INSTITUTIONAL ASSESSMENT REPORT

BIOLOGY / 2013

Department's Relationship to the College Mission and Strategic Plan
(completed Spring semester or on accreditation cycle)

In a paragraph or two, discuss how the department's work carries out the Mission and Strategic Plan.

The Biology Department reflects the mission of Jefferson College as *a student-centered comprehensive community college, committed to providing an accessible, quality college experience as it strives to meet the diverse needs of the students and the community.* Full-time faculty members offer a variety of entry-level classes on several campuses and online. Evening and weekend classes expand the traditional daytime class schedule to provide opportunities for students who might otherwise be unable to further their education. Online and hybrid courses provide additional flexibility for today's learner.

The Biology Department offers *a strong general education curriculum, college transfer and technical programs, personal enrichment courses, and on-campus experiences that prepare students to succeed in their careers, further their education, and prosper in a diverse world.* A number of biology courses satisfy the General Education requirement to "analyze scientific and mathematical concepts and their uses and impact in the modern world."

These general education courses include:

BIO101 General Biology
BIO102 Concepts in Biology
BIO109 Ecology and Environmental Conservation
BIO113 Microbiology for the Health Sciences
BIO205 General Botany
BIO206 General Zoology
BIO207 Vertebrate Anatomy
BIO211 Anatomy and Physiology I

Upper-level biology courses that can be transferred as part of an Associate's Degree include:

BIO208 Vertebrate Physiology
BIO212 Anatomy and Physiology II
BIO245 Pathophysiology

The Biology Department also offers a number of courses that support other programs on campus:

BIO113 Microbiology for the Health Sciences
BIO116 Anatomy and Physiology for Pre-Hospital Healthcare
BIO207 Vertebrate Anatomy
BIO208 Vertebrate Physiology
BIO211 Anatomy and Physiology I

BIO212 Anatomy and Physiology II
BIO245 Pathophysiology

Many activities of the Biology Department align with the priorities of Strategic Planning as follows. Other opportunities for alignment are addressed later in this document.

Student Learning

The Biology Department delivers "a high quality, consistent, rigorous education to all students." Instructors who teach different sections of the same course use the same textbook. Many sections are assessed through multi-section assessment to ensure that the courses are equivalent. Moreover, instruction is delivered "flexibly to meet the learning and scheduling needs of our students" since basic courses taught by full-time faculty are offered on more than one campus, as well as in online or hybrid formats. The Biology Department offers an honors course to "address the needs of high-achieving students."

Student Support

By offering courses on non-traditional schedules and in online or hybrid format, the department "provides educational services and resources that meet the evolving needs of the diverse community." In the past two years, the Biology Department has worked with Student Services to establish peer tutoring groups in BIO211 and BIO101 to "increase utilization of academic and support services."

Community Collaboration

The Biology Department is uniquely qualified to provide community leadership, especially in "providing leadership and raising awareness of environmentally responsible technologies and practice." Several faculty members speak publicly through the Jefferson College Speakers' Bureau when groups request programs related to these topics. Biology Department faculty have also spoken on campus and have led campus-wide initiatives fostering environmentally responsible practices.

The Biology Department responded to local employment situations by offering more sections of courses when students needed them for new education initiatives. The department also responded with additional sections that were needed to support new Career and Technical Education (CTE) initiatives directed at filling local employment needs.

Support for Employees

The Biology Department has added three new faculty members, Marialana Speidel, Vivian Aubuchon and Bruce Carr, and a new laboratory instructor, Kimberleigh Foster. This allows

more sections to be taught by full-time faculty without increasing the load for other faculty members.

Facilities and Infrastructure

Equipment and facilities of the Biology Department have been upgraded significantly with lab renovations at the Hillsboro campus, the addition of lab facilities at Arnold, and the use of labs at Northwest High School. These have immensely improved the delivery of the laboratory component of biology courses while "updating and maintaining all physical facilities to address future need."

Moreover, the department has "developed and maintained the technology infrastructure and capability to meet or exceed industry standards." One example of meeting this goal is seen in the addition of new microscopes for use in BIO113 Microbiology for the Health Sciences. This improved accessibility allows students to observe and perform biological procedures in a “hands-on” format, in direct support of the general education requirement to "analyze scientific and mathematical concepts and their uses and impact in the modern world."

A five-year *Outdoor Education Initiative* is proposed later in this document, which would provide the students with high-impact learning opportunities. The proposal provides for community outreach in the utilization of the classroom.

Finally, the Biology Department offered only one online course at the time of the last departmental review in 2005. At this time, the department offers six courses in an online or hybrid format that "expands physical and virtual facilities to meet the needs of underserved areas of the District."

Financial Responsibility

With departmental organization that includes two Laboratory Instructors, the department has attempted to "streamline and improve the efficiency of the procurement process." This process is ongoing.

Assessment

The department does "review programs, instruction, and services to support quality and innovation." General Biology full-time faculty developed and have been conducting multi-section course level assessment in the lecture course, utilizing a pre-test/post-test tool to assess course effectiveness. Analysis of previous semesters indicates the course is successful in taking the students from an "F" average at the beginning of the semester to a "C" average at the end of the semester. Individual item analysis allows us to examine areas in the curriculum where students are progressing more or less successfully. The Scantron machine that was a recent purchase at the time of the last Institutional Review is routinely used by many faculty in the department and has improved the ability to continually assess student achievement.

Summary of Departmental Activities, Assessment and Use of Results
(completed Spring semester or on accreditation cycle)
(may include process flowchart)

Provide a brief overview of major accomplishments since the last review and how assessment results have been used to improve services/learning outcomes.

The goals listed in the 2005 review of the Biology Department included the following:

1. *Determine means of assessment to measure departmental goals.*

   The General Biology faculty have formulated a series of questions pertaining to the Natural Sciences that can be used in the Biology Program to determine student understanding of pertinent Biological concepts. These are administered in a pre-test/post-test format. Analysis of results are facilitated by use of the Scantron machine.

2. *Recruit more Biology majors to Jefferson College and Build relationships with high school faculty.*

   The proposed addition of an *Outdoor Education Initiative* is expected to draw more biology majors to Jefferson College. Other efforts to reach high school students are ongoing.

3. *Assure equipment is maintained.*
   Renovation of lab facilities has been accompanied by purchase of new lab equipment and software. Efforts to develop a maintenance and repair schedule for science equipment, especially microscopes, are ongoing.

4. *Increase enrollment in Biotechnology program.*

   This program was discontinued due to lack of enrollment.

5. *Hire full-time faculty to meet growth, primarily to support health professions.*

   Three full-time faculty members and one full-time lab instructor have been hired. All of these positions support courses required for students entering health professions.

Moreover, distance learning offerings have been greatly expanded. We have repaired and replaced microscopes. Older microscopes are replaced by newer versions as they are acquired. Our course offerings have expanded with two new JCA science labs. We currently teach BIO101, BIO113, BIO211, and BIO212 at JCA. With the projected continued expansion of the medical field, we have the opportunity to continue to support new health profession programs.

Innovative changes that have been initiated since the last department review or are proposed for the future include:

A five-year *Outdoor Education Initiative* is proposed which would provide the students with high-impact learning opportunities. The proposal provides for community outreach in the utilization of the classroom. It could also aid in "recruiting more Biology majors to Jefferson College" as well as serve as a means to “build relationships with high school faculty.”

New microscopes and digital cameras have been acquired for BIO113 Microbiology for Health Sciences. This course allows students to utilize top of the line scopes that are current with industry standards. The digital cameras allow the instructor to take still images/videos that can be uploaded to PowerPoint lectures and used to make digital images for computer-based quizzes. Additionally, images can be uploaded to Blackboard for students to study for quizzes and lab practicums outside of the classroom.

Biology faculty continue to update their content and teaching knowledge by attending local and national meetings. Faculty are also active on campus by serving on various committees that have direct impact on the college and our students such as Student Learning and Support, Accommodations Committee, Environmental Safety Committee, and Curriculum Committee.

Internal and External Data Collection and Analysis
(completed by Fall semester or on accreditation cycle)

Gather and analyze relevant internal and external data (link to data).

Enrollment has increased from 6,515 students indicated in the previously noted five year period (Summer 2000 through Spring 2005) to 11,556 students for this five year period (Summer 2008 through Spring 2013), which is a 43.6% increase. These results indicate 61.4% of those students were instructed by full-time faculty, which indicates a high dependency on adjunct faculty for instruction. The average attrition rate for faculty has remained low at 10.8% overall, which indicates that students are generally satisfied with the courses as well as the course instruction and laboratories offered in the biology department at Jefferson College.

Members of the Biology Department requested data to answer the following questions:

1. Is student success rate consistent across all sections of BIO211 and BIO212?
2. Can we predict student success in BIO211 A&P I?

Is student success rate consistent across all sections of BIO211 and BIO212?

Students who were enrolled in full-time faculty BIO211 A&P I course had a grade point average of 1.88/4.00 while students taught in adjunct courses received a grade point average of 2.79/4.00.

Students who were enrolled in full time faculty BIO212 A&P II courses received an average grade point of 2.57/4.00 while those in the same adjunct course received 3.30/4.00. A survey of

51 BIO212 students indicate that there are some inconsistencies with the implementation of Mastering A&P learning activities and hands-on laboratory exercises in both A&P courses.

Faculty Indicators for Biology--(BIO), (School Years 2008-2013)
School Terms 200901 Through 201303 (Summer 2008 through Spring 2013)

Number of Course Sections Taught	Total Students	Attrition Number ("W" Grades)	Attrition Percent	Student Credit Hours Earned	Average Students	Average GPA	Annualized 5-Year Program FTE
450	11,556	1,243	10.8%	37,735	25.7	2.488	251.6

Notes: Attrition % represents the number of "W" grades conferred as a percentage of ALL students.
Annualized Program FTE is the number of graded credit hours divided by 150 (30 hrs/yr for 5 years).

Grade point averages (GPAs) for full-time A&P faculty are:

Allen	1.946
Carr	2.733
Speidel	2.357

GPAs for adjuncts who teach A&P as of Fall 2013 are:

Ameling	2.974
Jablonowski	2.948
LaVigne	2.915
Spath	3.160

To address apparent inconsistencies, the A&P faculty propose the following:

1. Assess existing A&P courses taught by full-time faculty by implementing multi-section assessments. Affirm standards of content and learning outcomes, and connect all full-time A&P faculty to learning goals and standards.

2. Redistribute full-time and adjunct teaching assignments for A&P. With the addition of a new faculty member (Carr) and the potential to consolidate existing lecture sections, we propose to assess the increased capacity to teach existing A&P courses with full-time faculty. This would reduce dependence upon multiple adjuncts.

3. Study and report the feasibility for extending multi-section assessment to adjunct sections. Training sessions will continue to be scheduled before the start of each semester to give all instructors an opportunity to ask questions and review the Mastering A & P website.

Student Success in BIO211- Anatomy and Physiology I

We requested data relating student success in BIO211 to ACT and Compass scores, student age, and achievement of prerequisites courses in biology and chemistry.

Comparison of students who earned A, B, or C grades with those who earned D. F or W grades based on their ACT or Compass scores showed no dramatic trends. Analysis of variance confirms that there are no significant differences in test scores between students who earned A, B, or C grades and those who earned D, F, or W scores.

The age of students was correlated with success in the course. These are presented below:

	Total (#; %)	Students < 20	Students > 25
A, B, C	687; 56.6%	189; 43%	319; 69.9%
D, F, W	527; 43.4%	251; 57%	139; 30.1%

Students under 20 earned significantly fewer ABC grades and significantly more DFW grades than the average. Students over 25 earned significantly more ABC grades and significantly fewer DFW grades than the average. Students from 20-24 scored very near the average number for all grades.

This data is positively correlated with where students took the prerequisites in biology and chemistry before taking BIO211 A&P I. Younger students often fulfilled their prerequisite courses in high school and entered BIO211 prior to taking other college science courses. Older students often had passed the five-year deadline for prerequisites and had to take biology and chemistry either at Jefferson College or at another college. Data from 2012-2013 are presented below:

	Total (#; %)	High School Pre-requisites	College Pre-requisites
A, B, C	883; 57.1%	287; 46.1%	596; 64.5%
D, F, W	663; 42.9%	335; 53.9%	328; 35.5%

Since it appears that we can predict potential success in BIO 211 we should investigate means to increase success in students who are most at risk. This group is largely students who enter the course directly from high school. Possible approaches to improve success in this group include:

1. Developing a study module through the Learning Center that would prepare students for taking BIO211.

2. Investigate the possibility of developing a course that would review the pre-requisite concepts of biology and chemistry.

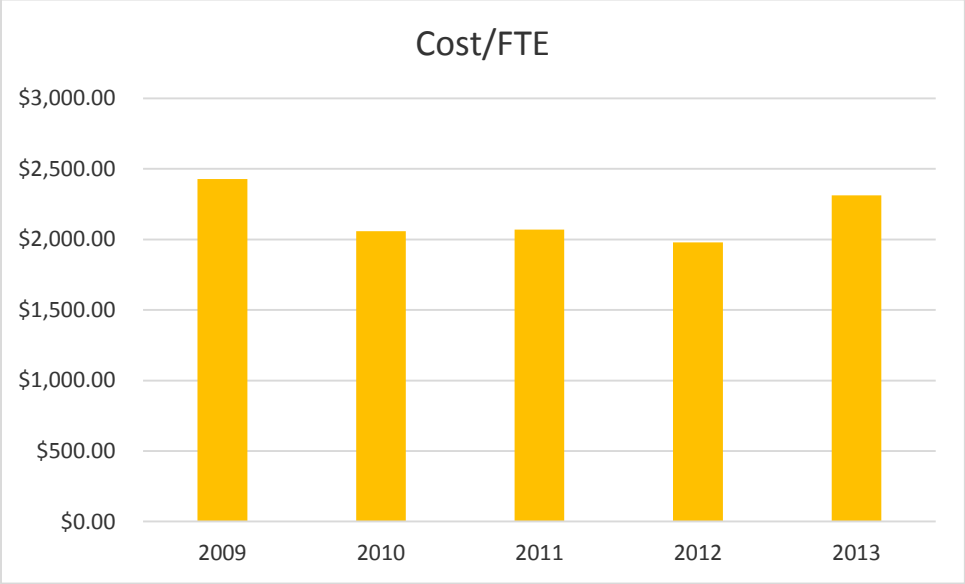
3. Continuing to extend efforts in expanding learning opportunities by utilizing the proposed Academic Success Center.

Annual Cost per FTE and Trend Analyses
(completed by Fall semester)

Provide cost per FTE and analyze for the period being evaluated.

Cost

Biology Annual Cost per FTE and Trend Analyses					
Academic Year	**2009**	**2010**	**2011**	**2012**	**2013**
Credit Hours	8,356	10,268	10,990	10,585	9,068
FTE	278.53	342.26	366.33	352.83	302.26
Program Cost	$676,455	$704,404	$758,160	$698,342	$699,197
Cost/FTE	$2,428.66	$2,058.09	$2,069.61	$1,979.26	$2,313.23



SWOT Analysis
(completed by Fall semester)

Using the data collected and analyzed, complete a SWOT analysis. Reference and link data for each.

Internal Strengths	Internal Weaknesses
• Addition of full-time faculty strengthens the department by reducing the number of adjunct sections. • New laboratory facilities and equipment • Full-time faculty have been the recipients of college and state teaching achievement awards • Full-time faculty have held, and hold institutional leadership positions on various committees including but not limited to Curriculum Committee, Faculty Senate, President's Leadership Council. • Full-time faculty serve as cross disciplinary advisory board members (e.g. Vet Tech) • Courses offered within the department support various programs in other departments (e.g. Nursing, Veterinary Technology, health occupations, etc.); opportunities exist for developing new support courses (e.g. Nutrition) • Department is second, within the college, in terms of library use (implementation as part of course curricula) • Faculty promote diversity awareness in their curriculum as well as in the community. • Acquisition of new microscopes for the microbiology course, that are current with industry standards. • Variety of online and hybrid course offerings, as well as alternate scheduling of basic courses • Broad use of technology in both lecture sections and labs	• Apparent inconsistencies in student grades in A&P courses. • Limited dialogue between the nursing program and the new health occupations programs in terms of curriculum support, course development, and multi-section assessment. • Laboratory resources need to be augmented (e.g. muscle models) and updated (e.g. iWorx software). • Budget/purchasing mechanism reduces expeditious ordering/receiving of needed equipment and supplies. • Low student success in the A & P I course among younger students who likely completed pre-requisite courses in high school.

External Opportunities	External Threats
• Publicity surrounding new health programs increases visibility of Jefferson College and may recruit additional students into prerequisite biology courses. • Investigate different avenues that will boost communication and interaction between Jefferson College's biology department and area schools, businesses, governmental agencies, etc., in order to increase enrollment in the discipline.	• Federal and State Budgetary cuts affect current and prospective student enrollments. • Other area colleges offer fast-paced or all online degrees in the health fields.

Internal Strengths

Addition of full-time faculty strengthens the department by reducing the number of adjunct sections. Full-time faculty have been the recipients of college and state teaching achievement awards, have held institutional leadership positions, and serve as cross-disciplinary advisors. Faculty promote diversity awareness in their curriculum as well as in the community, and use a variety of technology in teaching both labs and lectures. A variety of online and hybrid courses, as well as alternate scheduling of basic courses is offered. The department is second, within the college, in terms of library use as part of course curricula.

Courses offered within the department support various programs in other departments (e.g. Nursing, Veterinary Technology, health occupations, etc.). The nursing department has requested initiation of a biology course in nutrition that we should be able to propose and implement. Currently, nutrition is offered within the nursing program, but will not transfer to a continuing program at another institution. Students who apply to other nursing programs take the course at another community college or through Missouri Baptist University.

New laboratory facilities and equipment and the acquisition of new microscopes for the microbiology course have significantly upgraded laboratory experiences.

Internal Weaknesses

We have presented apparent evidence of inconsistencies in student grades in A&P courses. First, full-time faculty need to evaluate and confirm desired content and learning outcomes. Then we propose to examine how a maximum number of A&P sections can be taught by full-time faculty. Finally, we will expand confirmed course content and learning goals to adjunct instructors and provide support to improve course consistency.

We have a unique opportunity to increase dialogue between the nursing program and the new health occupations programs in terms of curriculum support. We propose to assess existing A&P

courses relative to the health professions programs and adapt and align courses where beneficial. One goal is to determine what subsets of A&P content would satisfy various health professions requirements while addressing their desire to shorten the time required for program completion. There are possibilities for new course development and implementation in support of the health occupation and nursing programs. Working together, we can also consider multi-section assessments across disciplines to ensure that we are working together optimally.

Laboratories are set up to aid students in hands-on application, and scientific-inquiry based solutions through discovery. Students will utilize this knowledge beyond the classroom and into their respective career fields. It is imperative that Jefferson College provide its science students with the tools they need for success in their occupations. This means that laboratories will need to be maintained with modern equipment and systems, and that faculty will need additional education and training, in order to keep up or be familiarized with state-of-the-art technologies. Faculty will be able to extend this learning to their students, making them competitive in the job market.

For the purpose of maintaining quality instruction, we propose the following:

1. Purchase of additional and updated laboratory equipment

2. Training with new equipment

3. Ongoing attendance at professional meetings that keep faculty current with ever-changing, scientific procedures, medical and other biological breakthroughs.

The process of ordering and budgeting for lab supplies and the preparation of weekly labs is unclear. Working with the Division Chair, we propose to clarify the processes involved in supplying and preparing biology labs.

The student success rate can be improved for students taking Anatomy and Physiology I. The research indicates there is a correlation between age of student and student success in this course. To provide more support for students taking A&P courses, the faculty plan to work closely with the Learning Center to design study modules and coursework to review key concepts. Students will be encouraged to participate in study groups in the Academic Success Center.

External Opportunities

Through proposal of a new Outdoor Education facility, the biology department can increase community service and outreach. Not only will this benefit the community, but may increase awareness of the biology program at Jefferson College and attract more potential majors. Ongoing publicity of the new Health Occupations Programs also increases awareness of the Biology Department as a support arm for those programs.

External Threats

Federal and state budget cuts, coupled with a general lack of interest in science and math among students, may make it difficult to attract prospective students. Enrollment in biology classes may also be affected by the reduction in enrollment in the nursing program, lack of ability to recruit students into the new health occupations programs, and competition with other schools that offer fast-paced or online health programs.

External Accreditation (if applicable)
Link to accreditation report.

Not applicable.

INSTITUTIONAL ACTION PLANS for Biology Department/2013

Org	Aim	Obj	Action Plan	KPI	$	Other Req	Responsible Party	End Date	Status	Target Year	Metric Desc	Metric Value	Benchmark Desc	Benchmark Value	Target Desc	Target Value
55302	I	1	The Biology Department Outdoor Education Initiative is a five-year plan designed to meet the continued need to provide our students, the College and the community with a high quality educational experience while promoting emerging trends in natural resource stewardship and conservation. The program would provide a quality learning environment with numerous high-impact, multi-disciplinary education opportunities within the campus and extending to the community.	37	$20,000		Biology Department Faculty		Pending (New Plan)	2014-2019	Survey to assess usage	Utilization opportunities provided by college faculty	Number of classes and students	TBD	Increase number of classes and students utilizing the outdoor classroom	TBD

DEPARTMENTAL ACTION PLANS for Biology Department/2013

Org	Aim	Obj	Action Plan	KPI	$	Other Req	Responsible Party	End Date	Status	Target Year	Metric Desc	Metric Value	Benchmark Desc	Benchmark Value	Target Desc	Target Value
55302	1 Student Learning	1	Core faculty examine and as necessary revise learning standards for existing A&P I and II. Develop expectations for lecture and lab instructors. Implement multi-section assessments for Microbiology and A&P courses.	2	$0		A & P faculty Microbiology faculty	Ongoing	Pending (New Plan)	2014 - 2016	Cross sectional assessment activity	3	Number of multi-section assessments	3	Number of multi-section assessments	3
55302	1 Student Learning	1	Investigate the opportunities to support CTE health occupation programs to meet curriculum needs through open dialogue and new course development.	2	TBD		Biology faculty, CTE faculty	Ongoing	Pending (New Plan)	2014-2019	Team meetings with Biology faculty and CTE faculty	1	Increase number of Team meetings	1	Increase number of Team meetings	2
55302	1 Student Learning	1	Update instructional equipment and laboratories to meet industry standards. Update instructional software.	2	TBD		Biology faculty	Ongoing	Pending (new plan)	2014 - TBD	Update equipment and instructional tools routinely	1	Timely submission of action plans and capital project requests	1	Number of action plans and capital project requests	1
55302	4 Support of Employees	22	Improve the procurement process.	24	$0		Laboratory Instructors and Science Division Secretary	Ongoing	Pending (new plan)	2014	Streamline the ordering and acquisition process		Improve efficiency and reduce time delays	Improve efficiency by 25%		Improve efficiency by 25%
55302	1 Student Learning	2	Work with the Learning Center to design A & P study modules, promote and support the Academic Success Center study groups, and investigate the possibility of developing a course to review prerequisite concepts for A & P I.	4	$3,000		A & P faculty	Ongoing	Pending (new plan)	2014-2015	Curriculum Development	2	Increase utilization of academic support services	Increase by 10%	Number of students using support services	Increase by 10%

Evaluation

☒ Meets Expectations
Comments:

☐ Requires Attention and Submission of a Follow-Up Report
Comments:

☐ Does Not Meet Expectations and Requires Submission of a Follow-Up Report
Comments:

Follow-up report required by: _____
Comments: (Date)

Approvals

Linda K. Abernathy — 2/25/2014
Division Chair/Director — Date
Comments:

Shirley Davenport — 2/28/14
Dean — Date
Comments:

M.K. Selsor — March 25, 2014
Vice President/President — Date
Comments