



## Analysis of Student Success in CHEM 400 after Enrollment in CHEM 300

### **Background**

During the Spring of 2009, The Research Office responded to a request from the Chemistry Department to study the academic performance of CHEM 300 students who subsequently enrolled into CHEM 400. More specifically, the Chemistry faculty wanted to know the grading distribution in CHEM 400 of students who had successfully completed CHEM 300. Furthermore, they wanted to control for the recency between successful completion of CHEM 300 and subsequent enrollment in CHEM 400.

It was decided to look at three time gaps between successful completion of CHEM 300 and completion of CHEM 400; students who took CHEM 400 the next semester after successfully completing CHEM 300; students who took CHEM 400 within one academic year after the successful completion of CHEM 300; and students who enrolled in CHEM 400 more than one academic year after successfully completing CHEM 300.

Between Fall, 2003 and Spring, 2008, a total of 229 CRC students were identified as having successfully completed CHEM 300 at the College prior to their enrollment in CHEM 400. The average course success rate for students who successfully completed CHEM 300 and subsequently enrolled in CHEM 400 was 54.2%. By way of comparison, the overall Spring 2008 course success rates for CHEM 400 were 58.2%.

### **Overall Success Rates**

When the lag time between successful completion of CHEM 300 and subsequent enrollment into CHEM 400 was controlled for, there were significant differences among the success rates.

- Success rates in CHEM 400 with 1 semester lag from successful completion of CHEM 300 were 59.6%
- Success rates in CHEM 400 with 1 year lag from successful completion of CHEM 300 were 48.3%
- Success rates in CHEM 400 with more than a 1 year lag from successful completion of CHEM 300 were 61.8%. It should be noted, however, that only 15% of these students received a grade higher than a C. The relatively high success rates may also be attributed to the students taking one or more courses in the intervening period that improved their skill set which attributed to the increase in course success. In particular, they may have improved their math skills or may have enrolled in Chem 400 at other colleges. In fact, close to 14% of students who successfully completed Chem 300 enrolled in Math courses that were required for entry into Chem 400 (geometry or Intermediate Algebra) **after** completing Chem 300.

### **Other Observations**

- Almost 50% of the students who successfully completed Chem 300 enrolled in Chem 400 the next semester.
- Eighty percent of students who received an A in Chem 300 and enrolled in Chem 400 the next semester received As or Bs in Chem 400. This drops to 54.6% for students who enrolled in Chem 400 two or three semesters (including summer) after the successful completion of Chem 300.

- Almost 37% of students who received a B in Chem 300 and enrolled in Chem 400 the next semester received As or Bs in Chem 400. This drops to 20% for students who enrolled in Chem 400 two or three semesters (including summer) after the successful completion of Chem 300.
- Only 13.2% of students who received a C in Chem 300 and enrolled in Chem 400 the next semester received As or Bs in Chem 400. This drops to 3.7% for students who enrolled in Chem 400 two or three semesters (including summer) after the successful completion of Chem 300.
- Students who got a C in CHEM 300 were more likely to withdraw from CHEM 400 no matter how soon they took CHEM 400.

Details about the grade distributions in Chem 400 for the different cohorts of students appear in both tabular and graphical form on the following pages.

For further information about the study, please contact Kathy McLain, Dean of Planning and Research at extension 7144 or Brad Brazil, Research Analyst at extension 7385.

The analysis of the grade distributions in CHEM 400 for these groups of students follows.

**Grade received in CHEM 400 (Taken within 1 Semester) by Grade Received in CHEM 300<sup>a</sup>**

			CHEM 400 Grade						Total
			A	B	C	D	F	W	
CHEM 300 Grade	A	Students	12	8	4	1	0	0	25
		Percent	48.0%	32.0%	16.0%	4.0%	.0%	.0%	100.0%
	B	Students	6	8	9	3	4	8	38
		Percent	15.8%	21.1%	23.7%	7.9%	10.5%	21.1%	100.0%
	C/CR	Students	1	4	10	7	5	14	41
		Percent	2.4%	9.8%	24.4%	17.1%	12.2%	34.1%	100.0%
Total	Students	19	20	23	11	9	22	104	
	Percent	18.3%	19.2%	22.1%	10.6%	8.7%	21.2%	100.0%	

a. Academic\_Year\_Lag = Within One Semester

As would be expected, the higher the grade received in CHEM 300 translated to having a higher probability of receiving a higher grade in CHEM 400. These are students who enrolled and completed CHEM 400 the subsequent semester after taking CHEM 300.

**Grade received in CHEM 400 (Taken within 1 Academic Year) by Grade Received in CHEM 300<sup>a</sup>**

			CHEM 400 Grade						Total
			A	B	C	D	F	W	
CHEM 300 Grade	A	Students	2	4	3	0	0	2	11
		Percent	18.2%	36.4%	27.3%	.0%	.0%	18.2%	100.0%
	B	Students	1	3	10	2	2	2	20
		Percent	5.0%	15.0%	50.0%	10.0%	10.0%	10.0%	100.0%
	C/CR	Students	0	1	4	3	7	12	27
		Percent	.0%	3.7%	14.8%	11.1%	25.9%	44.4%	100.0%
Total	Students	3	8	17	5	9	16	58	
	Percent	5.2%	13.8%	29.3%	8.6%	15.5%	27.6%	100.0%	

a. Academic\_Year\_Lag = Within One Academic Year

The number of students who enrolled and completed CHEM 400 within 1 academic year after successfully completing CHEM 300 is roughly half of the number of students who enrolled in CHEM 400 the subsequent semester after completing CHEM 300. The grading distribution shifts toward a greater probability of receiving a "C" grade in CHEM 400. Over 25% Students completing CHEM 300 with a C/CR grade received "W's" in CHEM 400.

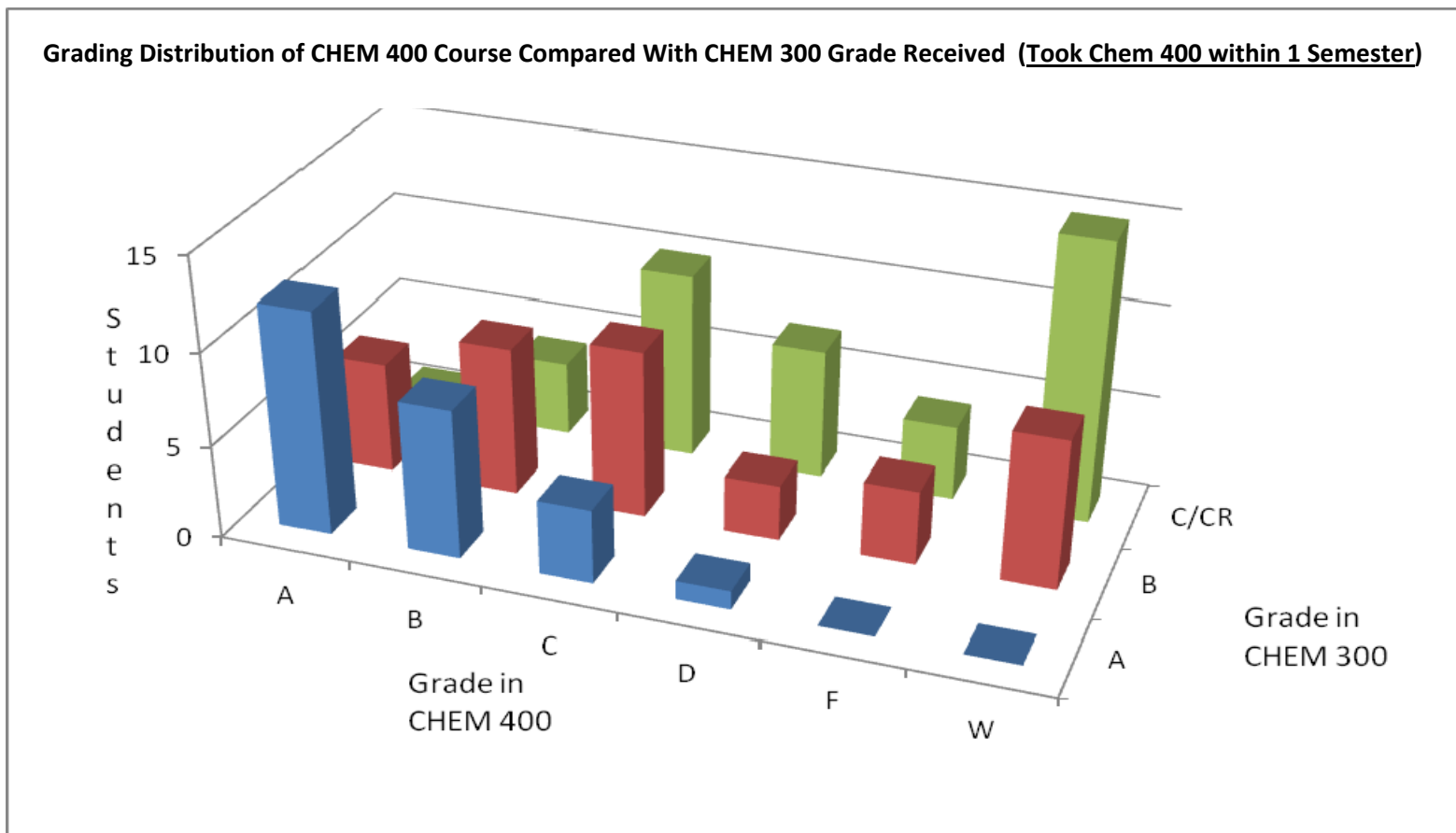
Grade received in CHEM 400 (Taken more than 1 Academic Year) by Grade Received in CHEM 300<sup>a</sup>

			CHEM 400 Grade						Total
			A	B	C	D	F	W	
CHEM 300 Grade	A	Students	2	0	1	0	0	0	3
		Percent	66.7%	.0%	33.3%	.0%	.0%	.0%	100.0%
	B	Students	0	6	8	1	1	0	16
		Percent	.0%	37.5%	50.0%	6.3%	6.3%	.0%	100.0%
	C/CR	Students	0	1	16	10	2	7	36
		Percent	.0%	2.8%	44.4%	27.8%	5.6%	19.4%	100.0%
Total	Students	2	7	25	11	3	7	55	
	Percent	3.6%	12.7%	45.5%	20.0%	5.5%	12.7%	100.0%	

a. Academic\_Year\_Lag = More Than One Academic Year

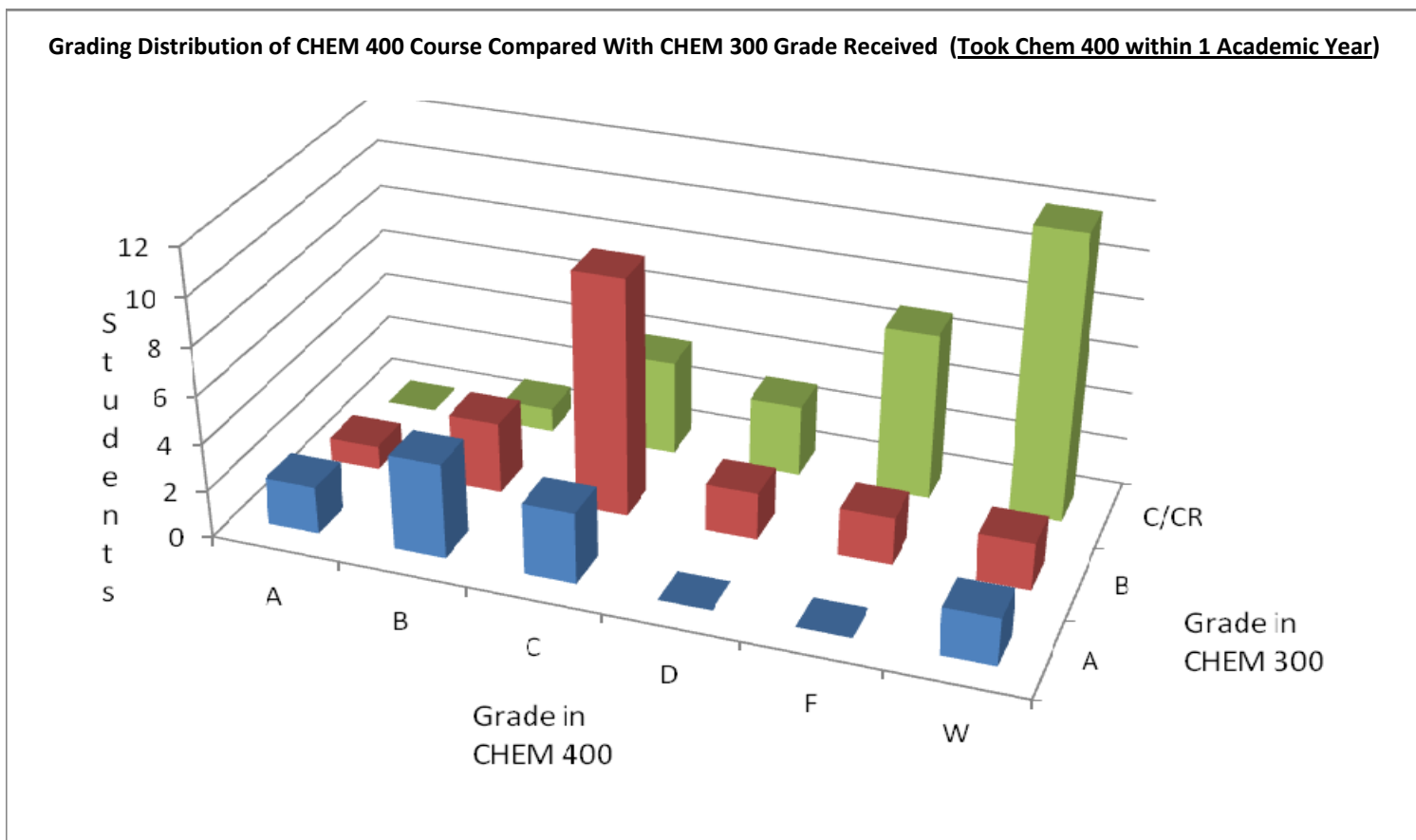
The number of students who enrolled and completed CHEM 400 *after* 1 academic year after successfully completing CHEM 300 is showing a surprising result. Although the grading distribution of successful grades migrated toward C/CR's, the average course success rate for those students who enrolled in CHEM 400 after 1 academic year after successfully completing CHEM 300 is higher than those students who took the CHEM 400 within 1 academic year.

## Course Grading Distribution in CHEM 400



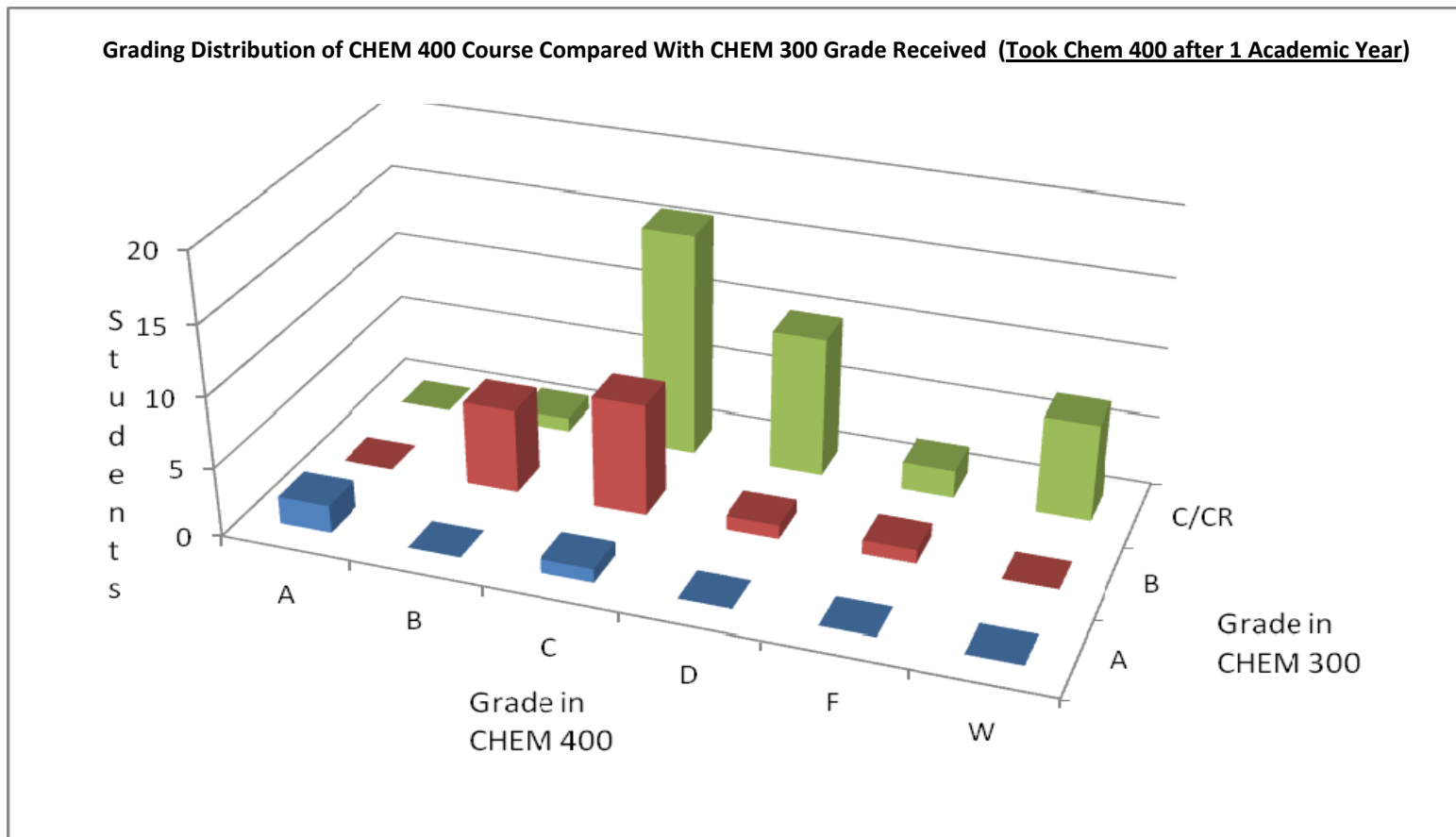
The graph above shows the grading distribution of CHEM 400 enrollments with the associated grade received in CHEM 300 for students who enrolled in CHEM 400 within 1 semester of successfully completing CHEM 300. As shown on the graph, students who receive an “A” grade in CHEM 300 have a greater probability of receiving a better grade in CHEM 400 compared to receiving a lower grade in CHEM 300.

## Course Grading Distribution in CHEM 400 (continued)



The graph above shows the grading distribution of CHEM 400 enrollments with the associated grade received in CHEM 300 for students who enrolled in CHEM 400 two or three semesters after successfully completing CHEM 300. Students who receive an “A” grade in CHEM 300 have higher grades in CHEM 400 compared to those students who received a lower grade in CHEM 300. Note the majority of students who had a “C” in CHEM 300 did not do well in CHEM 400.

## Course Grading Distribution in CHEM 400 (continued)



The previous graph shows the grading distribution of CHEM 400 enrollments with the associated grade received in CHEM 300 for students who enrolled in CHEM 400 four or more semesters after successfully completing CHEM 300. Very few students who received an “A” grade in CHEM 300 waited more than 1 year to take CHEM 400. Students receiving a “C” grade in CHEM 300 did not fare as well in CHEM 400 compared to students with higher grades in CHEM 300.

## Math Enrollments

One of the findings of the study showed students who took more than 1 academic year to enroll in CHEM 400 after successfully completing CHEM 300 had a higher average course success rate than expected. One theory is that the students are taking selected MATH classes in the interim before enrolling in CHEM 400.

Here is the list of MATH courses taken by the students who successfully completed CHEM 300 and enrolled in CHEM 400 (regardless of lag between the enrollment between CHEM 300 and CHEM 400). These MATH enrollments show all duplicated enrollments post completion of CHEM 300.

### Math courses Taken By CHEM 300 Students After Completion in CHEM 300

	Number of Enrollments	Percent
MATH 335	148	25.3
MATH 370	84	14.4
MATH 400	78	13.4
MATH 401	59	10.1
MATH 120	47	8.0
MATH 350	45	7.7
MATH 351	26	4.5
MATH 112	25	4.3
MATH 402	24	4.1
MATH 343	19	3.3
MATH 420	11	1.9
MATH 125	7	1.2
MATH 300	5	0.9
MATH 410	5	0.9
MATH 480	1	0.2
Total	584	100.0