, and Early college groups are included for analysis

Model 3: Variable Gender, Ethnicity, Scholarship status, SAT score, High school of origin, Early college groups, and Numbers of transfer credits are included for analysis

Model 4: Variable Gender, Ethnicity, Scholarship status, SAT score, High school of origin, Early college groups, Numbers of transfer credits, and UT Dallas top 10 majors are included for analysis

In summary, being female, being Asian or other ethnic group, having a full or partial scholarship, taking any early college courses, and numbers of early college courses taken contributed to this prediction, controlling other variables. In addition, majoring in Computer Science, Biomedical Engineering, Mechanical Engineering, or Computer Engineering had a negative statistically significant effect on the first year GPA while majoring in Finance and Accounting had a positive statistical significant effect on the first year GPA. The programs of Computer Science, Biomedical Engineering, Mechanical Engineering, and Computer Engineering present a more rigorous curriculum in the first year.

Outcome Variable: First Year Retention and 4-Year Retention

Using the last model to examine the first year retention rate and 4-year graduation, a logistic regression was performed because the outcome variable is a dichotomous variable. The first year GPA was included as a consideration of controlling for student's academic ability in addition to the scholarship status and early college group. A test for fall to fall retention as the dependent variable was statistically significant with a Wald chi-square value of 2426.7103 $p < .0001$, $df = 27$ (Table 52).

Controlling for student's academic ability, Asians were about 1.67 times more likely to return in following fall semester than minority students defined as African Americans, Hispanics, and American Indians. Students who took both exam-based and dual credit courses were over 2.60 times more likely to return in the following fall semester than students who didn't take any early college courses; students who took exam-based courses were 1.64 times more likely to return and dual credit students were 1.46 times more likely to return than those with no early college credits. A unit change in the first year GPA increased by 3.25 the odds of returning in the following fall semester.

Table 52 Logistic Regression on Fall to Fall Retention for All FTIC Students

Parameter	Estimate	Standard	Wald	Pr > ChiSq	Point Estimate	95% Wald	
		Error	Chi-Square			Confidence Limits	
Intercept	-1.7929	0.3533	25.7595	<.0001***			
Female	-0.0451	0.0685	0.4335	0.5103			
Asian	0.5103	0.0882	33.4734	<.0001***	1.6660	1.4010	1.9800
White	-0.0942	0.0811	1.3502	0.2452			
Others	0.2781	0.1185	5.5106	0.0189			
Full_Scholarship	-0.0366	0.1082	0.1148	0.7348			
Partial_Scholarship	-0.2825	0.1003	7.9272	0.0049			
SAT_Final	-0.0001	0.0003	0.1491	0.6994			
GPA_1YR	1.1774	0.0347	1153.7465	<.0001***	3.2460	3.0330	3.4740
Transfer_SCH	0.0012	0.0025	0.2300	0.6315			
Exam-only	0.4960	0.0869	32.5807	<.0001***	1.6420	1.3850	1.9470
DC-only	0.3807	0.0948	16.1427	<.0001***	1.4630	1.2150	1.7620
Both-type	0.9540	0.1227	60.4945	<.0001***	2.5960	2.0410	3.3010
Major_Biology	0.1638	0.1128	2.1073	0.1466			
Major_ComputerScience	0.2429	0.1153	4.4375	0.0352			
Major_Neuroscience	0.3342	0.1673	3.9901	0.0458			
Major_BiomedicalEngineering	0.5352	0.1829	8.5628	0.0034			
Major_Biochemistry	0.1436	0.1768	0.6604	0.4164			
Major_ElectricalEngineering	0.2902	0.1752	2.7424	0.0977			
Major_MechanicalEngineering	0.1014	0.1277	0.6307	0.4271			
Major_Undecided	-0.3092	0.1217	6.4551	0.0111			
Major_ArtsandTechnology	0.0950	0.1352	0.4932	0.4825			
Major_BusinessAdministration	-0.2030	0.1595	1.6201	0.2031			
Major_ComputerEngineering	0.0290	0.1566	0.0342	0.8533			
Major_Finance	-0.1401	0.1917	0.5339	0.4650			
Major_HealthcareStudies	0.0585	0.2203	0.0704	0.7907			
Major_Psychology	-0.3159	0.1671	3.5733	0.0587			
Major_Accounting	0.0216	0.1961	0.0122	0.9122			
***p=0.0001							

The investigated independent variables such as scholarship, student’s major, SAT score and total credit hours transferred did not reach statistical significance as predictors of returning in the following fall semester. Some predictors overlap to measure some of the same academic abilities. For example, the scholarship effect faded because first year GPA was a stronger predictor and students holding a scholarship should must maintain a GPA of 3.0 or better.

Table 53 Logistic Regression on 4-Year Graduation for All FTIC Students

Parameter	Estimate	Standard	Wald	Pr > ChiSq	Point Estimate	95% Wald	
		Error	Chi-Square			Confidence Limits	
Intercept	-5.1636	0.5223	97.7394	<.0001***			
Female	0.3920	0.0808	23.5663	<.0001***	1.2660	1.0180	1.5750
Asian	0.2362	0.1113	4.5012	0.0339			
White	0.2003	0.1087	3.3953	0.0654			
Others	0.3295	0.1454	5.1385	0.0234			
Full_Scholarship	0.7087	0.1249	32.1979	<.0001***	2.0310	1.5900	2.5950
Partial_Scholarship	0.3803	0.1133	11.2620	0.0008			
SAT_Final	-0.0016	0.0004	14.3467	0.0002			
GPA_1YR	1.8467	0.0794	540.7489	<.0001***	6.3390	5.4250	7.4070
Transfer_SCH	0.0183	0.0028	43.0292	<.0001***	1.0180	1.0130	1.0240
Exam-only	0.8518	0.1133	56.5553	<.0001***	2.3440	1.8770	2.9270
DC-only	0.5178	0.1239	17.4566	<.0001***	1.6780	1.3160	2.1400
Both-type	0.9052	0.1294	48.9679	<.0001***	2.4720	1.9190	3.1860
Major_Biology	-0.1818	0.1204	2.2773	0.1313			
Major_ComputerScience	0.2243	0.1609	1.9427	0.1634			
Major_Neuroscience	0.1390	0.1902	0.5342	0.4649			
Major_BiomedicalEngineering	-0.8425	0.2316	13.2287	0.0003			
Major_Biochemistry	-0.2862	0.1883	2.3116	0.1284			
Major_ElectricalEngineering	-0.3496	0.1829	3.6556	0.0559			
Major_MechanicalEngineering	0.0326	0.1730	0.0356	0.8504			
Major_Undecided	-0.2626	0.1446	3.2996	0.0693			
Major_ArtsandTechnology	-0.0455	0.1852	0.0604	0.8059			
Major_BusinessAdministration	0.4148	0.2037	4.1442	0.0418			
Major_ComputerEngineering	-0.0587	0.2035	0.0833	0.7728			
Major_Finance	-0.2452	0.2366	1.0738	0.3001			
Major_HealthcareStudies	-0.2831	0.6563	0.1860	0.6662			
Major_Psychology	0.1058	0.2270	0.2172	0.6412			
Major_Accounting	0.4245	0.2398	3.1330	0.0767			
***p=0.0001							

Data were restricted to include 2010 fall, 2011 fall, and 2012 fall cohorts only for examination of the 4-year graduation rate. A test for 4-year graduation rate as the dependent variable was statistically significant with a Wald chi-square value of 1975.8849 $p < .0001$, $df = 27$ (Table 53). *Controlling for student's academic ability, being female made it 1.27 times more likely to graduate in 4 years than being male. Students having full scholarship were over 2.03 times more likely to graduate in 4 years than students who didn't have a scholarship. Students who took a combination of exam-based and dual credit courses were over 2.47 times more likely*

to graduate in 4 years than students who didn't take any early college courses; students who took exam-based courses were 2.34 more likely and students who dual credit courses were 1.68 more likely to graduate than those with no early college credits. A one unit change in the first year GPA increases the odds of graduating in 4 years by 6.34. A one unit change in the credit hours transferred increases the odds of graduating in 4 years by 1.02.

MINORITY STUDENTS

At UT Dallas, around 20% of FTIC students were minority students: African Americans, Hispanics, and American Indians. Out of 2,425 minority students, 44% were female and 56% were male. In regard to the early college group for minority students, 33% were students who didn't take any early college courses, 24% took exam-based courses, and 27% took dual credit courses only. Only 16% took a combination of exam-based courses and dual credit courses. From previous analysis, we recognized that minority students who didn't take any early college courses had a relatively low fall to fall retention rate and 4-year graduation rate.

Minority Student Characteristics Disaggregation

Disaggregating the minority population, 1,888 or 77.38% were Hispanics and 571 or 21.19% were African Americans (Table 54). Out of 1,888 Hispanic, 58.10% were male and 41.90% were female. The gender distribution for African Americans is opposite to UT Dallas FTIC population's distribution. More female African Americans (53.19%) enrolled in UT Dallas than male African Americans (46.81%).

With regard to taking early college courses, 38.68% of African Americans and 31.09% of Hispanics did not take any early college courses. When they did, African Americans were more likely to take dual credit courses. Hispanics were more likely to take either dual credit courses or

exam-based courses. The majority of African Americans (83.75%) and Hispanics (72.35%) didn't have any merit-scholarship awarded. Over 40% were awarded a Pell grant.

Table 54 Minority Student Characteristics Disaggregation

	African American		American Indian or Alaskan Native		Hispanic		Native Hawaiian or Pacific Islander	
	#	%	#	%	#	%	#	%
Female	275	53.19%	10	50.00%	791	41.90%	5	33.33%
Male	242	46.81%	10	50.00%	1097	58.10%	10	66.67%
Total	517	100.00%	20	100.00%	1888	100.00%	15	100.00%
Both-type	73	14.12%	2	10.00%	317	16.79%	2	13.33%
DC-only	142	27.47%	6	30.00%	501	26.54%	3	20.00%
Exam-only	102	19.73%	6	30.00%	483	25.58%	4	26.67%
No AP/IB/DC	200	38.68%	6	30.00%	587	31.09%	6	40.00%
Full Scholarship	41	7.93%	4	20.00%	342	18.11%	2	13.33%
No Scholarship	433	83.75%	14	70.00%	1366	72.35%	12	80.00%
Partial Scholarship	43	8.32%	2	10.00%	180	9.53%	1	6.67%
Pell Grant	238	46.03%	6	30.00%	787	41.68%	4	26.67%
STEM Major	322	62.28%	11	55.00%	1084	57.42%	12	80.00%
Top 10%	151	55.31%	4	44.44%	692	60.86%	4	33.33%
SAT	1146.42		1208.24		1179.70		1152.79	
ACT	24.82		25.18		25.51		25.86	
AP SCH	8.60		11.29		10.55		7.80	
IB SCH	7.22				8.92			
DC SCH	17.99		24.75		19.34		17.00	
Post Matriculation SCH	11.20		5.00		9.69		10.67	
1st Fall GPA	2.79		3.07		2.91		3.22	
1st Year GPA	2.76		2.90		2.84		3.09	
Fall to Fall Retention	413	79.88%	14	70.00%	1524	80.72%	15	100.00%
4-yr Graduation	69	35.75%	6	50.00%	275	40.98%	3	75.00%
6-yr Graduation	36	50.00%	3	100.00%	119	58.05%	2	100.00%

The average SAT scores for African Americans and Hispanics were 1146.42 and 1179.70 which were significantly lower than the average score of 1256.12 for the total FTIC students. However, 55.31% of African Americans and 60.86% of Hispanics ranked in the top 10% of their high school graduating class which were significantly higher than total FTIC students of 30.77%.

In terms of academic performance shown in Table 53, the GPAs for African Americans and Hispanics were lower than the average GPA of 3.04 for the total FTIC students. The fall to fall retention rates for African Americans (79.88%) and Hispanics (80.72%) were significantly lower than the average retention rate for Asian Americans (90.96%) and total FTIC students of 85.46%. African Americans had the lowest 4-year (35.75%) and 6-year (50.00%) graduation rates.

Interaction Effects of Early College Groups and Ethnicity

The interaction between early college groups and minority students with respect to postsecondary academic performance was investigated to better understand if taking early college courses benefited academic performance for African Americans and Hispanics. Table 55 confirms that African American and Hispanic students taking early college courses were more likely to be retained. Over 94% of African American and Hispanic students who took a combination of dual credit and exam-based courses returned in the following fall semester. On the contrary, only 66% of African Americans and 64.57% of Hispanics who didn't take any early college courses returned in the following fall semester.

Table 55 Fall to Fall Retention by Early College Groups for Minority Students

	Both-type	DC-only	Exam-only	No AP/IB/DC	TOTAL
African American	94.52%	85.21%	89.22%	66.00%	79.88%
American Indian or Alaskan Native	50.00%	100.00%	83.33%	33.33%	70.00%
Hispanic	94.32%	82.44%	89.65%	64.57%	80.72%
Native Hawaiian or Pacific Islander	100.00%	100.00%	100.00%	100.00%	100.00%

With regard to 4 year graduation rates, 66.42% of African Americans and 66.67% of Hispanics who took a combination of dual credit and exam-based courses graduated in 4 years. However, the 4-year graduation rates was significantly lower (12.50% for African Americans & 14.42% for Hispanics) when those students did not have early start (Table 56).

Table 56 Graduated in 4 Yr (2010FA, 2011FA, 2012FA) by Early College Groups for Minority Students

	Both-type	DC-only	Exam-only	No AP/IB/DC	TOTAL
African American	68.42%	42.59%	57.50%	12.50%	35.75%
American Indian or Alaskan Native	100.00%	66.67%	40.00%	33.33%	50.00%
Hispanic	66.67%	39.89%	60.23%	14.42%	40.98%
Native Hawaiian or Pacific Islander	100.00%	0.00%		100.00%	75.00%

Table 57 shows that the effect of no early college credits carries beyond 4 years. African American and Hispanic students who did not take any early college courses were less likely to graduate in 6 years.

Table 57 Graduated in 6 Yr (2010FA Only) by Early College Groups for Minority Students

	Both-type	DC-only	Exam-only	No AP/IB/DC	TOTAL
African American	100.00%	58.33%	83.33%	26.32%	50.00%
American Indian or Alaskan Native	100.00%		100.00%		100.00%
Hispanic	94.44%	56.86%	81.63%	37.93%	58.05%
Native Hawaiian or Pacific Islander				100.00%	100.00%

The findings demonstrate that African American and Hispanic students who did not have early college coursework were less likely to be retained in the following fall semester and complete the degree in 4 years or 6 years. The effects of lack of early college coursework on graduation are more significant for African Americans than Hispanics.

Regression Analysis

Regression was conducted to test minority students only. The minority variable was dummy-coded into two variables: Hispanic and American Indian_Hawaiian with African American as the reference group. The multiple regression model with 25 predictors produced $R^2=0.2401$, indicating that 24.01% of variance in first year GPA is explained by the model. *For minority students, being female, having full or partial scholarship, and taking any early college courses had a positive statistically significant effect on the first year GPA, controlling other*

variables (Table 58). Majoring in Computer Science had a negative statistically significant effect on first year GPA. Within minority students, being African Americans, Hispanics, and American Indians/Hawaiians didn't reach a statistically significant effect on the first year GPA. The SAT score and number of early college credit hours transferred did not reach to the statistical significant level.

Table 58 Multiple Regression on 1st Year GPA for Minority Students

Parameter	DF	Estimate	Standard Error	Wald 95% Confidence Limits		Wald Chi-Square	Pr > ChiSq
Intercept	1	1.9954	0.1681	1.6659	2.3249	140.8700	<.0001***
Female	1	0.1539	0.0355	0.0844	0.2235	18.8100	<.0001***
Hispanic	1	-0.0183	0.0403	-0.0974	0.0607	0.2100	0.6490
American Indian_Hawaiian	1	0.1598	0.1389	-0.1126	0.4321	1.3200	0.2502
Full_Scholarship	1	0.4004	0.0571	0.2884	0.5123	49.1300	<.0001***
Partial_Scholarship	1	0.3077	0.0603	0.1895	0.4258	26.0500	<.0001***
Exam-only	1	0.6520	0.0476	0.5588	0.7453	187.8100	<.0001***
DC-only	1	0.4689	0.0516	0.3679	0.5700	82.7400	<.0001***
Both-type	1	0.8257	0.0563	0.7154	0.9360	215.2300	<.0001***
SAT_final	1	0.0002	0.0001	-0.0001	0.0005	2.0100	0.1564
Transfer_SCH	1	0.0029	0.0013	0.0004	0.0054	5.2700	0.0217
Major_Biology	1	0.0156	0.0573	-0.0966	0.1278	0.0700	0.7855
Major_ComputerScience	1	-0.2470	0.0688	-0.3820	-0.1121	12.8700	0.0003**
Major_Neuroscience	1	-0.0804	0.0842	-0.2455	0.0847	0.9100	0.3398
Major_BiomedicalEngineering	1	-0.1138	0.0886	-0.2875	0.0599	1.6500	0.1990
Major_Biochemistry	1	0.0403	0.0936	-0.1431	0.2238	0.1900	0.6665
Major_ElectricalEngineering	1	0.0093	0.0861	-0.1595	0.1781	0.0100	0.9139
Major_MechanicalEngineering	1	-0.0539	0.0669	-0.1850	0.0771	0.6500	0.4199
Major_Undecided	1	-0.0438	0.0730	-0.1869	0.0994	0.3600	0.5490
Major_ArtsandTechnology	1	0.1792	0.0701	0.0418	0.3167	6.5400	0.0106
Major_BusinessAdministration	1	0.1335	0.0941	-0.0510	0.3179	2.0100	0.1561
Major_ComputerEngineering	1	-0.1290	0.0912	-0.3077	0.0497	2.0000	0.1572
Major_Finance	1	0.2333	0.1002	0.0369	0.4297	5.4200	0.0199
Major_HealthcareStudies	1	0.1652	0.1149	-0.0599	0.3904	2.0700	0.1502
Major_Psychology	1	-0.0643	0.0874	-0.2356	0.1070	0.5400	0.4619
Major_Accounting	1	0.2103	0.0973	0.0197	0.4009	4.6800	0.0306

* p=0.01, **p=0.001, ***p=0.0001

A test for fall to fall retention as the dependent variable was statistically significant with a Wald chi-square value of 704.4240 $p < .0001$, $df = 26$. The first year GPA was the most

influential predictor of returning in following fall semester, controlling for other variables (Table 59). A unit change in the first year GPA increased by 4.37 the odds of returning in the following fall semester. Holding other variables at a fixed value, minority students who took a combination of exam-based and dual credit courses were over 2.14 times more likely to return in the following fall semester than student who didn't take any early college courses. Students who took exam-based courses were 1.74 times more likely to return in the following fall semester than students who didn't take any early college courses. No statistically significant effect on returning in the following fall semester for those students who took dual-credit only.

Taking early college courses appears to increase the possibility of returning as a precursor to successful first year academic performance –especially examination (AP/IB) only or examination and dual credit combinations. It may be that early course work prepares students both with content and importantly learning regimens to have first year success. Gender, SAT score, scholarship status, numbers of credit hours transferred, and student's major did not reach statistical significance as predictors of returning in the following fall semester. No statistically significant difference on returning in the following fall semester between African Americans and Hispanics within minority students.

Table 59 Logistic Regression on Fall to Fall Retention for Minority Students

Parameter	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	Point Estimate	95% Wald Confidence Limits	
Intercept	-2.9271	0.6273	21.7692	<.0001***			
Female	-0.1474	0.1405	1.1008	0.2941			
Hispanic	-0.1623	0.1549	1.0988	0.2945			
American Indian_Hawaiian	-0.4937	0.5450	0.8207	0.3650			
Full_Scholarship	-0.1560	0.2621	0.3544	0.5516			
Partial_Scholarship	-0.2009	0.2658	0.5716	0.4496			
GPA_1YR	1.4751	0.0811	330.7916	<.0001***	4.3710	3.7290	5.1240
Exam-only	0.5510	0.1941	8.0561	0.0045*	1.7350	1.1860	2.5380
DC-only	0.3485	0.1957	3.1711	0.0749			
Both-type	0.7623	0.2719	7.8604	0.0051*	2.1430	1.2580	3.6520
SAT_final	0.0004	0.0005	0.5438	0.4608			
Transfer_SCH	0.0023	0.0054	0.1837	0.6682			
Major_Biology	0.0273	0.2257	0.0147	0.9036			
Major_ComputerScience	0.2478	0.2691	0.8480	0.3571			
Major_Neuroscience	0.5916	0.3645	2.6337	0.1046			
Major_BiomedicalEngineering	0.5009	0.3820	1.7188	0.1898			
Major_Biochemistry	0.2879	0.3986	0.5215	0.4702			
Major_ElectricalEngineering	0.5507	0.3977	1.9175	0.1661			
Major_MechanicalEngineering	0.2199	0.2556	0.7403	0.3896			
Major_Undecided	-0.2147	0.2642	0.6605	0.4164			
Major_ArtsandTechnology	0.2576	0.2875	0.8032	0.3701			
Major_BusinessAdministration	-0.0981	0.3429	0.0818	0.7749			
Major_ComputerEngineering	0.0452	0.3261	0.0192	0.8897			
Major_Finance	-0.0027	0.3958	0.0000	0.9946			
Major_HealthcareStudies	-0.6626	0.3894	2.8962	0.0888			
Major_Psychology	-0.1217	0.3169	0.1475	0.7009			
Major_Accounting	0.1014	0.4006	0.0641	0.8002			

* p=0.01, **p=0.001, ***p=0.0001

Since the 4-year graduation analysis was restricted the data from 2010-2012, there was no American Indian or Hawaiian students during this period. The American Indian_Hawaiian variable was dropped in this logistic regression. A test for 4-year graduation rate as the dependent variable was statistically significant with a Wald chi-square value of 428.9021 $p < .0001$, $df = 25$. *The first year GPA was the most influential predictor of returning and graduating in 4 years, controlling for other variables (Table 60). A unit change in the first year GPA increased by 8.65 the odds of graduating in 4 years. Students having a full scholarship*

were over 2.76 times more likely to graduate in 4 years. Students who took a combination of exam-based and dual credit courses or took exam-based coursework were over 2.68 times more likely to graduate in 4 years than students who didn't take any early college courses. A unit change in the early college credit hours transferred increased by 1.02 the odds of graduating in 4 years.

Table 60 Logistic Regression on 4-Year Graduation for Minority Students

Parameter	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	Point Estimate	95% Wald Confidence Limits	
Intercept	-6.3297	1.1289	31.4355	<.0001***			
Female	0.0073	0.2007	0.0013	0.9709			
Hispanic	-0.1560	0.2327	0.4496	0.5025			
Full_Scholarship	1.0140	0.3194	10.0758	0.0015**	2.7570	1.4740	5.1550
Partial_Scholarship	0.7008	0.3087	5.1548	0.0232			
GPA_1YR	2.1576	0.2118	103.7892	<.0001***	8.6500	5.7120	13.1010
Exam-only	0.9844	0.2868	11.7849	0.0006**	2.6760	1.5260	4.6950
DC-only	0.6898	0.2950	5.4699	0.0193			
Both-type	0.9850	0.3365	8.5668	0.0034**	2.6780	1.3850	5.1790
SAT_final	-0.0012	0.0009	2.1162	0.1457			
Transfer_SCH	0.0231	0.0075	9.5848	0.002**	1.0230	1.0090	1.0380
Major_Biology	-0.2809	0.2971	0.8938	0.3444			
Major_ComputerScience	0.4673	0.4714	0.9829	0.3215			
Major_Neuroscience	-0.4900	0.4829	1.0295	0.3103			
Major_BiomedicalEngineering	-1.5368	0.6114	6.3190	0.0119			
Major_Biochemistry	-0.4913	0.5572	0.7776	0.3779			
Major_ElectricalEngineering	-0.6116	0.4707	1.6880	0.1939			
Major_MechanicalEngineering	-0.8912	0.4295	4.3058	0.0380			
Major_Undecided	-0.3833	0.3759	1.0396	0.3079			
Major_ArtsandTechnology	-0.3002	0.4084	0.5404	0.4623			
Major_BusinessAdministration	0.9756	0.4926	3.9214	0.0477			
Major_ComputerEngineering	-0.4659	0.6695	0.4842	0.4865			
Major_Finance	-0.7124	0.5651	1.5890	0.2075			
Major_HealthcareStudies	2.5093	3.0173	0.6916	0.4056			
Major_Psychology	0.2453	0.4552	0.2904	0.5899			
Major_Accounting	-0.1572	0.4858	0.1047	0.7463			

* p=0.01, **p=0.001, ***p=0.0001

DUAL CREDIT (DC) ONLY STUDENTS

Table 61 and Table 62 present two slightly different views of the data on merit scholarships by dual credit hours taken. Of the students with more than 50 dual credits (n=635), 250 or 39.37% were awarded a full scholarship (Table 61). Approximately 42% (250 out of 595) of dual credit full scholarship students had over 50 dual credit hours transferred to UT Dallas (Table 62). These students also had higher SAT/ACT scores (Table 63).

Table 61 Scholarship Status by Dual Credit Semester Credit Hour

CATEGORY	Full Scholarship		Partial Scholarship		No Scholarship		Total	
	FREQ	%	FREQ	%	FREQ	%	FREQ	%
0.5-9.99	111	11.71%	97	10.23%	740	78.06%	948	100%
10-19.99	106	12.69%	94	11.26%	635	76.05%	835	100%
20-29.99	60	16.85%	39	10.96%	257	72.19%	356	100%
30-39.99	34	20.99%	18	11.11%	110	67.90%	162	100%
40-49.99	34	30.63%	10	9.01%	67	60.36%	111	100%
50-80	250	39.37%	78	12.28%	307	48.35%	635	100%
TOTAL	595	19.53%	336	11.03%	2,116	69.45%	3047	100%

Table 62 Scholarship Status by Dual Credit Semester Credit Hour

CATEGORY	Full Scholarship		Partial Scholarship		No Scholarship		Total	
	FREQ	%	FREQ	%	FREQ	%	FREQ	%
0.5-9.99	111	18.66%	97	28.87%	740	34.97%	948	31.11%
10-19.99	106	17.82%	94	27.98%	635	30.01%	835	27.40%
20-29.99	60	10.08%	39	11.61%	257	12.15%	356	11.68%
30-39.99	34	5.71%	18	5.36%	110	5.20%	162	5.32%
40-49.99	34	5.71%	10	2.98%	67	3.17%	111	3.64%
50-80	250	42.02%	78	23.21%	307	14.51%	635	20.84%
TOTAL	595	100%	336	100%	2116	100%	3047	100%

Academic Characteristics by DC Hours Taken Category

The ‘dual-only’ group (n=3,047) was further examined to identify their characteristics and performance by dual credit hours taken (Table 63). The group was partitioned into six categories based on the number of dual credit hours taken. As can be seen, the average SAT scores varied depending on the number of dual credit hours taken. In general, the more dual credit hours, the higher average SAT score. While the fall to fall retention rate was up to 91% for

those students who took over 50 dual credit hours, retention by other groupings varied from 81.48% to 87.36%. These variations are most likely explained by high school of origin and other student characteristics.

Table 63 Academic Characteristics & Performance by DC-only Grouping

DC SCH CATEGORY	SAT MV*	ACT COMP*	POST MATRI. SCH**	1ST FA GPA	1ST YR GPA	FALL TO FALL RETENTION	STEM MAJOR	PELL GRANT
0.5-9.99	1181.17	25.61	10.76	2.94	2.89	85.34%	58.44%	31.75%
10-19.99	1177.20	25.93	9.72	3.00	2.94	84.91%	60.96%	29.94%
20-29.99	1168.95	26.23	10.30	3.06	3.01	87.36%	61.24%	26.97%
30-39.99	1189.72	26.31	8.86	3.05	2.98	81.48%	59.26%	25.31%
40-49.99	1217.58	28.02	11.25	3.03	3.06	85.59%	60.36%	27.03%
50-80	1260.57	28.14	7.69	3.30	3.29	91.34%	68.35%	33.39%
TOTAL	1196.99	26.41	9.79	3.05	3.01	86.51%	61.63%	30.52%
*Some students don't have the score on file.								
**Community college semester credit hours earned after students entered UT Dallas								

Time to Degree by DC Hours Taken Category

Of the four early college credit groups, the ‘dual-only’ group had the highest percentage of students graduating in 2 or 3 years. Table 64 provides insight into the need to further analyze the ‘dual-only’ group. Approximately 41% of the dual-credit only students presenting 50 or more hours graduated in 3 years or less. *Those students who earned 50 or over dual credit hours performed well as same as students in the ‘both-type’ and ‘exam-only’ groups.* The pattern was consistent for the cohort 2011 and 2012 as well.

Table 64 Graduation Rate by DC Grouping for FTIC 2010 Cohort

FTIC-2108 DC ONLY (304 OUT OF 1377)						
DC SCH CATEGORY	# Students	GRAD. IN 2 YRS	GRAD. IN 3 YRS	GRAD. IN 4 YRS	GRAD. IN 5 YRS	GRAD. IN 6 YRS
0.5-9.99	116	0.00%	0.00%	32.76%	52.59%	62.07%
10-19.99	77	0.00%	1.30%	38.96%	58.44%	63.64%
20-29.99	21	0.00%	9.52%	38.10%	66.67%	71.43%
30-39.99	13	0.00%	23.08%	38.46%	38.46%	38.46%
40-49.99	6	0.00%	0.00%	50.00%	50.00%	50.00%
50-80	71	15.49%	40.85%	73.24%	78.87%	80.28%
TOTAL	304	3.62%	11.51%	44.74%	60.53%	66.12%

External Educational Institutional Origins of Dual Credit

As one can see in Table 65 below, 45% of dual credit coursework credits earned were from Dallas County Community College District, followed by University of North Texas (UNT) and Collin College. Students from Texas Academy of Math & Science, located on the UNT campus, contributed the majority of dual credit courses from University of North Texas.

Table 65 Top 10 External Organizations

Institutions	# DC Courses	%
Dallas County Cmty Coll Dist	16789	44.99%
University of North Texas	4901	13.13%
Collin College	4819	12.91%
Austin Community College	1620	4.34%
Lone Star College System	1093	2.93%
Tarrant County College Distric	674	1.81%
North Central Texas College	562	1.51%
San Jacinto College Central	487	1.31%
Navarro College	465	1.25%
Houston Community College	395	1.06%

Regression Analysis

Since students who took dual credit courses appeared to have varied academic performance at UT Dallas, a further investigation was conducted to include the high school information. At UT Dallas, around 25%, or 3,047, of the FTIC students in our database took dual credit courses. Out of 3,047 students, 47% were female and 53% were male. The high schools they came from were categorized into 7 groups. They are Collegiate Schools, Islamic Schools, TAMS, Home Schooled, Plano ISD, Public Schools within 15 miles, and Others. The number of dual credit hours taken was dummy coded into two variables: DC13_39 (dual credit hours between 13 and 39) and DC40 (dual credit hours over 40) with a reference group of students who took dual credit hours between 1 and 12.

This regression model with 32 predictors produced $R^2=0.1545$, indicating that 15.45% of variance in first year GPA is explained by the model (Table 66). *Being female, having a full or partial scholarship, amount of SCH of dual credit earned, SAT score, coming from Islamic schools, and majoring in Computer Science as well as Mechanical Engineering had statistically significant effect on first year GPA, controlling other variables.*

Table 66 Multiple Regression on 1st Year GPA for DC Students

Parameter	DF	Estimate	Standard Error	Wald 95% Confidence Limits		Wald Chi-Square	Pr > ChiSq
Intercept	1	2.2877	0.1626	1.9691	2.6063	198.0500	<.0001***
Female	1	0.1684	0.0277	0.1142	0.2227	37.0500	<.0001***
Asian	1	0.0798	0.0378	0.0057	0.1539	4.4500	0.0348
White	1	0.0114	0.0377	-0.0625	0.0854	0.0900	0.7617
Others	1	0.0768	0.0533	-0.0277	0.1813	2.0800	0.1496
Full_Scholarship	1	0.4118	0.0482	0.3174	0.5062	73.1300	<.0001***
Partial_Scholarship	1	0.2308	0.0451	0.1425	0.3191	26.2300	<.0001***
Transfer_SCH	1	0.0049	0.0019	0.0013	0.0086	6.9200	0.0085*
SAT_Final	1	0.0004	0.0001	0.0001	0.0006	6.8300	0.0090*
Pell_Grant	1	0.0557	0.0298	-0.0027	0.1141	3.5000	0.0615
DC btw 13 and 39	1	-0.0153	0.0396	-0.0930	0.0623	0.1500	0.6988
DC over 40	1	-0.1456	0.1057	-0.3526	0.0615	1.9000	0.1684
Collegiate_School	1	-0.0764	0.0721	-0.2176	0.0649	1.1200	0.2894
Islamic_School	1	0.2209	0.0791	0.0659	0.3758	7.8000	0.0052*
TAMS	1	0.1523	0.0759	0.0035	0.3011	4.0300	0.0448
Homed_School	1	0.1804	0.0836	0.0165	0.3442	4.6600	0.0310
Plano_ISD	1	-0.0241	0.0547	-0.1313	0.0832	0.1900	0.6602
Public_15 miles	1	-0.0505	0.0329	-0.1149	0.0138	2.3700	0.1239
Major_Biology	1	0.0040	0.0429	-0.0802	0.0881	0.0100	0.9264
Major_ComputerScience	1	-0.3227	0.0553	-0.4311	-0.2143	34.0200	<.0001***
Major_Neuroscience	1	-0.0895	0.0612	-0.2096	0.0305	2.1400	0.1437
Major_BiomedicalEngineering	1	-0.1615	0.0686	-0.2959	-0.0271	5.5500	0.0185
Major_Biochemistry	1	-0.0256	0.0761	-0.1748	0.1236	0.1100	0.7368
Major_ElectricalEngineering	1	-0.0427	0.0730	-0.1858	0.1003	0.3400	0.5583
Major_MechanicalEngineering	1	-0.1681	0.0578	-0.2814	-0.0548	8.4500	0.0036*
Major_Undecided	1	0.0074	0.0597	-0.1097	0.1244	0.0200	0.9021
Major_ArtsandTechnology	1	0.0404	0.0618	-0.0808	0.1616	0.4300	0.5134
Major_BusinessAdministration	1	0.0470	0.0692	-0.0886	0.1827	0.4600	0.4966
Major_ComputerEngineering	1	-0.1470	0.0805	-0.3048	0.0108	3.3300	0.0679
Major_Finance	1	0.1086	0.0891	-0.0660	0.2832	1.4900	0.2230
Major_HealthcareStudies	1	0.0684	0.0770	-0.0824	0.2193	0.7900	0.3739
Major_Psychology	1	-0.0438	0.0727	-0.1863	0.0986	0.3600	0.5462
Major_Accounting	1	0.1086	0.0710	-0.0305	0.2478	2.3400	0.1260

* p=0.01, **p=0.001, ***p=0.0001

A test for fall to fall retention as the dependent variable was statistically significant with a Wald chi-square value of 475.5068 $p < .0001$, $df = 33$. *The first year GPA was the dominant predictor (Table 67). A unit change in the first year GPA increased by 3.60 the odds of returning in the following fall semester. Holding other variables at a fixed value, Asian students were over 2.01 times more likely to return in the following fall semester than African Americans, Hispanics, and American Indians for those students who took dual credit courses only. Students who did not declare a major or majored in Arts and Technology were less likely to return in the following fall semester for students who took dual credit hours only. All other predictors such as gender, ethnicity, SAT score, scholarship status, numbers of credit hours transferred, and student's high school of origin didn't reach the statistical significance.*

A test for 4-year graduation rate as the dependent variable was statistically significant with a Wald chi-square value of 453.0965 $p < .0001$, $df = 33$. *The first year GPA was the most influential predictor of graduating in 4 years, controlling for other variables (Table 68). A unit change in the first year GPA increased by 5.25 the odds of graduating in 4 years. Females were over 1.66 times and students having a full scholarship were over 2.02 times more likely to graduate in 4 years. Students who were from Islamic schools were over 9.32 times more likely to graduate in 4 years. Home-school students were 4.81 times more likely to graduate in 4 years. Students who majored in Biomedical Engineering were less likely to graduate in 4 years for students who took dual credit courses only. The various ethnic groups, SAT score, and numbers of credit hours transferred didn't reach the statistical significance as predictors.*

Table 67 Logistic Regression on Fall to Fall Retention for DC Students

Parameter	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	Point Estimate	95% Wald Confidence Limits	
Intercept	-1.1256	0.7783	2.0916	0.1481			
Female	0.1625	0.1349	1.4501	0.2285			
Asian	0.7003	0.1864	14.1127	0.0002**	2.0140	1.3980	2.9030
White	-0.2097	0.1646	1.6243	0.2025			
Others	0.4128	0.2659	2.4097	0.1206			
Full_Scholarship	0.0552	0.2446	0.0510	0.8213			
Partial_Scholarship	-0.4017	0.2054	3.8233	0.0505			
Transfer_SCH	0.0035	0.0090	0.1491	0.6994			
SAT_Final	-0.0005	0.0006	0.5720	0.4495			
GPA_1YR	1.2822	0.0769	278.0945	<.0001***	3.6040	3.1000	4.1910
Pell_Grant	-0.0478	0.1416	0.1139	0.7358			
DC btw 13 and 39	-0.1720	0.1842	0.8721	0.3504			
DC over 40	-0.4371	0.5071	0.7430	0.3887			
Collegiate_School	0.4670	0.3405	1.8805	0.1703			
Islamic_School	1.2144	0.5874	4.2745	0.0387			
TAMS	0.5116	0.4891	1.0945	0.2955			
Homed_School	0.7680	0.4842	2.5157	0.1127			
Plano_ISD	0.4170	0.2858	2.1287	0.1446			
Public_15 miles	0.2711	0.1529	3.1418	0.0763			
Major_Biology	-0.3344	0.2168	2.3788	0.1230			
Major_ComputerScience	0.1662	0.2588	0.4126	0.5207			
Major_Neuroscience	0.0810	0.3327	0.0593	0.8076			
Major_BiomedicalEngineering	0.1239	0.3479	0.1268	0.7218			
Major_Biochemistry	-0.6321	0.3450	3.3578	0.0669			
Major_ElectricalEngineering	0.6578	0.4378	2.2573	0.1330			
Major_MechanicalEngineering	-0.1650	0.2539	0.4223	0.5158			
Major_Undecided	-0.6757	0.2585	6.8347	0.0089*	0.5090	0.3070	0.8440
Major_ArtsandTechnology	-0.6578	0.2546	6.6746	0.0098*	0.5180	0.3140	0.8530
Major_BusinessAdministration	-0.3843	0.3247	1.4006	0.2366			
Major_ComputerEngineering	0.0338	0.3692	0.0084	0.9271			
Major_Finance	-0.6043	0.3857	2.4543	0.1172			
Major_HealthcareStudies	-0.2029	0.4320	0.2207	0.6385			
Major_Psychology	-0.7510	0.3152	5.6776	0.0172			
Major_Accounting	-0.1791	0.3710	0.2330	0.6293			
* p=0.01, **p=0.001, ***p=0.0001							

Table 68 Logistic Regression on 4-Year Graduation for DC Students

Parameter	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	Point Estimate	95% Wald Confidence Limits	
Intercept	-5.2491	0.9507	30.4829	<.0001***			
Female	0.5061	0.1504	11.3222	0.0008**	1.6590	1.2350	2.2270
Asian	0.2433	0.2073	1.3770	0.2406			
White	0.0520	0.2048	0.0644	0.7996			
Others	-0.0468	0.3007	0.0242	0.8763			
Full_Scholarship	0.7018	0.2631	7.1130	0.0077*	2.0170	1.2040	3.3790
Partial_Scholarship	0.1780	0.2262	0.6194	0.4313			
Transfer_SCH	0.0136	0.0116	1.3875	0.2388			
SAT_Final	-0.0004	0.0008	0.2268	0.6339			
GPA_1YR	1.6588	0.1402	140.0816	<.0001***	5.2530	3.9910	6.9130
Pell_Grant	-0.0532	0.1552	0.1175	0.7317			
DC btw 13 and 39	0.0363	0.2226	0.0266	0.8704			
DC over 40	-0.4217	0.6653	0.4018	0.5262			
Collegiate_School	0.8095	0.4172	3.7657	0.0523			
Islamic_School	2.2318	0.7819	8.1478	0.0043*	9.3170	2.0120	43.1350
TAMS	0.7779	0.4813	2.6119	0.1061			
Homed_School	1.5712	0.5936	7.0067	0.0081*	4.8130	1.5040	15.4040
Plano_ISD	0.2595	0.2845	0.8319	0.3617			
Public_15 miles	-0.1090	0.1723	0.4003	0.5269			
Major_Biology	-0.4215	0.2172	3.7652	0.0523			
Major_ComputerScience	-0.1427	0.3386	0.1777	0.6734			
Major_Neuroscience	-0.4505	0.3460	1.6950	0.1929			
Major_BiomedicalEngineering	-1.4507	0.4791	9.1695	0.0025*	0.2340	0.0920	0.5990
Major_Biochemistry	-0.1957	0.3934	0.2474	0.6189			
Major_ElectricalEngineering	-0.7397	0.3419	4.6799	0.0305			
Major_MechanicalEngineering	-0.0886	0.3330	0.0708	0.7902			
Major_Undecided	-0.2765	0.2754	1.0075	0.3155			
Major_ArtsandTechnology	-0.0745	0.3437	0.0470	0.8283			
Major_BusinessAdministration	0.0779	0.3974	0.0384	0.8445			
Major_ComputerEngineering	-0.0656	0.3813	0.0296	0.8635			
Major_Finance	0.0643	0.4364	0.0217	0.8828			
Major_HealthcareStudies	-0.2098	1.1569	0.0329	0.8561			
Major_Psychology	0.1553	0.3856	0.1623	0.6871			
Major_Accounting	0.3144	0.4298	0.5350	0.4645			

* p=0.01, **p=0.001, ***p=0.0001

CONCLUSION

The University of Texas at Dallas has unique and diverse population. Approximately 35.5% of FTIC students were white, 34.3% were Asians, 19.9% were African Americans, Hispanics, and American Indians. Approximately 46% of FTIC students were from high schools in Dallas metroplex. Plano ISD (13.92%) is the top feeder school for UT Dallas, followed by Lewisville ISD (4.90%) and Garland ISD (4.73%). In contrast to many other universities, only 25.71% of FTIC students didn't take any early college courses.

Female were more likely to take dual credit courses or a combination of dual credit courses and exam-based courses while male were more likely to take exam-based courses or not take any early college courses. Asian Americans were more likely to take any early college courses than other ethnic groups regardless of types of course offering, especially taking a combination of exam-based courses and dual credit courses. African American, Hispanic, and American Indian students were less likely to take early college courses which may partially result from the availability of coursework in their high schools of origin. Whites were more likely to take exam-based courses. Students in the 'both-type' and 'exam-only' early college group were more likely to have full scholarships. The majority of students in the dual-only early college group who had a full scholarship were students who took 40 or over dual credit hours while in high school.

Overall, the average first year GPA was 3.04 and the fall to fall retention rate was 85.45%. The six year graduation rate for the 2010 fall cohort was 67.25% and the average four year graduation rate for the 2010, 2011, and 2012 fall cohorts was 52.40% (2468 out of 4710).

Not surprisingly, students who presented both exam-based and dual credit coursework credits performed the best, followed by exam-only group, dual-only group. Students in the 'No AP/IB/DC' group performed the worst. Compared to the other groups, they had the highest first semester GPA of 3.46, highest first year GPA of 3.42, highest retention rate of 95.05% and highest 6-year graduation rate of 85.25%.

For ISDs with over 100 students enrolled in UT Dallas, *students from Dallas ISD had the lowest fall to fall retention rate at 78.54%, the lowest 6-year graduation rate at 47.89% and the lowest 4-year graduation rate at 31.60%* compared to students from other groups. Dallas ISD had significantly lower percentage of Asian American students (9.31%) and significantly higher percentage of minority students (73.08%). Regardless of gender, students from Dallas ISD were more likely not take any early college courses. Early college opportunities or encouragement to try early college coursework may be unevenly textured across DISD that results in divergent postsecondary academic performance within DISD.

Over half of Plano ISD students were Asian Americans (54.04%). Regardless of gender, ethnicity, high school of origin, students from Plano ISD were more likely take exam-based early college courses. The findings from Chi-Square tests confirm that students who took early college courses outperformed peers who did not take any early college courses with respect to postsecondary outcomes measured by first year retention and graduation rates when we only examined Plano ISD students.

African Americans, Hispanics, American Indians, and Whites did not take any early college courses had the lower first year retention rate and graduation rate. Students who didn't have any scholarship and didn't take any early college courses had a relatively low 4-year graduation rate. Students who did not successfully take early college coursework and are

undeclared are at a greater risk of not being academically successful. Focusing on the major of students by early college group, students who did not have early start were less likely to complete the degree in 4 years for some STEM majors, particular in engineering and neuroscience.

There is no content relationship between the subject matter of AP/IB/DC coursework and the student's major. The majority of students took core early college courses to waive core course requirements mandated by THECB. At UT Dallas, students were more likely to take exam-based (AP/IB) early college courses than dual credit courses in the subjects of History and Math. With regard to the subject of English, 21.32% of students took dual credit courses while 23.65% took AP courses and 2.88% took IB courses. For the subjects of Government students were less likely to take AP early college courses than dual credit courses.

Table 69 presents the influential factors of predicting the first year GPA and first year retention and 4-year graduation by population. For first-time-in-college students:

- Being female, being Asian or other ethnic group, having a full or partial scholarship, taking any early college courses, and numbers of early college earned had a positive statistically significant effect on the first year GPA. In addition, majoring in Computer Science, Biomedical Engineering, Mechanical Engineering, or Computer Engineering had a negative statistically significant effect on the first year GPA while majoring in Finance and Accounting had a positive statistical significant effect on the first year GPA. The programs of Computer Science, Biomedical Engineering, Mechanical Engineering, and Computer Engineering had more rigorous subjects and curriculum in results of the lower GPA.
- Controlling for student's academic ability, Asians were about 1.67 times more likely to return in following fall semester than minority students defined as African Americans, Hispanics, and American Indians. Students who took a combination of exam-based and dual credit courses were 2.60 times more likely to return in the following fall semester than students who didn't take any early college courses; students who took exam-based courses were 1.64 times more likely to return and dual credit students were 1.46 times more likely to return than those with no early college credits. A unit change in the first year GPA increased by 3.25 the odds of returning in the following fall semester.
- Controlling for student's academic ability, being female made it 1.27 times more likely to graduate in 4 years than being male. Students having full scholarship were over 2.03 times more likely to graduate in 4 years than students who didn't

have a scholarship. Students who took a combination of exam-based and dual credit courses were over 2.47 times more likely to graduate in 4 years than student who didn't take any early college courses; students who took exam-based courses were 2.34 more likely and students who dual credit courses were 1.68 more likely to graduate than those with no early college credits. A one unit change in the first year GPA increases the odds of graduating in 4 years by 6.34. A one unit change in the credit hours transferred increases the odds of graduating in 4 years by 1.02.

Table 69 Summary of Influential Predictors by Population

	Influential Predictors on 1st Yr GPA	Influential Predictors on Retention Rate	Influential Predictors on 4-Year Graduation Rate
FTIC Students	Female, Asian, Others, FullScholarship, PartialScholarship, Exam-only, DC-only, Both-type, Transfer_SCH, Computer Science, Biomedical Engineering, Mechanical Engineering, Computer Engineering, Finance, Accounting	Asian, 1st Yr GPA, Exam-only, DC-only, Both-type	Female, FullScholarship, 1st Yr GPA, Numbers of credit hours transferred, Exam-only, DC-only, Both-type
Minority Students	Female, FullScholarship, PartialScholarship, Exam-only, DC-only, Both-type, Computer Science	1st Yr GPA, Exam-only, Both-type	FullScholarship, 1st Yr GPA, Numbers of credit hours transferred, Exam-only, Both-type
Dual Credits Taken Students	Female, FullScholarship, PartialScholarship, Numbers of credit hours transferred, SAT, Islamic schools, Computer Science, Mechanical Engineering	Asian, 1st Yr GPA, Undecided, Arts and Technology	Female, FullScholarship, 1st Yr GPA, Islamic schools, Home-school, Biomedical Engineering

For African American, Hispanic, and American Indian/native Hawaiian students:

- Being female, having full or partial scholarship, and taking any early college courses had a positive statistically significant effect on the first year GPA, controlling other variables. Majoring in Computer Science had a negative statistically significant effect on first year GPA. Within minority students, being African Americans, Hispanics, and American Indians/Hawaiians didn't reach a statistically significant effect on the first year GPA.
- The first year GPA was the most influential predictor of returning in following fall semester, controlling for other variables. A unit change in the first year GPA increased by 4.37 the odds of returning in the following fall semester. Holding other variables at a fixed value, minority students who took a combination of exam-based and dual credit courses were over 2.14 times more likely to return in the following fall semester than student who didn't take any early college courses. Students who took exam-based courses were 1.74 times

more likely to return in the following fall semester than students who didn't take any early college courses. Taking early college courses appears to increase the possibility of returning as a precursor to successful first year academic performance –especially examination (AP/IB) only or examination and dual credit combinations. It may be that early course work prepares students both with content and importantly learning regimens to have first year success.

- The first year GPA was the most influential predictor of returning in graduating in 4 years, controlling for other variables. A unit change in the first year GPA increased by 8.65 the odds of graduating in 4 years. Students having a full scholarship were over 2.76 times more likely to graduate in 4 years. Students who took a combination of exam-based and dual credit courses or took exam-based coursework were over 2.68 times more likely to graduate in 4 years than students who didn't take any early college courses. A unit change in the early college credit hours transferred increased by 1.02 the odds of graduating in 4 years.

For students who took dual credit hours only:

- Being female, having a full or partial scholarship, amount of SCH of dual credit earned, SAT score, coming from Islamic schools, and majoring in Computer Science as well as Mechanical Engineering had statistically significant effect on first year GPA, controlling other variables.
- The first year GPA was the dominant predictor. A unit change in the first year GPA increased by 3.60 the odds of returning in the following fall semester.

Holding other variables at a fixed value, Asian students were over 2.01 times more likely to return in the following fall semester than African Americans, Hispanics, and American Indians for those students who took dual credit courses only. Students who did not declaim their majors or majored in Arts and Technology were less likely to return in the following fall semester for students who took dual credit hours only.

- The first year GPA was the most influential predictor of graduating in 4 years, controlling for other variables. A unit change in the first year GPA increased by 5.25 the odds of graduating in 4 years. Female were over 1.66 times and students having a full scholarship were over 2.02 times more likely to graduate in 4 years. Students who were from Islamic schools were over 9.32 times more likely to graduate in 4 years than students who had majors other than top 15 majors at UT Dallas. Home-school students were 4.81 times more likely to graduate in 4 years. Students who majored in Biomedical Engineering were less likely to graduate in 4 years.

The results of regression analyses confirm that students who took early college courses outperform peers who did not take any early college courses with respect to postsecondary outcomes such as GPA, persistence and graduation rates even after controlling for academic ability. Students in the 'both-type' group were more likely to be successful, followed by the 'exam-only' and 'DC-only.' The effect of AP/IB courses was stronger than dual credit courses.

Regardless of the focus on the entire sample of FTIC, or the sub-samples of minority students, Dual Credits only students, or by high school ISD sub-samples, being female made it more likely to have a higher first year GPA than being male. Having merit based scholarships

was another influential predictor of the first year GPA because the scholarship recipients must maintain at least a 3.0 minimum cumulative GPA at UTD. Taking any early college coursework helps maintain a higher GPA.

With regard to the first year retention, the first year GPA was the most salient predictor of returning in the following fall semester for the entire sample or the sub-group samples. Asian students were more likely to be retained. In the entire sample, students who took early college coursework were more likely to be retained. However, in the minority sub-group sample, the effect of taking dual credit courses on returning in the following fall semester faded; there was no statistical significant difference on the first year retention between African American and Hispanic students. For students who took dual credit courses only, students who did not declare a major or majored in Arts and Technology were less likely to be retained.

The first year GPA was the most influential predictor of graduating in 4 years in the entire sample or the sub-group samples. Having a full scholarship contributed to graduating in 4 years. In the entire sample, females or students who took early college coursework were more likely to graduate in 4 years. However, in the minority sub-group sample, the effect of being female or taking dual credit courses on graduating in 4 years faded; there was no statistical significant difference on 4-year graduation between African American and Hispanic students. For students who took dual credit courses only, being female, coming from Islamic schools or home schooling were more likely to graduate in 4 years but majoring in Biomedical Engineering were less likely to graduate in 4 years.

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APPENDIX

ISD	School
Plano ISD	Plano East Senior, Plano Senior, Plano West Senior
Allen ISD	Allen High, Becky Lowery Freshman Center
Carrollton ISD	Creekview, Early College, Ranchview, Smith, Turner
Coppell ISD	Coppell, New Tech, Victory place
Dallas ISD	Bryan Adams, W.H. Adamson, Maya Angelou, David W. Carter, Emmett J. Conrad, Dallas ISD Evening Academy , Trinidad "Trini" Garza Early College High School at Mountain View, Kathlyn Joy Gilliam Collegiate Academy, Hillcrest, Innovation/Design/Entrepreneurship Academy at James W. Fannin, Thomas Jefferson, Justin F. Kimball, Dr. Wright L. Lassiter Jr. Early College High School at El Centro College, Lincoln, Lincoln Humanities/Communications Magnet, James Madison, Moisés E. Molina, Multiple Careers Magnet Center, North Dallas, Barack Obama Male Leadership Academy at B.F. Darrell, John Leslie Patton Jr. Academic Center, L.G. Pinkston, Irma Lerma Rangel Young Women's Leadership School, Franklin D. Roosevelt, W.W. Samuell, Judge Barefoot Sanders Magnet Center For Public Service: Government, Law and Law Enforcement at Yvonne A. Ewell Townview Center, School Community Guidance Center, School for the Talented and Gifted at Yvonne A. Ewell Townview Center, School of Business and Management at Yvonne A. Ewell Townview Center, School of Health Professions at Yvonne A. Ewell Townview Center, School of Science and Engineering at Yvonne A. Ewell Townview Center, Rosie M. Collins Sorrells School of Education and Social Services at Yvonne A. Ewell Townview Center, Seagoville, Skyline, A. Maceo Smith New Tech, South Oak Cliff, H. Grady Spruce, Sunset, Booker T. Washington High School for the Performing and Visual Arts, W.T. White, Wilmer-Hutchins, Woodrow Wilson
Frisco ISD	Centennial, Frisco, Heritage, Independence, Lebanon Trail, Liberty, Lone Star, Reedy, Wakeland
Garland ISD	Garland, Lakeview Centennial, Naaman Forest, North Garland, Rowlett, Sachse, South Garland
Irving ISD	Cardwell, Irving, MacArthur, Nimitz, Singley Academy
Richardson ISD	Berkner, Lake Highlands, Pearce, Richardson, Christa McAuliffe Learning Center
Cedar Hill ISD	Cedar Hill Collegiate, Cedar Hill
Highland Park ISD	Highland Park
Lewisville ISD	Flower Mound, Hebron, Lewisville, Marcus, The Colony
Lovejoy ISD	Lovejoy
Mesquite ISD	Poteet High, North Mesquite, Mesquite, West Mesquite, Horn
Wylie ISD	Wylie, Wylie East