

UNIVERSITY OF WISCONSIN MILWAUKEE DEPARTMENT OF BIOLOGICAL SCIENCES ASSESSMENT PROGRAM

INTRODUCTION: The Department of Biological Sciences has been using the following assessment tools to monitor student achievement of our program learning goals. These include:

- passing required courses (a direct measure)
- meeting with faculty advisors (from which we derive indirect & direct data)
- course evaluations (completed for every course at the end of each semester)
- survey of seniors in Senior Seminar (our capstone course)

Data from these tools are used by faculty individually, to improve the courses they offer, and by the Course & Curriculum Committee and the faculty as a whole, to enhance instruction and student learning in our program.

EVIDENCE OF PAST USE OF ONE OF OUR ASSESSMENT TO ENHANCE LEARNING: In the past, one tool that has enabled us to make positive changes is our Senior Exit Survey. Attached is a sample of that survey plus data collected between 1993 – 1998, compiled for our department's 10-year review (please see UWM Department of Biological Sciences Senior Exit Survey Data for 1993-1998). One especially significant change we have made, in part based on this indirect measure, was to revise our curriculum. We concluded that we could better achieve our stated educational goals by revising our Foundations courses and by instituting three Gateway courses. The new curriculum went into effect in January of 2003.

Our students begin the major by taking Foundations of Biological Sciences I & II (2 one-semester courses, BIO SCI 150 & 152). Key revisions to the Foundations courses included:

1. reordering the sequence of topics to present a more coherent introduction to the diverse fields of biology
2. using evolution as the recurring/over-arching theme throughout both courses
3. Foundations II became a survey of life course and this has allowed us to include a unit on microbes
4. upgrading the laboratory components

The rationale for initiating the Gateway courses was to more effectively, uniformly and comprehensively teach to our stated education goals, early in the students' progression. These courses build on the framework established in the Foundations courses and demand a higher level of critical thinking and more hands-on and sophisticated participation in the process of scientific discovery. For example (please see attached survey tool & data for 1993-1998), students repeatedly reported on Senior Exit Surveys, that they received their best instruction and were best able to achieve our educational goals in Ecology (Bio Sci 310). Drs. T. Ehlinger & L. Whittingham designed the course with a lab component that requires students to undertake a semester-long research project. By the end of the semester, students have not only been introduced to the principals of ecology, but have performed an array of techniques and skills necessary to conduct ecological research. We also received an NSF ILI grant to update our student computer lab facilities, primarily for learning exercises in our Gateway courses. The new Gateway courses are Ecology 310, Genetics 325, Cell Biology 315, and Cell/Genetics Lab 316. Students learn diverse techniques in 316 lab that are currently used in cell biology and genetics research, based on the Ecology 310 model. Furthermore, the new Gateway requirement enables upper level courses to be taught at a more advanced level and minimizes the need for review of introductory material. From the additional data from the Senior Exit Surveys for 2003-2004, we seem to be improving our ability to serve our students (please see graphs below).

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NEW UWM DEPARTMENT OF BIOLOGICAL SCIENCES ASSESSMENT PROGRAM: We have come to the conclusion that our assessment program only affords a limited our ability to measure student achievement of our stated learning objectives. Accordingly, the Department of Biological Sciences has devised a new plan to assess student learning in our undergraduate degree programs (please see accompanying document). This plan is primarily the outcome of guidance we received by attending the two University of Wisconsin workshops presented by Barbara Walvoord over the past year. We have now developed a 3-stage program to better assess how well our majors are learning at critical points: after completion of the Foundations coursework, after completion of the Gateway coursework, and just prior to graduation. The new assessment program is more formal and will include greater participation by the entire instructional staff. The tools we use to measure student learning have been refined so that the data collected can better help us determine the best strategies to continually enhance student learning. Additionally, we have added a component where we will be able to receive annual feedback from the Center of Instructional & Professional Development on our annual reports concerning student learning (e.g., our data analyses and action plans based on such analyses).

Although our Senior Exit Survey has been a valuable tool, this year (based on input from outside consultants) we updated the survey (please see New UWM Department of Biological Sciences Senior Exit Survey Assessment Tool at end of this document) with the intent of collecting better information from the students on how we can best help them achieve the stated learning goals for our program.

UWM Department of Biological Sciences

Senior Exit Survey Data

1993-1998

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QUESTIONNAIRE
SENIOR BIOLOGY MAJORS
Spring 1998

Overall, how would you improve the instruction in biology at UWM: lectures, laboratories and discussion.

- I wish some lectures were more structured. I wish some professors were more personable. Labs that I have taken are structured very good! I don't remember any discussions.
- Make everything more interactive.
- Labs are diverse, both structurally and in teaching methodologies. Lecture evaluations should be on a case by case basis.
- I feel that more courses should become available each semester. For example, neurobiology is only offered in the spring.
- The laboratory should be more work related. Once you graduate it should prepare students for application of the lab work in the real world jobs, like classes in computer or education majors, because most of the time biology students have problems with the job outside.
- I think we could use longer labs and more field trips. Some classes don't have labs and I feel they should.
- Get some fresh blood – a lot of the professors have been here so long that they aren't very enthusiastic about their jobs. That makes it hard for the students to get excited about the topics being taught.
- Better facilities, especially for laboratories. Equipment is outdated and there is not enough of it.
- I just transferred here, so I'm not at liberty to say.

In the courses taken for your biological sciences major, do you feel that you gained experience (1 = extensive experience 5 = no exposure) in the items listed below.

Indicate, if possible, the course(s) where you learned the information, skills or concepts.

Extensive Experience -----> No Exposure

1. Use of the library as a technical resource: Course(s) that taught: 310, 402, 525, 670	1 2 3 4 5	Average = 2.05
2. Use of computers (data processing, etc): Course(s) that taught: 310, 407, 470, 505, 605, 670	1 2 3 4 5	Average = 2.52
3. Interpretation of graphical data: Course(s) that taught: 150, 152, 350, 356, 401, 407, 505, 575, 605	1 2 3 4 5	Average = 1.94
4. Verbal presentation of scientific information: Course(s) that taught: 150, 152, 260, 310, 407, 470	1 2 3 4 5	Average = 1.68
5. Written expression of technical concepts: Course(s) that taught: 150, 152, 303, 310, 407, 470	1 2 3 4 5	Average = 1.88
6. Application of scientific method: Course(s) that taught: 150, 152, 303, 310, 356, 401, 407, 470, 605, 670	1 2 3 4 5	Average = 2.00
7. Use of scientific instruments and procedures: Course(s) that taught: All, 150, 152, 303, 310, 356, 402, 407, 455, 470, 673	1 2 3 4 5	Average = 1.89

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Do you think your biology education has developed your abilities for critical thinking, problem solving and ethical decision making?

- For sure. I can see a big difference between the way I used to think and the way I think now. The biology education has made me think more deeply and made me able to think in many different ways.
- Yes.
- Yes, I feel that I am better at critical thinking. I feel that critical thinking, problem solving and ethical decision making are essential tools.
- Not very much. It just taught the overall science subjects and with little experience in the laboratory.
- Yes, like this class. I could think more and could listen to other students during the discussion period.
- Yes, but I've taken less classes in philosophy and felt that those fewer classes contributed more than all my biology classes (I'm a philosophy minor also).
- Yes.
- Yes! A great diversity of knowledge.
- Yes.

What did you like about your experience as a biology major?

- I liked it very much. But I wished that some of the laboratory experiences would relate very close to the outside real world jobs. Lectures were great, but needed more laboratory related experiences.
- The field trips that I participated in, especially in ecology, was a hands on experience for me. I really did enjoy the field research.
- The exposure to many techniques. Studying a subject that I liked. Understanding the roots of things. Broadened my ability to think and examine different concepts.
- Development of genuine interest in biological sciences.
- Lots of lab experiences. Exposure to extremely interesting issues related to medicine and health.
- Ability to pursue truth.
- Biology will help save the world if used properly so that is why I like it.
- I did like the experience of dissecting animals, insects and overall the lab experiences. Since the labs are the ones that really help you grasp the lecture material or the problems.
- Specific professors teaching in their area subject which interest them.
- Everything, well except for exams.
- The learning of new things – ideas, concepts and material.
- I enjoyed labs and learned a lot from them. I wish I could take more. The hands on experience is where I learned the most.
- It confirmed my decision to apply to medical school.
- Exposure to many different areas of life and science, a great background to build from.
- We were allowed to take courses that interest us as well as those that were required.
- I understand a lot more but would like more diverse topics in Biology. Only two classes I took in the biology department had field trips. I liked those field trips.
- The course that I took last semester, molecular techniques, was an awesome course. I could learn many techniques that are being used right now in many areas.
- Wide field of study as a general bio major.

Would you recommend this program/major to your friends?
(1 = strongly recommend; 5 = not recommend)

Average = 2.05

What is your approximate overall grade point average?

Average = 3.37

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Summary of Senior Survey
Majors in Biological Sciences
1993-1998

Objective Questions	1993	1994	1995	1996	1997	1998
1. Use of library resources	2.64	2.85	2.83	2.25	2.30	2.05
2. Use of computers	3.60	3.19	3.33	2.67	2.51	2.52
3. Interpretation of graphical data	2.25	2.55	2.16	2.39	2.09	1.94
4. Verbal presentation of scientific information	2.60	3.26	2.66	2.09	2.36	1.68
5. Written expression of technical concepts	1.96	2.83	2.16	1.92	2.04	1.88
6. Application of scientific method	2.22	3.20	1.83	1.71	1.83	2.00
7. Use of scientific instruments and procedures	2.12	2.12	2.50	2.10	1.83	1.89
8. Would you recommend this major/program to a friend?	2.12	2.12	2.50	2.10	2.26	2.05

Questions 1-7 1 = extensive experience; 5 = no experience

Question 8 1 = strongly recommend; 5 = no recommend

UWM Department of Biological Sciences

Senior Exit Survey Data for 1993–2004

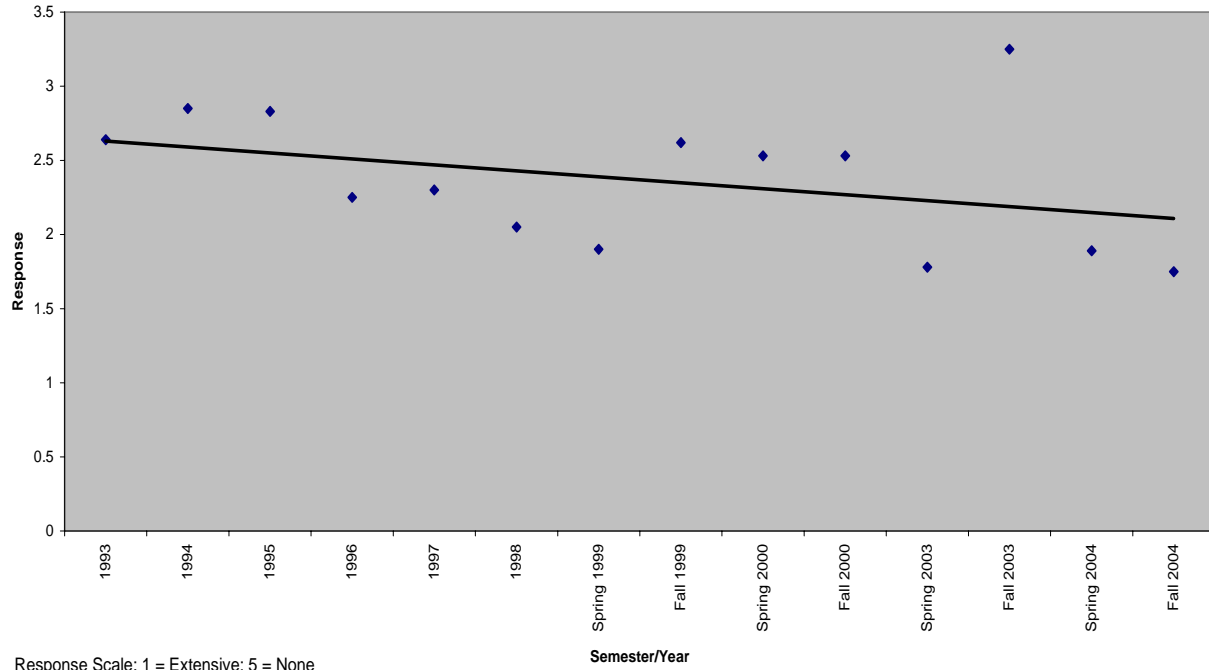
(Pre- & Post-Curriculum Reform)

Ratings on How Well Stated Learning Goals Were Taught

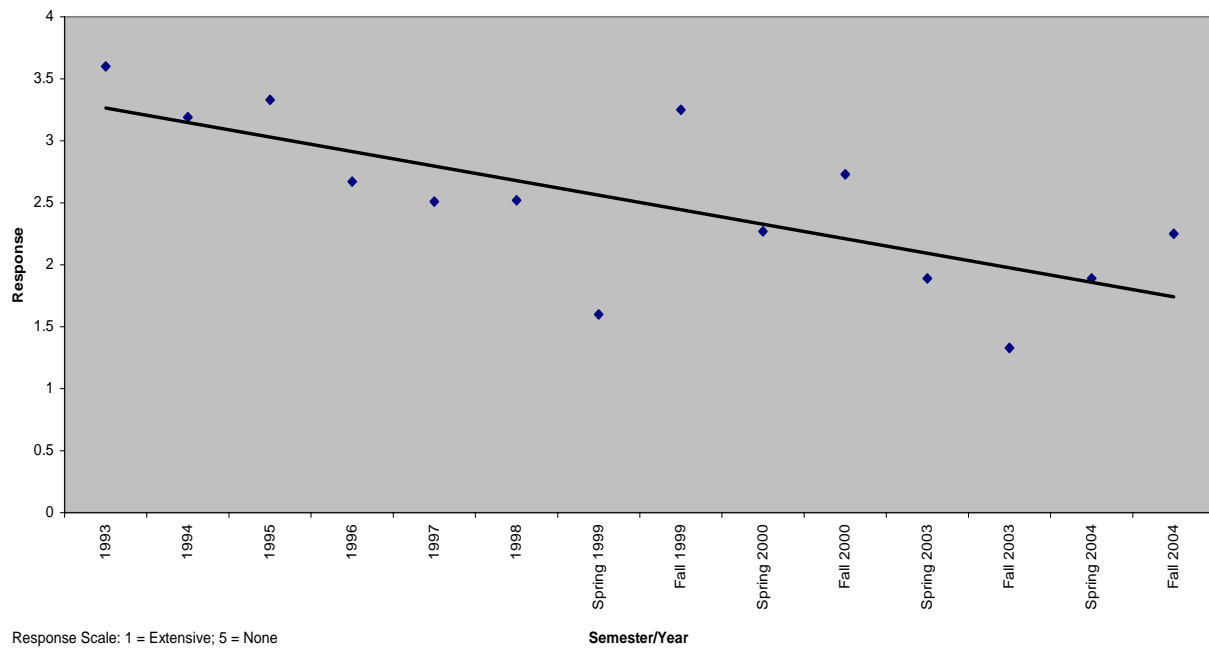
(1 = extensive; 5 = none)

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Use of Library Resources

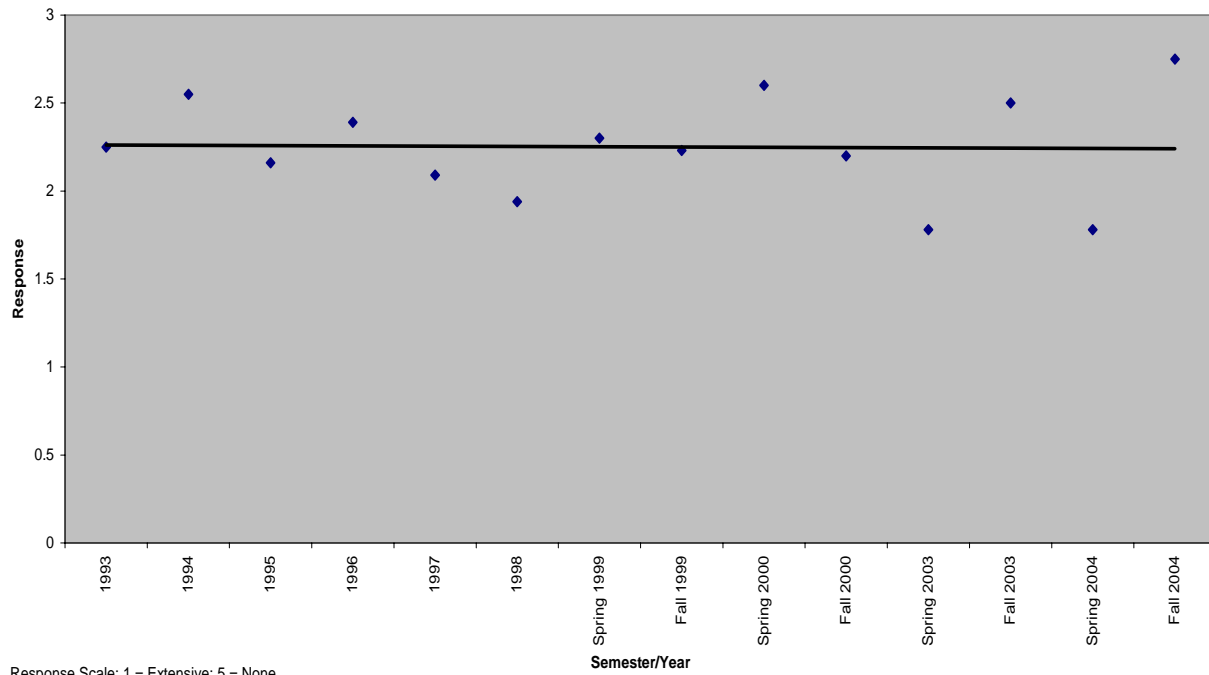


Use of Computers

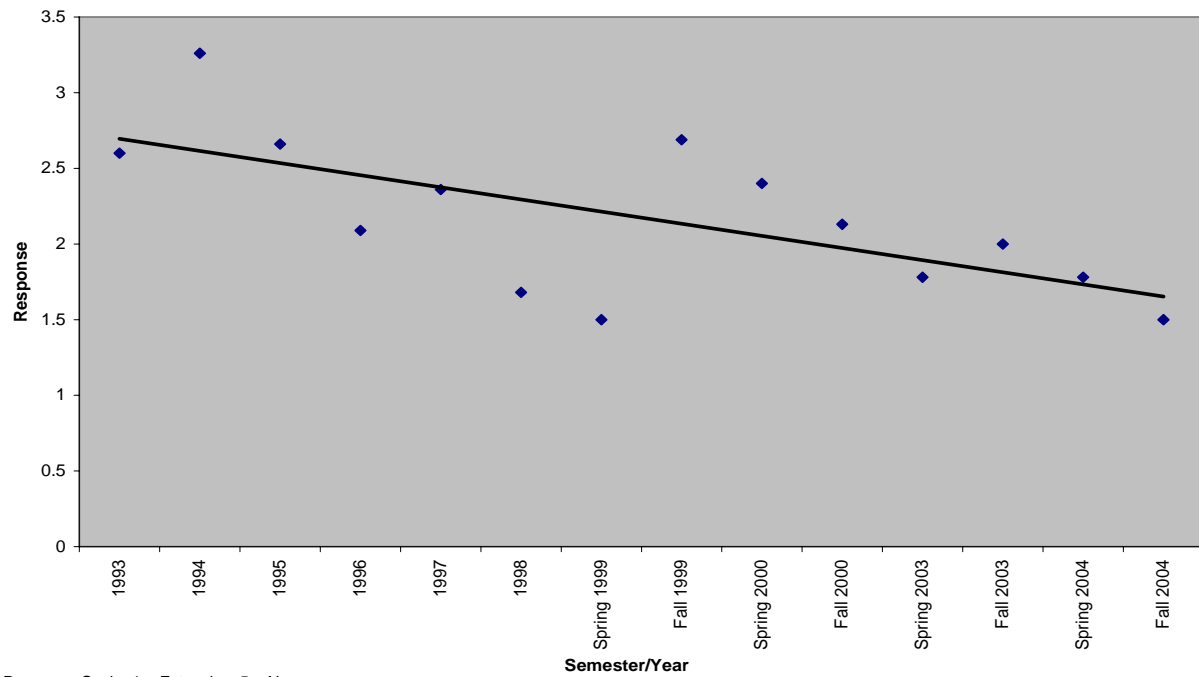


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Interpretation of Graphical Data

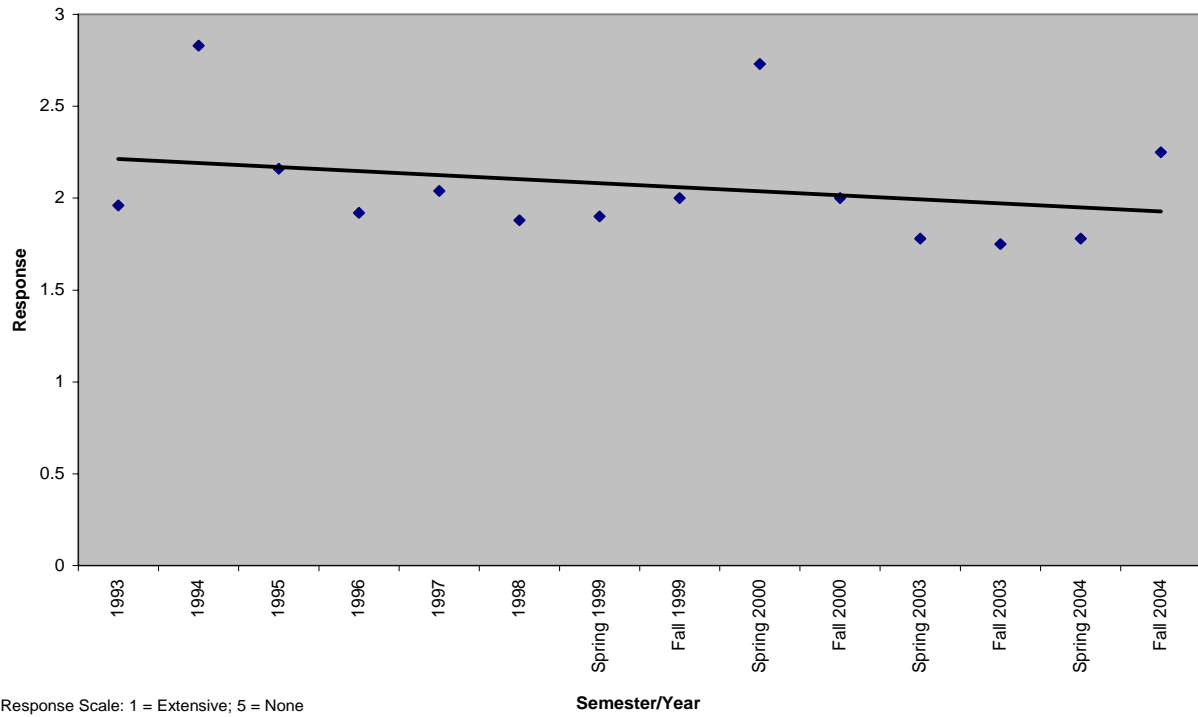


Verbal Presentation of Scientific Info

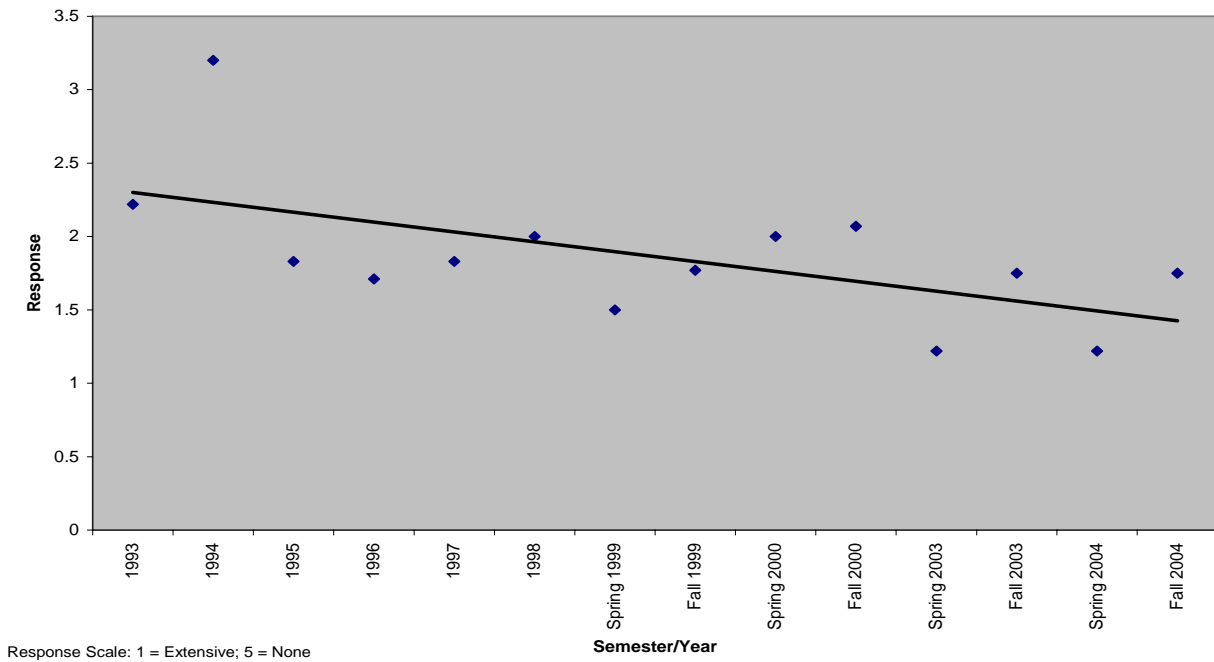


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Written Expression of Technical Info

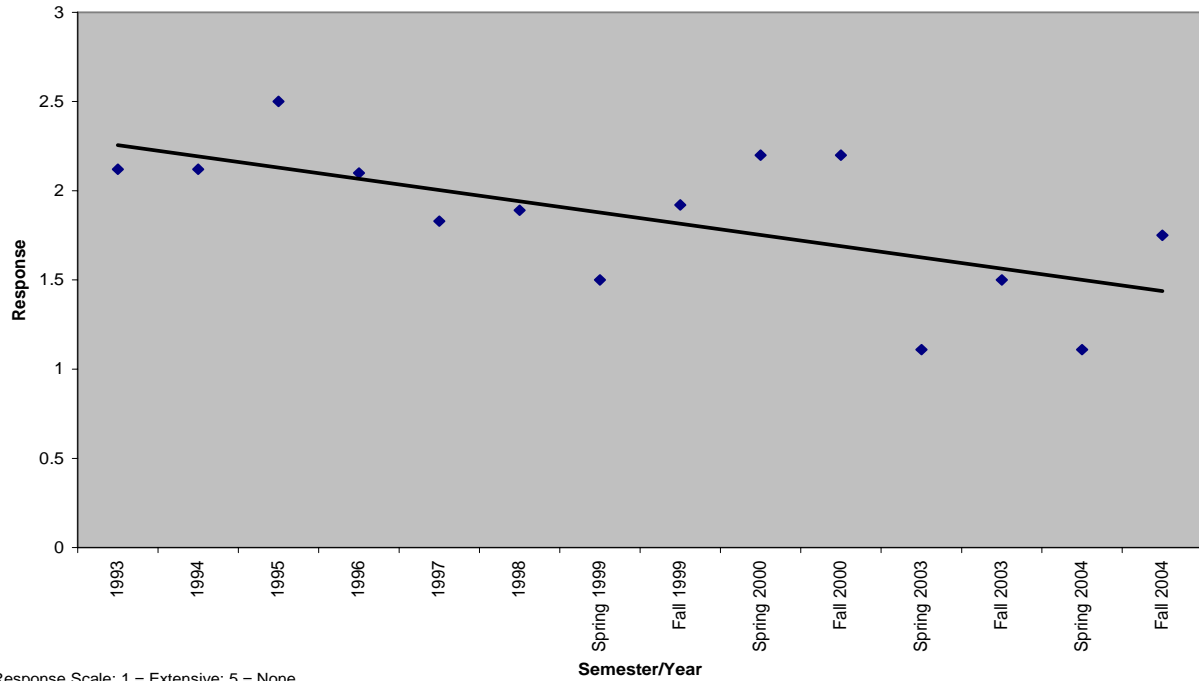


Application of Scientific Data



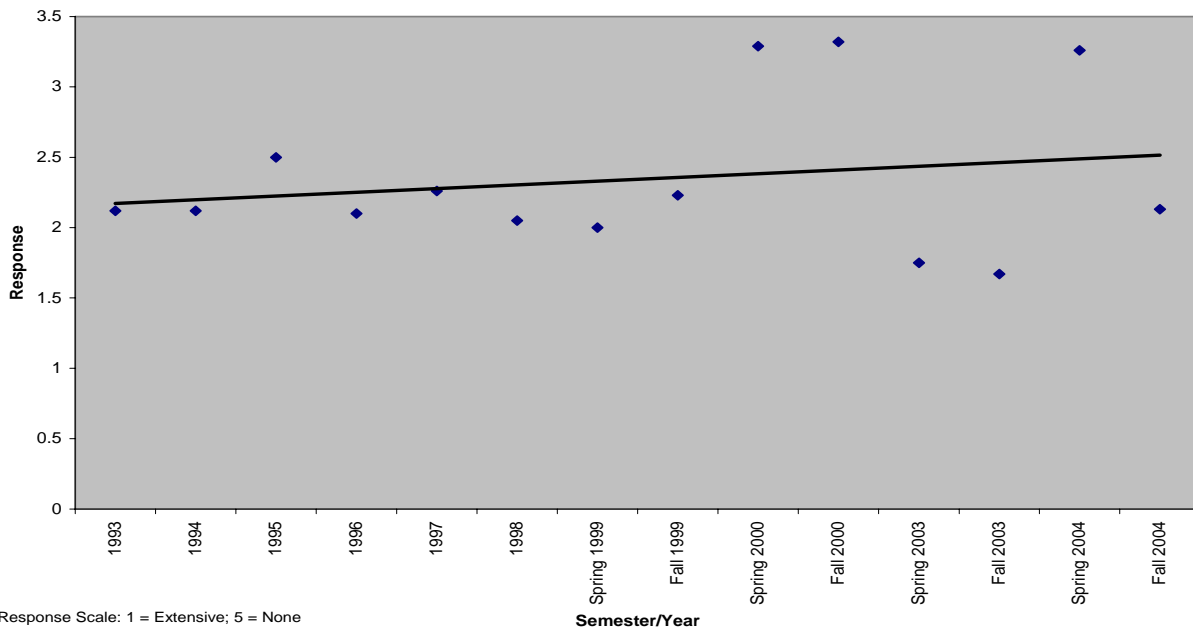
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Use of Scientific Instruments & Procedures



Response Scale: 1 = Extensive; 5 = None

Would you recommend this major to a friend?



Response Scale: 1 = Extensive; 5 = None

New UWM Department of Biological Sciences

Senior Exit Survey Assessment Tool

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Dear Graduating Senior:

Congratulations on completing your undergraduate major in Biological Sciences at UWM. We would appreciate your help in assessing the quality of education in the department so that we can continually improve the program. We are asking for an anonymous evaluation from senior Biological Sciences majors. On the back of this note you will find a statement of *Educational Goals for Biological Sciences Majors*. Please review these goals and complete the attached questionnaire in light of our learning goals, the curriculum, and your overall experience at UWM.

In view of the fact that laboratory and field research experiences are an integral part of your education experiences as a Biological Sciences major, we are also asking that you provide, by the end of this semester, a copy of a lab report that you have previously submitted for one of your courses. Your name should not be identifiable on this report. The lab report, prepared for an upper level biology course (>300 or above), or independent study (699) course should include a description of lab or field data collection procedures and analysis of results. If you do not have a report from a previous class, we ask that you save a report from one of the lab courses you are taking this semester. Alternatively, if you do not have a previously submitted lab report and are not currently enrolled in a lab or field course, you may submit a term paper that demonstrates your skills at library research and the interpretation of information in the current scientific literature. These reports will enable the faculty to evaluate how well our students have learned experimental design, lab techniques, data analysis and interpretation. The faculty wishes to thank you for your input. Your feedback will enhance our efforts to improve teaching and learning in the Biological Sciences major.

Sincerely,

Faculty in Biological Sciences

I hereby give the Department of Biological Sciences permission to review/ an anonymous copy of a lab/field course laboratory report.

Signature

Date

**EDUCATIONAL GOALS FOR
BIOLOGICAL SCIENCES MAJORS
University of Wisconsin-Milwaukee**

Upon successful completion of the major, our students will be able to:

1. describe and apply a broad base of biological information and concepts including societal and ethical questions related to biology.
2. apply the scientific method to biological questions and the ability to critically evaluate experimental design, as well as create & interpret numerical and graphical data used in sophisticated research (e.g., as published in peer-reviewed journals).
3. use diverse field and laboratory skills to investigate scientific questions. This includes an understanding of and proficiency in the use and application of an array of biological instruments and procedures.
4. use available resources (e.g., the library, computer databases, etc.) to retrieve scientific information.
5. synthesize, integrate and communicate scientific information to other scientists, students & the general public.
6. demonstrate an appreciation of the patterns and processes of life and clearly articulate why evolution is the unifying concept in biology

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For each of the learning goals for the major, please tell us how we could have helped you to better achieve the ability to:

1. describe and apply a broad base of biological information and concepts including societal and ethical questions related to biology.
2. apply the scientific method to biological questions and the ability to critically evaluate experimental design, as well as create & interpret numerical and graphical data used in sophisticated research (e.g., as published in peer-reviewed journals).
3. use diverse field and laboratory skills to investigate scientific questions. This includes an understanding of and proficiency in the use and application of an array of biological instruments and procedures.
4. use available resources (e.g., the library, computer databases, etc.) to retrieve scientific information.
5. synthesize, integrate and communicate scientific information to other scientists, students & the general public.
6. demonstrate an appreciation of the patterns and processes of life and clearly articulate why evolution is the unifying concept in biology.

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In the courses taken for your biological sciences major, do you feel that you gained experience in the areas listed below? Indicate, if possible, the course(s) in which you learned the information, skills or concepts.

Extensive experience (A) - No exposure (E)

7. Use of the library as a technical resource: A B C D E
course name(s):

8. Use of computers (data processing, etc.): A B C D E
course name(s):

9. Interpretation of graphical data: A B C D E
course name(s):

10. Verbal presentation of scientific information: A B C D E
course(s):

11. Written expression of technical concepts: A B C D E
course name(s):

12. Application of the scientific method: A B C D E
course name(s):

13. Use of scientific instruments and procedures: A B C D E
course name(s):

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Your Comments: