NOVA | Northern Virginia Community College

Student Adherence to Program Curriculum: A Case Study of the Engineering A.S. Program at NOVA

Research Report No. 71-17

Office of Institutional Effectiveness and Student Success
APRIL 2017

NORTHERN VIRGINIA COMMUNITY COLLEGE

OFFICE OF INSTITUTIONAL EFFECTIVENESS AND STUDENT SUCCESS

The purpose of the Office of Institutional Effectiveness and Student Success is to conduct analytical studies and provide information in support of institutional planning, policy formulation, and decision making. In addition, the office provides leadership and support in research related activities to members of the NOVA community engaged in planning and evaluating the institution's success in accomplishing its mission.

4001 Wakefield Chapel Road
Annandale, VA 22003-3796
(703) 323-3129
www.nvcc.edu/oir

Table of Contents

List of Tables

List of Appendix Tables

Executive Summary

Northern Virginia Community College (NOVA) offers a wide range of academic programs. Each program has a prescribed curriculum for students to complete to attain the relevant degree. The primary goal of the present study is to explore whether students follow the curriculum prescribed by the program and to what extent. Additional analyses explained certain results and offered a better understanding of student progress in the chosen program of study. The Engineering A.S. program is used as an example in this report, and Fall 2013 first-time to NOVA students were used as the base cohort for the analysis. Course credits (from courses within the curriculum vs. outside curriculum) were used as a measure to gauge how closely students followed the curriculum.

The results showed students attempted 13 credits on average outside the curriculum in the first three years, which amounted to a quarter of the total credits they attempted during that period. Since time spent on excess credits can delay the progress towards degree, the data was further explored in the context of graduation status. Students who graduated had an even greater number of credits from courses outside the curriculum than the average. This finding, being counter-intuitive, lead to further exploration of the graduate data, which revealed that many of the graduates earned a degree in an area different than Engineering A.S., indicating that these students switched majors at some point. Therefore, the data was further analyzed to explore program switching behavior of the students in the base cohort. Results showed 37 percent (146 out of 391 students) of students that started out in the Engineering A.S. program in Fall 2013 switched to a different program during the three-year period. Many of these students switched programs in the second semester. Although it was surmised that poor performance may be the reason why students decided to choose a different program of study, the GPA data did not support this.

While, there is not a conclusive reason for why students switch programs, course taking behavior of the students allows some guessing about which students are likely or unlikely to persist in a program. An analysis of course taking patterns indicated that students who graduated were more consistent in their course taking patterns even in the first semester; more importantly, they attempted courses beyond the basic English, Math, and Student Development domains and took courses directly relevant to the program of study.

Going back to the excess credits issue, the data indicates that many students accumulate more credits than required, a finding that applied to each group of students – students who switched to a different program, students who persisted in the program, as well as those who eventually graduated in the program. However, there were some differences between these groups. That is students who persisted in the Engineering A.S. program and those who eventually graduated in the same program accumulated fewer excess credits as a proportion of total credits attempted. Also, many of these credits were from higher level math and engineering courses. Perhaps some of these additional credits are intentional on the part of the students, e.g., for gaining depth and breadth of knowledge. Also, a significant proportion of excess credits came from developmental courses and pre-requisite courses required for the core courses in the program. However, the

issue remains with the excess credits that may be due to misinformation or unrealistic planning and/or expectations. A student focus group or survey can give more information about the underlying reasons.

Student Adherence to Program Curriculum:
A Case Study of the Engineering A.S. Program at NOVA

NOVA offers a wide range of academic programs spanning various fields of study. Each academic program has a prescribed curriculum to guide students in choosing and sequencing the courses effectively and to help them stay on track with the degree requirements. However, students often take much longer than expected to accomplish the end goal (attaining a degree or transferring), and often, they drop out before attaining a degree. In explaining this observation, one could wonder if the students are going off track from the prescribed curriculum and therefore, end up taking a longer path to degree.

This report explores students' course taking and credit accumulation patterns to determine how closely they follow the curriculum when choosing courses. The Engineering A.S. program is used as an example for this analysis. It is a medium-sized program at NOVA which awards a transfer degree.

Data and Method

The analyses are based on the Fall 2013 data and consider only the first-time to NOVA students. Limiting the cohort to first-time students would keep the sample homogenous with regard to the starting semester, the courses the students are expected to take in a given semester, and the time to degree.

There were 391 first-time to NOVA students enrolled in the Engineering A.S. program (Code: 8310) in Fall 2013. The program requires students to complete 68-69 credits, with 50 credits from core courses and the remaining 18-19 credits from electives.

The primary goal of the analysis is to see whether or not students follow program requirements and to what extent. This is achieved by exploring credit accumulation patterns using the following metrics:

- Total Credits
- Credits from courses listed in the curriculum
- Credits from courses outside the curriculum
- Credits from developmental courses

The above metrics can be explored both in terms of attempted credits as well as earned credits. Attempted credits give a better sense of time, effort, and money spent in pursuing the degree; whereas earned credits are better indicators of the useful credits that count in the end. While the detailed metrics for both attempted and earned credits are presented in the Appendix, the main text focuses on attempted credits.

Although, the main goal of the study was an exploration of the above metrics, the results lead to more questions that ensued a step-wise inquiry to explore why students attempted or earned excess credits. The remainder of the report discusses the data and findings in detail.

Results and Discussion

Course Credit Data

Analyses of course credit data was performed for all students who started in the Engineering A.S. program in Fall 2013 (see Table 1). The results show that students took 25 credits on average in the first year. Of those, 16 credits (11 core + 5 elective) were from courses listed in the curriculum and 9 credits were from courses outside the curriculum. However, not all 9 credits were unnecessary. On average, 3-4 of those 9 credits were related to developmental courses, which students needed to complete to be able to attempt the college-level courses. Thus, in effect, students on average took 5-6 credits (about 1-2 courses) outside the listed curriculum within the first year. In other words, one fifth of the credits came from courses that were not prescribed by the program.

A similar trend continued during later semesters. By the end of three years, students attempted 51 credits on average. Of those, 33 credits (22 core + 11 elective) were from the courses listed in the curriculum and 18 were from outside the curriculum. However, of those 18 credits, 5 credits were related to developmental courses, which leaves 13 credits (about 4 courses) from courses outside the listed curriculum and were not developmental.

Table 1. Credits Attempted by All Students in the Engineering A.S. Program: Fall 2013 Cohort

Credits	N	First Year*		At the End of 3 Years**	
		Mean	Median	Mean	Median
Total	391	25.2	26	51.0	52
Required	391	16.0	15	33.4	29
Outside Curriculum	391	9.2	8	17.6	14
Developmental	391	3.6	0	4.6	0
Non-Developmental	391	5.6	5	13.1	10

* Fall 2013 through Summer 2014

** Fall 2013 through Spring 2016

To determine which courses contributed to excess credits, the most frequently enrolled courses (over the first three years) that were not listed in the curriculum were analyzed (Table 2). Math 166 (Precalculus with Trigonometry) and Math 163 (Precalculus I) were among the top courses, and it appears that students are taking these courses as pre-requisites for other core courses such as Math 173 (Calculus With Analytic Geometry I) and Chemistry 111 (General Chemistry I). However, the same cannot be said about the other courses.

Table 2. Highest Enrollment Courses Outside the Engineering A.S. Curriculum

Course	#	Course	#
Math 166	231	Biology 141	18
Information Technology Essentials 115	106	Information Technology Programming 100	17
Math 163	98	Physics 101	16
Biology 101	55	Computer Science 130	15
Accounting 211	52	Information Technology Networking100	15
Business 100	52	Chemistry 101	13
Math 164	48	Computer Science 201	13
Math 285	44	Engineering 115	13
Chemistry 112	42	Computer Science 200	11
Math 151	39	Engineering 295	11
Math 291	32	Information Technology Essentials 140	11
Computer Science 110	31	Math 152	11
Math 271	28	Computer Aided Drafting 201	10
Accounting 212	24	Geology 105	10
Biology 102	24	Information Technology Essentials 170	10
Math 241	21		

Why do the students take these courses? Are they useful to them in some way? Or, are there some other reasons such as lack of information or misinformation, plans to change major on the part of the students, or a desire to increase ones' versatility? In any case, taking too many irrelevant courses will likely slow down the progress toward a degree. To test this idea, it may be useful to look at credit accumulation data in terms of graduation status.

Course Credit Metrics by Three-Year Graduation Status

Course credit data was analyzed to determine if students who graduated differed from those who did not graduate on any of the metrics with a focus on excess credits (Table 3). The data showed about 16 percent of students (62 out of 391) in the base cohort graduated with any NOVA degree within three years of starting at NOVA in Fall 2013.

The following tables provide detailed metrics for students who graduated and those who did not.

Table 3. Course Credits Attempted by Engineering A.S. Students by Three-Year Graduation Status: Fall 2013 Cohort

Credits	Graduated		Did Not Graduate	
	N	Mean	N	Mean
Total	62	77.4	329	46.1
Required	62	53.5	329	29.6
Outside Curriculum	62	23.9	329	16.5
Developmental	62	2.5	329	4.9
Non-Developmental	62	21.4	329	11.5

As can be seen in the table above, students who graduated attempted more credits across most metrics than students who did not graduate. However, they had fewer credits from developmental courses, implying that these students were probably more college-ready than their non-graduate counterparts. Interestingly, the students who graduated also attempted more credits outside the prescribed curriculum compared to the students who did not graduate (21 credits vs. 12 credits). This finding is very surprising, as it implies that the additional courses that the students took may have been useful for them to graduate. Were these courses giving the students some knowledge that was helping them with the curriculum or is there a different reason?

A closer look at the data indicated that many of these students actually graduated with a degree other than Engineering A.S.; the following is the breakdown (Table 4). As can be seen, only 22 students graduated with an Engineering A.S. degree. Thus, the courses the students were taking were probably useful, not for the Engineering A.S. program, but for the degree they eventually pursued.

Table 4. Engineering A.S. Students' Program of Graduation within Three Years: Fall 2013 Cohort

Program	Program Code	Students	
		#	%
Engineering A.S.	**8310**	**22**	**33%**
General Studies A.S.	6990	10	15%
Business Administration A.S.	2130	8	12%
General Education Certificate	6950	6	9%
Engineering/Electrical Engineering Specialization A.S.	8311	4	6%
Science A.S.	8800	4	6%
Computer Science A.S.	2460	3	5%
Information Technology A.S.	3400	2	3%
Social Sciences A.S.	8820	2	3%
Business Information Technology CSC	221-212-15	1	2%
Information Systems A.A.S.	2990	1	2%
Fine Arts A.A.	5290	1	2%
Liberal Arts A.A.	6480	1	2%
Social Sciences/Teacher Education Specialization A.S.	8822	1	2%

Note: Some of the students graduated with more than one degree and therefore, may be counted multiple times, once in each program applicable.

Given this, it would be important to see what the metrics look like for the students who persisted in the program and those who eventually graduated in Engineering A.S. program and see where they stand with excess credits. The data (Table 5) shows that even the students who persisted in the Engineering A.S. program accumulated excess credits (8 credits) and students who graduated accumulated slightly more of such credits (11 credits). However, the excess credits were a smaller proportion of the total credits attempted (18 percent and 13 percent, respectively) by these students, in comparison with all students (26 percent). Moreover, when we look at courses that contribute to excess credits (Table 6), several credits are from pre-requisite courses, higher-level math courses, and Engineering courses. This is especially the case for students who graduated from the Engineering A.S. program.

Table 5. Course Credits Attempted by Students Who Persisted and Those Who Graduated in Engineering A.S. Within Three Years: Fall 2013 Cohort

Credits	N	Within Three Years			
		Persisted in Engineering A.S.		Graduated in Engineering A.S.	
		Mean	Median	Mean	Median
Total	245	44.1	36	80.5	77.5
Required	245	31.9	22	68.5	68
Outside Curriculum	245	12.2	10	12.0	12
Developmental	245	4.2	0	1.3	0
Non-Developmental	245	8.0	6	10.7	10

Table 6. Most Frequently Enrolled Excess Courses by Students Who Persisted and Those Who Graduated in the Engineering A.S. Program Within Three Years: Fall 2013 Cohort

Within Three Years			
Persisted in Engineering A.S. (N=245)		Graduated in Engineering A.S. (N=22)	
Excess Course	# Enrolled	Excess Course	# Enrolled
Math 166	138	Math 285	13
Math 163	49	Math 291	12
Math 285	34	Math 166	10
Chemistry 112	26	Engineering 295	8
Info. Technology Essentials 115	24	Engineering 115	5
Math 291	23	Chemistry 112	4
Math 164	22	Math 164	2
Business 100	15		
Computer Science 110	14		
Biology 101	10		
Engineering 115	10		
Accounting 211	9		
Engineering 295	9		
Math 151	7		

Program Switching Data

The above data in a way closes the loop about the credit accumulation related inquiry.

However, the fact that many students graduated in a different program than the one they started out in, leaves one question open – why and when did these students switch to a different program, and how often did this happen? Thus, a closer look was taken at the program switching behavior of the students. An analysis was done to see how many students switched to a different program of study and when they made that switch. The results showed that 146 of the 391 students who started in Engineering A.S. program in Fall 2013 switched to a different program within the three-year period. Some students switched majors multiple times. Interestingly, most students switched to a non-science major (Table 7). In terms of the degree type, the majority chose an A.S. degree again.

Table 7. Programs to Which Engineering A.S. Students Subsequently Switched Within Three Years: Fall 2013 Cohort

Program	Program Code	Students	
		#	%
General Studies A.S.	6990	33	19.8%
Business Administration A.S.	2130	31	18.6%
Engineering/Electrical Engineering Specialization A.S.	8311	16	9.6%
Information Technology A.S.	3400	15	9.0%
Computer Science A.S.	2460	13	7.8%
Science A.S.	8800	11	6.6%
Social Sciences A.S.	8820	5	3.0%
Automotive Technology A.A.S.	9090	5	3.0%
Administration of Justice A.A.S.	4000	3	1.8%
Fine Arts A.A.	5290	3	1.8%
Liberal Arts A.A.	6480	3	1.8%
Social Sciences/Political Science Specialization A.S.	8824	3	1.8%
Business Management A.A.S.	2120	2	1.2%
Engineering Technology/Civil Engineering Technology A.A.S.	9681	2	1.2%
Social Sciences/Geospatial Specialization A.S.	8825	2	1.2%
Social Sciences/Psychology Specialization A.S.	8821	2	1.2%
Accounting A.A.S.	2030	1	0.6%
Architecture Technology A.A.S.	9010	1	0.6%
Construction Management Technology A.A.S.	9170	1	0.6%
Engineering Technology/Mechanical Engineering Technology A.A.S.	9683	1	0.6%
Hospitality Management A.A.S.	7750	1	0.6%
Hospitality Management/Hotel Mgt Specialization A.A.S.	7752	1	0.6%
Hospitality Management/Nutrition Mgt Specialization A.A.S.	7753	1	0.6%
Information Systems Technology A.A.S.	2990	1	0.6%
Liberal Arts/International Studies A.A.	6486	1	0.6%
Liberal Arts/Psychology A.A.	648B	1	0.6%
Music Recording Technology Certificate	5570	1	0.6%
Social Sciences/Teacher Education Specialization A.S.	8822	1	0.6%

Note: Some students switched programs multiple times. Therefore, the total count may be greater than the actual number of students who switched.
Six students switched to being non-program placed.

Table 8. Number of Students Who Switched Programs by Semester: Fall 2013 Cohort

Semester	Program Switchers	
	#	%
Spring 2014	53	31.7
Summer 2014	11	6.6
Fall 2014	28	16.8
Spring 2015	27	16.2
Summer 2015	17	10.2
Fall 2015	18	10.8
Spring 2016	13	7.8

About one third of the program switches took place in the second semester (53 switches; 32 percent), and by Fall 2014, 55 percent of the switches had occurred (Table 8).

What could be driving the students to switch majors so early in the program and continue to do so there after? To determine if poor academic performance was the reason for the program switching behavior, student GPA at the end of the first semester was analyzed. The data showed that students who switched majors in the second semester (N=53), surprisingly, had a slightly better average GPA (2.4) compared to students who continued in the same major (N=338, GPA=2.1) (see Appendix Table A9).

Since the GPA data did not indicate a particular reason for the program switching behavior, it was considered useful to also look at the course-taking patterns of the students to get a better understanding of what was going on.

.

Course-Taking Patterns

Course-taking patterns of students were analyzed for Fall 2013, which was the starting semester. Table 10 provides the frequently enrolled courses or course combinations for the three groups of students described in Table 9.

Table 9. Groups of Students in the Fall 2013 Cohort

Description	Label
1. Students who persisted in the Engineering A.S. program for all three years	Persisters
2. Students who switched to a different major within three years of starting in the Engineering A.S. program	Switchers
3. Students who graduated in the Engineering A.S. program	Graduates

It should be noted that the table only displays the courses and course combinations that were enrolled by at least 20 percent of the students within the respective groups.

The results showed a greater number of common courses and course combinations (with at least 20 percent of students enrolling in them) for the graduates and the persisters, indicating greater consistency in course taking behavior within these groups compared to the switchers.

Also, for the courses and course combinations that were common across the three groups, there were higher percentages associated with graduates and to some extent with persisters, indicating students were more concentrated within these course combinations, compared to the switchers. In other words, the graduates and persisters displayed more cohesiveness in their course taking behavior, unlike the switchers who had varied course enrollment patterns.

Regarding the type of courses the students enrolled in, there was a substantial overlap among the three groups. However, what set them apart is the percentage of students concentrated in these courses and course combinations, and the non-overlapping courses added to the disparity. Stating specifically, the data indicates that, although Student Development 100 (College Success Skills), English 111 (College Composition I), and Math 166 (Precalculus with Trigonometry) were among the common courses across the three groups, a greater percentage of the graduates took Student Development 100 in the first semester compared to the persisters and switchers. Also, switchers were mainly concentrated in the basic courses such as Student Development 100, English 111, and Math 166, which could apply to a different program of study. Persisters, in addition, were also concentrated in Engineering 120 (Introduction to Engineering), a course that seems to be more specifically related to the Engineering A.S. degree. Graduates as a group were further ahead with enrollment in Engineering 120 and Chemistry 111 (General Chemistry I) and also other courses such as Math 173 (Calculus with Analytic Geometry) and Physical Education 116 (Lifetime Fitness and Wellness). – higher percentages of students were concentrated in these courses. Thus, the three groups had different course taking patterns in their very first semester. The switchers were mainly concentrated in the basic English, Math, and Student Development courses, whereas, a good proportion of the persisters and graduates were venturing into other courses.

Going back to the initial question, why did the students switch their major? The data does not pinpoint a reason. In spite of the differences noticed in the three groups of the students, it is difficult to say whether the Switchers were undecided about their major to begin with or whether some other academic or non-academic factor caused them to switch to a different major later. However, the data at the least indicates that students who take courses beyond the basic English, Math, and Student Development domains and the courses that are more directly related to the program itself are more likely to persist in their program and graduate within the same program eventually.

Table 10. Most Common Course-Taking Patterns by Student Group: Fall 2013 Cohort

Students Switched to a Different Program (N=146)			Students Persisted in the Program (N=245)			Students Persisted and Graduated in the Program (N=22)				
% Enrolled	Course 1	Course 2	% Enrolled	Course 1	Course 2	% Enrolled	Course 1	Course 2	Course 3	Course 4
61.0%	SDV 100		62.4%	ENG 111		68.2%	SDV 100			
60.3%	ENG 111		54.3%	SDV 100		54.5%	ENG 111			
35.6%	MTH 166		33.1%	MTH 166		50.0%	CHM 111			
25.3%	CHM 111		30.2%	CHM 111		45.5%	EGR 120			
43.2%	SDV 100	ENG 111	28.2%	EGR 120		40.9%	MTH 166			
26.7%	ENG 111	MTH 166	42.9%	ENG 111	SDV 100	31.8%	MTH 173			
21.2%	SDV 100	MTH 166	29.0%	ENG 111	CHM 111	27.3%	PED 116			
19.9%	ENG 111	CHM 111	25.7%	ENG 111	MTH 166	45.5%	SDV 100	ENG 111		
			20.4%	SDV 100	MTH 166	40.9%	ENG 111	CHM 111		
			19.6%	ENG 111	EGR 120	36.4%	SDV 100	CHM 111		
						36.4%	SDV 100	EGR 120		
						31.8%	SDV 100	MTH 166		
						31.8%	ENG 111	MTH 166		
						31.8%	CHM 111	MTH 166		
						22.7%	SDV 100	PED 116		
						22.7%	ENG 111	EGR 120		
						22.7%	CHM 111	EGR 120		
						22.7%	EGR 120	MTH 173		
						31.8%	SDV 100	ENG 111	CHM 111	
						27.3%	SDV 100	ENG 111	MTH 166	
						27.3%	ENG 111	CHM 111	MTH 166	
						22.7%	SDV 100	ENG 111	EGR 120	
						22.7%	SDV 100	CHM 111	EGR 120	
						22.7%	SDV 100	CHM 111	MTH 166	
						22.7%	SDV 100	ENG 111	CHM 111	MTH 166

Notes: Course-taking patterns by 20 percent or more of the cohort. CHM = Chemistry; EGR = Engineering; ENG = English; MTH = Math; PED = Physical Education; SDV = Student Development. See NOVA Catalog for more details: http://www.nvcc.edu/catalog/index.html

Conclusion

Course credit data analysis revealed that the students took a significant amount of credits from courses outside the listed curriculum. A substantial proportion of these credits were from developmental courses as well as courses that were pre-requisites for some of the core courses of the program. However, some of these courses were truly not required by the curriculum. It is possible that students are misinformed about the courses, they are trying to gain depth in the subject area, or they are taking courses from other disciplines to increase the breadth of knowledge. Speaking with students through focus groups or surveying students may offer greater insight.

Regarding developmental and pre-requisite courses, the College can give students better guidance as to what it takes to complete the program. It would be beneficial if pre-requisites are listed within the curriculum. In addition, it can be useful if students are informed about the time and effort they may be spending in fulfilling the developmental requirements and how it could extend the time to degree

Future Directions

This report only addressed the Engineering A.S. program. In the future, this study could extend to include a program from each degree type to make a more comprehensive and representative case study.

The majority of Engineering A.S. students who switched to a different program chose a non-science major. Further studies could determine how many students who start out in a non-science major switch to a science vs. a non-science major.

In addition, instead of looking at students who started out in the Engineering A.S. program, the College can analyze all students who graduated in the Engineering A.S. program in a particular year and observe course enrollment patterns as well as time to degree attainment.

Appendix

Three-Year Data for All Students

Table A1. Credits Attempted by All Students in the Engineering A.S. Program Within Three Years: Fall 2013 Cohort

Credits	N	Mean	Median	Minimum	Maximum	Range
Total	391	51.0	52	1	122	121
Required	391	33.4	29	0	97	97
Required – Core	391	21.9	16	0	78	78
Outside Curriculum	391	17.6	14	0	75	75
Developmental	391	4.6	0	0	72	72
Non-Developmental	391	13.1	10	0	62	62

Table A2. Credits Earned by All Students in the Engineering A.S. Program Within Three Years: Fall 2013 Cohort

Credits	N	Mean	Median	Minimum	Maximum	Range
Total	391	39.3	36	0	114	114
Required	391	26.3	23	0	84	84
Required – Core	391	16.8	10	0	66	66
Outside Curriculum	391	13.0	9	0	68	68
Developmental	391	2.9	0	0	52	52
Non-Developmental	391	10.1	6	0	62	62

Three-Year Data by Graduation Status

Table A3. Credits Attempted by Students in the Engineering A.S. Program Who Graduated from Any NOVA Program Within Three Years: Fall 2013 Cohort

Credits	N	Mean	Median	Minimum	Maximum	Range
Total	62	77.4	77	33	110	77
Required	62	53.5	59	7	84	77
Required – Core	62	34.5	36.5	1	69	68
Outside Curriculum	62	23.9	21.5	0	62	62
Developmental	62	2.5	0	0	22	22
Non-Developmental	62	21.4	19.5	0	62	62

Table A4. Credits Earned by Students in the Engineering A.S. Program Who Graduated from Any NOVA Program Within Three Years: Fall 2013 Cohort

Credits	N	Mean	Median	Minimum	Maximum	Range
Total	62	72.7	74	33	102	69
Required	62	50.1	51.5	7	80	73
Required – Core	62	31.7	30.5	1	66	65
Outside Curriculum	62	22.6	20.5	0	62	62
Developmental	62	2.3	0	0	22	22
Non-Developmental	62	20.3	19	0	62	62

Table A5. Credits Attempted by Students in the Engineering A.S. Program Who Did Not Graduate from Any NOVA Program Within Three Years: Fall 2013 Cohort

Credits	N	Mean	Median	Minimum	Maximum	Range
Total	329	46.1	44	1	122	121
Required	329	29.6	24	0	97	97
Required – Core	329	19.5	13	0	78	78
Outside Curriculum	329	16.5	13	0	75	75
Developmental	329	4.9	0	0	72	72
Non-Developmental	329	11.5	9	0	49	49

Table A6. Credits Earned by Students in the Engineering A.S. Program Who Did Not Graduate from Any NOVA Program Within Three Years: Fall 2013 Cohort

Credits	N	Mean	Median	Minimum	Maximum	Range
Total	329	33.0	29	0	114	114
Required	329	21.8	17	0	84	84
Required – Core	329	14.0	9	0	56	56
Outside Curriculum	329	11.2	7	0	68	68
Developmental	329	3.0	0	0	52	52
Non-Developmental	329	8.2	5	0	41	41

Three-Year Data by Developmental Education Status

Table A7. Credits Attempted by Developmental Education Students in the Engineering A.S. Program Within Three Years: Fall 2013 Cohort

Credits	N	Mean	Median	Minimum	Maximum	Range
Total	143	53.7	55	6	122	116
Required	143	29.4	25	0	85	85
Required – Core	143	18.1	10	0	68	68
Outside Curriculum	143	24.3	22	1	75	74
Developmental	143	12.5	8	1	72	71
Non-Developmental	143	11.8	9	0	43	43

Note: Students who took at least one developmental course – MTT, ENF, ESL – are considered developmental students.

Table A8. Credits Earned by Students Developmental Education Students in the Engineering A.S. Program Within Three Years: Fall 2013 Cohort

Credits	N	Mean	Median	Minimum	Maximum	Range
Total	143	41.2	37	0	114	114
Required	143	23.7	20	0	70	70
Required – Core	143	14.4	8	0	59	59
Outside Curriculum	143	17.4	13	0	68	68
Developmental	143	8.0	2	0	52	52
Non-Developmental	143	9.5	5	0	39	39

Note: Students who took at least one developmental course – MTT, ENF, ESL – are considered developmental students.

First Semester GPA by Program Switch Status

Table A9. First Semester GPA of Students Who Switched vs. Those Who Did Not Switch to a Different Program in Spring 2014: Fall 2013 Cohort

	N	Mean	Median	Minimum	Maximum	Range
Switched	53	2.4	2.6	0	4	4
Did Not Switch	338	2.1	2.3	0	4	4

NOVA

Northern Virginia
Community College

703–323–3000 | *www.nvcc.edu*