



# Report on the Growth of Undergraduate Biological Sciences Courses and Majors at UW-Madison 1995-2004<sup>1</sup>

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In 1991, the Hearn Committee published a “Review of the Biological Sciences” at UW-Madison that made recommendations for research and teaching improvements in biological sciences. Recommendations that have been implemented include a substantial increase in resources committed to teaching the one-year introductory course sequence and creation of a Biology Major allowing students the “flexibility to broaden their scope beyond department boundaries, to include emerging interdisciplinary fields.” The effect of these improvements in undergraduate education can now be assessed by looking at the number of students being served in the introductory courses and the number of students graduating with a major in a biological science.

The recommendation for a campus-wide one year introductory sequence was instituted by enlarging Botany/Zoology 151/2. This course has grown to accommodate over 1000 students per year, up from just over 200 when the Hearn Committee examined it (the full impact of the latest increase in enrollment will not be present in the data until 2007). Because access was limited, about 1/4 of the students were Seniors, 1/2 Juniors, and almost none were Sophomores, the target audience. Freshman access funding resulted in about 30 Freshman being added. This pedagogically disastrous situation has been remedied and now >90% of the students are second year students, the target audience (better preparation of incoming students has caused the target to move forward to include many first years students, those entering with AP courses in chemistry or who take the one semester accelerated course, chemistry 109). The bottom line is that *enrollment in laboratory-based introductory biology courses has increased from 1314 to 2095, an increase of more than 50% over the past decade* (Appendix Table 1).

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<sup>1</sup> A preliminary, undated version of this report was distributed. The April 26, 2005 version is the final version.

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The increased enrollment in the one year sequence has not caused a decline in either the one semester sequence, Zoology 101/102, or the honors two-year sequence, Biocore. The increased enrollment is accounted for by two factors: 1. the enrollment in 1991 was artificially low because of the problems associated with access, 2. the number of majors in biological sciences has increased.

One source of increased pressure on enrollments comes from increased requirements put in place once access was improved. For example, pharmacy required just Zoology 101/2 even though they preferred the one year sequence. Once the one year sequence came available, the requirements in pharmacy were changed to the one year sequence. At the same time, Psychology did not require any biology but put in place a requirement for at least one semester. Therefore, the move of Pharmacy students from 101/2 to 151/2 was compensated by increased enrollments from Psychology in 101/2. Also, majors that are technically in the physical sciences, are moving toward biological applications and so recommending or requiring biology courses. For example, Biomedical Engineering first appears in the 1999-2001 catalog and requires at least one semester of introductory biology, with two semesters preferred.

The number of graduations in biological sciences has recently been examined ([http://wiscinfo.doit.wisc.edu/obpa/degrees/BiologicalSci\\_FTEMajors\\_2004.pdf](http://wiscinfo.doit.wisc.edu/obpa/degrees/BiologicalSci_FTEMajors_2004.pdf)). The majors can be divided into four categories, 1. Large departmental majors, 2. Small departmental majors, 3. Interdepartmental majors, and 4. Medically related majors. In addition, Communicative disorders is technically a biological major but does not require introductory biology and so I shall exclude it from the analysis.

The number of students graduating each in 1995 and 2004 is the following:

	1995	2004	Change
Large departments	281	331	+50
Small departments	140	152	+12
Interdepartmental	100	304	+204
Medical	427	178	-249

(Table 1. Drawn from Appendix Table 2)

Several things are apparent. First, there is a net increase in non-medical biological science majors of 266 graduations. Second, much but not all of this growth occurred in the interdepartmental majors (specifically the Biology Major). Third, medical majors fell, mostly because several programs that had been undergraduate programs became graduate programs. However, this change does not reduce the pressure on introductory biology courses. In the case of Pharmacy, the switch to the Pharm. D. classification did not change the requirements for the first two years and the coincidentally, the requirement was increased from one to two semesters of introductory biology during this decade.

What is not apparent in Table 1 is that there was a rapid increase in the number of students in many of the large majors between 1995 and 1998, straining their resources. The extension of the Biology Major from Education to L&S and CALS relieved this pressure. Nevertheless, the net effect has been that in the core biological science departments, *graduations have increased from 521 to 787 between 1995 and 2004, an increase exceeding 50%.*

In summary, there has been a substantial growth in interest in biological sciences over the past 15 years. The University has responded by increasing access to the introductory courses and creating new opportunities in the Biology Major. These changes have been successful, but have put strains on other areas, including space and resources for upper-level labs in biological science courses.

## Appendix

Appendix Table 1. Course enrollment in introductory biology lab courses. Zoology 102 is the lab portion of the 101/2 pair. Additional students take only the lecture portion of this course. Zoology 101/2 is sometimes paired with Botany 130 to make a two semester introduction to biology. Zoology/Botany/Biology 152 is the second of the two course sequence. Essentially all of the students in 152 will have taken 151 the previous semester. Biocore 303/4 is the second of a four course sequence. Most students in this course will take all four courses. These numbers are a conservative headcount of students taking introductory biology courses.

Course	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Zoology 102	875	1001	886	923	976	1057	1091	1265	1249	1157	1157
Biology 152	295	362	516	520	531	682	640	724	743	747	823
Biocore 304	144	141	138	150	148	123	118	109	143	137	115
<b>Total</b>	1314	1504	1540	1593	1655	1862	1849	2098	2135	2041	2095

Appendix Table 2. Biological Science majors graduations

Large biology majors	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	04-95
99 Bacteriology	72	60	65	64	64	58	68	58	42	35	
103 Biochemistry	34	45	56	65	70	72	68	65	80	68	
459 Genetics	21	17	29	42	33	42	39	34	38	56	
652 MMI	10	15	24	56	67	84	59	55	43	34	
995 Zoology	144	170	150	186	197	167	176	166	133	138	
<b>Total</b>	<b>281</b>	<b>307</b>	<b>324</b>	<b>413</b>	<b>431</b>	<b>423</b>	<b>410</b>	<b>378</b>	<b>336</b>	<b>331</b>	<b>+50</b>
Small biology majors											
54 Agronomy	9	5	6	8	10	10	9	6	6	5	
65 Animal Sciences	21	19	14	24	27	21	27	21	25	11	
121 Botany	7	10	7	10	15	11	11	15	14	11	
247 Dairy Science	12	20	11	16	11	16	14	11	12	11	
253 Dietetics	16	28	36	40	44	35	37	36	32	29	
409 Entomology	5	7	7	4	2	5	3	5	5	4	
436 Food Science	14	14	21	15	14	17	8	14	12	7	
443 Forest Science	2	13	11	12	11	13	14	6	15	6	
531 Horticulture	11	12	14	24	18	23	26	15	22	16	
717 Nutritional Sciences	13	7	5	8	12	7	6	9	18	20	
796 Plant Pathology	0	0	0	3	1	3	3	2	4	2	
814 Poultry Science	5	7	2	6	3	2	3	3	4	0	
991 Wildlife Ecology	25	26	30	40	39	29	30	26	21	30	
<b>Total</b>	<b>140</b>	<b>168</b>	<b>164</b>	<b>210</b>	<b>207</b>	<b>192</b>	<b>191</b>	<b>169</b>	<b>190</b>	<b>152</b>	<b>+12</b>
ICBE majors											
108 BAC	40	49	58	68	63	74	50	66	40	58	
112 Biology	4	7	5	4	7	4	51	115	165	209	
684 Molecular Biology	56	51	66	64	46	56	49	44	47	37	
<b>Total</b>	<b>100</b>	<b>107</b>	<b>129</b>	<b>136</b>	<b>116</b>	<b>134</b>	<b>150</b>	<b>225</b>	<b>252</b>	<b>304</b>	<b>+204</b>
Medical biology majors											
657 Medical Science	1	3	3	3	4	5	2	4	3.6	3.1	
661 Clinical Laboratory Science	20	21	33	20	19	19	17	12	21	18	
712 Nursing	155	125	118	122	102	87	134	115	105	103	
715 Nursing (Collaborative Program)	2	12	9	15	6	15	6	10.2	9.3		
720 Occupational Therapy (now MS-OT)	35	39	44	44	41	41	42	45	23	19	
744 Pharmaceutical Sciences	7	2	2	2	1	1	1	2.5			
750 Pharmacology and Toxicology	9	14	9	7	6	13	15	9	4	10	
756 Pharmacy (now Pharm. D.)	114	105	102	94	103	30	30	91.1			
778 Physical Therapy (now MPT)	59	61	56	59	54	57.8					
780 Physician Assistant	25	28	29	29	30	26	28	29	30	25	
<b>Total</b>	<b>427</b>	<b>410</b>	<b>405</b>	<b>395</b>	<b>366</b>	<b>294.8</b>	<b>275</b>	<b>317.8</b>	<b>195.9</b>	<b>178.1</b>	<b>-249</b>
Other biology major											
216 Communicative Disorders	53	54	66	71	55	57	62	43	47	39	<b>-14</b>