

# INSTITUTIONAL ASSESSMENT REPORT

## CHEMISTRY / 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 vision and purpose of the Chemistry program at Jefferson College is to provide students with a supportive learning environment that promotes intellectual, social and personal growth. To support the strategic aim of providing a high quality, consistent, and rigorous education, the faculty work as facilitators to encourage critical thinking, problem solving, and exploration in the field of Chemistry. Students are given the opportunity for hands-on experience in the chemistry laboratory assignments.

In support of the Strategic Aims I., Student Learning and II., Student Support, the Chemistry Department at Jefferson College strives to provide a thorough and in-depth coverage of the subject area. Chemistry courses offered include Introductory Chemistry, Concepts in Chemistry, General Chemistry I and II, and Organic Chemistry I and II. Students will build a solid understanding of the chemical sciences as a foundation for continued studies in the natural sciences and the allied health field. Furthermore, the Chemistry program at Jefferson College hosts a rigorous program that effectively provides a strong educational background in the chemical sciences enabling students to successfully transfer to four-year institutions, again supporting Strategic Aims I and II, as well as Strategic Aim VII., Assessment.

### Summary of Departmental Activities, Assessment and Use of Result

*Learning/Service and Action from 2008 Institutional Effectiveness Review:*

Proposed Learning/Service Goal	Proposed Assessment Measurement/ Action	Person(s) to Implement	Timeframe	Resource Implications
<b>Goal 1</b> Change the CHM 101 Text used.	Departmental Committee	Faculty	Summer '08	Time/input
<b>Goal 2</b> New Chemistry Faculty Member.	Written request	Administration	Fall '08	\$60 K



<b>Goal 3</b> Upgrade instrumentation	Written request	Faculty	Fall '09	\$20 K
<b>Goal 4</b> New Organic Chemistry Lab Kits.	Written request	Faculty	Fall '09	\$5 K
<b>Goal 5*</b> Offer Analytical Chemistry.	Written request	Faculty	Fall '09	\$10 K

\*All goals were met except for goal 5, which after further investigation, was found to be unrealistic given the general lack of interest found in the student population served.

1. Chemistry faculty reviewed new textbooks for the Introductory Chemistry course. While it has been a challenge to find the “perfect” text, the faculty designed a customized textbook that includes an emphasis on topics related to health care. The supplemental resources are up-to-date, available in online formats and focus on the connection with biological processes.
2. An additional full time faculty member was hired in Chemistry for the Fall 2008 semester to due to increase enrollments in chemistry courses.
3. General Chemistry II lecture and laboratory, CHM112 and CHM113, respectively, were combined into one course, CHM112 and offered for the first time during the Spring 2010 semester. This was done to provide curriculum continuity, having the course structured in a similar manner as other laboratory-based Chemistry courses. In addition, this change has helped to facilitate student learning of concepts covered in General Chemistry II by requiring laboratory coursework.
4. Chemistry faculty participate in the Jefferson County community by serving as judges for the annual Mastodon Arts and Science Fair. Faculty judge both individual projects as well as those destined for the International Science and Engineering Fair (ISEF).
5. Multi-section course assessment was implemented in the Introductory Chemistry, CHM101, during the Spring 2013 semester. The chemistry faculty are reviewing the assessment results to determine curriculum improvements. Faculty designed an assessment tool consisting of multiple-choice questions aligned to course objectives. The assessment process includes a test/retest format. The assessment questions are included on section exams and again on the final exam.
6. The department has secured external funding for a table top centrifuge and gas chromatograph column through donations from the Dow Chemical in Pevely, Missouri. Equipment and supplies procured have and will be used to update and enhance the quality of the educational experience for students. The table top centrifuge allows students to apply qualitative analysis techniques. These laboratory experiences provide opportunities for students to develop critical thinking and deductive reasoning skills.



## 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).

### Faculty Indicators for Chemistry--(CHM), (School Years 2008-2013) School Terms 200901 Through 201303 (Summer 2008 through Spring 2013)

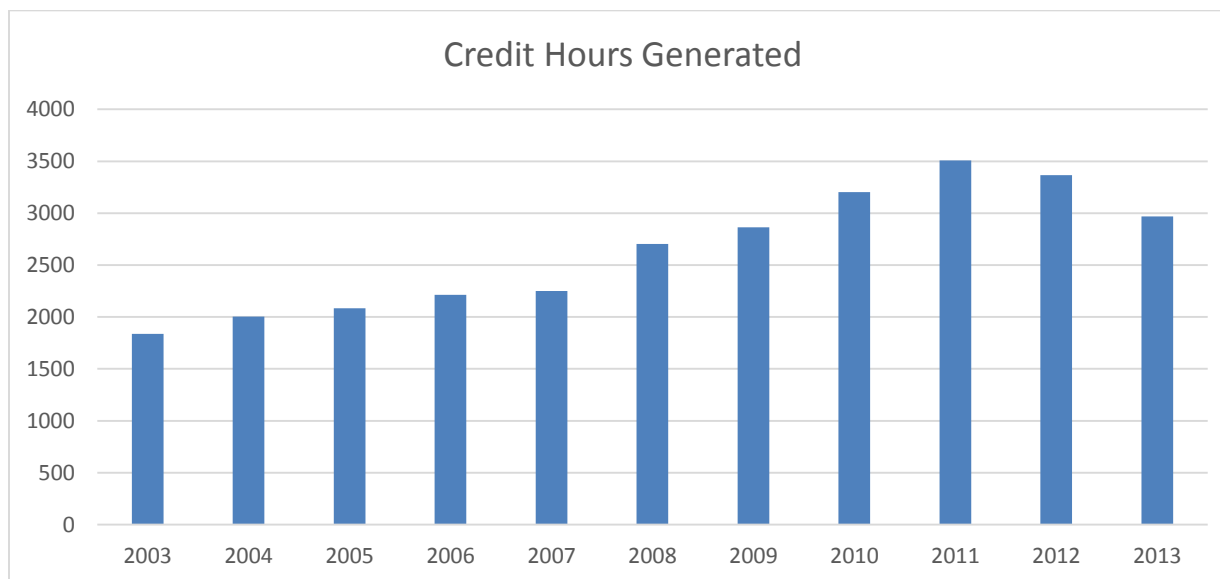
Number of Course Sections Taught	Total Students	Attrition Number ("W" Grades)	Attrition Percent	Student Credit Hours Earned	Average Students	Average GPA	Annualized 5-Year Program FTE
134	3,299	340	10.3%	12,068	24.6	2.400	80.5

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).

Student attrition rate continues to remain low in the Chemistry courses taught at Jefferson College. Full-time faculty attrition was found to be 10.3% during the 2003-2007 review cycle and 10.4% during the 2008-2013 review cycle; essentially unchanged. After the 2008-2011 spike in pre-pharmacy interest among Jefferson College students, the enrollment in Organic Chemistry has declined. Those students who complete Introductory Chemistry with a grade of C or better, and move onto General Chemistry generally fare well in the General Chemistry sequence. There has also been noted success among students who have completed coursework through Organic Chemistry at Jefferson College and then transferred to a four year institution, such as Saint Louis University, to complete their education.

Enrollment in Chemistry courses has increased from 2,245 students during the previous five year period (Summer 2002 to Spring 2007) to 3,299 students for the current five year period (Summer 2008 to Spring 2013). In addition, student credit hours earned rose from 9,322 over the 2002-2007 time period to 9,931 during the 2008-2013 time frame, a 6.1% increase.





As a rule, students are very satisfied with the education provided by the Chemistry Department. Each semester, tenured faculty conduct student evaluations in one section, and all non-tenured and adjunct faculty members conduct student evaluations in all sections. For review purposes, student evaluations were conducted in all sections during spring 2013. The results of the student surveys indicate that students are generally satisfied with the Chemistry course offerings at Jefferson College. They appreciate the use of technology in the classroom to enhance the understanding of challenging concepts. They find that the labs are meaningful, useful, and helpful in facilitating their grasp of chemical concepts. Generally, they find the textbooks used to be helpful. In general, the instructors are well received and knowledgeable. Students also find the faculty to be quite helpful and willing to assist them.

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

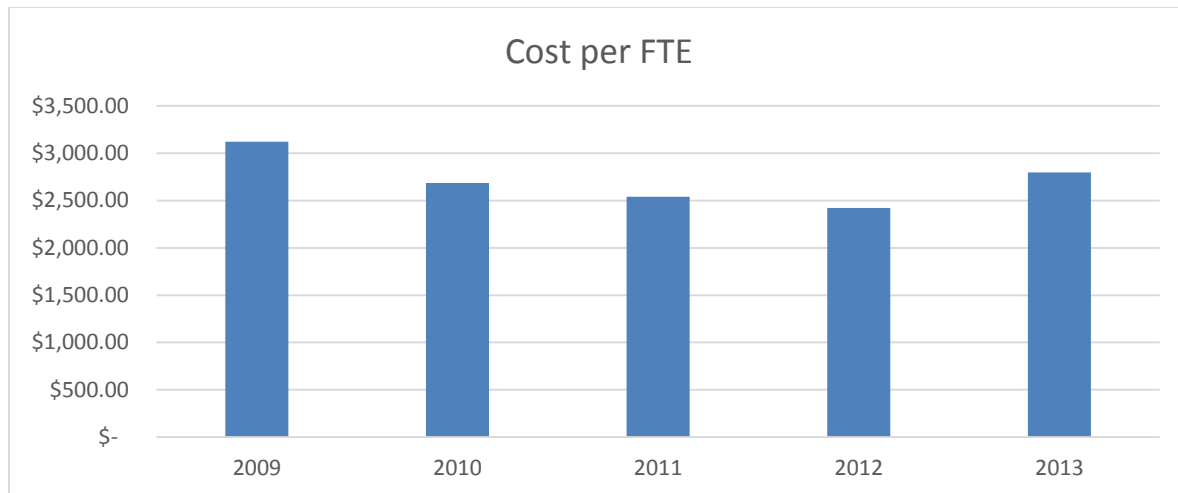
*Provide cost per FTE and analyze for the period being evaluated.*

***Cost***

A summary of the Chemistry budget for 2008-2013 is on file in the Office of the Dean of Arts and Sciences Education. The full-time instructional cost per FTE for Chemistry courses is \$2,697.56.

<b>Academic Year</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>Credit Hours</b>	2,864	3,204	3,509	3,367	2,969
<b>FTE</b>	95.46	106.8	116.96	112.23	98.96
<b>Program Cost</b>	\$298,058	\$286,890	\$297,238	\$271,868	\$276,758
<b>Cost/FTE</b>	\$3,122.34	\$2,686.24	\$2,541.37	\$2,422.42	\$2,796.66





The cost per FTE has declined over the past five years with the exception of 2013. With the enrollment changes this past year the cost per FTE rose slightly from the previous year. Anticipated costs per FTE should continue to decline for the next academic year due to changes in faculty assignments. To meet the increasing enrollment demands, a temporary full-time position was added for 2012 and 2013. As enrollments have started to decline recently, the temporary position was not renewed for the 2013-2014 academic year.



**SWOT Analysis**  
(completed by Fall semester)

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

<p style="text-align: center;"><b>Strengths</b></p> <ul style="list-style-type: none"> <li>• Talented, well-educated faculty with a strong diverse background.</li> <li>• High student retention</li> <li>• A variety of course options</li> <li>• Online course options</li> <li>• College serves as a Resource Center for Jefferson County High School Chemistry Departments.</li> </ul>	<p style="text-align: center;"><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>• Outdated laboratory equipment and technology</li> <li>• Dependency on adjunct faculty</li> <li>• Lack of science career information posted on bulletin boards in and around the classrooms</li> </ul>
<p style="text-align: center;"><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>• The laboratories at Jefferson College – Arnold offer an increase in course availability and possible offerings outside of the main campus in Hillsboro.</li> <li>• An increase in the demand for Nurses and others going into the health related professions.</li> <li>• Jefferson College has meaningful and mutually beneficial partnerships with business, industry, and universities.</li> <li>• Partnership with Dr. Ryan Groeneman at Webster University</li> <li>• Science club interest</li> </ul>	<p style="text-align: center;"><b>Threats</b></p> <ul style="list-style-type: none"> <li>• Reduction in state funding to community colleges</li> <li>• Reduction in the size of the Jefferson College nursing program and pre-nursing enrollments</li> <li>• Difficulty in transferring higher level chemistry courses to some transfer institutions</li> </ul>

***Strengths***

The strengths of the chemistry department include well-educated faculty with a diverse background in chemistry and biochemistry. The department offers courses on multiple campuses, online and evening options. The courses are designed to meet the industry standards and outcomes. Jefferson College serves as a resource for Jefferson County High School chemistry faculty by providing training sessions during adjunct orientations. Student success indicators show that students persist in the coursework and indicate a low attrition rate for chemistry classes.



### ***Weaknesses***

The chemistry department has procured new laboratory equipment through generous donations by Dow Company. However, some of the laboratory instrumentation and equipment may need upgrading in the next few years to meet industry standards and incorporate new technologies. (DAP#2) The chemistry department is dependent on adjunct faculty teaching the Introductory Chemistry courses. To increase the number of courses taught by full-time faculty, the department requests an additional full-time chemistry position. (DAP#1) To promote career opportunities in the STEM fields, more marketing efforts need to be explored. The chemistry faculty plan to design a bulletin board to display career information about opportunities in the science fields. (DAP#4)

### ***Opportunities***

The chemistry classes are offered at the Hillsboro and the Arnold campuses. Future expansion to off-site locations may provide opportunities for additional course offerings. Jefferson College has been experiencing new program development in health occupations and a growing interest in the nursing program. The chemistry department provides prerequisite coursework to support the health occupation programs and as enrollments increase in these programs the demand for Introductory Chemistry will increase. (DAP#2) The chemistry faculty seek opportunities to partner with business, industry and universities through interactions with the American Chemical Society (ACS). Students have indicated an interest in forming a science club and developing a student association with the ACS. Chemistry faculty will investigate the possibility of offering a chemistry club. Chemistry faculty have discussed with Dr. Ryan Groeneman the possibility of taking students to Webster University to tour chemistry research facilities in the future. (DAP#3)

### ***Threats***

The impact of state budgetary reductions for higher education has reduced funding for Jefferson College. A new application process for the nursing program has reduced the pre-nursing population. This reduction has negatively impacted enrollments in Introductory Chemistry. The higher level chemistry courses articulate to some of the transfer institutions, but are not accepted at all colleges.

\*DAP Department Action Plan

<b>External Accreditation (if applicable)/Link to accreditation report.</b>
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The Chemistry department does not have external accreditations.



### DEPARTMENTAL ACTION PLANS for *Chemistry* / 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
55303	1,4		Hire one additional chemistry instructor.	1	\$60K per year		Administration		New Plan (pending)	2015	% of classes taught by full time faculty	70%	Increase % of classes taught by full time faculty	70%	Increase % of classes taught by full time faculty	100%
55303	1,2,5		Upgrade chemistry laboratories and equipment. Investigate opportunities to expand chemistry laboratories to off-site locations.	7	\$30K		Chemistry faculty		New Plan (pending)	2015	Equipment	3	Improve and expand chemistry laboratories to meet industry standards by upgrading instrumentation and equipment	3	Improve and expand chemistry laboratories to meet industry standards by upgrading instrumentation and equipment	3
55303	1,2,3		Investigate opportunities for students to participate in industry affiliated student organizations and tour research laboratories. These opportunities may include participation in ACS student organization, tour of Webster University research laboratories and tours of Dow Chemical or Monsanto plants.	7	\$2K	Chemicals, space, PR, safety measures	Chemistry faculty		New Plan (pending)	2014	Student club affiliated with American Chemical Society and chemistry demonstrations	1	Increase the visibility and attractiveness of the Jefferson College Science curriculum through demonstrations and science related clubs	1	Increase the visibility and attractiveness of the Jefferson College Science curriculum through demonstrations	1
55303	1,2,3		Design and maintain a bulletin board to increase awareness of career opportunities in STEM fields.	1	\$500	Bulletin board	Chemistry faculty		New Plan (pending)	2014	Chemistry Bulletin Board	1	Increase the level of awareness of opportunities available in science and current scientific progress	1	Increase the level of awareness of opportunities available in science and current scientific progress	1



### 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

Genda K. Abernathy  
Division Chair/Director  
*Comments:*

10/30/13  
Date

Shirley Davenport  
Dean  
*Comments:*

11/1/13  
Date

M.K. Selson  
Vice President/President  
*Comments:*

March 25, 2014  
Date