

BIOLOGY PROGRAM REVIEW PORTFOLIO

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PROGRAM REVIEW SECTION 1

Program's Purpose:

The Biology Program's primary mission is to teach students biological science and the process of scientific research in the life sciences. The Department does this by providing lecture and laboratory courses that examine basic biological concepts, introduce students to the scope and limitations of the scientific approach, address how the life sciences influence and are influenced by contemporary society, and provide substantial involvement with the tools and processes of scientific investigation.

The Biology Program fulfills its mission in three ways. The first is by providing courses that satisfy the laboratory science requirement for students receiving an associate's degree at Western Wyoming Community College. Courses offered to fulfill this objective include General Biology Honors General Biology, Current Issues in Biology, and Honors Current Issues in Biology.

Secondly, the Department provides a sequence of upper division courses for biology majors and for pre-professional students (pre-med, pre-vet, pre-physical therapy, pre-occupational therapy, pre-pharmacy, pre-dentistry, pre-chiropractic, pre-nursing) to enable them to transfer to four-year programs as juniors. These courses also fulfill requirements for two-year professional programs such as Nursing. Courses fulfilling this objective include: Anatomy and Physiology 1 and 2, Animal Biology, Plant and Fungal Biology, General Ecology, Field Ecology, Microbiology, and Pathogenic Microbiology.

Lastly, the department provides courses and programs in response to the interests of the community. Courses such as Birding and Wyoming Flora, and participation in programs such as "Evening at Western" and "Free Day" fulfill this need. The program consists of 5 full-time faculty in Rock Springs, along with 6 adjuncts spread across the college's service area. Faculty members strive to remain active and knowledgeable in the field by a variety of professional development activities. The Department adjusts to the changing needs of modern students by offering both General Biology and Anatomy and Physiology as online courses.

Connecting to the Guiding Principles

"Learning is our purpose."

The Biology program is committed to experiential learning that involves students in meaningful activities. All our classes have both a lecture and a laboratory component. The laboratory component is designed not only to complement and reinforce material covered in lecture but also to provide students with hands-on activities and opportunities to acquire job-related skills.

The Biology Program offers multiple courses via distance media. We hope to continue and enhance these offerings in the future.

“Students are our focus.”

The small class sizes and hands-on learning that takes place within our biology courses allows for student-student and student-instructor interact that is unique. These opportunities expose student to a diverse range of viewpoints and ideas, enhancing their academic development.

The Biology Department attempts to provide up-to-date equipment for student use. The recent addition of modern tablet computers and a range of molecular biology equipment, including a PCR thermocycler enable our students to learn modern laboratory techniques. Bud Chew's cardiovascular physiology research also provides students with some modern research experiences.

“Employees are our Most Important Resource”

The Biology Department provides a program of support for personal and professional development within the constraints of the mandate we face to teach a large and diverse student body. This support is, in practice, difficult to extend to adjunct faculty due to time constraints on full-time faculty. Faculty are encouraged to teach in their areas of expertise and to develop new course offerings that benefit both the faculty member and the student. Recently we have attempted to strengthen ties to the University of Wyoming, to allow for even more diverse course offerings. We try to remain flexible enough for all teachers to get the academic stimulation they need for teaching.

We collaborate with other departments so that our faculty members can contribute to other programs on campus in which they have expertise. For instance, Sandy Mitchell has been provided the opportunity to teach both Philosophy of Religion and Psychobiology, two areas she has interests in. Sandy Mitchell, Rob Carey, Emma Chaput, and Dee Forrest will participate in the team-teaching of BIOL 1002 with Dave Metz, Craig Thompson, and Steve Brumbaugh. We believe that this flexibility keeps our faculty fresh, motivated, and interested in both teaching and learning.

“The Community is Our Partner”

The Biology Department makes every effort to respond to the community's needs in terms of courses that we offer, in terms of times that we offer courses, and in terms of special workshops, seminars, and events we offer.

Each year the Biology Department hosts the Southwest Wyoming District Science Fair, the largest in the state. This event allows students from as far away as Baggs, Afton, Jackson, Evanston, and all places in between to visit our campus and present the science fair project they have already won awards for at the local level. Winners here then proceed to the State Science Fair in Casper. We commonly have over 230 students from the western part of the state participating in this event.

Biology faculty are often asked to present timely seminars or participate in panel discussions of current affairs. For instance, Rob Carey, Bud Chew, and Sandy Mitchell participated in an "Evening at Western" panel discussion on forensic DNA technology. Rob Carey has also taught classes on genetics for "Free Day", and participated as a judge for the Pinedale Middle School Science Fair. Sandy Mitchell takes guests to view sage grouse leks during free day. Dee Forrest has taught classes on the heart and skeleton for free day. Dee Forrest, Sandy Mitchell, and Bud Chew participated in an "Evening at Western" presentation on stem cell research, GMOs, etc. The biology faculty have also helped with workforce training programs. There are many more examples.

Further, we teach classes that meet the needs of students for a "lab science general education requirement". We also have many short summer courses approved for continuing education credit by the State Department of Education, so that local teachers can attend WWCC to remain licensed in the State of Wyoming. For instance, both Wyoming Flora and Birding have been approved for continuing education credit.

We confer with other departments, particularly the health sciences, to determine not only which courses we need to offer each semester, but also at what times we need to offer them. For instance, Bud Chew offers A&P I and A&P II in 8-week blocks in the spring semester to facilitate application to the nursing program for students in their second year.

"Adapting to Change Defines our Future"

The Biology Program addresses this guiding principle by "providing an environment in which students and staff can adjust positively to change" and by "evaluating and integrating appropriate technology into our institutional processes" (Items 5A and 5C)

The Biology Program has a small but active faculty who routinely attend national and regional conferences, workshops, and seminars in their areas of expertise. Therefore, any recent developments or technologies are continually integrated into the biology classes. For instance, recent changes in the taxonomy of birds and grasses and recent technological advances in molecular biology (DNA extraction and analysis) have been incorporated into appropriate classes.

The Biology Department models "life-long learning" and fosters a culture of continuing education. We all attend seminars, workshops, and conferences in our areas of interest. (For specifics, see the section on professional development). Because scientific knowledge is constantly expanding, we constantly read and research to remain at the forefront of knowledge in our fields. We apply for and receive grants to engage in continuing research. We have received EPSCoR grants to provide our students the opportunity to engage in current research projects. Bud Chew runs an ongoing student research project funded by Wyoming INBRE. We model the principle of life-long learning for our students and expect them to develop similar habits in our classes.

"Ethical Standards Guide Our Actions"

We model ethical behavior for our students, as we feel that “actions speak louder than words.” We do teach the ethical standards of the profession in every class and expect students to adhere to those standards in their dealings with one another, the faculty, and in the work that they perform.

Primary Learning Goals for the Biology Program

Program Level Goals	WWCC College Wide Goals	Assessment for Student Goals
Integrate and synthesize scientific data.	Communicate competently. Solve problems.	Demonstrated improvement in laboratory report quality, including the ability to explain the meaning of statistical test results.
Display an increased proficiency in experimental design and basic laboratory skills.	Retrieve information. Solve problems.	Daily observation and evaluation by instructor.
Demonstrate a collegiate level of proficiency with the concepts of human biology.	Communicate competently. See issues from multiple perspectives. Solve problems.	Written assignments and exams. Implementation of standardized pre-/post-content assessment.
Demonstrate a collegiate level of proficiency with the concepts of ecology, evolution, genetics, and molecular biology.	Communicate competently. See issues from multiple perspectives. Solve problems.	Written assignments and exams. Implementation of standardized pre-/post-content assessment.
Demonstrate improved proficiency in computer usage, including word processing and spreadsheet programs, reading biology textbooks and articles, and preparing formal laboratory reports.	Communicate competently. Develop life skills. Retrieve information. See issues from multiple perspectives.	Continued use of standardized syllabi and a variety of assignments to improve continuity throughout the department’s offerings.

BIOLOGY PROGRAM REVIEW SECTION II
A. Enrollment and the Audience of the Biology Program

The Biology Program serves local, Outreach and Internet students. Tables 1 summarizes changes in enrollment in the Biology Program over the past 7 academic years (AY) in terms of annualized FTE and percent of change from AY to AY. Table 1 and the graphs on the following pages show that major changes are:

- Biology Program percentage of total FTE has remained fairly constant.
- Biology Program total FTE increases and decreases mostly reflect increases and decreases in total WWCC enrollment.
- New format offerings (Internet classes) have resulted in FTE category enrollment changes.
 - As full time local faculty teach Internet classes, fewer on campus sections of the same classes can be offered by those faculty members. This is reflected by a slight decrease in local FTE and a large increase in Internet FTE.
 - Drop in Outreach FTE is likely also due to the Outreach audience switching to Internet classes taught by full time local faculty.
 - Reaching the on line audience with courses taught by full time local instructors has been successful with a 55% increase in FTE in the online enrollment between AY06-07 and AY 07-08. It would seem that this is a receptive audience that might be even better served with more online classes.

Table 1. Annualized FTE Enrollment Statistics for the Biology Program for Academic Years (AY) 01-02 to 07-08.

	AY 01-02	AY 02-03	AY 03-04	AY 04-05	AY 05-06	AY 06-07	AY 07-08
Local FTE	94.92	120.09	116.38	121.92	114.37	90.84	71.85
Outreach FTE	22.67	22.34	24.67	20.33	21.50	23.16	11.01
Internet FTE	0	0	0	0	0	20	30.85
Total Biology FTE	117.57	143.43	141.05	142.25	135.87	134.00	114.80
Total College FTE	1783	1889	1982	2111	2215	2146	2041
Biology FTE as % of Total College FTE	6.6	7.59	7.12	8.74	6.13	6.24	5.61
% change from AY to AY in total Biology FTE	Not available	21.97	-1.66	.85	-4.48	-1.37	-14.48

PLEASE NOTE THAT PRIOR TO 2006, INTERNET COURSES TAUGHT BY FACULTY AT THE ROCK SPRINGS CAMPUS ARE INCLUDED IN THE "LOCAL" FIGURES BY THE REGISTRAR. DR. MITCHELL HAS BEEN TEACHING BIOLOGY 1010 ONLINE SINCE 1997, AND THE BIOLOGY DEPARTMENT HAS A PROUD TRADITION OF ONLINE EXCELLENCE.

See Appendix A3 for attendance figures.

B. Evaluation of Facilities and Equipment

A. Facilities

The biology department currently utilizes 4 lab rooms:

1) Room 2030 is our largest lab, capable of holding labs of 24 students comfortably. This lab is used for General Biology (usually labs at capacity), Animal Biology (usually over the capacity of 24), and Plant and Fungal Biology (usually lower number of students, but the lab is directly across the hall from the Greenhouse, which is shared space for the Biology department and Physical Plant). It has also been used for Microbiology and Anatomy and Physiology at times, due to its size, and is also routinely used as a classroom. The lab is reasonable in size, although the adjacent prep room is too small to house the equipment and supplies for the multiple uses of this lab. Another problem with the lab is the lack of adequate heat in winter, largely due to windows that don't close properly.

2) Room 1306 is our Microbiology and Anatomy and Physiology lab. It can hold 16-20 students comfortably, and has an adjacent prep room. The lab is adequate, although the biology department has been requesting for several years to remove the teacher's platform at the front of the lab to no avail. The major problem with this lab is its size, which limits us to 20 students. Both Microbiology and A&P could have larger lab sections, if the physical space allowed.

3) Room 1441 is the Advanced Science lab. This lab was formerly underutilized as the Analytical Chemistry lab. It is a small lab, capable of housing labs of a maximum of 16 students. This lab is used for our Current Topics in Biology lab, which has had smaller lab sections, but is a course that is rapidly gaining popularity among non-science majors. The Advanced Science Lab also houses some of our newest cell biology/genetics equipment (thermocycler, sterile hood, etc.), so labs in General Biology or other courses that will use this equipment use this space.

4) Room 1307 is the Advanced Life Science lab. It formerly housed Western's now defunct Radiology program. Its primary purpose is to house our INBRE (Idea Network for Biomedical Research Excellence) program and Introduction to Research classes, but is also used for A&P or other labs that wish to utilize the equipment in the lab. It also has a small

conference area that serves as a meeting place for the biology department, and the office for one faculty member (Dr. Bud Chew). The room also has a small animal holding facility. This lab is small, and therefore is only occasionally used as a lab for classes.

In general, there are three major shortcomings of our facilities:

- 1) Lack of adequate storage space, preferably in a centralized location so equipment and supplies could be shared.
- 2) Insufficient number of large labs. Only the General Biology lab (room 2030) is large enough to hold 24 students. Scheduling for this lab has necessitated creative solutions, such as holding labs on Monday or Wednesday afternoons. This creates scheduling conflicts for students, forcing students to choose between the open lab section and another course they need. With five full time faculty members, and usually one part-time lab instructor, we simply need more large lab spaces.
- 3) Layout of current labs is inflexible. Ideally, we would have pentagonal or hexagonal movable workbenches, which would allow for better group work. The workbenches could have a sink, gas and electric and storage space for microscopes, computers, and supplies. In this way, we could move students in and out of groups as needed.

The only comprehensive solution to the first two problems is to build a new science facility, with a large, centralized storage facility for biology and chemistry. This facility should have 2 or 3 biology labs capable of comfortably holding labs of 24 students, as well as several smaller labs. It should also have research labs, since a number of our science faculty either currently perform research, or may begin to do so in the future. Faculty research inevitably affords student research opportunities, as well as equipment enhancements and faculty professional development.

The layout problem could be addressed by re-modeling existing labs.

B. Equipment

The Biology department has made major improvements in our equipment inventory in recent years:

- 1) Both the General Biology lab and the A&P lab now have laptop computers (approximately 1 computer for each 2 students), with Internet access and a wireless printer. The department has purchased numerous software programs to allow for graphical analysis of data, statistical comparisons, ecology simulations and modeling, and genetic investigations.
- 2) Twelve dissecting microscopes have been added, primarily for use in General Biology, Animal Biology, and Plant and Fungal Biology. Along with some major maintenance on our compound microscopes, we now have a good array of functional microscopes on our

campus. We also have access to UW's Microscopy Center for SEM, TEM, and confocal microscope requirements, but this opportunity is not widely utilized.

3) Cell biology/Microbiology/Genetics equipment has also been added, and is used in our General Biology and Microbiology classes. This equipment includes a thermocycler, sterile hood, and other equipment used in these fields. We also recently replaced our old and inadequate autoclave, as well as adding a good power supply for electrophoresis.

4) In A&P, we have replaced numerous old and broken models, as well as stethoscopes and blood pressure cuffs. We are currently requesting funds to purchase 4 or 5 digital physiological data acquisition systems, which will allow us to perform 20 or so new physiology labs. The Exercise Science department allows us to use their metabolic cart for pulmonary function and metabolic gas analysis labs, and the equipment in the Advanced Life Science lab is used for Langendorff heart and baroreflex labs, as well as a high performance liquid chromatography lab.

The lab facilities have also benefited from new chairs in the Advanced Science lab, and new window shades in the General Biology lab.

Our equipment advances have been a major reason why we can now offer much better, more modern labs than just a few years ago.

C. Evaluation of website and printed materials

The website materials for biology are adequate, but somewhat dated in the sense that we need to add our new faculty members to the list of contacts. Neither Rob Carey nor Emma Chaput is listed as faculty who can be contacted. It might also pay to add more detail to our course descriptions, such as when courses are offered. The catalog offers such details, but the website could benefit by duplicating this information. More importantly, we should also devote some coverage to the INBRE program and the benefits it provides students, allowing for undergraduate research and future opportunities at the University of Wyoming. We might also suggest which faculty members could be contacted for more information about their particular area of expertise or interest.

The print brochure for the biology program is adequate.

D. Staffing

Current teaching loads among biology faculty are very high, with all full-time faculty either at the upper limit of a normal load, or on overload. The addition of the Critical Science Skills course has made this problem worse. For example, here are the course loads of full-time biology faculty for 2009-2010:

Rob Carey:

Fall 2009 total (15.6 – not including 4 credit course taught for UW outreach)

Biol 1010	4.2 credits
Biol 1010	4.2 credits
Biol 1010	4.2 credits
Biol 1009	3 credits

Spring 2010 total (15.6)

Biol 1010	4.2 credits
Biol 1010	4.2 credits
Biol 1010NT	4.2 credits
Biol 1009	3 credits

TOTAL: 31.2 credits

Emma Chaput:

Fall 2009 total (16.8):

Biol 1003	4.2 credits
Biol 1003	4.2 credits
Biol 1003	4.2 credits
Biol 2010	4.2 credits

Spring 2010 total (16.8):

Biol 1003	4.2 credits
Biol 2015	4.2 credits
Biol 2010	4.2 credits
Biol 2015	4.2 credits

TOTAL: 33.6 credits

Bud Chew (Division Chair;1/2 load):

Fall 2009 (4.2):

Biol 2010	4.2 credits
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Spring 2010 (12.6):

Biol 2010	4.2 credits
Biol 2015	4.2 credits
Biol 1390	4.2 credits

TOTAL: 16.8 credits

Dee Forrest:

Fall 2009 (15.6)

Biol 2010	4.2 credits
Biol 2010	4.2 credits
Biol 2010NT	4.2 credits
Biol 1009	3 credits

Spring 2010 (16.8)

Biol 2015	4.2 credits
Biol 2015	4.2 credits
Biol 2015NT	4.2 credits
Biol 2022	4.2 credits

TOTAL: 32.4 credits

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Sandy Mitchell:

Fall 2009 (17.6)

Biol 1010	4.2 credits
Biol 1010	4.2 credits
Biol 1010NT	4.2 credits
Biol 1009	3 credits
Peac course	2 credits

Spring 2010 (17.6)

Biol 1010NT	4.2 credits
Biol 1003	4.2 credits
Biol 2400	3 credits
Biol 2410	2 credits
Molb 2210	4.2 credits

TOTAL: 35.2 credits

From the above data, the average load for a biology faculty member is ~104% of maximum load. The normal load range for WWCC faculty is between 28 and 32 credits. Thus, biology faculty are consistently at the upper limit of a normal load, or are on overload. The problem is even worse than it seems, as biology faculty are not given full credit for the time they spend teaching laboratories. Science faculty are only credited with 0.6 hours of load for every hour spent in lab. Thus, a lab course, which would constitute five credits if fully counted, is only counted as 4.2. This method of assigning credit is ironic, as lab is far *more* time consuming than class as far as preparation and grading. The reason that lab credit is assigned in this grossly unfair manner is apparently to avoid the cost of hiring additional faculty.

Biology 1009 and the proliferation of online courses have made load issues more concerning. Biology 1009, while a valuable endeavor, has added 4 additional classes per year to be taught by biology faculty. The faculty have been team teaching (with only one getting load credit)

to try and ease the burden. Online courses are far more time intensive (particularly if they involve a lab) than onsite courses. This additional effort is not rewarded with additional load credit. As the demand for online offerings increase, the demands on the time of biology faculty will pass the breaking point.

A temporary solution to this load issue would be to hire an additional faculty member (in the chemistry program) that could also teach 1009. Even so, the unfair assignment of lab credit is an issue that deserves further attention.

E. Learning pathways within the Biology Program

Course #	PG1: Integrate and synthesize scientific data.	PG2: Display an increased proficiency in experimental design and basic laboratory skills.	PG3: Demonstrate appropriate level of proficiency with human biology.	PG4: Demonstrate appropriate level of proficiency with ecology, evolution, genetics, and molecular biology.	PG5: Illustrate support for and collaboration with institution-wide goals of computer use, reading, and writing across the curriculum.	GSS1: Communicate competently.	GSS2: Retrieve information.	GSS3: See issues from multiple perspectives.	GSS4: Solve problems.	GSS5: Develop life skills.
BIOL 1002*	X	X			X	X	X	X	X	X
BIOL 1003*	X	X			X	X	X	X	X	X
BIOL 1010*	X	X		X	X	X	X	X	X	X
BIOL 1210		X		X				X		X
BIOL 1220		X		X				X		X
BIOL 1390	X	X				X	X		X	X
BIOL 2010*	X	X	X		X	X	X		X	
BIOL 2015*	X	X	X		X	X	X		X	
BIOL 2022*	X	X		X	X	X	X		X	
BIOL 2023*	X	X		X	X	X	X		X	
BIOL 2080*	X	X	X		X	X	X		X	X
BIOL 2310	X	X			X	X	X	X	X	X
BIOL 2390	X	X	X			X	X	X	X	X
BIOL 2400	X			X	X	X	X	X	X	
BIOL 2410	X	X		X		X	X		X	X
MOLB 2210*	X	X	X	X	X	X	X		X	
* COURSE INCLUDES LAB COMPONENT										

F. Professional Activities of Biology Department Faculty

Dr. Robert Carey

- Member of the American Society of Plant Biologists
- Member of the Society of Molecular Biology and Evolution
- Led student research in evolutionary genetics and bioinformatics using funding from Wyoming EPSCoR grants in the summer of 2008 and 2009
- Developed and taught LIFE 3050 (Genetics) for University of Wyoming outreach
- Published original research in the Annals of Botany (London)
- Attended INBRE research retreat 2008
- Participated in student journal club discussions
- Peer reviewer for the journal Protoplasma
- Taught 5 lectures and a lab for Biology 1002 – “Discovering Science”
- Serves/participates in promoting the vital few for student learning through leading faculty sessions on how to use reading and writing to engage students in content.

Emma Chaput

- UW courses (Evolutionary Biology; Pathophysiology) in 2007 and 2008
- Wyoming K-16 Statewide Life Sciences Summit, 2008 and 2009
- INBRE Regional Meetings, 2008-2009
- Working with UW sponsored group developing and assessing Scientific Literacy and the impact of Affective Domain on science teaching and learning
- Member of the American Public Health Association

Dr. Bud Chew

- INBRE grant research every year. We recently received a favorable score for INBRE-2, which should allow us 5 more years of funding.
- Presentations at Experimental Biology every year from 2003-2007.
- Presentation at CUR (Council of Undergraduate Research) national meeting in summer 2008.
- Member of APS, CUR, and HAPS (Human Anatomy and Physiology Society)
- Reviewer of Anatomy and Physiology Revealed, V 2.0. Ongoing work with McGraw-Hill in development of digital media products for Anatomy and Physiology.

Dee Forrest

- belong to HAPS and attended HAPS national convention for 3 of the past 5 yrs.
- took class on how to teach an NT class(the one you're in)..that developed my professional patience
- attended the state Outreach/NT convention meetings.
- learned how to incorporate podcasts into my personal WEBpage which involved learning how to work in the MAC environment
- learned many new software programs in conjunction with the NT class
- attended our state Biology articulation meetings for all but one year to meet with UW, and colleagues to ensure our classes are equivalent and get new ideas on how to assess, etc.
- academic leave to research and develop an on-line AP 1 and 2 lecture/lab class and research and development of an Animal Biology class.
- Presenter Red Desert Trauma Conference for 3 summers.
- Instructor of Cardiovascular Unit for RS District 1 Firefighters
- Webinar through McGraw Hill on presenting Internet Courses
- Member of AAAS
- Director of Regional Science Fair

Dr. Sandy Mitchell

- Became a Master Gardner's program to enhance my ability to field the unending series of public questions about insect pests and plant diseases
- Taking Ornithology course from Cornell Laboratory of Ornithology
- Engaged in on-going study of Joyce Creek sage grouse lek
- Engaged in on-going study of nightjars in Sweetwater County
- Participated in annual "Free Day" at WWCC, an effort to bring community members on campus for several years since the last program review.
- Took Drift boat fishing
- Taught five lectures, four labs in Discovering Science
- Taught extra course Hike-Camp-Fish for two of the past three years, only missing the year I had surgery for breast cancer.
- Participated in 4,5,6, and 7th Annual International Online Conference for Teaching and Learning
- Attended a webinar series entitled Understanding the Millenials and Neo-millenials.
- Was named "Master Distance Educator of the Year" by WWCC in 2005.
- Attended WyDEC (Wyoming Distance Education Conference) in 2005 and 2006.
- Presented a workshop on Using Course Genie to Develop Online Courses at WyDEC in 2006.
- Attended Great Salt Lake Bird Festival in 2005, 2006, and 2009.
- Attended state biology articulation meetings in 2006 and 2009. This meeting brings together biologists from all the state's community colleges and the University of Wyoming to discuss common problems and issues and to allow for enhanced communication and collaboration between the faculty at different institutions.

G. Implementation of Suggestions from Previous Program Review

1) The Biology department needs to have improved communication with Outreach instructors in order to have more consistency between the courses taught by Outreach and those taught on campus. Teleconferencing or videoconferencing would minimize productive time lost to travel yet still provide face-to-face interactions.

Communication with outreach instructors is better, but could still be improved. All new qualified outreach instructor applications are reviewed by the department faculty and interviews are now conducted.

2) The Biology department needs to review all syllabi from Outreach each semester to ensure that these instructors are aware of new curriculum or changes in the old curriculum.

Standardized syllabi are now provided for outreach courses. These syllabi were prepared by the full time biology faculty. There is no system to ensure their use.

3) The Biology department needs to network with members of other departments such as Outdoor Recreation and Western American Studies to recruit more students for its classes such as Birding, Flora, and Natural History.

The Outdoor Recreation program no longer exists.

4) The Biology department needs to have better communication both within the department itself and with other departments to ensure that classes are offered at optimal times for students to enroll.

This is still a concern, but we still make an effort to offer courses at convenient times for students. Scheduling processes have been and continue to be problematic across disciplines.

5) The Biology department desperately needs additional storage space for lab supplies and materials. We could best serve our students by having a classroom dedicated to biology, anatomy and physiology, exercise physiology and exercise science classes. With such a classroom we could build shelves for display models and mannequins and greatly reduce the wear and tear on our supplies. This would also alleviate some of the shortage of storage space we currently face in the labs, Rooms 2030 and 1306. Perhaps Room 2025 would be a suitable classroom that could be shared by several departments, but that could be secured for classroom supplies.

This is still a **major** problem. Please see the review of facilities for a summary.

6) The Biology department needs to investigate the possibility of offering more of its courses in non-traditional formats.

A&P is now offered online. The biology department will continue to offer as many courses as possible in non-traditional formats. This includes our new course, Critical Science Skills.

7) The Biology department needs to continue its tradition of working with other departments to meet the changing needs of the college and the community.

We have continued this effort. Interdepartmental courses, including the Hike-Camp-Fish course (PEAC 1309), Discovering Science (Biology 1002) course, and Critical Science Skills (Biol/Chem 1009) exemplify this department's commitment to interdepartmental collaboration.

8) We desperately need more storage space. Both prep rooms are so crammed with supplies that they are probably not really safe. It is becoming increasingly difficult to find supplies and organize materials, much less add new activities to the students' learning repertoire.

Again, this is a **major** concern. Without proper laboratory and storage space, the students' experience suffers and the breadth of experience we can offer is limited.

9) We need a data projector and screen or, preferably, a Smartboard dedicated to the Biology Department. We currently use a Smartboard that is moved about on the second floor. This is not working out well, as it is only functional about 50% of the time we are relying on it to use in our classes. Apparently, moving it around creates problems. Some people who are not properly trained appear to have attempted to disconnect the Smartboard from the computer and literally ripped out the serial port connection on the Smartboard. This has been a recurring problem; we think it is imperative to have reliable up-to-date tools to teach our classes efficiently and effectively.

These needs have been addressed by the installation of data projectors in all of the classrooms used heavily by biology faculty.

10) We would like to have at least one digital camera attached to a microscope and computer. This would allow us to teach students the skills involved in uploading photomicrographs. It would allow students to design web pages with biological information useful for teaching future classes.

We now have this capability.

11) Equipment needs:

- a) Two human skeletons with origin and insertion of muscles marked (\$1849 apiece)*
- b) Software and hardware to allow physiological and ecological data to be collected, uploaded, and analyzed (Computer-Based-Learning Systems)*
- c) Statistical analysis software and graphing software in the labs to teach students the rudiments of data presentation*
- d) Another color-coded skull (\$498.75) for a total of three*
- e) An additional set of disarticulated bones (\$384.30) for a total of three*
- f) Another disarticulated skull (\$498.75) for a total of two*
- g) Another set of mannequins (Torso - \$4400; Arm - \$970; Leg - \$1125); presently we have one full torso, two partial torsos; three arms and three legs.*
- h) Another set of plant and animal cell models (\$200) for a total of two each.*

We have obtained this equipment and put it to good use.

12) We need a computer for every student to ensure that everyone gets hands-on experience with the procedures and research methods we employ. We would like to purchase 12 PCs and 12 Macintosh laptops and have Internet access for every student in the labs.

Both the A&P and General Biology labs are now equipped with tablet PCs for student use. This is an excellent resource for the students.

13) We need funds to travel to regional and national conferences on a regular basis.

More funding of this type is still desirable.

Section III

Part A: Assessment Reporting of the Biology Program

1. Integrate and synthesize scientific data.

a. Common lab rubric – A common rubric (See Appendix A.1) will be used to evaluate the students' ability to integrate and synthesize scientific data. This will be used in conjunction with a lab that is common to all instructors' Biology 1010 courses. For a first attempt, will we use this common rubric to evaluate students' performance in our "Scientific Method" lab.

Criterion for success: Our objective is a 70% pass rate (70% of students score 70/100 or higher) using the rubric.

b. Other subjective measures – Instructors will evaluate the students' ability to explain experimental processes and evaluate the meaning and significance of results (using statistical tests).

Criterion for success: Improvement through the semester's lab work.

2. Display an increased proficiency in experimental design and basic laboratory skills.

a. Common lab rubric – A common rubric (See Appendix A.2) will be used to evaluate the students' proficiency in basic laboratory skills. This will be used in conjunction with the microscopy lab that is common to all instructors' Biology 1010 courses. The rubric would be used early in the semester and again at the end.

Criterion for success: Our objective is a 70% pass rate (70% of students score 10/14 or higher) using the rubric. We would expect a 20% increase in pass rate at the end of the semester.

b. Other subjective measures – Instructors will evaluate the students' ability design experiments and execute basic tasks in the biology lab.

Criterion for success: Improvement through the semester's lab work.

3. Demonstrate a collegiate level of proficiency with the concepts of human biology.

Implementation of standardized pre/post test questions to assess content proficiency – A common set of pre and posttest questions will be given in Anatomy and Physiology I covering basic and essential concepts of human

biology. Scores will be evaluated as a group at the beginning and end of the semester. Data will not be paired.

Criterion for success: Our objective is a 70% pass rate (70% of students score 70% or higher on the common questions) at the end of the semester. Demonstrable improvement in scores from pre to post testing will also be an objective.

4. Demonstrate a collegiate level of proficiency with the concepts of ecology, evolution, genetics, and molecular biology.

Implementation of standardized pre/post test questions to assess content proficiency – A common set of pre and post test questions will be given in Biology 1010 covering basic and essential concepts of ecology, evolution, genetics, and molecular biology. Scores will be evaluated as a group at the beginning and end of the semester. Data will not be paired.

Criterion for success: Our objective is a 70% pass rate (70% of students score 70% or higher on the common questions) at the end of the semester. Demonstrable improvement in scores from pre to post testing will also be an objective.

5. Demonstrate improved proficiency in computer usage, including word processing and spreadsheet programs, reading biology textbooks and articles, and preparing formal laboratory reports.

a. Common lab rubric – A common rubric (See Appendix A.1) will be used to evaluate the students' ability to integrate and synthesize scientific data. This will be used in conjunction with a lab that is common to all instructors' Biology 1010 courses. For a first attempt, will we use this common rubric to evaluate students' performance in our "Scientific Method" lab.

Criterion for success: Our objective is a 70% pass rate (70% of students score 70/100 or higher) using the rubric.

Part B: Strengths, Limitations, and Opportunities of the Biology Program

A. STRENGTHS

1. Improved connections with University of Wyoming and state community college biology colleagues.
 - a. Sandy Mitchell, Bud Chew, Dee Forrest, and Emma Chaput have all participated in articulation conferences with biology colleagues throughout Wyoming.
 - b. LIFE 3050 (Genetics) now taught by Rob Carey in Rock Springs through the UW outreach school.

2. Bud Chew works with colleagues in Laramie and throughout the state via his INBRE research
3. Improved connections with Wyoming K-12 SMET colleagues
 - a. Regional science fair
 - b. Activity in the Wyoming School-University Partnership
 - c. Local RSHS and Lyman HS teachers and Advanced Placement students attend hands on labs at WWCC.
 - d. Senior Day attracts many students to a variety of Biology classes, including Anatomy & Physiology
4. A diverse and qualified set of fulltime faculty, all with excellent credentials and a variety of academic specialties from physiology to ecology to public health and genetics.
5. New field ecology and molecular biology equipment allows for modern and high-quality teaching lab experiences.
6. An increased percentage of biology offerings are now taught by fulltime faculty, owing to expansion of faculty positions in the department.
7. Improved screening of adjunct hires has improved the quality of courses offered by adjunct faculty.
8. The development of BIOL 1009 (Critical Science Skills) will allow for a better educational experience for under prepared students. This will also likely reduce attrition rates in Biology 1010.
9. The offering of Genetics through UW outreach has opened to door to offering more upper-level courses to students in Sweetwater County.
10. The interdisciplinary honors course (BIOL 1002 – Discovering Science) in which Emma Chaput, Sandy Mitchell, Dee Forrest, and Rob Carey participated was a great success.
11. Enrollment is quite stable, even during the economic “boom”.
12. Our department, with the addition of Anatomy and Physiology online continues to offer a diverse and high-quality array of online offerings.

B. LIMITATIONS

1. Physical space of laboratories and storage areas (see Section II)
2. Configuration of lab space (see Section II)
3. Lab load calculations are unfair and lead to overburdening of instructors’ time.
4. Online load calculations are unfair and lead to overburdening of instructors’ time.
5. Very high frequency of under prepared students.
6. Faculty loads are high. Critical science skills and upper level courses exacerbate this problem.

C. OPPORTUNITIES

1. Continue to improve connections with UW and the outreach school
2. Enhance relations with K-12 educators through K16 programs, the School University Partnership, local outreach, and the science fair.
3. Continue to articulate with adjuncts.
4. Furnish more tablet computers for use in the biology labs.
5. Improve lab space and configuration.

PART C: Action Plan of the Biology Program

First Year, 2009-2010			
Task or Action	Purpose	Measure of Success	Responsible Party
Begin gathering assessment measures data of program learning goals	Assess whether or not students are achieving the program learning goals	As detailed in Section III, Part A, improvement in pre/post tests and achievement on par with Wyoming state levels of science preparedness	Full-time Biology program faculty
Implement Biology 1009, Critical Science Skills	Attempt to meet the needs of students under prepared to succeed in Biology 1010	Successful development of the course materials and 2 semesters of team taught courses	Full-time Biology program faculty
Tasks Dependent on Funding (provide estimated cost)	Data to Justify Need, and Consequence of Not Funding		Responsible Party
Update lab facilities, as described in Section II, Part B Estimated cost: \$10K-\$200K	For justification, refer to the shortcomings described in Section II, Part B Consequence of not funding: class sizes limited by space; diminished ability to encourage collaboration among students in lab courses; challenges in lab organization and lab preparation, reducing learning opportunities for students; limited faculty research opportunities		WWCC administration (Chair, VP, and Pres) and state are responsible parties; state and outside grants are potential sources of funding

Second Year, 2009-2010			
Task or Action	Purpose	Measure of Success	Responsible Party
Continue gathering assessment measures data and begin analyzing data from 2010-2011	Assess whether or not students are achieving the program learning goals	As detailed in Section III, Part A, improvement in pre/post tests and achievement on par	Full-time Biology program faculty

		with Wyoming state levels of science preparedness	
Begin to analyze impact of Biology 1009, Critical Science Skills	Quantify the impact of Biology 1009 on first year of students, to assess success of the course	Compare success rates in Biology 1010 (defined as completion of course with a C or better in Biology 1010) between students who completed Biol 1009 in AY 09-10 to those who would have placed into Biol 1009 in previous years (AY 07-08 and AY 08-09)	Full-time Biology program faculty
Tasks Dependent on Funding (provide estimated cost)	Data to Justify Need, and Consequence of Not Funding		Responsible Party
None			

Third Year, 2011-2012			
Task or Action	Purpose	Measure of Success	Responsible Party
Consider appropriate program changes based on data gathered and analyzed during AY 09-10 and 10-11	Ensure that the Biology Program is adhering to the College's guiding principle of "Adapting to Change" by using teaching methods that ensure high quality and rigorous science instruction	As detailed in Section III, Part A, continued improvement in pre/post tests and achievement on par with Wyoming state levels of science preparedness	Full-time Biology program faculty
Continue analysis of the impact of Biology 1009, Critical Science Skills	Quantify the impact of Biology 1009 on students, and if needed, adapting	Continue to compare to success rates in Biology 1010 between	Full-time Biology program faculty

	the course with the goal of better preparing students to succeed in Biology 1010	students who completed Biol 1009 in AY 09-10 and AY to those who would have placed into Biol 1009 in previous years (AY 07-08 and AY 08-09)	
Tasks Dependent on Funding (provide estimated cost)	Data to Justify Need, and Consequence of Not Funding		Responsible Party
Build a new science facility. Approximately \$26 Million			WWCC administration (Chair, VP, and Pres) and state are responsible parties; state is the only likely source of funding

Appendix A1 - General Lab Rubric

General Lab Rubric					
Component of Lab Report	Criteria			Value	
	2	4	8	10	Points Earned
Format	Does not follow format or lacks two or more of the elements or has almost everything in the wrong place.	Lacks two of the elements or has multiple things in the wrong place.	Lacks one of the elements or has one thing in the wrong place.	Contains all headings, properly labeled. Contains all necessary elements in correct order and with correct information under each heading: title, author, abstract, introduction, materials and methods, results, discussion, references.	
Introduction	Provides no background information.	Presents lead-in but uses no references.	Presents lively lead-in but uses inappropriate references or incorrectly cites them.	Presents a concise and engaging lead-in to the problem, using appropriate background references	

				and properly cites them.	
Hypothesis	Does not state hypothesis.	States hypotheses incorrectly.	Does not state both null and alternative hypotheses.	Correctly states null and alternative hypotheses using language of discipline	
Materials and Methods	Not sequential, uses recipe approach, or is missing steps.	Most steps are confusing or lack detail.	Presents steps in logical order but may have done something wrong procedurally.	Presents logically ordered steps in proper format	
Results	Results are incorrectly presented and are incomplete.	Results section is so poorly written as to have no meaning.	Results are either correctly or completely presented, but not both.	Results are correctly and completely presented.	—
Statistical Analysis	Results are incorrectly presented and interpreted and language is not used properly.	Results of the statistical analysis are correctly presented or interpreted but not both and language is not used properly.	Results of the statistical analysis are correctly presented and interpreted but the language of the discipline is not	Results are correctly presented and interpreted using the language of the discipline.	—

			used properly.		
Tables	Tables are absent or present incorrect data.	Table are present but are uninterpretable.	Tables lack one or two proper labels	Tables are correctly presented with all columns and rows correctly and completely labeled.	—
Figure	Figure is absent or presents incorrect data.	Figure is present but is uninterpretable.	Figure lacks one or two proper labels.	Figure is correctly presented with elements correctly labeled.	—
Conclusion	Conclusion is incorrect and language is so poorly used it is uninterpretable or ambiguous.	Conclusion is incorrect or language is so poorly used it is uninterpretable.	Conclusion present but no reference to background info is made	Presents a logical explanation using the language of the discipline and presented in context of background	—
Grammar and Spelling	Very frequent spelling and/or grammatical errors are present	More than two spelling or grammatical errors are present.	Only one or two spelling or grammatical errors are present	All grammar and spelling are correct.	—
Total					

Appendix A2 - Microscope Rubric

Demonstrate freshman/sophomore college level lab technique in General Biology using the microscope

Microscope Use Rubric

Starting out on scanning power with stage and lens as close together as possible 1 pt.	
Starting out with condenser and diaphragm wide open (and light adjustment reasonable) 1 pt.	
Finding object on scanning power 1 pt.	
Centering object on scanning and getting it in good focus before moving on 1 pt.	
Focusing on low power 1 pt.	
Focusing on high dry power 1 pt.	
Putting oil on scope at proper time and properly (not raising lens or lowering stage or vice versa when doing so) 1 pt.	
Focusing with oil immersion lens 1 pt.	
Cleaning scope properly (includes removing oil from objectives) 1 pt.	
Putting lens back into position with scanning objective in place and lowered all the way 1 pt.	
Turning off all lights 1 pt.	
Wrapping cord around scope tightly 1 pt.	
Putting cover back on scope 1 pt.	
Replacing in cabinet properly 1 pt.	

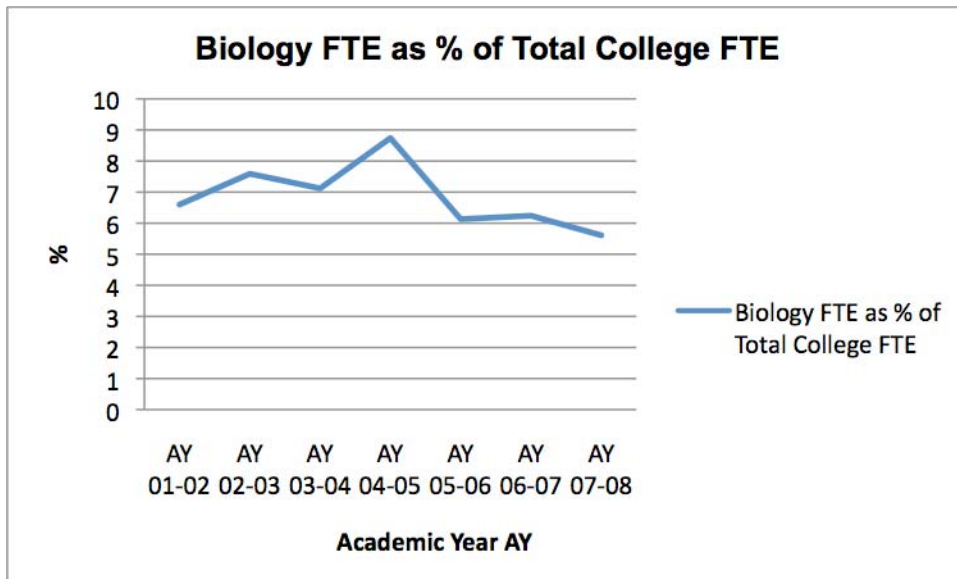
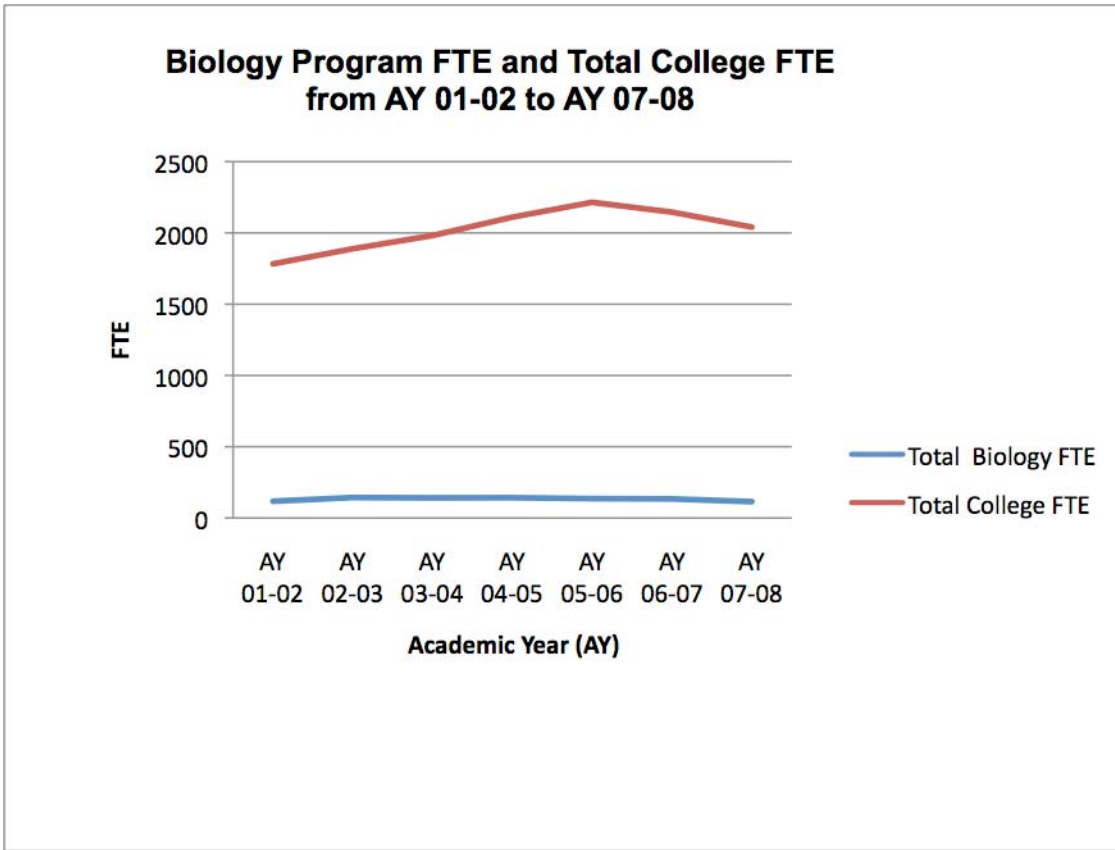
Skill
instructor

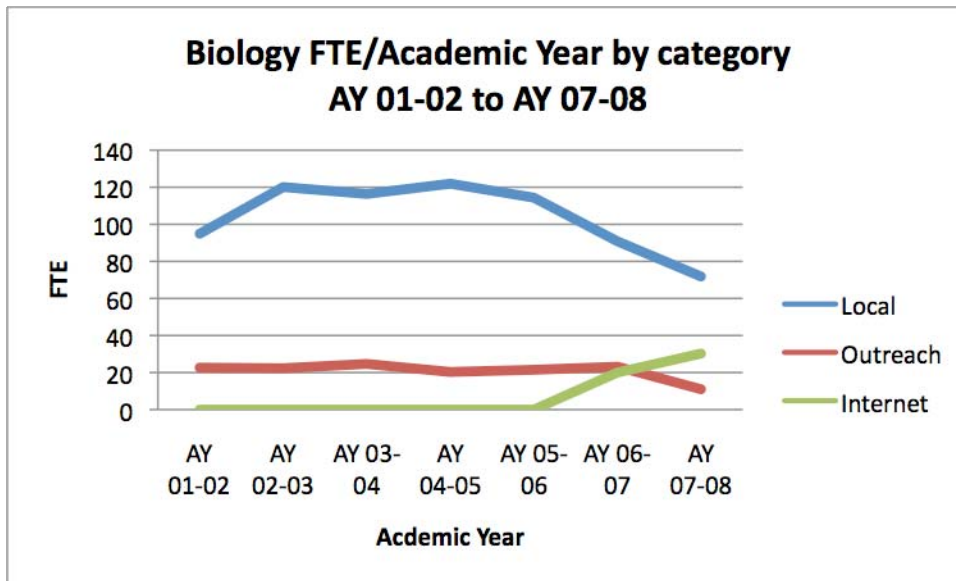
Points given by

Passing at 70%=demonstrating successfully 10/14 skills.

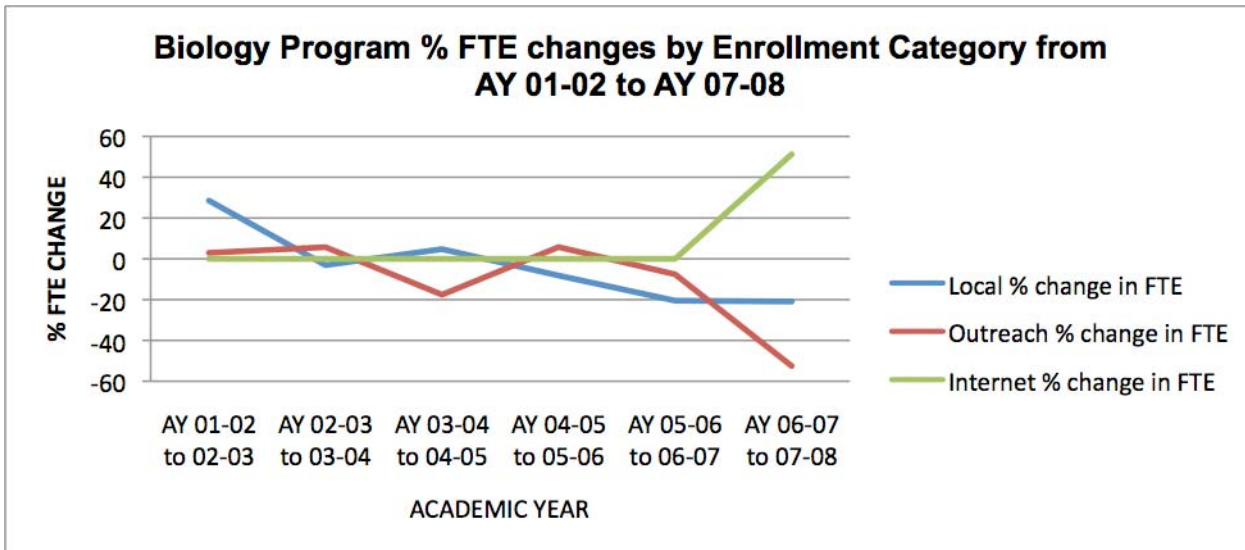
We would give this assessment during the first 3 weeks of lab after students have been taught proper use and record the % of the class who pass at 70% or higher. We would give it again at the end of the semester. We would consider a 20% increase in pass rate successful.

Appendix A3 - Attendance Charts





Note that as local and Outreach FTE decrease , Internet FTE increases.



Note that as local and Outreach FTE decrease , Internet FTE increases.

**Biology Program Total % change in FTE from
AY 01-02 to AY 07-08**

