



Academic Performance of Former Science One Students

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September 2004

The data presented in this report was collected for students who participated in Science One between 1999 and 2002 classes. These students were chosen since they represent classes subsequent to the last program review for whom data was available to be examined.

Admissions and Grading

The average grade for students has been slowly increasing, as admission to UBC becomes more competitive. However, high school averages are not very accurate predictors of success at UBC, as shown in Figure 1 which relates incoming grades to first year averages for students admitted to the program. Therefore it is difficult to say whether the calibre of our students is changing in any significant way based on admission averages.

In order to assess the fairness of our grading, we have examined the correlation between first year and second year sessional averages for our students. In this comparison, there is a negligible difference (0.6%) on average between first year and second year averages. There is also a fairly good correlation as indicated by Figure 2. This gives us some confidence that our evaluations are useful predictors of future success and are thus reasonably fair.

Beyond Science One

In the last program review, we used Biology 334 (Introductory Genetics) to examine the relative performance of our students in a problem based environment. The justification for this choice was the general view that success in the course demands

good problem solving skills. As this is an area where we invest significant effort to improve the skills of our students, we would hope to see some evidence of an enhancement to these skills. The results indicated that there was a measurable difference between students who had been in Science One and their peers.

For this review, we have chosen courses in all of our four subject areas to examine in a similar fashion. The courses identified were Chem 231 (Introductory Organic Chemistry), Biol 334 (Introductory Genetics), Math 226 (Honours Multivariable Calculus), and Physics 200 (Modern Physics).

The first comparison we made was to investigate the overall performance in the courses. This revealed very similar results for all of the courses we examined. The distribution of grades in these courses for our former students was noticeably higher than their classmates (Figures 3-6). This is even the case when the comparison group is confined to a subset of students in degree programs where a higher than average ability would be expected, for example (Biochemistry, Microbiology, Physiology, Pharmacology, Honours Mathematics).

Since this comparison does not take into account the bias that may be introduced by the fact that our students are selection process, a more difficult comparison was undertaken where the student's course grade was compared to their sessional average. The basis for this was that if these courses place a significant demand on learning skills emphasized in Science One, our students may exhibit a level of success in these courses similar to that obtained in their other courses. This comparison (Figures 7-10) brings the comparison groups closer together, but the differences in the means of the distributions (Tables 1-4) are still significant due to the large sample sizes available.

It should be noted that this last comparison is a very difficult one for students already performing at a high level since there is less room for improvement. A comparison of sessional average distributions (Figures 11-14) show that as a group, Science One have higher sessional averages, reducing their relative possible upside in a comparison of their course grades and sessional averages.

	Grades			Sess. Avg.			Delta		
	<i>BSc</i>	<i>Selected</i>	<i>Sci 1</i>	<i>BSc</i>	<i>Selected</i>	<i>Sci 1</i>	<i>BSc</i>	<i>Selected</i>	<i>Sci 1</i>
Mean	58.6	61.3	70.6	68.6	70.4	76.0	-9.95	-9.07	-5.47
Median	59.0	62.0	73.0	68.8	70.8	77.7	-9.10	-7.90	-5.30
Mode	45.0	45.0	84.0	66.1	69.8	77.7	-4.30	-4.30	0.20
Std. Dev.	14.5	13.9	12.3	10.6	10.3	9.6	10.0	9.34	7.80
Count	2054	712	89	2054	712	89	2054	712	89

Table 1. Statistical parameters from analyzing the data from Chemistry 231. Selected students are those enrolled in Microbiology, Microbiology and Immunology, Physiology, and Pharmacology programs. Delta refers to the difference between a student's grade in Chem 231 and their sessional average.

	Grades			Sess. Avg.			Delta		
	<i>BSc</i>	<i>Selected</i>	<i>Sci 1</i>	<i>BSc</i>	<i>Selected</i>	<i>Sci 1</i>	<i>BSc</i>	<i>Selected</i>	<i>Sci 1</i>
Mean	67.0	73.9	82.9	71.8	75.4	80.3	-4.81	-1.57	2.67
Median	70.0	77.0	85.0	72.9	77.0	82.6	-3.00	0.15	3.90
Mode	80.0	80.0	90.0	76.3	71.0	79.2	0.00	4.00	-8.10
Std. Dev.	19.3	16.7	11.9	10.9	9.9	9.4	13.9	12.4	10.3
Count	2339	592	133	2339	592	133	2339	592	133

Table 2. Statistical parameters from analyzing the data from Biol 334. Selected students are those enrolled in Biochemistry, Microbiology, and Microbiology and Immunology programs. Delta refers to the difference between a student's grade in Biol 334 and their sessional average.

	Grades		Sess. Avg.		Delta	
	<i>BSc</i>	<i>Sci 1</i>	<i>BSc</i>	<i>Sci 1</i>	<i>BSc</i>	<i>Sci 1</i>
Mean	73.6	84.3	76.8	84.3	-3.23	0.04
Median	76	87	78.6	85.7	-2.75	1.60
Mode	85	97	88.8	92.7	2.60	n/a
Std. Dev.	16.8	11.8	12.7	7.1	11.21	7.38
Count	174	27	174	27	174	27

Table 3. Statistical parameters from analyzing the data from Math 226. Delta refers to the difference between a student's grade in Math 226 and their sessional average.

	Grades		Sess. Avg.		Delta	
	<i>BSc</i>	<i>Sci 1</i>	<i>BSc</i>	<i>Sci 1</i>	<i>BSc</i>	<i>Sci 1</i>
Mean	65.5	79.1	70.0	79.3	-4.50	-0.14
Median	68	80.5	71.4	81.4	-3.20	0.25
Mode	72	85	76	82.5	-0.70	-2.50
Std. Dev.	17.5	11.3	13.1	9.9	10.82	8.55
Count	483	64	483	64	483	64

Table 4. Statistical parameters from analyzing the data from Phys 200. Delta refers to the difference between a student's grade in Phys 200 and their sessional average.

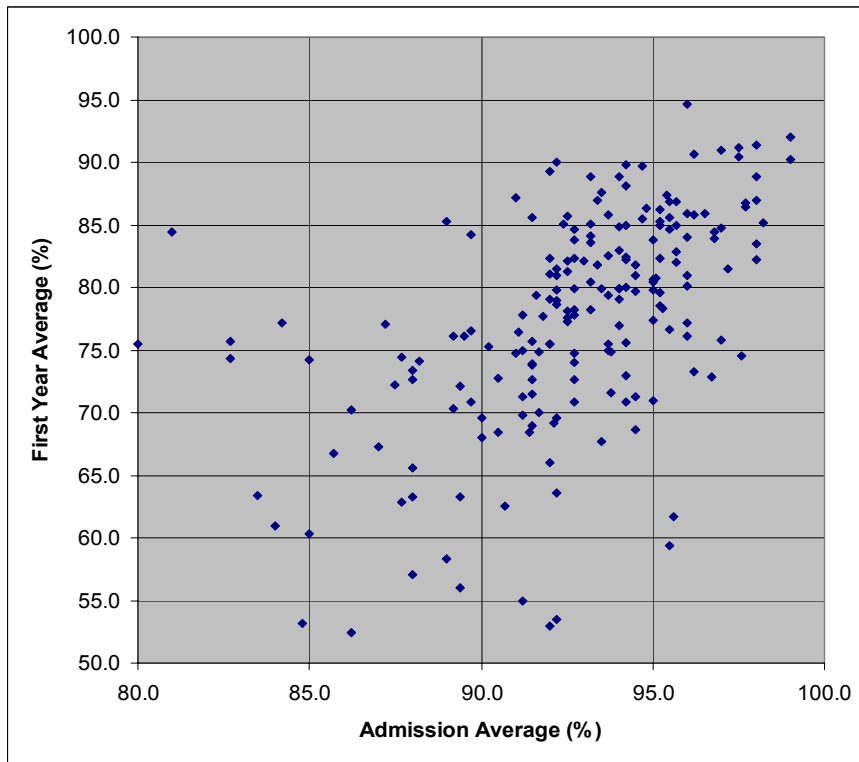


Figure 1. Admission average versus first year average for students participating in Science One from 1999-2002.

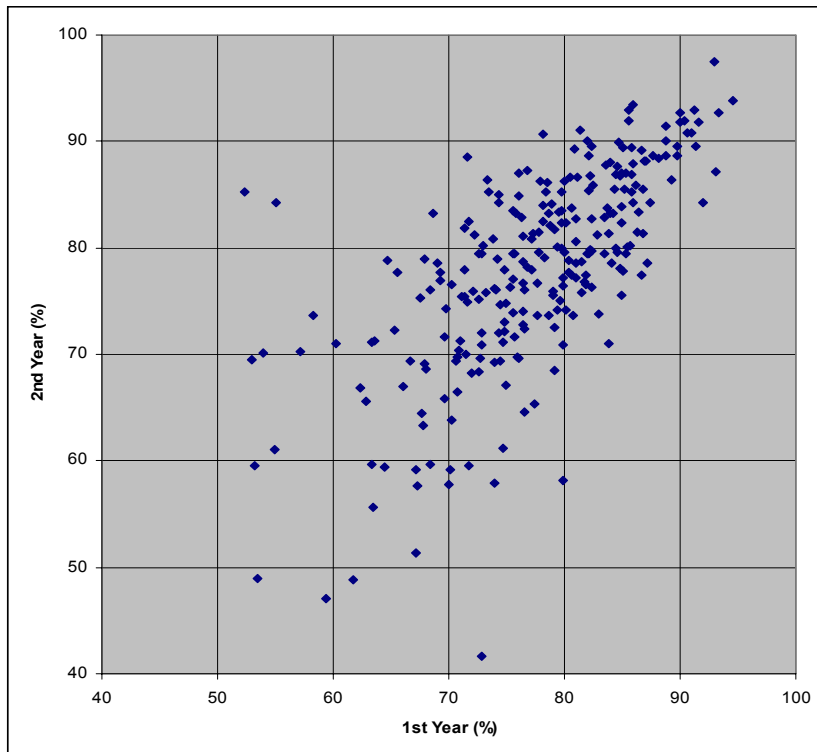


Figure 2. First year average versus second year average for students participating in Science One from 1999-2002.

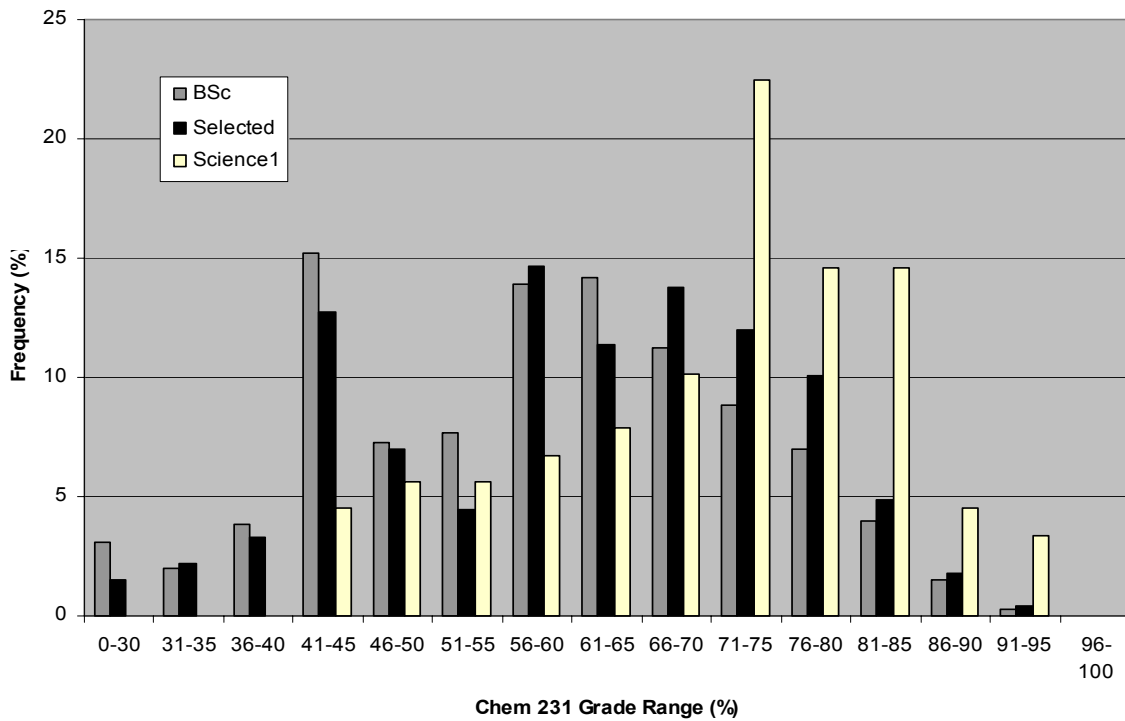


Figure 3. Grade distributions for students in Chem 231. The selected group comprises students in Microbiology, Microbiology and Immunology, Physiology, and Pharmacology.

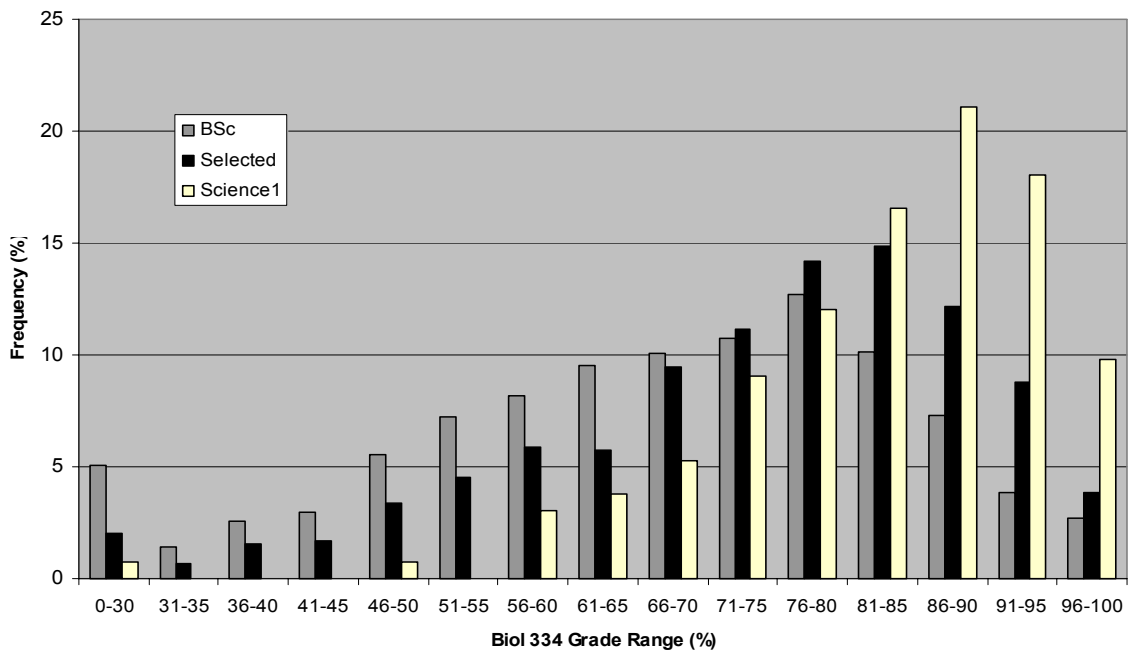


Figure 4. Grade distributions for students in Biol 334. The selected group comprises students in Biochemistry, Microbiology, and Microbiology and Immunology.

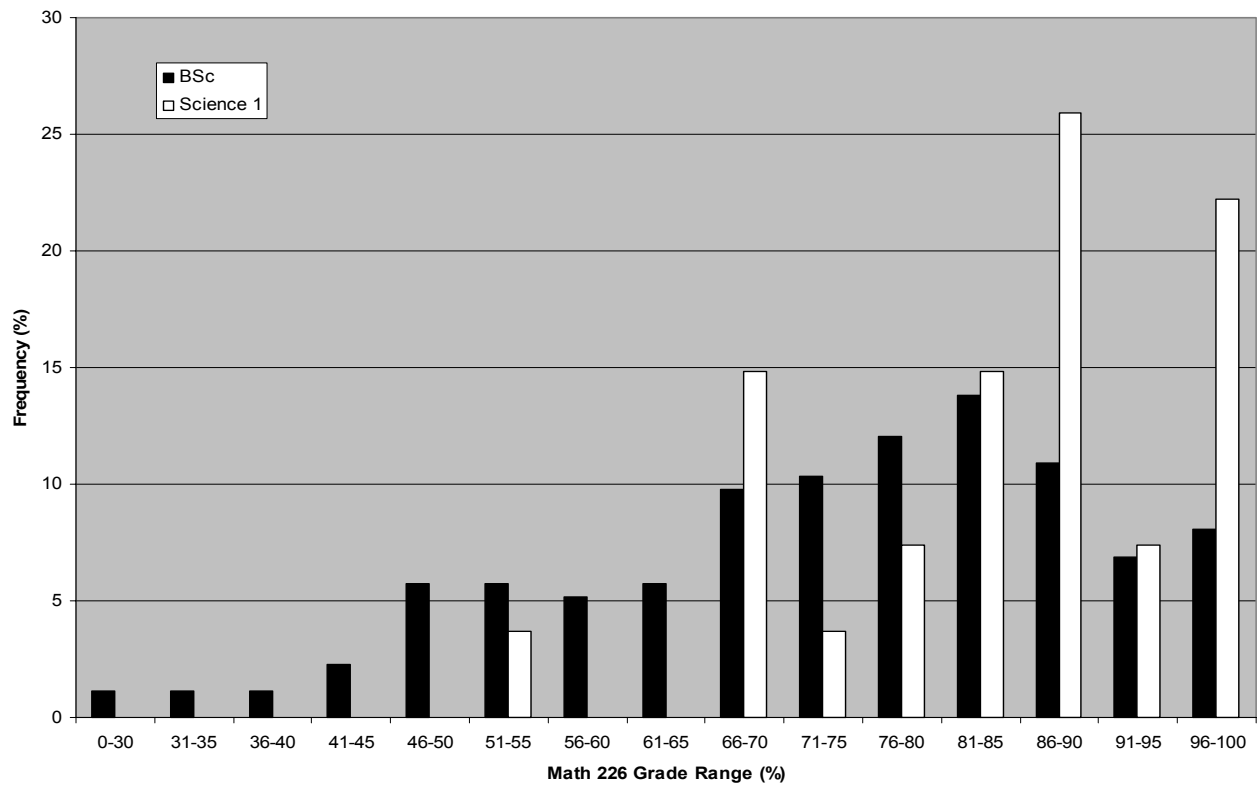


Figure 5. Grade distributions for students in Math 226.

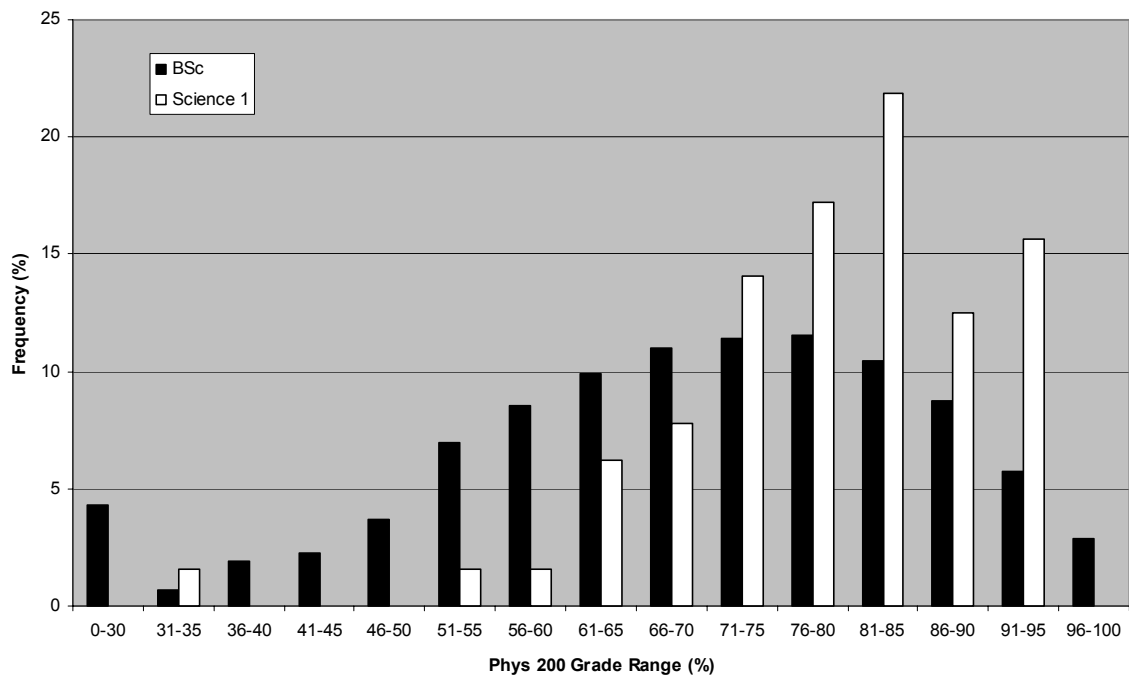


Figure 6. Grade distributions for students in Phys 200.

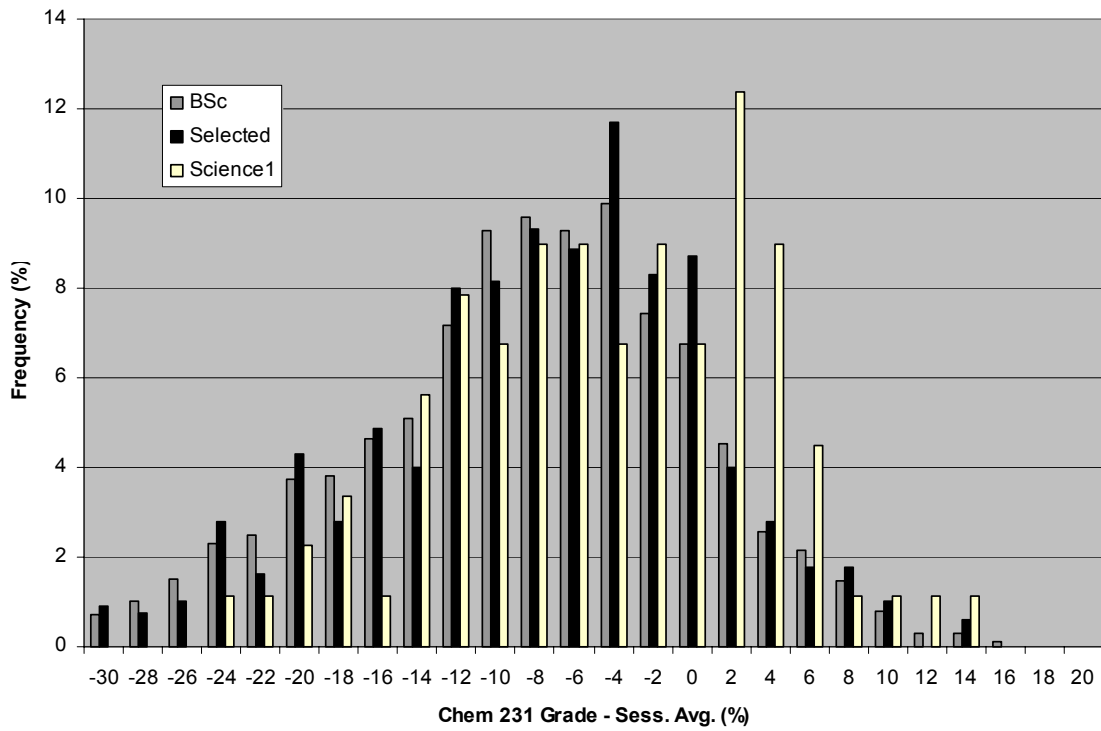


Figure 7. Relative performance distributions for students in Chem 231. The selected group comprises students in Microbiology, Microbiology and Immunology, Physiology, and Pharmacology.

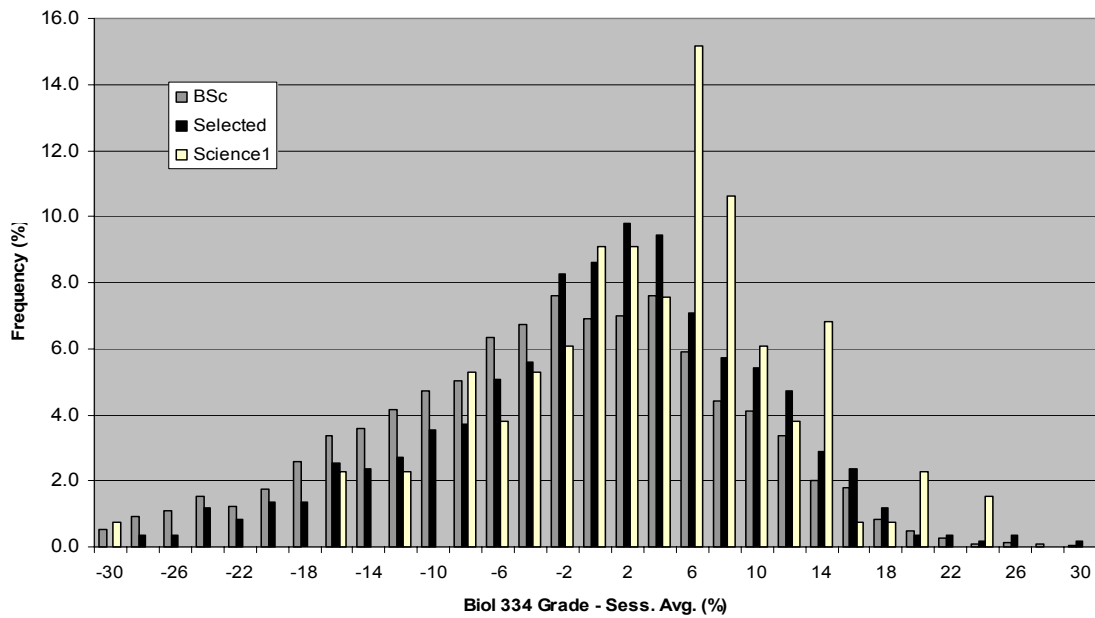


Figure 8. Relative performance distributions for students in Biol 334. The selected group comprises students in Biochemistry, Microbiology, and Microbiology and Immunology.

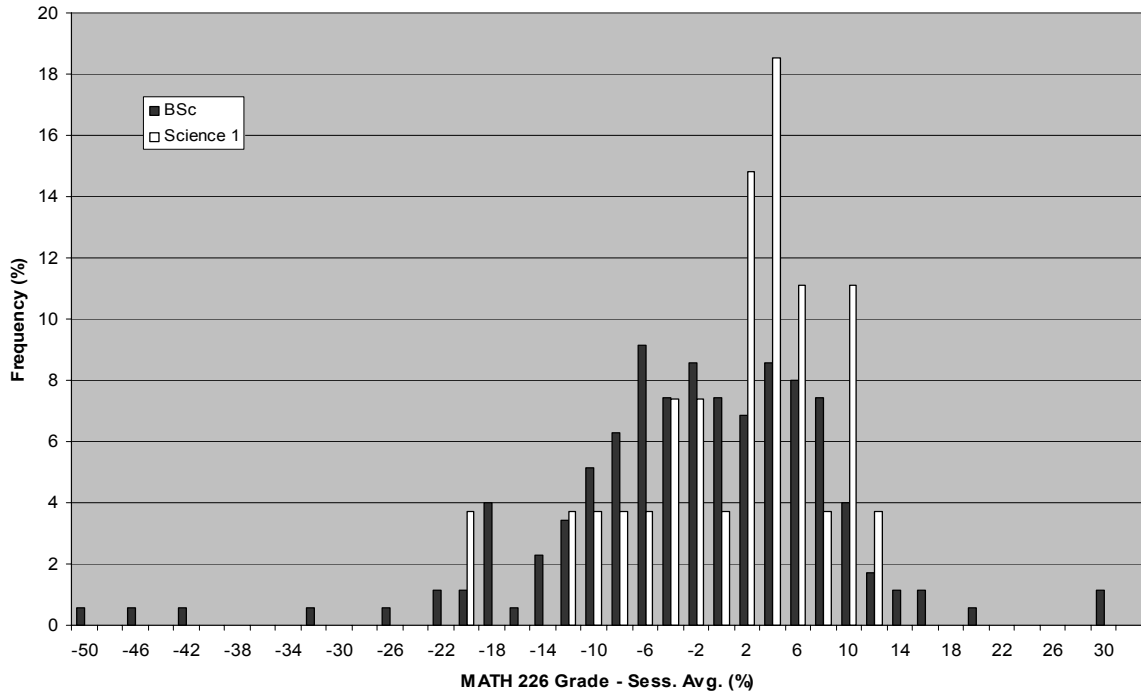


Figure 9. Relative performance distributions for students in Math 226.

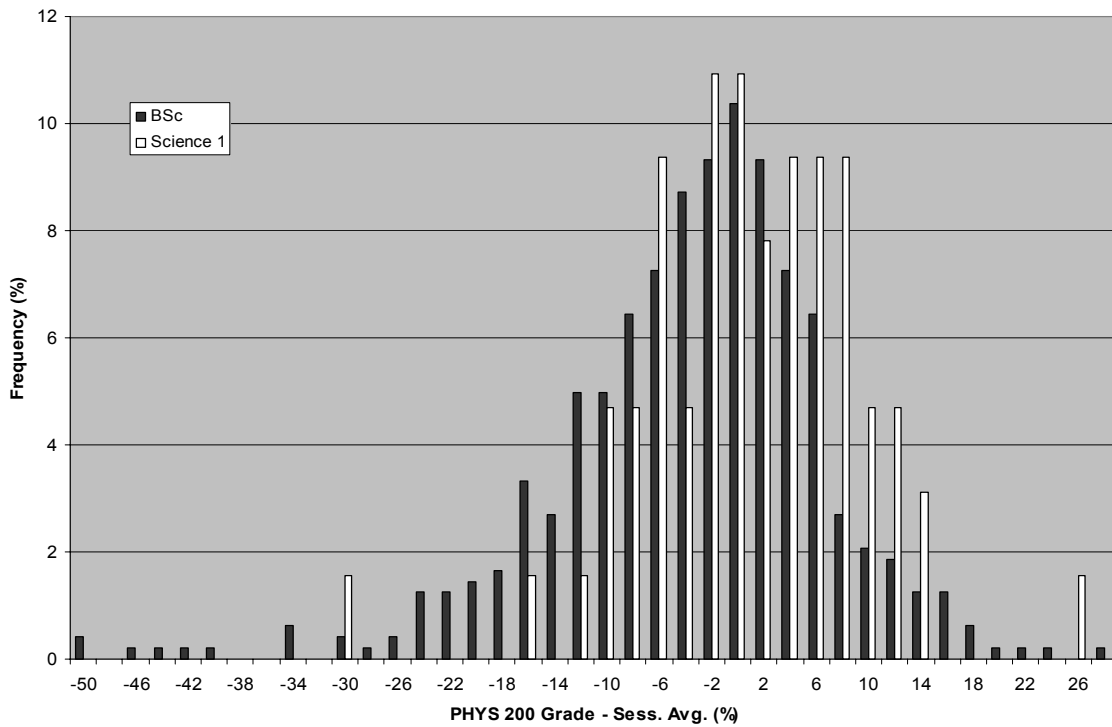


Figure 10. Relative performance distributions for students in Phys 200.

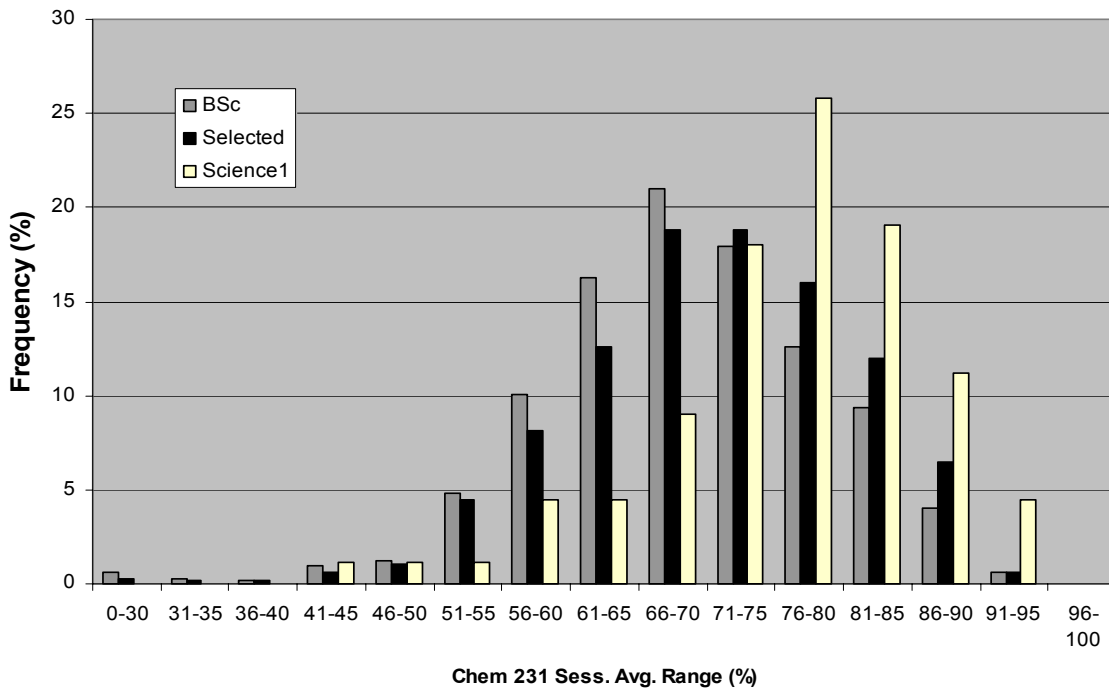


Figure 11. Sessional average distributions for students in Chem 231. The selected group comprises students in Microbiology, Microbiology and Immunology, Physiology, and Pharmacology.

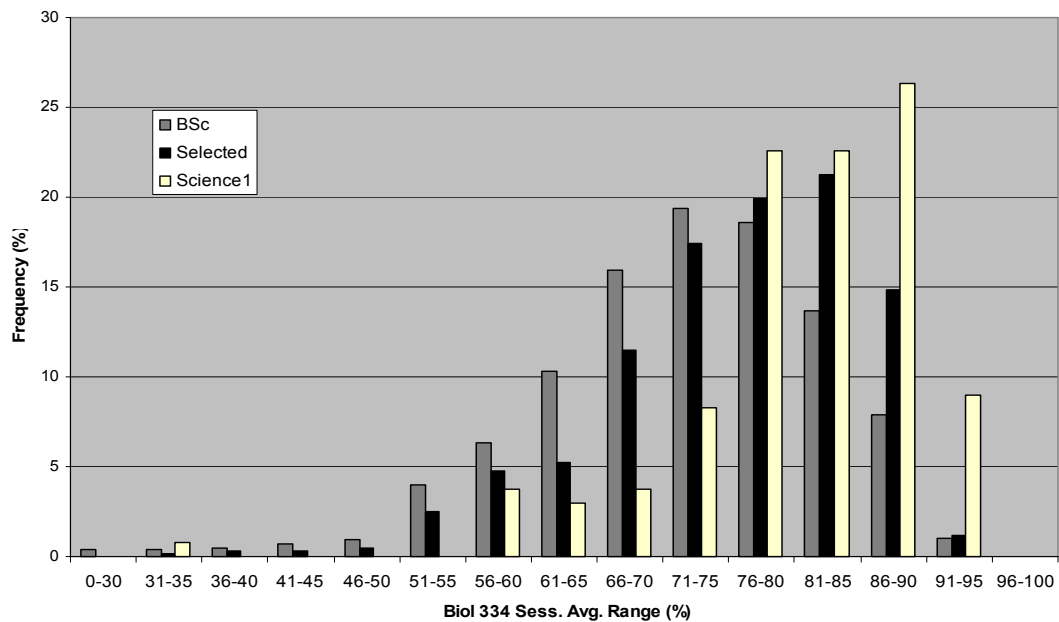


Figure 12. Sessional average distributions for students in Biol 334. The selected group comprises students in Biochemistry, Microbiology, and Microbiology and Immunology.

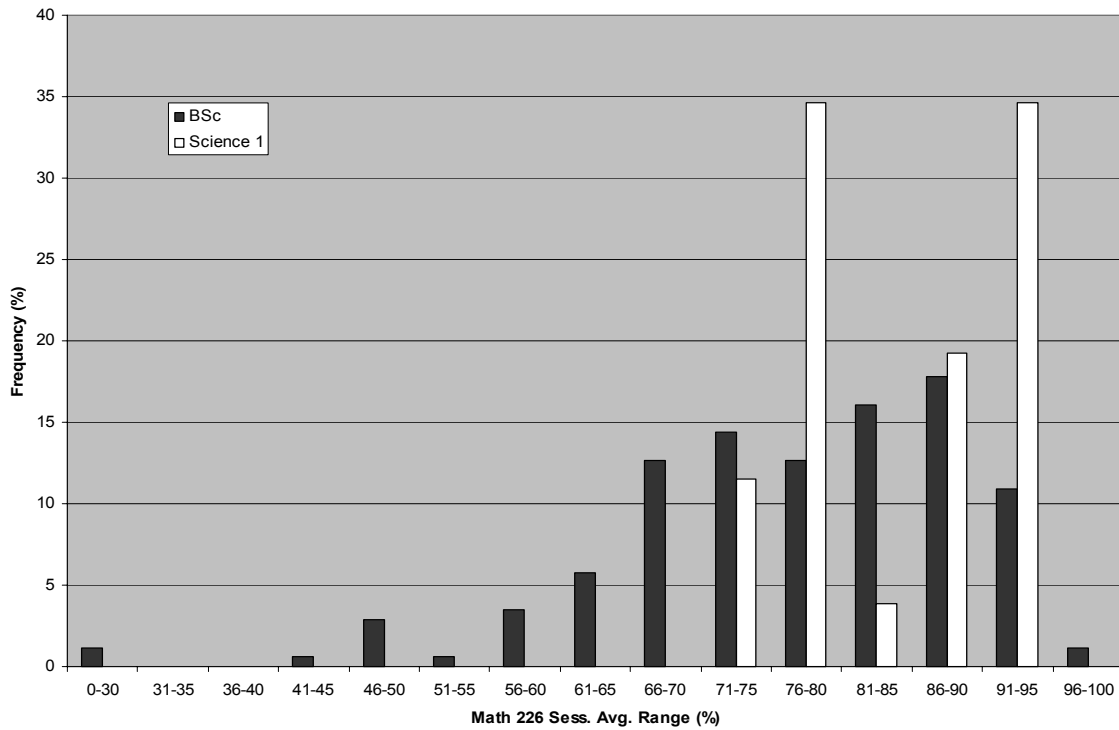


Figure 13. Sessional average distributions for students in Math 226.

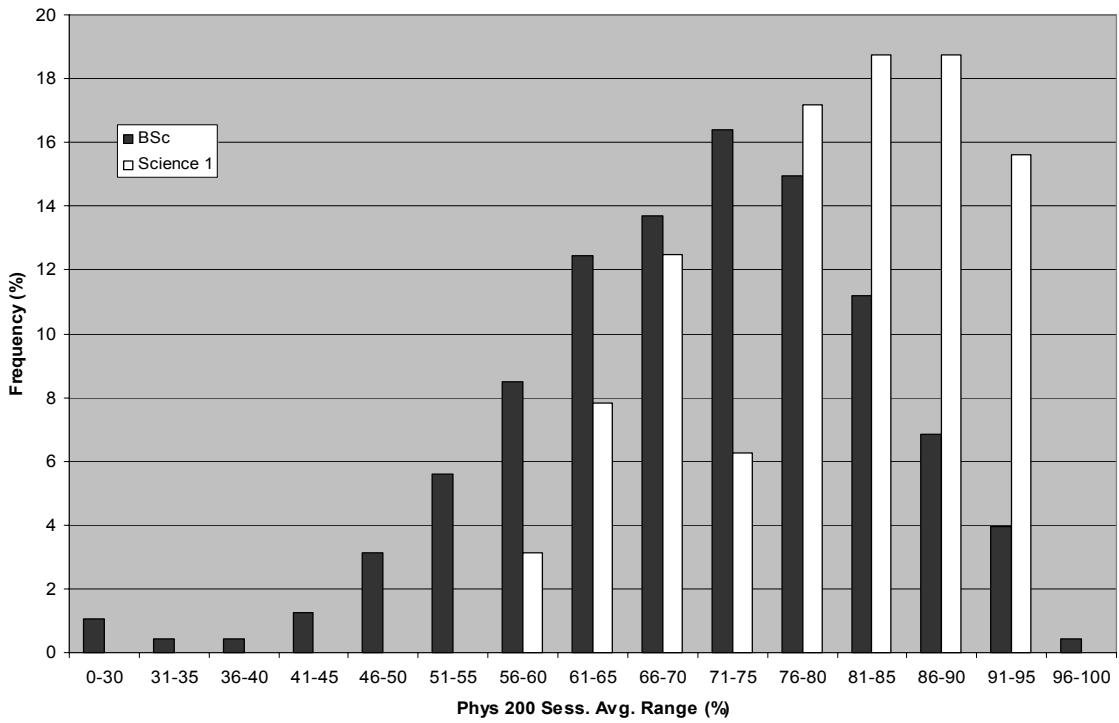


Figure 14. Sessional average distributions for students in Phys 200.