Chemistry & Biochemistry

BA Report

for the

Academic Program Review Committee

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Section 1 Program Overview

Section 1, Part A PROGRAM GOALS

1) Goals

The mission of the Chemistry and Biochemistry BA programs is to provide students with the chemical/biochemical knowledge and laboratory skills as well as the critical thinking, communication, and teamwork skills necessary to be successful in a chemical/biochemical or science-related career. This mission is fleshed out in the educational goals for both programs as listed below.

Upon graduation Chemistry BA students should be able to:

- Demonstrate working knowledge of inorganic, organic, analytical, and physical chemistry.
- Apply their understanding of chemistry and supporting disciplines to analyze and solve chemical problems utilizing formal and concrete thinking skills.
- Critically evaluate the work of others and cooperate to solve problems.
- Work in a chemistry laboratory in a safe and effective manner, applying the scientific method to the design, execution and interpretation of experiments and experimental data.
- Perform accurate and precise quantitative measurements and perform statistical analyses of resultant data to assess reliability of results.
- Effectively communicate and present technical information in a clear, concise, scientifically appropriate manner in a variety of formats.

Upon graduation Biochemistry BA students should be able to:

- Demonstrate working knowledge of inorganic, organic, analytical, and physical chemistry.
- Demonstrate the basic knowledge of biology topics supporting their understanding of chemistry.
- Articulate the relationship between chemistry and the biological sciences.
- Apply their understanding of chemistry and supporting disciplines to analyze and solve chemical problems utilizing formal and concrete thinking skills.
- Critically evaluate the work of others and cooperate to solve problems.
- Demonstrate the skills to work in a chemistry laboratory in a safe and effective manner, applying the scientific method to the design, execution and interpretation of experiments and experimental data.
- Demonstrate mastery of basic biochemical laboratory techniques and theories associated with analysis/manipulation of biomolecules.
- Recognize the value of effective communication and present technical information in a clear, concise, scientifically appropriate manner in a variety of formats.
- Retrieve and use peer-reviewed scientific literature and evaluate technical articles critically.

These educational goals are realized through a carefully developed, implemented, and assessed educational process that is supported by the following 4 pillars:

1) A process by which learning is assessed.

2) Appropriate course and program offerings.

3) Well maintained up-to-date equipment and learning spaces.

4) A faculty that is up-to-date on current pedagogical and scientific developments.

Consequently our broader program goals in support of our educational goals are to:

1) Use course and program assessment data to improve student learning.

2) Continuously evaluate course offerings as well as the need for additional program offerings.

3) Maintain and upgrade the chemistry labs, equipment, and instrumentation.

4) Support faculty development.

2) Goal establishment

These goals were established by a committee of chemistry faculty and the Physical Sciences department head, and were reviewed by the other chemistry faculty.

3) How Goals Prepare Students

Employers tell us that they want graduates who can communicate effectively, solve problems, and work as part of a team. These skills are an integral part of the mission of the Chemistry and Biochemistry BA programs and are emphasized in various courses throughout the BA curriculum.

4) Have Goals Changed Since Last Program Review?

This is the first program review for the Chemistry and Biochemistry BAs so no there are no changes.

5) Relationship of Goals to University's mission and college and department strategic plans.

The 4 broader program goals closely parallel the 4 strategic planning goals of the Physical Sciences Department and strongly support College of Arts and Sciences Strategic Planning Goal 3 which is to "Become a demonstrable center of excellence in educational quality, student engagement, and student learning."

The Chemistry and Biochemistry BA program goals also relate very strongly to the mission of the University, which is to prepare students for successful careers, responsible citizenship, and lifelong learning. It is the goal of the Chemistry and Biochemistry BA programs to prepare students for *successful careers* in chemistry or in science-related fields. The programs emphases on teamwork and communication provides students with skills required for *responsible citizenship* and the emphasis on critical thinking helps prepare the student for a *lifetime of effective learning*.

Section 1, Part B PROGRAM VISIBILITY AND DISTINCTIVENESS

1) Unique Features (related suggestions to build on these are included for selected cases).

i) Chemistry and Biochemistry are relatively new (as Bachelor's Degree offerings), yet they benefit from a long chemistry tradition at Ferris *via* the Industrial Chemistry Technology Associates degree program.

ii) Ferris' Chemistry and Biochemistry BA programs are one of very few programs in the country which offer the opportunity for students to spend the entire second semester of the organic chemistry laboratory engaged in collaborative research projects.

iii) Ferris has a national award winning chapter of the American Chemical Society Student Affiliates.

iv) Unexpected rapid growth since the B.A. programs' inception in 2003. The incoming sophomore class has about twenty majors, 10 majors just graduated in 2009. This compares favorably with an average of 15 majors for each of our three comparison schools, a number which has held roughly steady for five years for these institutions even as Ferris' graduate count has climbed.

v) Schools of Pharmacy and Optometry: enhanced admission odds for Ferris students who apply as undergrads (including but not limited to Honors program).

vi) Based on information available, Ferris appears to have smaller class sizes in most cases (see comparison table below). Even in General Chemistry, it is unusual to have a course with much over 100 students. Upper division classes in Chemistry and ICT typically range from several dozen to less than a dozen with the exception of some instances of biochemistry.

vii) "Pre-pharmacy crossovers": an internal source of strong of Chemistry majors.

viii) Faculty and emphasis is unusually strong in teaching for a large university. Two faculty (Pasquale DiRaddo and Dan Adsmond) are recent Ferris Distinguished Teacher Awardees. Survey data included in this document affirms students' high regard for our faculty' dedication to helping them learn. (See also Section 3, Part H on Faculty).

ix) *Good potential for future growth in undergraduate research as well as formal laboratory instruction*; e.g. , somewhat underutilized but available instrumentation; good anecdotal evidence for growing pool of research-motivated undergrads (many but not all are chem. majors), some faculty interest among those not currently engaged in chemistry research. Program would benefit from additional newer lab instrumentation in selected cases (e.g. a tabletop GC/MS.

x) Ferris's breadth of academic subjects (beyond that of even a typical comprehensive university) is a continuing resource for future Chemistry growth through interdisciplinarity (see also item xii on minors)

xi) *Opportunities exist for undergraduates to complement their chemistry training wit a choice of supporting minors.*

2) Program's Ability to Attract Quality Students.

The Honors Program at Ferris State attracts over 200 students each year. Currently, there are 598 students in the Honors Program, and of these students, approximately 54% take two years of chemistry for their intended program. A majority of the students that graduate from the Chemistry BA program are students that switch after taking more than one semester of chemistry. The average GPA and ACT (see

Section 3, Part A)) of the Chemistry BA graduates in the 2008/2009 school year are above average for Ferris and nationally. See also portions of Section 1 above for additional factors that would make Ferris a strong choice.

The "Pre-Pharmacy Pipeline": Comments and Suggestions

Former Ferris Pre-Pharmacy students have serendipitously become the key source for in-house "crossover" chemistry/biochemistry majors. Their grades tend to be very good. They constitute more than half of the chemistry/biochemistry majors pipeline, as detailed elsewhere in this report. Average GPA of an accepted [for Ferris] internal pharmacy school applicant is in the 3.7-3.8 range. In retrospect, it is perhaps not surprising that a number of very talented and hardworking students (many with good to excellent grades) still won't make those numbers for a variety of reasons which bear little on ability or likely future success in either pharmacy or chemistry.

How can we constructively exploit this trend to keep and attract even more such students and still..:

i) Give them a good academic good home in Ferris's chemistry and biochemistry programs

ii) Prepare them for possible future efforts to enter pharmacy school (or other health-related program if they so desire), or further study in Chemistry.

iii) Provide the type of strong training and marketable skills that will allow for a variety of other career or graduate study pathways. In short, we allow the centrality and versatility of our science to enhance such students' future prospects within and outside chemistry.

The Boomers' "elder bulge" is already here. Needs of this huge group are likely to make pharmacy (and, indeed, other desirable health careers) attractive options for the foreseeable future. Value of Chemistry and Biochemistry programs should be stressed to high schoolers considering Ferris. The Chemistry or Biochemistry major is an excellent *first choice* for students contemplating pharmacy or pharma related careers. Ferris' recruiting efforts need not be limited to welcoming the valuable "in-house" crossovers, but also to actively recruiting high schoolers*:*

a) Continue grow the Chemistry/Biochemistry major into a good platform for pre-pharmacy students with good backgrounds who are not immediately able to enter pharmacy school.

b) Through the Chemistry/Biochemistry major, create a well-designed coordinated program to give our graduates a strong "second chance" at pharmacy school admission should this still be their postgraduate goal.

3) Competing Programs at other Institutions. Table 1 below summarizes some key points:

TABLE 1. Chemistry Programs at Ferris and Three Nearby Public Institutions: Comparison of Selected Aspects

	Ferris	**Grand Valley**	**Central**	**Western**
2-Year Programs	Industrial Chemical Technology	no	no	no

BS /BA Concentrations	biochemistry chemistry secondary ed.	biochemistry and molecular biology environmental "professional", "technical"	chemistry biochemistry	chemistry biochemistry environmental
Chem minor	no	yes	yes	yes
College Acceptance Rate	74%	78%	70%	85%
Ave ACT scores	21.4	23.8	22	22
Freshman-soph retention rate (schoolwide)	70%	86%	78%	75%
Ave HS GPA	3.17 /4.00	3.53 /4.00	3.33/4.00	3.27/4.00
Masters	no	"advanced content" for M. Ed	yes	yes
Ph.D.	no	no	Traditional; strong materials/ polymer emphasis	Traditional, environmental emphasis; required 2nd discipline strength
ACS-Accredited BS degree	no	yes	yes	yes
Gen. Chem. Class Size	75-120	100-140 majors 30 or less	150-250	200-230
Organic Chem. Class size	50-90	30-35, majors 20 or less	30-65	75-100
Upper Div Class size	5-40, up to 60 for biochem.	30 or less	30 or less, up to 95 for biochem.	17 or less
Tuition (08-09) 30 credits fresh. ('08-'09)	$9,000* but fewer fees!	$8,196	$9,720	$8, 228
Undergraduate Research	yes, but limited	yes	yes	yes
Student/Faculty ratio	**ratio:** 15:1	**ratio:** 18:1	**ratio:** 21:1	**ratio**19:1

Inspection of the majors on record reveals a fairly diffuse geographic distribution within Michigan. The three most closely situated public universities all have attractive and well-established undergraduate chemistry programs:

A. **Grand Valley State University** http://www.gvsu.edu/chem/index.cfm?id=F0ED8827-C77D-A493-5903CB949263564A

Comprehensive undergraduate university with much emphasis on undergraduate research and a broad focus on many areas of chemistry. Many internship and internal research opportunities for a primarily undergraduate chemistry school; biomedicine and environmental areas appear popular and strong. Excellent Web site, which we could learn from! Numerous options for Chemistry as a major or minor BS/BA Program with concentrations or 'emphases' (see Table)BS is ACS Certified if desired. Available M.Ed. with "advanced content" concentration in chemistry .

B. Central Michigan State University
http://www.cst.cmich.edu/units/chm/Studentinfo/undergrad_studies.htm

Ph.D. granting institution with a medium-sized (18 member faculty) and significant research effort. Seems to benefit from presence of Dow and other industrial connections. Materials and nanotechnology , polymers well –represented, but all "traditional" areas (organic, inorganic, physical, analytical, physical, biochem) major areas of chemistry are represented.

C. Western Michigan University
Chemistry: http://www.wmich.edu/chemistry/undergraduate.htm

Undergraduate breadth of choices similar to Grand Valley with additional strength in environmental area (which is also strong at GVSU, as noted above).Ph. D. Program in Chemistry. Applied emphasizes environmental aspects, has good research money from EPA and similar sources. A second discipline relevant to environmental studies in addition to chemistry is also an interesting feature. While this has not been checked yet, this program's "trickledown" influences might make WMU very attractive to undergrads with such interests.

a) How are these programs similar and different from the FSU program? See also Table 1:

i) The comparison schools have larger average class sizes in chemistry; for example, Central's General Chemistry lectures typically range from 150 to 250 or so students. Honors classes and specialty courses can have 20 or less. Grand Valley's class sizes are the smallest of the three, and are mostly similar to ours, yet have great upper-division variety.(the data was obtained from direct phone contacts with staff and in the case of GVSU, the chair).

ii) Admissions criteria vary from moderately more selective for the comparison schools, with GVSU most selective.

iii) Of the schools in the comparison group, only Ferris has no available *ACS certified bachelor 's degree*

iv) While chemistry/biochemistry majors are required to have minors at Ferris, *chemistry itself is not offered as a minor here, in contrast to the other schools in our group*.

v) Company Internships are available at the other schools. Grand Valley, in particular, uses these resume-building outside-the–classroom experiences as a selling point.

vi) There are (likely) proportionately more pre-meds, pre-dents (and similar level) pre-health professions students in Chem/Biochem programs (and in the pool of potential majors) of the other schools with the strong exception of pre-pharms. (Our anecdotal evidence on this point will benefit from further research). A trend similar to that with pre-pharms is likely (but not yet proven with hard data) for pre-optometry students.

vii) Two of the three schools are full-fledged MS and Ph.D. granting institutions. Presumably they both suffer and benefit - relative to Ferris - from the expected trade offs; e.g., unpredictable quality of grad

student TAs, less emphasis on teaching, easy opportunities for undergrad research, more course variety (inspection of online info confirms the greater variety of offerings, even at primarily undergrad GVSU). GVSU also has taken steps to provide strong research opportunities, and the aforementioned internships. Biomedical and environmental upper-division offerings and the presence in Grand Rapids of so many nearby companies , healthcare, and non-profit institutions) figure prominently in these efforts.

b) What can be learned from them that would improve the program at Ferris? (several of these items have been mentioned previously, some are further developed below)

i) Continue to welcome pre-pharm program transfers while recruiting new freshman as well by enhancing pre-pharm and all pre-health opportunities.

ii) Continue to support and enhance the cooperative research opportunities in organic lab. Supply additional access to instrumentation, equipment, software as well as instruction in assessing and communicating results to build further on this vibrant and unique course opportunity. Consider expansion to other courses , even to selected general chemistry sections (perhaps as an option) and consider such work as a possible bridge to "regular" undergraduate research for those so inclined.

iii) Larger number of upper-division course offerings, perhaps on a rotating and/ or "Topics", mini-course, or team-taught basis. With Colleen Partigiaoni's Inorganic Chemistry, a well-attended one-semester Physical Chemistry course (Piram Prakasam), and Kim Colvert's longstanding offerings in biochemistry, we are already moving towards that end. Desire for greater diversity of advanced course was noted several times in our alumni survey results.

v) Make our undergraduate research experiences distinctive by continuing to stress the abundant one-on-one interaction with faculty more than might be found in the larger schools, and also fostering (perhaps in some formal way) students' communication skills in thinking about and articulating results using the full range of media, formats, and styles appropriate to the profession.

vi) Promotion of chemically intelligent software skills (beyond structure-drawing alone) would add value to Ferris' degree, be saleable to prospective students, and mesh well with our tradition of teaching hands-on state of the art technical skills. Our survey shows only lukewarm satisfaction on the computer –related question.

vii) Greater Chemistry/Biochemistry presence on the Web. Ferris exposure compared to our regional competition in this regard is modest at present. Dr. Francis Burns is initiating some Web design work for us; several faculty have offered to assist. A number of conventional and novel ideas are being informally discussed. GVSU has a particularly effective Web presence for a primarily undergrad school.

viii) Unique summer opportunities involving chemical themes, such as travel. Mark Thomson has ongoing efforts in this direction (at this time, for gen. ed. level courses combined with humanities.)

ix) Regular (even if small; e.g. 2x per semester) seminar program OUTSIDE the already very full student affiliate meeting schedule.

x) Continue to study the market, other programs, and ourselves/our students as follow up to these initial findings. Subsequently design and carry out a coordinated campaign to draw in students who might not have considered Ferris at all. Other institutions seem to be more aggressive towards that end than we are at present.

Section 1, Part C PROGRAM RELEVANCE

1) Labor Market Demand Analysis

The most reliable and complete source of information on the chemistry job market in the United States is a census which has been conducted by American Chemical Society (ACS) of its members every 5 years since 1985. The latest such census, ChemCensus 2005, shows that there have been some significant changes in the employment of chemists over the past 20 years. The percent of chemists employed full time has dropped from 95% to 91% since 1985 and the percent of ACS chemists who are unemployed and seeking employment has risen from 1.6% to 3.1% over that same period. Over the past 10 years there has been an increase of 63,000 jobs (28% increase) for chemists in the pharmaceutical industry and a decrease of 172,000 jobs (23%) for chemists in other areas for a net decrease of 109,000 jobs (11%) for chemists over the 10 year period.

In 2005 the top 5 areas of employment for chemists by work function were research (39%); management (17%); analysis including 1% in forensics (15%); production/quality control (10%); and marketing/sales (5%). In 2004 the mean salary for inexperienced Bachelor's chemist was $34,000 and the median salary for all Bachelors chemists was $63,000. For BA/BS chemists working less than 12 months a salary of $46,000 was in the 90^{th} percentile and a salary of $24,000 was in the 10^{th} percentile.

2) Program Response to Issues

Because of the young age of the program (first graduate in 2004) and the fact that this is our first program review we are just now establishing the bench mark from which we will veer in the future in response to changes in employer and students needs.

3) Why Students Enroll and Satisfaction of Enrolled Students

The results of the Current Student Survey and the Graduating Student Exit Survey showed a variety of sources for a student's initial interest in the FSU Chemistry or Biochemistry programs.

Question 25 in the Current Student Survey asked, "How did you find out about Ferris' Chemistry or Biochemistry program?" The 15 students replying gave the following responses:

Ferris faculty or staff - 8 (53%), Ferris literature – 3 (20%),

High school guidance counselor or teacher -1 (7%), Friend – 1 (7%), other – 2 (13%)

Question 11 in the graduating Student Exit Survey asked, "Who prompted your interest in the Chemistry or Biochemistry program at FSU?" The 8 responses are as follows:

HS counselor or teacher -2 (25%) FSU professor – 3 (38%) friend – 1 (12%) other – 2 (25%)

In summary of these two surveys the enrollment of half of the students in the Chemistry or Biochemistry programs may be attributed to encounters with Ferris faculty or staff. Over half of our current majors did not come to Ferris initially intending to major in Chemistry or Biochemistry.

The question of how well the program meets student expectations was addressed in both the Current Student Survey and the Graduating Student Exit Survey. These two tools are, at this point, our major means of accurately measuring student sentiment.

Question 18 in the Current Student Survey asked "Please indicate your level of agreement with the statement: The Chemistry or Biochemistry program at Ferris is serving my needs for the future." Of the 14 responses received 1 student (7%) somewhat disagreed, 10 students (71%) somewhat agreed, and 3 students (21%) strongly agreed.

Question 19 in the Current Student Survey asked: "Would you recommend the Chemistry or Biochemistry program at Ferris to a prospective student?" Of the 15 responses received 11 students (73%) said yes, 1 student (7%) said no, and 3 students (20%) said possibly in the future as the program grows.

Question 2 of the Graduating Student Exit Survey asked students about their level of satisfaction with 6 different aspects of the Chemistry or Biochemistry program. Responses to each aspect are listed below.

a) Experiences in laboratory courses

very dissatisfied – 1 (11%) somewhat satisfied – 2 (22%) very satisfied – 6 (67%)

b) Laboratory facilities in Chemistry or Biochemistry

somewhat dissatisfied – 2 (22%) somewhat satisfied – 2 (22%) very satisfied – 5 (56%)

c) Ability to work in a chemistry laboratory in a safe manner

somewhat satisfied – 1 (11%) very satisfied – 8 (89%)

d) Expertise of chemistry faculty in their professional areas

somewhat satisfied – 2 (22%) very satisfied – 7 (78%)

e) Availability of books/journals/information

somewhat dissatisfied – 1 (11%) somewhat satisfied – 4 (44%) very satisfied – 4 (44%)

f) The chemistry program overall

somewhat dissatisfied – 1 (11%) somewhat satisfied – 3 (33%) very satisfied – 5 (56%)

67% of the responses of the 2009 graduating seniors across these six aspects of the program fell in the category of *very satisfied*.

Section 1, Part D PROGRAM VALUE

1) Benefit of Program, Facilities, and Personnel to the University

One of the most obvious benefits of the program courses to the university is the huge number of student credit hours that they generate. In the 2008/09 school year alone 860 students enrolled in the general chemistry and organic chemistry sequences generating over 4300 SCHs. In addition the chemistry faculty contribute another huge number of SCHs in a variety of non-majors service courses as listed in Section 3, Part 1. Chemistry faculty have benefited the university over the last 5 years by delivering a wide range of local presentations for the benefit of faculty, students, and the local community. These talks have ranged from fermentation discussions to overseas

sabbatical reports to graduation addresses. Chemistry faculty have contributed to the university over the past 5 years as well through a wide variety of committee service and leadership.

2) Benefit of Program, Facilities, and Personnel to the program students

The expertise of the faculty, the hands-on problem solving experiences, and the high level of hands-on instrumental experience add to the richness of the students' educational experience. As mentioned above, students in both the chemistry and biochemistry programs have the opportunity to learn to conduct extended research projects as early as the spring semester of their sophomore year (in organic chemistry lab). This unusual opportunity lays a foundation for further literature and lab work. Several faculty members have supervised independent student research projects in the laboratory ranging in duration from 1 semester to 2 years. These projects provide students with invaluable experience working in the laboratory. This additional one-on-one time with a faculty member and the experience of working independently in the laboratory provides valuable preparation for a career in chemistry or science-related field.

Due to the fact that both programs are BA degrees, students may tailor the degrees to their specific interests, through the selection of an appropriate minor and/or other elective courses. For example, students who intend to pursue jobs in the chemical industry will be encouraged to take the four additional classes in the ICT degree that prepare them for hands-on employment. Students who intend to go to graduate school in chemistry or biochemistry will be encouraged to take more than the minimum number of required upper-level courses in the program.

3) Value of Program to Employers

Due to the lack of survey response from employed graduates we have no feedback.

4) Other benefits

Ferris faculty regularly contribute services in manuscript reviewing for professional journals, the facilities have been used to host meetings of the West Michigan chapter of the American Chemical Society and to host outside speaker presentations to the ACS group, the students, faculty, and local community. Prof. Mark Thomson also contributes his services to the ACS speaker circuit.

5) Services for Public Groups and Their Benefits

Faculty and Students through the student affiliate chapter of the ACS have regularly contributed their expertise in delivering presentations to K – 12 classrooms, science fair judging, and tutoring of students.

Section 2: Collection of Perceptions

Section 2, Part A GRADUATE FOLLOW-UP SURVEY

A Chemistry & Biochemistry graduate survey was mailed to the last mailing address known for 21 chemistry graduates. Surveys were completed and returned by 7 of the 21 graduates. The survey consisted of 11 questions comparing their backgrounds in various areas with others and assessing their level of satisfaction with the program and courses. Students were asked to report how they entered the program, their graduation year, and current status. A free response area was included for additional comments. The survey and summary of the results follows.

Chemistry & Biochemistry Graduate Survey

The Chemistry and Biochemistry programs are going through the Academic Program Review (APR) process and need feedback from our graduates to assist in this process. Please take a few minutes to complete this short survey. We appreciate you giving us your honest opinions.

Q1 **Please indicate your level of agreement with each of the following, beginning "Compared to other Bachelor entry-level lab personnel or graduate students,..."**

	Much Weaker	Slightly Weaker	Comparable	Slightly Stronger	Much Stronger
My background in **chemistry** is	❑	❑	❑	❑	❑
My **laboratory experience** is	❑	❑	❑	❑	❑
My **problem solving** skills are	❑	❑	❑	❑	❑
My **critical thinking** skills are	❑	❑	❑	❑	❑
My background in **computer usage** is	❑	❑	❑	❑	❑
My background in **math** is	❑	❑	❑	❑	❑
My background in **writing** is	❑	❑	❑	❑	❑
My **oral communication** skills are	❑	❑	❑	❑	❑
My **interpersonal communication** skills are	❑	❑	❑	❑	❑
My background in **social awareness** is	❑	❑	❑	❑	❑
My background in **cultural enrichment** is	❑	❑	❑	❑	❑

Q2 **Please indicate your level of satisfaction with the level of expertise of the program faculty in their professional areas.**

- ❑ Very Dissatisfied
- ❑ Somewhat Dissatisfied
- ❑ Somewhat Satisfied
- ❑ Very Satisfied

Q3 **Please indicate your overall level of satisfaction with the program.**

- ❑ Very Dissatisfied
- ❑ Somewhat Dissatisfied
- ❑ Somewhat Satisfied
- ❑ Very Satisfied

Q4 **Was there any one required course which you can identify as being the most beneficial to you in your career?**

- ❑ Yes
- ❑ No

Q5 **Which one?**

Q6 **Was there any one required course which you can identify as being the least beneficial to you in your career?**

- ❑ Yes
- ❑ No

Q7 **Which one?**

❑ Accepted to/attending graduate school
❑ Unemployed, Seeking employment (not in grad school)
❑ Unemployed, Not seeking employment (not in grad school)

Q8 Please use this space for additional comments.

Background

Q9 I entered the program

❑ As a freshman
❑ As a transfer student
❑ From another program at Ferris

Please Specify: _____

Q10 Graduation Year

_____

Q11 Are you

❑ Employed full time
❑ Employed part time
❑ Self-employed
❑ Serving in the military

Thank you for your time and input.

Alumni Survey Results

Q1 -

Question	Much weaker	Slightly weaker	Comparable	Slightly stronger	Much stronger
My background in chemistry is			4	1	1
My laboratory experience is		1	1	2	2
My problem solving skills are			3	2	2
My critical thinking skills are			3	2	2
My background in computer usage is		1	2	4	
My background in math is		1	1	3	2
My background in writing is			3	1	3
My oral communication skills are			1	4	2
My interpersonal communication skills are				5	2
My background in social awareness is			3	2	2
My background in cultural enrichment is			2	3	2

Q2 - Level of satisfaction with level of expertise of the program faculty in their professional areas.

Somewhat satisfied - 1 Very satisfied - 6

Q3 - Overall level of satisfaction with the program

Somewhat satisfied - 2 Very satisfied - 5

Q4 & 5 - Any one course most beneficial?

Yes - 6 No - 1

Chem 121/122 1

Chem 231 1

Chem 245 2

Chem 321/322 1

Chem 322 1

ICT 1

Q6 & 7 - Any one course least beneficial?

Yes - 2 No - 5

Chem 364

Geography of Michigan

Q8 - Additional comments

"The program and effort of the professors provided a phenomenal foundation in chemistry and excellent critical thinking skills that were very beneficial in graduate school."

"Great program. It would be nice to have ACS certified BS degree. Also, more chemistry related course options"

"I always wish I had taken an inorganic chem. Class during my BA"

"Would be pleased to see 2nd semester of physical chemistry available as well as an advanced org chem. Course (for juniors/seniors). Happy to hear inorganic will be offered more regularly."

"Having completed graduate-level chemistry coursework and participating in graduate research, I am confident that Ferris State sufficiently prepares the interested student for a graduate program in chemistry. The professors are dedicated to teaching and always knowledgable in their field. Thank you!"

"If you are interested in a guest speaker I would love to tell students about my career in an environmental lab."

Q9 - Entered the program

as a freshman 2 as a transfer student 1 from another program at Ferris 4

Dual major Math BA 2

Pharmacy 1

ICT 1

Q10 - Graduation Year 2004 - 1 2005 - 3 2006 – 1 2008 – 2

Q11 - Employed full time – 2 Employed part time – 1 Accepted to/attending graduate school - 6

Section 2, Part B EMPLOYER FOLLOW-UP SURVEY

An Employer Survey was developed for future use but because of the lack of survey response among employed graduates we have no employers to survey at this time. The Employer Survey follows.

Chemistry & Biochemistry Employer Survey

The Chemistry and Biochemistry programs are going through the Academic Program Review (APR) process and need feedback from employers of their graduates to assist in this process. Please take a few minutes to complete this short survey. We appreciate you giving us your honest opinions.

Q1 Which of the following describes your company's *primary* activity?

- ❑ Manufacturing
- ❑ Research & Development
- ❑ Consulting
- ❑ Other

Please Specify: _____

Q2 How many Ferris State University Chemistry B.A. grads does your company currently employ?

- ❑ 1
- ❑ 2-4
- ❑ 5 or more
- ❑ Don't know

Q3 Which of the following *best* describes the type of work carried out by these graduates?

- ❑ Research/development
- ❑ Manufacturing
- ❑ Analysis
- ❑ Education
- ❑ Other

Please Specify: _____

Q4 Please indicate your level of satisfaction with each of the following skills of the graduate(s).

	Very Dissatisfied	Somewhat Dissatisfied	Somewhat Satisfied	Very Satisfied	No knowledge/Not applicable
Laboratory skills	❑	❑	❑	❑	❑
Communication skills	❑	❑	❑	❑	❑
Instrumental skills	❑	❑	❑	❑	❑
Critical thinking/reasoning skills	❑	❑	❑	❑	❑
Understanding of chemical concepts	❑	❑	❑	❑	❑

Q5 Is there one area in which these graduates excel?

- ❑ Yes
- ❑ No

Q6 Please use this space to elaborate.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Q7 Is there one area in which these graduates are weak?

- ❑ Yes
- ❑ No

Q8 Please use this space to elaborate.

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Q9 Please use this space for additional comments.

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Thank you for your time and input.

Section 2, Part C GRADUATING STUDENT EXIT SURVEY

The 16 graduating chemistry and biochemistry were asked to complete an online survey consisting of 29 multiple choice questions and 3 free response questions. 9 of the 16 graduating students responded. Six of the respondents were seeking the Chemistry BA and three were seeking the Biochemistry BA. Students were asked to indicate their level of satisfaction with courses in 10 different catagories; their level of satisfaction with 6 different aspects of the Chemistry/Biochemistry program; and their level of satisfaction regarding how well 4 different chemistry courses prepared them for future courses. They were also asked about how they learned about the program; when in their college career they entered the program; and their plans upon graduation. The survey and the results of the exit survey follow.

Chemistry & Biochemistry Graduating Student Exit Survey

The Chemistry and Biochemistry programs are going through the Academic Program Review (APR) process and need feedback from graduating students to assist in this process. Please take a few minutes to complete this short survey. We appreciate you giving us your time and input.

Q1 Please indicate your level of satisfaction with the following courses:

	Very Dissatisfied	Somewhat Dissatisfied	Somewhat Satisfied	Very Satisfied
Chemistry or Biochemistry courses	❑	❑	❑	❑
Courses in your minor	❑	❑	❑	❑
Courses that incorporated critical thinking/problem solving	❑	❑	❑	❑
Courses that incorporated computer experiences	❑	❑	❑	❑
Courses in quantitative skills/mathematics	❑	❑	❑	❑
Courses in written communication/writing	❑	❑	❑	❑
Courses in oral or interpersonal communication	❑	❑	❑	❑
Courses in foreign language	❑	❑	❑	❑

Courses in social awareness	❑	❑	❑	❑
Courses in cultural enrichment	❑	❑	❑	❑

Q2 Please indicate your level of satisfaction with the following:

	Very Dissatisfied	Somewhat Dissatisfied	Somewhat Satisfied	Very Satisfied
Your experiences in laboratory courses	❑	❑	❑	❑
The laboratory facilities in Chemistry or Biochemistry	❑	❑	❑	❑
Your ability to work in a chemistry laboratory in a safe manner	❑	❑	❑	❑
The expertise of your Chemistry faculty in their professional areas	❑	❑	❑	❑
The availability of books/journals/information (both in the library and on-line)	❑	❑	❑	❑
The Chemistry or Biochemistry program overall	❑	❑	❑	❑

Q3 Please indicate your level of satisfaction regarding how well the following courses prepared you for future courses:

	Very Dissatisfied	Somewhat Dissatisfied	Somewhat Satisfied	Very Satisfied
CHEM 121 (General Chemistry 1)	❑	❑	❑	❑
CHEM 122 (General Chemistry 2)	❑	❑	❑	❑
CHEM 321 (Organic Chemistry 1)	❑	❑	❑	❑
CHEM 322 (Organic Chemistry 2)	❑	❑	❑	❑

Q4 What two or three aspects of the Chemistry or Biochemistry program were you *most* satisfied with?

Q5 What two or three changes to the program would have made it a better experience for you?

Q6 Please use this space for additional comments.

Background

Q7 Which degree are you seeking?

- ❑ Chemistry BA
- ❑ Biochemistry BA

Q8 Did you also obtain an Associate's degree in Industrial Chemistry Technology (ICT)?

- ❑ Yes
- ❑ No

Q9 How many semesters did you attend college before attaining your BA degree?

- ❑ 1-8 semesters
- ❑ 9-10 semesters
- ❑ 11-12 semesters
- ❑ More than 12 semesters

Q10 When did you enter the Chemistry or Biochemistry program?

- ❑ As a freshman
- ❑ Transfer student from another college
- ❑ Transferred from another program at Ferris

Q11 Who prompted your interest in the Chemistry or Biochemistry program at FSU?

- ❑ HS counselor or teacher
- ❑ FSU professor
- ❑ Friend
- ❑ Other

Please Specify: _____

Q12 What are your immediate plans once you graduate?

- ❑ Employment
- ❑ Graduate school
- ❑ Professional school (Pharmacy, Medical, etc.)
- ❑ Other

Please Specify: _____

Q13 Are you planning on staying in Michigan following graduation?

- ❑ Yes
- ❑ No
- ❑ Will depend on job offers/grad school acceptance

Thank you for your time and input.

08 Chemistry/Biochemistry APR...Graduating Students

Frequencies

Prepared by: Institutional Research & Testing, 02/09

Statistics

	N		Mean	Median	Std. Deviation
	Valid	Missing	Valid	Missing	Valid
q1a Courses: Chem/Biochem	9	0	3.11	3.00	.782
q1b Courses: Minor	9	0	3.33	3.00	.500
q1c Courses: Critical thinking/prob solving	9	0	3.22	3.00	.441
q1d Courses: Computer experiences	9	0	2.67	3.00	.707
q1e Courses: Quantitative skills/math	9	0	2.78	3.00	.972
q1f Courses: Written comm'n/writing	9	0	2.78	3.00	.667
q1g Courses: Oral/interpers'l comm'n	9	0	2.78	3.00	.667
q1h Courses: Foreign language	9	0	3.33	3.00	.500
q1i Courses: Social awareness	9	0	3.44	3.00	.527
q1j Courses: Cultural enrichment	9	0	3.33	3.00	.500
q2a Experiences in lab courses	9	0	3.44	4.00	1.014
q2b Labs in Chem/Biochem	9	0	3.33	4.00	.866
q2c Ability to work in a chem lab safely	9	0	3.89	4.00	.333
q2d Expertise of Chem faculty	9	0	3.78	4.00	.441
q2e Availability of resources (library & on-line)	9	0	3.33	3.00	.707
q2f Chem/Biochem program overall	9	0	3.44	4.00	.726
q3a CHEM 121	9	0	3.56	4.00	.527
q3b CHEM 122	9	0	3.33	3.00	.707
q3c CHEM 321	9	0	3.22	3.00	.833
q3d CHEM 322	9	0	3.11	3.00	.782
q4 2 or 3 aspects most satisfied with	9	0			
q5 2 or 3 changes would have made better	9	0			
q6 Additional comments	9	0			
q7 Degree	9	0	1.33	1.00	.500
q8 Obtain an Associate's in ICT	9	0	1.78	2.00	.441
q9 Semesters attended coll before getting BA	9	0	2.22	2.00	.833
q10 Enter Chem/Biochem	9	0	2.11	2.00	.928
q11 Prompted interest	8	1	2.38	2.00	1.188
q11a Interest Other specified	9	0			
q12 Immediate plans	9	0	2.00	1.00	1.323
q12a Plans Other specified	9	0			
q13 Planning on staying in MI	9	0	2.56	3.00	.882

Frequency Table

q1a Courses: Chem/Biochem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Dissatisfied	2	22.2	22.2	22.2
	Somewhat Satisfied	4	44.4	44.4	66.7
	Very Satisfied	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

q1b Courses: Minor

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Satisfied	6	66.7	66.7	66.7
	Very Satisfied	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

q1c Courses: Critical thinking/prob solving

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Satisfied	7	77.8	77.8	77.8
	Very Satisfied	2	22.2	22.2	100.0
	Total	9	100.0	100.0	

q1d Courses: Computer experiences

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Dissatisfied	4	44.4	44.4	44.4
	Somewhat Satisfied	4	44.4	44.4	88.9
	Very Satisfied	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q1e Courses: Quantitative skills/math

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Dissatisfied	1	11.1	11.1	11.1
	Somewhat Dissatisfied	2	22.2	22.2	33.3
	Somewhat Satisfied	4	44.4	44.4	77.8
	Very Satisfied	2	22.2	22.2	100.0
	Total	9	100.0	100.0	

q1f Courses: Written comm'n/writing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Dissatisfied	3	33.3	33.3	33.3
	Somewhat Satisfied	5	55.6	55.6	88.9
	Very Satisfied	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q1g Courses: Oral/interpers'l comm'n

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Dissatisfied	3	33.3	33.3	33.3
	Somewhat Satisfied	5	55.6	55.6	88.9
	Very Satisfied	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q1h Courses: Foreign language

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Satisfied	6	66.7	66.7	66.7
	Very Satisfied	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

q1i Courses: Social awareness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Satisfied	5	55.6	55.6	55.6
	Very Satisfied	4	44.4	44.4	100.0
	Total	9	100.0	100.0	

q1j Courses: Cultural enrichment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Satisfied	6	66.7	66.7	66.7
	Very Satisfied	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

q2a Experiences in lab courses

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Dissatisfied	1	11.1	11.1	11.1
	Somewhat Satisfied	2	22.2	22.2	33.3
	Very Satisfied	6	66.7	66.7	100.0
	Total	9	100.0	100.0	

q2b Labs in Chem/Biochem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Dissatisfied	2	22.2	22.2	22.2
	Somewhat Satisfied	2	22.2	22.2	44.4
	Very Satisfied	5	55.6	55.6	100.0
	Total	9	100.0	100.0	

q2c Ability to work in a chem lab safely

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Satisfied	1	11.1	11.1	11.1
	Very Satisfied	8	88.9	88.9	100.0
	Total	9	100.0	100.0	

q2d Expertise of Chem faculty

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Satisfied	2	22.2	22.2	22.2
	Very Satisfied	7	77.8	77.8	100.0
	Total	9	100.0	100.0	

q2e Availability of resources (library & on-line)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Dissatisfied	1	11.1	11.1	11.1
	Somewhat Satisfied	4	44.4	44.4	55.6
	Very Satisfied	4	44.4	44.4	100.0
	Total	9	100.0	100.0	

q2f Chem/Biochem program overall

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Dissatisfied	1	11.1	11.1	11.1
	Somewhat Satisfied	3	33.3	33.3	44.4
	Very Satisfied	5	55.6	55.6	100.0
	Total	9	100.0	100.0	

q3a CHEM 121

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Satisfied	4	44.4	44.4	44.4
	Very Satisfied	5	55.6	55.6	100.0
	Total	9	100.0	100.0	

q3b CHEM 122

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Dissatisfied	1	11.1	11.1	11.1
	Somewhat Satisfied	4	44.4	44.4	55.6
	Very Satisfied	4	44.4	44.4	100.0
	Total	9	100.0	100.0	

q3c CHEM 321

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Dissatisfied	2	22.2	22.2	22.2
	Somewhat Satisfied	3	33.3	33.3	55.6
	Very Satisfied	4	44.4	44.4	100.0
	Total	9	100.0	100.0	

q3d CHEM 322

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Dissatisfied	2	22.2	22.2	22.2
	Somewhat Satisfied	4	44.4	44.4	66.7
	Very Satisfied	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

q4 2 or 3 aspects most satisfied with

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	11.1	11.1	11.1
	Biochemistry class did a great job teaching the connections between the metabolic pathways. The lab work really helped to make the material we were studying more interesting and easier to understand.	1	11.1	11.1	22.2
	I really enjoyed the quantitative and instrumental courses, they gave a good understanding of how lecture relates in the lab. I like how most of the professors are available outside class time for help and are happy to help.	1	11.1	11.1	33.3
	I was very satisfied with the experience I was given in a laboratory, especially the analytical chemistry courses. I was very satisfied with the level of help I was able to obtain from my professors. They all seemed very concerned with my personal abilities and my learning.	1	11.1	11.1	44.4
	The chemistry program had a lot of flexibility with minors. I enjoyed the option of classes to be taken in one section (biochem labs vs intrumental analysis). It is a very doable to graduate from this program in 4 years.	1	11.1	11.1	55.6
	The faculty are really amazing and pleasant to work with.	1	11.1	11.1	66.7
	The friendliness and helpfulness of the professors. They will help you in any way they can. The laboratory experience was indeed helpful.	1	11.1	11.1	77.8
	The profesors and the ability to find information/help.	1	11.1	11.1	88.9
	The professors and the labs	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q5 2 or 3 changes would have made better

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	11.1	11.1	11.1
	I think more lab classes should be offered. I think there should be classes available for specialization in certain equipment, rather than just the Instrumental class that is a broad overview of everything. I would also like to see an inorganic chemistry class offered more often. I would also prefer more help in obtaining jobs as this is never really addressed for chemistry students.	1	11.1	11.1	22.2
	I would say, get rid of physical chemistry altogether! I learned next to nothing and feel it was a waste of my time and money, something I am not too happy about.	1	11.1	11.1	33.3
	Inorganic req rather than biochem Better lab facilities/equipment	1	11.1	11.1	44.4
	Introduction to Physical Chemistry course could be more related to living organisms. Try to make it to where there isn't such a gap between P.Chem. and CHEM122, since these two courses are very connected. (Maybe make there be less pre-reqs for P. Chem.)	1	11.1	11.1	55.6
	More biochem/P-chem class time options.	1	11.1	11.1	66.7
	More updated lab equipment	1	11.1	11.1	77.8
	The professors need to work on explaining at level easier understood by students, some professors seem to smart to dumb it down. I think that work in the lab should be increased, I think I would benefit from feeling more comfortable with the lab "machines".	1	11.1	11.1	88.9

	There were a few classes that I didn't benefit from the prof's teaching style. It was difficult to learn the material because of this. Would also suggest that all organic courses be taught in a similar manner. I don't as if I am prepared in organic as much as I should be.	*1*	*11.1*	*11.1*	*100.0*
	Total	*9*	*100.0*	*100.0*	

q6 Additional comments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		*8*	*88.9*	*88.9*	*88.9*
	Killian is a wonderful professor and mentor.	*1*	*11.1*	*11.1*	*100.0*
	Total	*9*	*100.0*	*100.0*	

q7 Degree

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Chemistry BA	*6*	*66.7*	*66.7*	*66.7*
	Biochemistry BA	*3*	*33.3*	*33.3*	*100.0*
	Total	*9*	*100.0*	*100.0*	

q8 Obtain an Associate's in ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	*2*	*22.2*	*22.2*	*22.2*
	No	*7*	*77.8*	*77.8*	*100.0*
	Total	*9*	*100.0*	*100.0*	

q9 Semesters attended coll before getting BA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-8 semesters	*1*	*11.1*	*11.1*	*11.1*
	9-10 semesters	*6*	*66.7*	*66.7*	*77.8*
	11-12 semesters	*1*	*11.1*	*11.1*	*88.9*
	More than 12 semesters	*1*	*11.1*	*11.1*	*100.0*
	Total	*9*	*100.0*	*100.0*	

q10 Enter Chem/Biochem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	As a freshman	*3*	*33.3*	*33.3*	*33.3*
	Transfer student from another college	*2*	*22.2*	*22.2*	*55.6*
	Transferred from another program at Ferris	*4*	*44.4*	*44.4*	*100.0*
	Total	*9*	*100.0*	*100.0*	

q11 Prompted interest

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	HS counselor or teacher	2	22.2	25.0	25.0
	FSU professor	3	33.3	37.5	62.5
	Friend	1	11.1	12.5	75.0
	Other	2	22.2	25.0	100.0
	Total	8	88.9	100.0	
Missing	System	1	11.1		
Total		9	100.0		

q11a Interest Other specified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		6	66.7	66.7	66.7
	Finished pre-pharm. Didn't want to continue. Pursued Chemistry and Biology majors.	1	11.1	11.1	77.8
	I was trying to enter the college of Pharmacy and decided I would rather work in the lab.	1	11.1	11.1	88.9
	My chemistry 103 course	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q12 Immediate plans

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Employment	5	55.6	55.6	55.6
	Graduate school	1	11.1	11.1	66.7
	Professional school (Pharmacy, Medical, etc.)	1	11.1	11.1	77.8
	Other	2	22.2	22.2	100.0
	Total	9	100.0	100.0	

q12a Plans Other specified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		7	77.8	77.8	77.8
	Currently considering my options, so I am unsure.	1	11.1	11.1	88.9
	Possible ICT degree and/or masters in Chem	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q13 Planning on staying in MI

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	22.2	22.2	22.2
	Will depend on job offers/grad school acceptance	7	77.8	77.8	100.0
	Total	9	100.0	100.0	

Section 2, Part D STUDENT PROGRAM EVALUATION

The 32 students currently enrolled in the chemistry and biochemistry BA programs were asked to complete an online survey consisting of 28 multiple choice questions and 1 free response question. 15 of the 32 students responded, 11 of whom were enrolled in the chemistry BA program and 4 of whom were enrolled in the biochemistry BA program. Students were asked to respond to statements about the instructor and the teaching (and the lab facilities and lab experiments where applicable) in 8 different chemistry and biochemistry courses. They were asked more generally about their satisfaction with the program and were also asked about how they learned about the program; when in their college career they entered the program; and their plans upon graduation. The survey and the results of the survey follow.

2008 Chemistry & Biochemistry Current Student Survey

The Chemistry and Biochemistry programs are undergoing their Academic Program Review (APR) process. This process allows programs to see what is going well and where improvements need to be made. We are asking our current students to please take a few minutes to complete this survey providing your opinions about various aspects of your program.

The following questions deal with specific Chemistry classes. For each class, please indicate your level of agreement with the statements. If you don't feel you have enough experience with the class to adequately respond to a statement, please leave it blank.

Q1 Did you take, or are you currently taking, CHEM 121-122 (General Chem) at Ferris?

❑ Yes ❑ No

Q2 Please indicate your level of agreement with each of the following statements as they relate to your Ferris CHEM 121-122 experience.

	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
Instructor was knowledgeable	❑	❑	❑	❑
Instructor was helpful	❑	❑	❑	❑
Instructor was approachable	❑	❑	❑	❑
Teaching was clear/understandable	❑	❑	❑	❑
Lab facilities were helpful	❑	❑	❑	❑
Experiments were helpful	❑	❑	❑	❑

Q3 Did you take, or are you currently taking, CHEM 231 (Quantitative Analysis) at Ferris?

❑ Yes ❑ No

Q4 **Please indicate your level of agreement with each of the following statements as they relate to your Ferris CHEM 231 experience.**

	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
Instructor was knowledgeable	❑	❑	❑	❑
Instructor was helpful	❑	❑	❑	❑
Instructor was approachable	❑	❑	❑	❑
Teaching was clear/understandable	❑	❑	❑	❑
Lab facilities were helpful	❑	❑	❑	❑
Experiments were helpful	❑	❑	❑	❑

Q5 **Did you take, or are you currently taking, CHEM 317 (Instrumental Analysis) at Ferris?**

❑ Yes ❑ No

Q6 **Please indicate your level of agreement with each of the following statements as they relate to your Ferris CHEM 317 experience.**

	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
Prepared me well for future courses	❑	❑	❑	❑
Instructor was knowledgeable	❑	❑	❑	❑
Instructor was helpful	❑	❑	❑	❑
Instructor was approachable	❑	❑	❑	❑
Teaching was clear/understandable	❑	❑	❑	❑
Lab facilities were helpful	❑	❑	❑	❑
Experiments were helpful	❑	❑	❑	❑

Q7 **Did you take, or are you currently taking, CHEM 321-322 (Organic Chem) at Ferris?**

❑ Yes ❑ No

Q8 **Please indicate your level of agreement with each of the following statements as they relate to your Ferris CHEM 321-322 experience.**

	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
Instructor was knowledgeable	❑	❑	❑	❑
Instructor was helpful	❑	❑	❑	❑
Instructor was approachable	❑	❑	❑	❑
Teaching was clear/understandable	❑	❑	❑	❑
Lab facilities were helpful	❑	❑	❑	❑
Experiments were helpful	❑	❑	❑	❑

Q9 **Did you take, or are you currently taking, CHEM 332-333 (Biochemistry/Lab 1 & 2) at Ferris?**

❑ Yes ❑ No

Q10 **Please indicate your level of agreement with each of the following statements as they relate to your Ferris CHEM 332-333 experience.**

	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
Instructor was knowledgeable	❑	❑	❑	❑
Instructor was helpful	❑	❑	❑	❑
Instructor was approachable	❑	❑	❑	❑
Teaching was clear/understandable	❑	❑	❑	❑
Lab facilities were helpful	❑	❑	❑	❑

Experiments were helpful	❑	❑	❑	❑

Q11 Did you take, or are you currently taking, CHEM 364 (Biochemistry) at Ferris?

❑ Yes
❑ No

Q12 Please indicate your level of agreement with each of the following statements as they relate to your Ferris CHEM 364 experience.

	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
Instructor was knowledgeable	❑	❑	❑	❑
Instructor was helpful	❑	❑	❑	❑
Instructor was approachable	❑	❑	❑	❑
Teaching was clear/understandable	❑	❑	❑	❑
Experiments were helpful	❑	❑	❑	❑

Q13 Did you take, or are you currently taking, CHEM 451 (Intro to Physical Chemistry) at Ferris?

❑ Yes
❑ No

Q14 Please indicate your level of agreement with each of the following statements as they relate to your Ferris CHEM 451 experience.

	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
Instructor was knowledgeable	❑	❑	❑	❑
Instructor was helpful	❑	❑	❑	❑
Instructor was approachable	❑	❑	❑	❑
Teaching was clear/understandable	❑	❑	❑	❑

Q15 Did you take, or are you currently taking, CHEM 474 (Advanced Biochemistry) at Ferris?

❑ Yes
❑ No

Q16 Please indicate your level of agreement with each of the following statements as they relate to your Ferris CHEM 474 experience.

	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
Instructor was knowledgeable	❑	❑	❑	❑
Instructor was helpful	❑	❑	❑	❑
Instructor was approachable	❑	❑	❑	❑
Teaching was clear/understandable	❑	❑	❑	❑

Q17 Please indicate your level of agreement with the statement: The presence of the ACS Student Affiliate enhanced my Chemistry experience at Ferris.

❑ Strongly Disagree
❑ Somewhat Disagree
❑ Somewhat Agree
❑ Strongly Agree
❑ Did not participate

Q18 Please indicate your level of agreement with the statement: The Chemistry or Biochemistry program at Ferris is serving my needs for the future.

❑ Strongly Disagree
❑ Somewhat Disagree
❑ Somewhat Agree
❑ Strongly Agree

Q19 Would you recommend the Chemistry or Biochemistry program at Ferris to a prospective student?

❑ Yes
❑ No
❑ Possibly in the future, as the program grows

Q20 Please use this space for additional comments.

Q21 Which degree program are you enrolled in?

- ❑ Chemistry B.A.
- ❑ Biochemistry B.A.

Q22 Are you additionally enrolled in the ICT program?

- ❑ Yes
- ❑ No
- ❑ No, but would consider it

Q23 What is your academic status?

- ❑ Freshman
- ❑ Sophomore
- ❑ Junior
- ❑ Senior
- ❑ Other

Please Specify: _____

Q24 What is your expected calendar year of graduation (any semester)?

- ❑ 2008
- ❑ 2009
- ❑ 2010
- ❑ 2011
- ❑ After 2011

Q25 How did you find out about Ferris' Chemistry or Biochemistry program?

- ❑ HS Guidance counselor or teacher
- ❑ Ferris literature (any form, including on-line)
- ❑ Ferris faculty or staff
- ❑ Friend
- ❑ Other

Please Specify _____

Q26 How did you enter the Chemistry or Biochemistry program?

- ❑ Straight in
- ❑ Transferred from another institution
- ❑ Transferred from another Ferris program

Q27 Which institution?

_____

Q28 Which Ferris program?

_____

Q29 What are your immediate goals upon graduation?

- ❑ Professional employment
- ❑ Pharmacy school
- ❑ Medical, Dental, Optometry School
- ❑ Graduate school in Chemistry, Biochemistry or closely related field
- ❑ Graduate school in an unrelated field
- ❑ Other

Please Specify: _____

Thank you for your time and input.

08 Chemistry/Biochemistry APR...Current Students

Frequencies

Prepared by: Institutional Research & Testing, 02/09

Statistics

	N		Mean	Median	Std. Deviation
	Valid	Missing	Valid	Missing	Valid
q1 Take CHEM121-122	15	0	1.13	1.00	.352
q2a Instructor was knowledgeable	13	2	3.62	4.00	.650
q2b Instructor was helpful	13	2	3.38	4.00	.768
q2c Instructor was approachable	13	2	3.31	4.00	.947
q2d Teaching was clear/understandable	13	2	2.62	3.00	.768
q2e Lab facilities were helpful	13	2	2.77	3.00	.725
q2f Experiments were helpful	13	2	2.85	3.00	.689
q3 Take CHEM 231	15	0	1.67	2.00	.488
q4a Instructor was knowledgeable	5	10	3.80	4.00	.447
q4b Instructor was helpful	5	10	3.00	3.00	.707
q4c Instructor was approachable	5	10	2.80	3.00	.837
q4d Teaching was clear/understandable	5	10	2.20	2.00	.837
q4e Lab facilities were helpful	5	10	3.20	3.00	.447
q4f Experiments were helpful	5	10	3.40	3.00	.548
q5 Take CHEM 317	15	0	1.73	2.00	.458
q6a Prepared me well for future courses	4	11	4.00	4.00	.000
q6b Instructor was knowledgeable	4	11	4.00	4.00	.000
q6c Instructor was helpful	4	11	4.00	4.00	.000
q6d Instructor was approachable	4	11	4.00	4.00	.000
q6e Teaching was clear/understandable	4	11	4.00	4.00	.000
q6f Lab facilities were helpful	4	11	4.00	4.00	.000
q6g Experiments were helpful	4	11	4.00	4.00	.000
q7 Take CHEM 321-322	15	0	1.20	1.00	.414
q8a Instructor was knowledgeable	12	3	3.83	4.00	.389
q8b Instructor was helpful	12	3	3.67	4.00	.651
q8c Instructor was approachable	12	3	3.67	4.00	.651
q8d Teaching was clear/understandable	12	3	3.50	3.50	.522
q8e Lab facilities were helpful	12	3	3.58	4.00	.669
q8f Experiments were helpful	12	3	3.58	4.00	.515
q9 Take CHEM 332-333	15	0	1.93	2.00	.258
q10a Instructor was knowledgeable	1	14	4.00	4.00	
q10b Instructor was helpful	1	14	4.00	4.00	
q10c Instructor was approachable	1	14	4.00	4.00	

q10d Teaching was clear/understandable	1	14	4.00	4.00	
q10e Lab facilities were helpful	1	14	4.00	4.00	
q10f Experiments were helpful	1	14	4.00	4.00	
q11 Take CHEM 364	15	0	1.73	2.00	.458
q12a Instructor was knowledgeable	4	11	3.75	4.00	.500
q12b Instructor was helpful	4	11	3.50	3.50	.577
q12c Instructor was approachable	4	11	3.75	4.00	.500
q12d Teaching was clear/understandable	4	11	3.50	3.50	.577
q12e Experiments were helpful	3	12	3.67	4.00	.577
q13 Take CHEM 451	15	0	1.67	2.00	.488
q14a Instructor was knowledgeable	5	10	4.00	4.00	.000
q14b Instructor was helpful	5	10	3.60	4.00	.548
q14c Instructor was approachable	5	10	4.00	4.00	.000
q14d Teaching was clear/understandable	5	10	3.00	3.00	1.000
q15 Take CHEM 474	15	0	2.00	2.00	.000
q16a Instructor was knowledgeable	0	15			
q16b Instructor was helpful	0	15			
q16c Instructor was approachable	0	15			
q16d Teaching was clear/understandable	0	15			
q17 ACS Stu Affiliate enhanced Chem experience	15	0	3.93	4.00	1.033
q18 Chem/Biochem serving my needs for future	14	1	3.14	3.00	.535
q19 Recommend Chem/Biochem program	15	0	1.47	1.00	.834
q20 Additional comments	15	0			
q21 Degree program enrolled in	15	0	1.27	1.00	.458
q22 Enrolled in ICT prog as well	15	0	1.60	2.00	.632
q23 Academic status	15	0	3.13	3.00	.640
q23a Acad status Other specified	15	0			
q24 Expected year of graduation	15	0	3.47	4.00	.834
q25 Find out about Chem/Biochem	15	0	3.00	3.00	1.069
q25a Find out Other specified	15	0			
q26 How enter Chem/Biochem	15	0	2.47	3.00	.834
q27 Institution	15	0			
q28 Ferris program	15	0			
q29 Immediate goals after graduation	15	0	3.40	4.00	1.404
q29a Please Specify:	15	0			

Frequency Table

q1 Take CHEM121-122

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	86.7	86.7	86.7
	No	2	13.3	13.3	100.0
	Total	15	100.0	100.0	

q2a Instructor was knowledgeable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	6.7	7.7	7.7
	Somewhat Agree	3	20.0	23.1	30.8
	Strongly Agree	9	60.0	69.2	100.0
	Total	13	86.7	100.0	
Missing	System	2	13.3		
Total		15	100.0		

q2b Instructor was helpful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	2	13.3	15.4	15.4
	Somewhat Agree	4	26.7	30.8	46.2
	Strongly Agree	7	46.7	53.8	100.0
	Total	13	86.7	100.0	
Missing	System	2	13.3		
Total		15	100.0		

q2c Instructor was approachable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	6.7	7.7	7.7
	Somewhat Disagree	1	6.7	7.7	15.4
	Somewhat Agree	4	26.7	30.8	46.2
	Strongly Agree	7	46.7	53.8	100.0
	Total	13	86.7	100.0	
Missing	System	2	13.3		
Total		15	100.0		

q2d Teaching was clear/understandable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	6.7	7.7	7.7
	Somewhat Disagree	4	26.7	30.8	38.5
	Somewhat Agree	7	46.7	53.8	92.3
	Strongly Agree	1	6.7	7.7	100.0
	Total	13	86.7	100.0	
Missing	System	2	13.3		
Total		15	100.0		

q2e Lab facilities were helpful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	5	33.3	38.5	38.5
	Somewhat Agree	6	40.0	46.2	84.6
	Strongly Agree	2	13.3	15.4	100.0
	Total	13	86.7	100.0	
Missing	System	2	13.3		
Total		15	100.0		

q2f Experiments were helpful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	4	26.7	30.8	30.8
	Somewhat Agree	7	46.7	53.8	84.6
	Strongly Agree	2	13.3	15.4	100.0
	Total	13	86.7	100.0	
Missing	System	2	13.3		
Total		15	100.0		

q3 Take CHEM 231

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	33.3	33.3	33.3
	No	10	66.7	66.7	100.0
	Total	15	100.0	100.0	

q4a Instructor was knowledgeable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	1	6.7	20.0	20.0
	Strongly Agree	4	26.7	80.0	100.0
	Total	5	33.3	100.0	
Missing	System	10	66.7		
Total		15	100.0		

q4b Instructor was helpful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	6.7	20.0	20.0
	Somewhat Agree	3	20.0	60.0	80.0
	Strongly Agree	1	6.7	20.0	100.0
	Total	5	33.3	100.0	
Missing	System	10	66.7		
Total		15	100.0		

q4c Instructor was approachable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	2	13.3	40.0	40.0
	Somewhat Agree	2	13.3	40.0	80.0
	Strongly Agree	1	6.7	20.0	100.0
	Total	5	33.3	100.0	
Missing	System	10	66.7		
Total		15	100.0		

q4d Teaching was clear/understandable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	6.7	20.0	20.0
	Somewhat Disagree	2	13.3	40.0	60.0
	Somewhat Agree	2	13.3	40.0	100.0
	Total	5	33.3	100.0	
Missing	System	10	66.7		
Total		15	100.0		

q4e Lab facilities were helpful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	4	26.7	80.0	80.0
	Strongly Agree	1	6.7	20.0	100.0
	Total	5	33.3	100.0	
Missing	System	10	66.7		
Total		15	100.0		

q4f Experiments were helpful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	3	20.0	60.0	60.0
	Strongly Agree	2	13.3	40.0	100.0
	Total	5	33.3	100.0	
Missing	System	10	66.7		
Total		15	100.0		

q5 Take CHEM 317

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	26.7	26.7	26.7
	No	11	73.3	73.3	100.0
	Total	15	100.0	100.0	

q6a Prepared me well for future courses

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	4	26.7	100.0	100.0
Missing	System	11	73.3		
Total		15	100.0		

q6b Instructor was knowledgeable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	4	26.7	100.0	100.0
Missing	System	11	73.3		
Total		15	100.0		

q6c Instructor was helpful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	4	26.7	100.0	100.0
Missing	System	11	73.3		
Total		15	100.0		

q6d Instructor was approachable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	*4*	*26.7*	*100.0*	*100.0*
Missing	System	*11*	*73.3*		
Total		*15*	*100.0*		

q6e Teaching was clear/understandable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	*4*	*26.7*	*100.0*	*100.0*
Missing	System	*11*	*73.3*		
Total		*15*	*100.0*		

q6f Lab facilities were helpful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	*4*	*26.7*	*100.0*	*100.0*
Missing	System	*11*	*73.3*		
Total		*15*	*100.0*		

q6g Experiments were helpful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	*4*	*26.7*	*100.0*	*100.0*
Missing	System	*11*	*73.3*		
Total		*15*	*100.0*		

q7 Take CHEM 321-322

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	*12*	*80.0*	*80.0*	*80.0*
	No	*3*	*20.0*	*20.0*	*100.0*
	Total	*15*	*100.0*	*100.0*	

q8a Instructor was knowledgeable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	2	13.3	16.7	16.7
	Strongly Agree	10	66.7	83.3	100.0
	Total	12	80.0	100.0	
Missing	System	3	20.0		
Total		15	100.0		

q8b Instructor was helpful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	6.7	8.3	8.3
	Somewhat Agree	2	13.3	16.7	25.0
	Strongly Agree	9	60.0	75.0	100.0
	Total	12	80.0	100.0	
Missing	System	3	20.0		
Total		15	100.0		

q8c Instructor was approachable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	6.7	8.3	8.3
	Somewhat Agree	2	13.3	16.7	25.0
	Strongly Agree	9	60.0	75.0	100.0
	Total	12	80.0	100.0	
Missing	System	3	20.0		
Total		15	100.0		

q8d Teaching was clear/understandable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	6	40.0	50.0	50.0
	Strongly Agree	6	40.0	50.0	100.0
	Total	12	80.0	100.0	
Missing	System	3	20.0		
Total		15	100.0		

q8e Lab facilities were helpful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	6.7	8.3	8.3
	Somewhat Agree	3	20.0	25.0	33.3
	Strongly Agree	8	53.3	66.7	100.0
	Total	12	80.0	100.0	
Missing	System	3	20.0		
Total		15	100.0		

q8f Experiments were helpful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	5	33.3	41.7	41.7
	Strongly Agree	7	46.7	58.3	100.0
	Total	12	80.0	100.0	
Missing	System	3	20.0		
Total		15	100.0		

q9 Take CHEM 332-333

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	6.7	6.7	6.7
	No	14	93.3	93.3	100.0
	Total	15	100.0	100.0	

q10a Instructor was knowledgeable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	1	6.7	100.0	100.0
Missing	System	14	93.3		
Total		15	100.0		

q10b Instructor was helpful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	1	6.7	100.0	100.0
Missing	System	14	93.3		
Total		15	100.0		

q10c Instructor was approachable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	*1*	*6.7*	*100.0*	*100.0*
Missing	System	*14*	*93.3*		
Total		*15*	*100.0*		

q10d Teaching was clear/understandable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	*1*	*6.7*	*100.0*	*100.0*
Missing	System	*14*	*93.3*		
Total		*15*	*100.0*		

q10e Lab facilities were helpful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	*1*	*6.7*	*100.0*	*100.0*
Missing	System	*14*	*93.3*		
Total		*15*	*100.0*		

q10f Experiments were helpful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	*1*	*6.7*	*100.0*	*100.0*
Missing	System	*14*	*93.3*		
Total		*15*	*100.0*		

q11 Take CHEM 364

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	*4*	*26.7*	*26.7*	*26.7*
	No	*11*	*73.3*	*73.3*	*100.0*
	Total	*15*	*100.0*	*100.0*	

q12a Instructor was knowledgeable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	1	6.7	25.0	25.0
	Strongly Agree	3	20.0	75.0	100.0
	Total	4	26.7	100.0	
Missing	System	11	73.3		
Total		15	100.0		

q12b Instructor was helpful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	2	13.3	50.0	50.0
	Strongly Agree	2	13.3	50.0	100.0
	Total	4	26.7	100.0	
Missing	System	11	73.3		
Total		15	100.0		

q12c Instructor was approachable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	1	6.7	25.0	25.0
	Strongly Agree	3	20.0	75.0	100.0
	Total	4	26.7	100.0	
Missing	System	11	73.3		
Total		15	100.0		

q12d Teaching was clear/understandable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	2	13.3	50.0	50.0
	Strongly Agree	2	13.3	50.0	100.0
	Total	4	26.7	100.0	
Missing	System	11	73.3		
Total		15	100.0		

q12e Experiments were helpful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	1	6.7	33.3	33.3
	Strongly Agree	2	13.3	66.7	100.0
	Total	3	20.0	100.0	
Missing	System	12	80.0		
Total		15	100.0		

q13 Take CHEM 451

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	33.3	33.3	33.3
	No	10	66.7	66.7	100.0
	Total	15	100.0	100.0	

q14a Instructor was knowledgeable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	5	33.3	100.0	100.0
Missing	System	10	66.7		
Total		15	100.0		

q14b Instructor was helpful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	2	13.3	40.0	40.0
	Strongly Agree	3	20.0	60.0	100.0
	Total	5	33.3	100.0	
Missing	System	10	66.7		
Total		15	100.0		

q14c Instructor was approachable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	5	33.3	100.0	100.0
Missing	System	10	66.7		
Total		15	100.0		

q14d Teaching was clear/understandable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	2	13.3	40.0	40.0
	Somewhat Agree	1	6.7	20.0	60.0
	Strongly Agree	2	13.3	40.0	100.0
	Total	5	33.3	100.0	
Missing	System	10	66.7		
Total		15	100.0		

q15 Take CHEM 474

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	*15*	*100.0*	*100.0*	*100.0*

q16a Instructor was knowledgeable

		Frequency	Percent
Missing	System	*15*	*100.0*

q16b Instructor was helpful

		Frequency	Percent
Missing	System	*15*	*100.0*

q16c Instructor was approachable

		Frequency	Percent
Missing	System	*15*	*100.0*

q16d Teaching was clear/understandable

		Frequency	Percent
Missing	System	*15*	*100.0*

q17 ACS Stu Affiliate enhanced Chem experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	*1*	*6.7*	*6.7*	*6.7*
	Somewhat Agree	*5*	*33.3*	*33.3*	*40.0*
	Strongly Agree	*3*	*20.0*	*20.0*	*60.0*
	Did not participate	*6*	*40.0*	*40.0*	*100.0*
	Total	*15*	*100.0*	*100.0*	

q18 Chem/Biochem serving my needs for future

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	*1*	*6.7*	*7.1*	*7.1*
	Somewhat Agree	*10*	*66.7*	*71.4*	*78.6*
	Strongly Agree	*3*	*20.0*	*21.4*	*100.0*
	Total	*14*	*93.3*	*100.0*	
Missing	System	*1*	*6.7*		
Total		*15*	*100.0*		

q19 Recommend Chem/Biochem program

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	73.3	73.3	73.3
	No	1	6.7	6.7	80.0
	Possibly in the future, as the program grows	3	20.0	20.0	100.0
	Total	15	100.0	100.0	

q20 Additional comments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		12	80.0	80.0	80.0
	Have the same teachers available for the second semester of a 2 semester class like organic	1	6.7	6.7	86.7
	I haven't been to the future, so I can only estimate whether the program is serving my needs based on pretty much nothing.	1	6.7	6.7	93.3
	I would like Ferris to develop a BS in Chemistry since I feel that there are enough qualified professors to support such a program.	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

q21 Degree program enrolled in

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Chemistry B.A.	11	73.3	73.3	73.3
	Biochemistry B.A.	4	26.7	26.7	100.0
	Total	15	100.0	100.0	

q22 Enrolled in ICT prog as well

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	7	46.7	46.7	46.7
	No	7	46.7	46.7	93.3
	No, but would consider it	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

q23 Academic status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sophomore	2	13.3	13.3	13.3
	Junior	9	60.0	60.0	73.3
	Senior	4	26.7	26.7	100.0
	Total	15	100.0	100.0	

q23a Acad status Other specified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		15	100.0	100.0	100.0

q24 Expected year of graduation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2009	2	13.3	13.3	13.3
	2010	5	33.3	33.3	46.7
	2011	7	46.7	46.7	93.3
	After 2011	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

q25 Find out about Chem/Biochem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	HS Guidance counselor or teacher	1	6.7	6.7	6.7
	Ferris literature (any form, including on-line)	3	20.0	20.0	26.7
	Ferris faculty or staff	8	53.3	53.3	80.0
	Friend	1	6.7	6.7	86.7
	Other	2	13.3	13.3	100.0
	Total	15	100.0	100.0	

q25a Find out Other specified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		11	73.3	73.3	73.3
	Dr. Mark Thomson, Dr. Priam Prakasam	1	6.7	6.7	80.0
	From Big Rapids and I wanted to go into Chemistry	1	6.7	6.7	86.7
	Mr. William Killian	1	6.7	6.7	93.3
	Myself	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

q26 How enter Chem/Biochem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Straight in	3	20.0	20.0	20.0
	Transferred from another institution	2	13.3	13.3	33.3
	Transferred from another Ferris program	10	66.7	66.7	100.0
	Total	15	100.0	100.0	

q27 Institution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		13	86.7	86.7	86.7
	Delta Community College	1	6.7	6.7	93.3
	West Shore Community College	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

q28 Ferris program

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		8	53.3	53.3	53.3
	Career Exploration	1	6.7	6.7	60.0
	English	1	6.7	6.7	66.7
	pre-pharmacy	2	13.3	13.3	80.0
	Pre-Pharmacy	1	6.7	6.7	86.7
	Pre pharmacy	1	6.7	6.7	93.3
	Radiography	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

q29 Immediate goals after graduation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Professional employment	2	13.3	13.3	13.3
	Pharmacy school	2	13.3	13.3	26.7
	Medical, Dental, Optometry School	2	13.3	13.3	40.0
	Graduate school in Chemistry, Biochemistry or closely related field	7	46.7	46.7	86.7
	Graduate school in an unrelated field	1	6.7	6.7	93.3
	Other	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

q29a Please Specify:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		14	93.3	93.3	93.3
	Chiropractic	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

Section 2, Part E FACULTY PERCEPTIONS

The 14 chemistry and biochemistry faculty (both tenure track and non tenure track) were asked to complete an online survey consisting of 28 multiple choice response questions and three free response questions. 9 of the 14 faculty completed the survey. The survey was designed largely to gain information on the faculty perceptions of the amount of money, support and resources committed to the program; the course and degree offerings in chemistry; and the strengths and weaknesses of the program. Respondents were asked to select one of 4 possible responses to each of the statements: strongly disagree, somewhat diasagree, somewhat agree, and strongly agree. Both the survey and the report of the survey results follow.

Chemistry & Biochemistry Faculty Survey

The Chemistry and Biochemistry programs are going through the Academic Program Review (APR) process and need feedback from the faculty to assist in this process. Please take a few minutes to complete this short survey. We appreciate you giving us your honest opinions.

Q1 Please indicate your level of agreement with each of the following statements.

	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
The student-to-faculty ratio is sufficient to permit optimum program effectiveness	❑	❑	❑	❑
The program faculty has access to adequate funds for faculty development	❑	❑	❑	❑
The program has adequate leadership	❑	❑	❑	❑
Program safety procedures and resources are adequate	❑	❑	❑	❑
The program should use one instructor to teach the lecture and another to conduct the lab	❑	❑	❑	❑
Summer courses are needed to meet student progress needs	❑	❑	❑	❑
The programs need to interface with graduate schools to assess undergraduate needs	❑	❑	❑	❑
The faculty make good use of on-line tools for class assignments	❑	❑	❑	❑
The programs should offer some of its courses at off-campus locations such as other institutions and industrial sites	❑	❑	❑	❑
The department should offer a Chemistry and/or Biochemistry minor	❑	❑	❑	❑
The programs are comparable to offerings at other universities	❑	❑	❑	❑
Support courses are relevant to program goals and student needs	❑	❑	❑	❑
Aides and lab assistants are available and provide appropriate support for students and faculty to insure maximum effectiveness of the program	❑	❑	❑	❑
Adequate office and clerical assistance is available to support the program	❑	❑	❑	❑
Adequate stock room assistance is available to support the program	❑	❑	❑	❑
Equipment within the program is representative of equipment in undergraduate programs in Chemistry and/or Biochemistry at other institutions	❑	❑	❑	❑
Materials and supplies are readily available and in sufficient quantity to support quality instruction	❑	❑	❑	❑

	The curriculum allows the student to ***specialize*** in areas of interest	❑	❑	❑	❑
	The programs are recognized by other institutions as being a viable feeder for graduate students	❑	❑	❑	❑
	The programs are recognized by industry as a resource	❑	❑	❑	❑
	Adequate funds are available for new equipment and/or equipment repair	❑	❑	❑	❑
	Fund allocation for faculty development is consistent with the programs' objectives and faculty input	❑	❑	❑	❑
	The University has an effective system for job placement of students within the program	❑	❑	❑	❑
	There is adequate cooperation and collegiality within the programs	❑	❑	❑	❑
	Courses in the program are ordered in an appropriate manner and prepare students for subsequent courses	❑	❑	❑	❑
	The lecture room/laboratory facilities meet the faculty/program needs	❑	❑	❑	❑
	Students can take courses at other universities that transfer to these programs	❑	❑	❑	❑
	The department should offer a **BS degree** in Chemistry ***in addition*** to the **BA degree**	❑	❑	❑	❑

Q2 The top two program strengths are:

Q3 The top two program weaknesses are:

Q4 Please use this space for additional comments.

Thank you for your time and feedback.

08 Chemistry/Biochemistry APR...Faculty

Frequencies

Prepared by: Institutional Research & Testing, 02/09

Statistics

	N		Mean	Median	Std. Deviation
	Valid	Missing	Valid	Missing	Valid
q1a Student-to-faculty ratio is sufficient	9	0	3.56	4.00	.527
q1b Faculty has access to adequate funds	9	0	3.22	3.00	.441
q1c Program has adequate leadership	9	0	3.89	4.00	.333
q1d Safety procedures/resources are adequate	9	0	3.56	4.00	.527
q1e Should use 1 instructor for lec & another for lab	9	0	1.33	1.00	.500
q1f Summer courses are needed	9	0	2.44	2.00	.882
q1g Interface w/ grad schools to assess undergrad needs	9	0	2.78	3.00	.441
q1h Faculty make good use of on-line tools	9	0	3.00	3.00	.500
q1i Should offer courses at off-campus locations	9	0	2.67	3.00	.866
q1j Should offer a Chem and/or Biochem minor	9	0	3.33	4.00	1.000
q1k Comparable to offerings at other universities	9	0	2.89	3.00	1.167
q1l Support courses relevant to program goals/student needs	9	0	3.33	3.00	.500
q1m Aides/lab assts are available	9	0	2.11	2.00	.782
q1n Adequate office/clerical assistance is available	9	0	3.67	4.00	.500
q1o Adequate stock room assistance is available	9	0	3.11	3.00	1.054
q1p Equipment is representative of other institutions	9	0	3.22	3.00	.667
q1q Materials and supplies available and in sufficient quantity	9	0	3.44	4.00	.726
q1r Allows the student to specialize in areas of interest	9	0	2.22	2.00	.972
q1s Recognized by other institut'ns as being a viable feeder	9	0	2.56	3.00	1.130
q1t Recognized by industry as a resource	9	0	2.89	3.00	.782
q1u Adequate funds available for new equipmt/repair	9	0	2.78	3.00	.441
q1v Fund allocation for faculty development is consistent	9	0	3.00	3.00	.500
q1w University has an effective system for job placement	9	0	2.56	3.00	.527
q1x Adequate cooperation & collegiality within programs	8	1	3.50	3.50	.535
q1y Courses are ordered & prep students for subsequent courses	9	0	3.78	4.00	.441
q1z The lec room/lab facilities meet the faculty/program needs	9	0	3.22	3.00	.667
q1aa Students can take courses at other universities that transfer	9	0	3.44	3.00	.527
q1ab Should offer a BS degree in Chem	9	0	3.11	3.00	.782
q2 Top 2 program strengths	9	0			
q3 Top 2 program weaknesses	9	0			
q4 Additional comments	9	0			

Frequency Table

q1a Student-to-faculty ratio is sufficient

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	4	44.4	44.4	44.4
	Strongly Agree	5	55.6	55.6	100.0
	Total	9	100.0	100.0	

q1b Faculty has access to adequate funds

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	7	77.8	77.8	77.8
	Strongly Agree	2	22.2	22.2	100.0
	Total	9	100.0	100.0	

q1c Program has adequate leadership

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	1	11.1	11.1	11.1
	Strongly Agree	8	88.9	88.9	100.0
	Total	9	100.0	100.0	

q1d Safety procedures/resources are adequate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	4	44.4	44.4	44.4
	Strongly Agree	5	55.6	55.6	100.0
	Total	9	100.0	100.0	

q1e Should use 1 instructor for lec & another for lab

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	66.7	66.7	66.7
	Somewhat Disagree	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

q1f Summer courses are needed

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	11.1	11.1	11.1
	Somewhat Disagree	4	44.4	44.4	55.6
	Somewhat Agree	3	33.3	33.3	88.9
	Strongly Agree	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q1g Interface w/ grad schools to assess undergrad needs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	2	22.2	22.2	22.2
	Somewhat Agree	7	77.8	77.8	100.0
	Total	9	100.0	100.0	

q1h Faculty make good use of on-line tools

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	11.1	11.1	11.1
	Somewhat Agree	7	77.8	77.8	88.9
	Strongly Agree	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q1i Should offer courses at off-campus locations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	11.1	11.1	11.1
	Somewhat Disagree	2	22.2	22.2	33.3
	Somewhat Agree	5	55.6	55.6	88.9
	Strongly Agree	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q1j Should offer a Chem and/or Biochem minor

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	11.1	11.1	11.1
	Somewhat Agree	3	33.3	33.3	44.4
	Strongly Agree	5	55.6	55.6	100.0
	Total	9	100.0	100.0	

q1k Comparable to offerings at other universities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	22.2	22.2	22.2
	Somewhat Agree	4	44.4	44.4	66.7
	Strongly Agree	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

q1l Support courses relevant to program goals/student needs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	6	66.7	66.7	66.7
	Strongly Agree	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

q1m Aides/lab assts are available

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	22.2	22.2	22.2
	Somewhat Disagree	4	44.4	44.4	66.7
	Somewhat Agree	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

q1n Adequate office/clerical assistance is available

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	3	33.3	33.3	33.3
	Strongly Agree	6	66.7	66.7	100.0
	Total	9	100.0	100.0	

q1o Adequate stock room assistance is available

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	11.1	11.1	11.1
	Somewhat Disagree	1	11.1	11.1	22.2
	Somewhat Agree	3	33.3	33.3	55.6
	Strongly Agree	4	44.4	44.4	100.0
	Total	9	100.0	100.0	

q1p Equipment is representative of other institutions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	11.1	11.1	11.1
	Somewhat Agree	5	55.6	55.6	66.7
	Strongly Agree	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

q1q Materials and supplies available and in sufficient quantity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	11.1	11.1	11.1
	Somewhat Agree	3	33.3	33.3	44.4
	Strongly Agree	5	55.6	55.6	100.0
	Total	9	100.0	100.0	

q1r Allows the student to specialize in areas of interest

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	22.2	22.2	22.2
	Somewhat Disagree	4	44.4	44.4	66.7
	Somewhat Agree	2	22.2	22.2	88.9
	Strongly Agree	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q1s Recognized by other institut'ns as being a viable feeder

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	22.2	22.2	22.2
	Somewhat Disagree	2	22.2	22.2	44.4
	Somewhat Agree	3	33.3	33.3	77.8
	Strongly Agree	2	22.2	22.2	100.0
	Total	9	100.0	100.0	

q1t Recognized by industry as a resource

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	3	33.3	33.3	33.3
	Somewhat Agree	4	44.4	44.4	77.8
	Strongly Agree	2	22.2	22.2	100.0
	Total	9	100.0	100.0	

q1u Adequate funds available for new equipmt/repair

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	2	22.2	22.2	22.2
	Somewhat Agree	7	77.8	77.8	100.0
	Total	9	100.0	100.0	

q1v Fund allocation for faculty development is consistent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	11.1	11.1	11.1
	Somewhat Agree	7	77.8	77.8	88.9
	Strongly Agree	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q1w University has an effective system for job placement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	4	44.4	44.4	44.4
	Somewhat Agree	5	55.6	55.6	100.0
	Total	9	100.0	100.0	

q1x Adequate cooperation & collegiality within programs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	4	44.4	50.0	50.0
	Strongly Agree	4	44.4	50.0	100.0
	Total	8	88.9	100.0	
Missing	System	1	11.1		
Total		9	100.0		

q1y Courses are ordered & prep students for subsequent courses

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	2	22.2	22.2	22.2
	Strongly Agree	7	77.8	77.8	100.0
	Total	9	100.0	100.0	

q1z The lec room/lab facilities meet the faculty/program needs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	1	11.1	11.1	11.1
	Somewhat Agree	5	55.6	55.6	66.7
	Strongly Agree	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

q1aa Students can take courses at other universities that transfer

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Agree	5	55.6	55.6	55.6
	Strongly Agree	4	44.4	44.4	100.0
	Total	9	100.0	100.0	

q1ab Should offer a BS degree in Chem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Disagree	2	22.2	22.2	22.2
	Somewhat Agree	4	44.4	44.4	66.7
	Strongly Agree	3	33.3	33.3	100.0
	Total	9	100.0	100.0	

q2 Top 2 program strengths

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	11.1	11.1	11.1
	• The flexibility that it provides students to tailor the degree for different purposes. Students who want to go into industry can add four ICT courses. Students who want to go to grad school can be encouraged to participate in independent projects/research and to take as many of the upper level courses as possible. • While this wasn't originally intended as a preparation for MS or PhD work, several of our graduates have gone on to top-name grad schools (USC, Purdue, Wisconsin). One of our former students is about to earn his doctorate.	1	11.1	11.1	22.2
	accessabilty of faculty to students hands on instrument opportunities	1	11.1	11.1	33.3
	Faculty commitment to students. Faculty teaching the labs.	1	11.1	11.1	44.4
	faculty involvement	2	22.2	22.2	66.7
	Quality of most instruction Multipurpose courses so degrees are cost efficient	1	11.1	11.1	77.8
	The dedication of its faculty to teaching of students. The very strong industrial connections provide students with many opportunities.	1	11.1	11.1	88.9
	The strength and reputation of the ICT program. Faculty - student interaction.	1	11.1	11.1	100.0
	Total	9	100.0	100.0	

q3 Top 2 program weaknesses

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	11.1	11.1	11.1
	• The program is not large enough to offer multiple sections or frequent offerings of upper-level courses. Students need to carefully tailor their experiences with the assistance of their advisors; if students opt into these programs relatively late (i.e., make the switch from pre-pharm some time in their junior year), then their choices will be limited. • Not enough students know that these programs can provide a viable pathway into health-related professional schools, such as medicine, dentistry--or for graduate work in forensic science.	1	11.1	11.1	22.2
	Advanced level course offerings.	1	11.1	11.1	33.3
	few choices of courses stockroom support	1	11.1	11.1	44.4
	funding	2	22.2	22.2	66.7
	Lack of upper division courses. Lack of rigor in some of the courses.	1	11.1	11.1	77.8

	No real room for growth in some lab classes (resource limitations) Difficulty in getting approval for more choices in upper level courses	*1*	*11.1*	*11.1*	*88.9*
	The limited number of advanced level courses and/or advanced experiences (e.g., undergraduate research or organized internships) for the majors. The lack of opportunities for students to make oral presentation at small group seminars.	*1*	*11.1*	*11.1*	*100.0*
	Total	*9*	*100.0*	*100.0*	

q4 Additional comments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		*8*	*88.9*	*88.9*	*88.9*
	• The advisors know their students well and provide good assistance about meeting their career goals. • In just a few years of existence, the programs together enroll in excess of 40 students--more students than we expected when the programs were first designed.	*1*	*11.1*	*11.1*	*100.0*
	Total	*9*	*100.0*	*100.0*	

The overall data in the faculty survey suggests that the faculty responding to this survey tend toward similar direction of responses to most of the questions. Considering the small population of those responding (9) many times there is only 1 or 2 individuals with significantly different responses from the majority.

The areas where there is the widest distribution of responses is to the following questions.

1f Summer courses are needed
1i Should offer courses at off-campus locations
1j Should offer a Chem and/or Biochem minor
1k Comparable to offerings at other universities
1m Aides/lab assistants are available
1o Adequate stock room assistance is available
1r Allows the student to specialize in areas of interest
1s Recognized by other institutions as being a viable feeder.

Section 2, PART F ADVISORY COMMITTEE PERCEPTIONS

Because of the large variation in types of careers and in types of graduate and professional schools that our students pursue and because our program is not subject to an accrediting body, we have chosen not to appoint an advisory committee at this time.

Section 3: Program Profile

Section 3, Part A PROFILE OF STUDENTS

1) Student Demographic Profile

a) Gender, race/ethnicity, age (use annual institutional data)

The gender breakdown of the Chemistry BA students over the six year history of the program is 50% female and 50% male. 15% of our 34 graduates have been minorities. Currently, 54% of the Chemistry BA enrolled students are male and 46% are female. There are 3 African American, 1 Asian/Pacific Islander, and 24 White/Caucasian students currently enrolled in the program. The average age of students in the Chemistry BA program is currently 23.

The gender breakdown of the Biochemistry BA students over the six year history of the program is 50% female and 50% male. Currently, 47% of the Chemistry BA enrolled students are male and 53% are female. There are 3 foreign students, 1 Hispanic student and 11 White/Caucasian students currently enrolled in the program. The average age of students in the Biochemistry BA program is currently 21.

b) In-state and out-of state

An overwhelming majority of our students (96%) are in state, with only 1 out-of-state student currently enrolled in the program.

c) Full-time and part-time

Currently, all of the students in the Chemistry and Biochemistry BA programs are enrolled full-time.

d) Attend classes during the day, in the evenings, and on weekends

All of the program's classes are offered Monday through Friday during the day.

e) Enrolled in classes on and off-campus

All of the students currently enrolled in the Chemistry and Biochemistry BA programs are enrolled in classes on campus.

f) Enrolled in 100% on-line or mixed delivery courses.

There are no online or mixed-delivery course offerings.

g) Discuss how the information presented in a through f impacts the curriculum, scheduling, and /or delivery methods in the program.

All of the courses in the Chemistry and Biochemistry BA programs were already in place before the Chemistry BA degrees were established. The establishment of the BA degrees had little impact on enrollment in the lower level classes, as a majority of the students switch into the BA programs after taking or while enrolled in these courses and constitute a very small percentage of the total students in these courses. Our upper level courses, however, have seen a large enrollment boost. Physical chemistry, formerly offered every other year due to difficulty in making the minimum enrollment, now is offered every spring semester and easily exceeds the minimum enrollment. One of the program electives, Instrumental Analysis, is now filled to capacity and may have to turn away chemistry majors in 2010. To increase the elective choices and to help serve the chemistry majors who are turned away from Instrumental Analysis, we are offering Inorganic Chemistry as an experimental course and a Chemistry BA elective in the Spring 2010 semester.

2) Quality of Students

a) GPA and ACT for Current Students

The average GPA for students currently enrolled in the Chemistry BA program is 3.05, with a range from 2.29 to 3.74. The average ACT score for these current students is 23, with a minimum of 16 and maximum of 32.

The average GPA for students currently enrolled in the Biochemistry BA program is 3.12, with a range from 1.48 to 3.93. The average ACT score for these current students is 23, with a minimum of 18 and maximum of 29.

b) GPA and ACT for Graduating Students

The GPA for graduating students in the Chemistry BA program ranges from 2.96 to 3.93. The average GPA for graduating students in this program is 3.33, as compared to the 3.27 average GPA of all FSU graduating students. ACT scores for graduating students in the Chemistry BA program range from 16 to 32. The average ACT score for the graduating students in this program is 25, as compared to an average ACT score for all graduating FSU students of 21.

3.01 to 3.76. The average GPA for graduating students in this program is 3.26, as compared to the 3.27 average GPA of all FSU graduating students. ACT scores for graduating students in the Biochemistry BA program range from 25 to 25. The average ACT score for the graduating students in this program is 25, as compared to an average ACT score for all graduating FSU students of 21.

c) Assessment of Quality of Entering Students

Other than GPA and ACT values, no additional measures are used to assess the quality of students entering the Chemistry and Biochemistry BA programs.

d) Academic Awards

Ferris State University awards 2-3 ability-based scholarships from the Reitz Endowment per year to Chemistry and Biochemistry majors. The availability of these scholarships helps to attract students to the programs and assists the students in the funding of their education.

e) Scholarly/Creative Activities

Students in the Chemistry and Biochemistry BA programs take part in various scholarly activities and are given numerous awards and recognition each year. In March 2005, seven Ferris students, including chemistry majors Rachael Peterson and Ryan Littich, presented papers at the National American Chemical Society Conference in San Diego, CA. Since then, many more students in the program have also presented papers each year at this conference in such cities as Atlanta, GA and Chicago, IL. In 2005, Chemistry major and former ICT student, Emmanuela Ohaeri, was featured in an article in Chemical and Engineering News, a weekly publication for chemists and chemical engineers. Her role as president of an award-winning affiliate chapter of the ACS was highlighted in this article. Also, upon graduation, students in the Chemistry or Biochemistry program who are also in the Honors Program at Ferris are required to give a presentation on a research project of their choosing at the yearly Honors Senior Symposium.

f) Other Student Accomplishments

The Department of Physical Sciences (and by extension, the Chemistry and Biochemistry BA programs) sponsors the SAACS (Student Affiliate – American Chemical Society)—an organization which not only takes part in raising the awareness of students regarding the profession of chemistry, but it also provides several service opportunities for students. Among these are: sponsorship of a "chemical demonstration" speaker for local middle schools, tutoring of students, presentations to local K-12 classrooms, science fair judging, etc. These activities serve to interest younger students in science and bring visibility to the Ferris Chemistry and Biochemistry BA programs.

3) Employability of Students

Of the 7 students returning the alumni survey, only one was employed full-time in the field of chemistry. Four of these 7 students were pursuing a PhD in chemistry (Indiana University, University of Texas, Purdue University, and University of Southern California); one student was pursuing a PhD in mathematics (University of North Carolina); and one simply reported attending graduate school. Of those not returning the survey, one is known to be attending optometry school, one is in pharmacy school, one is in law school, one is in a biology-related Masters program at University of California Davis, one is taking extra courses in preparation for graduate school in chemistry, and two are known to be

working in the field. Although the program wasn't designed to prepare students for graduate school in chemistry, students who have taken additional math courses and a course in inorganic chemistry have done well in doctoral programs in chemistry. Until we track down additional graduates we cannot comment on the percentage of students that pursue graduate studies as compared to those entering the work force.

Section 3, Part B ENROLLMENT

1) Anticipated Fall Enrollment

The anticipated enrollment for the Fall 2009 semester for students in the Chemistry BA program will be similar to the past few years' enrollment numbers. The chemistry enrollment rates are steady and hover near 30 students. The biochemistry BA program adds about another ten to fifteen students to the total number. A majority of the student body is made up of students who switched to the chemistry or biochemistry BA programs after being exposed to the field during their other chemistry courses.

2) Chemistry BA Enrollment and Credit Hour Production

Academic Year & Semester	Total Enrollment	Total Student Credit Hours For Semester
Fall 2004	11	152
Fall 2005	18	260
Fall 2006	22	313
Fall 2007	31	439
Fall 2008	28	398

Biochemistry BA Enrollment and Credit Hour Production

Academic Year & Semester	Total Enrollment	Total Student Credit Hours For Semester
Fall 2004	5	69
Fall 2005	6	89
Fall 2006	9	134
Fall 2007	14	211
Fall 2008	15	202

The Chemistry and Biochemistry BA programs have not yet undergone review, as they are still new programs, but the enrollment growth since 2004 has exceeded our expectations. Because of the enrollment growth we have been able to make changes in the program course offerings that we couldn't have made without these numbers. Physical Chemistry which was previously under-enrolled and was only offered in alternate years is now offered every year and with record numbers of students. Also due to the high enrollment we are now able to offer a course in Inorganic Chemistry which is of critical importance to those continuing on to graduate school.

3) Number of Students Applying Annually

The application for enrollment in the Chemistry BA program is now approximately 10 students per year and about half of that for the Biochemistry BA.

4) Of applicants, what percentage and number are admitted?

All students that apply to the Chemistry and Biochemistry BA programs after being accepted into Ferris are admitted. At this time the program can absorb more students.

5) Of those admitted, what percentage and number enroll?

All current Ferris students who are granted admission to the Chemistry and Biochemistry BA programs enroll in the program, although some may change to a different major before graduating.

6) Goals/Strategies/Efforts to Maintain/Increase/Decrease Enrollment in the Program

Our current enrollment goals are to maintain or exceed our current combined chemistry and biochemistry graduation rate of 13 students per year. A majority of our recruiting efforts are directed at

the large pool of students taking General Chemistry (total enrollment for CHEM 121 for 2008/2009 was approximately 578 students) and Organic Chemistry (total enrollment for CHEM 321 for 2008/2009 was approximately 282 students). These recruiting efforts are well directed as 10 of 15 students responding to the current student survey report that they found out about the program from Ferris faculty and 10 of 15 report that they transferred in from another Ferris program.

Section 3, Part C PROGRAM CAPACITY

1) Program Enrollment Capacity and Limitations Given Its Available Resources

A significant increase in enrollment would put pressure on our upper level courses. More faculty hours would be required to teach additional sections or additional program electives would need to be added. The strongest pressure currently felt is in the Instrumental Analysis course which is limited to 12 students in the lab at a time in order to provide the requisite hands-on instrumental experience.

Section 3, Part D RETENTION AND GRADUATION

1) Annual Attrition Rate

No records have been kept on the attrition rate of students in the Chemistry BA program. Most students enter the program a year or more after they have begun studies at FSU, so the typical attrition rate data (i.e., how many students who enter the program as freshmen graduate from the program) would not be representative of our students.

2) Goals/Strategies/Efforts to Retain Students in the Program

The goal of the program advisor is to have a minimum of two student-advisor conferences per year to assess progress, aptitude, and interest. Among other things, academic assistance and study strategies are discussed as well as employment and graduate school opportunities.

3) Trends in Number of Chemistry BA Degrees Awarded

Year	Number of Grads
2004	1
2005	5
2006	1
2007	9
2008	7
2009	10

There has been a steady increase in the number of Chemistry BA graduates from 1 in 2004 to a record 10 graduates in 2009. The number of Biochemistry BA graduates has increased from 1 in 2005 to 3 graduates in 2009

4) Graduation within the Prescribed Time

Nearly all students graduate within a semester of the prescribed time, although this is difficult to measure accurately because many students change to the Chemistry and Biochemistry BA degrees in their second or third year of college.

5) Length of Time to Graduate

Results from the graduating students exit survey show an average time of 9-10 months for a student to graduate with a Chemistry BA degree. It is a 4-year degree and most students switching to the program later in their career have already taken a majority of the program and general education courses that other Chemistry BA students have taken during the same number of semesters in college. Consequently later switching students are generally not more than a semester behind the others in progress toward the Chemistry or Biochemistry BA degree.

Section 3, Part E ACCESS

1) Actions to Make the Program Accessible to Students

One of the ways in which we increase the accessibility of the program is to offer accelerated 6-week courses during the summer. We offer General Chemistry 1, General Chemistry 2, and Organic Chemistry 1 during the first 6-week summer session and we offer General Chemistry 2 and Organic Chemistry 2 during the second 6-week summer session. This allows students to accelerate through an entire year of chemistry during the summer which greatly improves accessibility for those switching chemistry from other majors. We are increasing our selection of chemistry electives this fall to include Inorganic Chemistry, an essential course for those pursuing graduate studies in chemistry. To help accommodate pre-pharmacy students switching into the program we have accepted Math 135 Calculus for Life Sciences as a replacement for the required Math 220 Calculus 1 in the program.

2) Effects of the Actions toward Accessibility to Students

Although the accelerated summer offerings and the inorganic chemistry offering require additional faculty hours, the main purpose of the accelerated courses is service to other majors.

3) How the Program's Actions Advance or Hinder of Goals

Although no records have been kept of numbers of chemistry majors taking advantage of the actions described above, increased course options increase program accessibility which is a positive thing.

Section 3, Part F CURRICULUM

Program check sheets and sample syllabi may be found in Appendix A.

1) Program Requirements

a) Directed Electives and General Education Courses

There are no directed electives or directed general education courses.

b) Hidden Prerequisites

There are no hidden prerequisites.

2) Revision since Last Review

The Chemistry and Biochemistry BA programs have not yet undergone review, as they are still new programs, so no significant revision has taken place.

3) Curricular/Program Changes Currently Being Reviewed

Currently, the only change being made to the Chemistry BA program is the addition of Inorganic Chemistry as an elective course. This is as an experimental course and is being added in order to help serve the chemistry majors who are turned away from the full Instrumental Analysis course and to improve the background of these students seeking to pursue graduate studies in chemistry..

4) Plans for Program Revision

At this time, there are no future plans for revision of the Chemistry or Biochemistry BA degrees in the next three to five years.

Section 3, Part G QUALITY OF INSTRUCTION

1) Student and Alumni Perceptions

In Question 2 of the alumni survey, graduates were asked about their level of satisfaction with the level of expertise of the program faculty in their professional areas. One student was somewhat satisfied and six were very satisfied. In Question 3 of the same survey, graduates were asked about their overall level of satisfaction with the program. Two students were somewhat satisfied and five were very satisfied.

Relevant data from the Chemistry and Biochemistry Graduating Student Exit Survey is presented in the following two tables. The following table summarizes the perceptions of graduating seniors on the quality of instruction:

Survey Topic	Very Dissatisfied	Somewhat Dissatisfied	Somewhat Satisfied	Very Satisfied
Chemistry/Biochemistry Courses	__	2 (22%)	4 (44%)	3 (33%)
Laboratory Experiences	1 (11%)	__	2 (22%)	6 (67%)
Expertise of Chemistry Faculty	__	__	2 (22%)	7 (78%)

Graduating students were asked how well 4 courses prepared them for future courses. The following table summarizes their level of satisfaction:

Course	Very Dissatisfied	Somewhat Dissatisfied	Somewhat Satisfied	Very Satisfied
General Chemistry 1	__	__	4 (44%)	5 (56%)
General Chemistry 2	__	1 (11%)	4 (44%)	4 (44%)
Organic Chemistry 1	__	2 (22%)	3 (33%)	4 (44%)
Organic Chemistry 2	__	2 (22%)	4 (44%)	3 (33%)

In the current student survey, students were asked four questions about the quality of instruction for each of the classes that they had enrolled in. A summary of their responses are shown in the table below.

Survey Question	Very Dissatisfied	Somewhat Dissatisfied	Somewhat Satisfied	Very Satisfied
Instructor was knowledgeable	__	1 (2%)	10 (23%)	33 (75%)
Instructor was helpful	__	4 (9%)	13 (30%)	27 (61%)
Instructor was approachable	1 (2%)	4 (9%)	9 (21%)	30 (68%)
Teaching was clear/understandable	2 (5%)	8 (18%)	18 (41%)	16 (36%)

On the average, 60% of the responses given by current students indicated that the students are very satisfied with the quality of their instruction.

2) Advisory Committee and Employer Perceptions

There is no Advisory Committee, and no employer perceptions have been collected.

3) Efforts for Improvement

Several efforts have been made toward the improvement of instruction over the past 5 years. For instance, a National Science Foundation (NSF) grant in 2002 allowed us to begin offering an opportunity for teams of students to be involved in extended research projects during the laboratory portion of Organic Chemistry 2. This research experienced has been modified over the past 7 years in order to more effectively attain the desired educational outcomes. Due to the high level of student-instructor interaction required for the research experience, the Physical Science department, has supported the hiring of undergraduate laboratory assistants to aid in the process.

In order to more effectively engage students in the learning process, Process Oriented Guided Inquiry Learning (POGIL) has been introduced into selected sections of General Chemistry. POGIL was developed through a grant from the NSF and builds a learning experience based on best pedagogical practices.

Teams of students in selected sections of General Chemistry 2 investigate and report on selected societal issues and the role that science plays in these issues.

4) Professional Development The single most valuable source of ideas for improving the teaching and learning of chemistry is the Biennial Conference on Chemical Education. A number of chemistry faculty regularly attend and present at this conference. Program faculty have attended other conferences related to science education including the Gordon Conference of Chemical Education. The faculty have also taken advantage of numerous local workshops offered by the Faculty Center for Teaching and Learning.

5) Interaction of Students with Faculty and Peers

One of the better ways in which students can interact on a one-on-one basis with faculty members is to carry out independent laboratory research projects. Several of our program students have taken advantage of this opportunity. Another excellent opportunity for students to interact with each other, with faculty, and with the general public is through the Spring poster session where students in selected sections of General Chemistry 2 and Organic Chemistry 2 present results of group research. Teams of Organic Chemistry 2 students also deliver Power Point presentations on laboratory research projects where they ask questions of each other and evaluate each other's presentations. Chemistry majors that are involved in the Student Affiliate of the American Chemical Society interact with each other, with faculty, and with the general public through a variety of experiences including service projects, national meeting attendance and presentation, and attendance at local outside speaker events. The faculty tend to have a high level of interaction with students both inside and outside the classroom. This is evidenced by the fact that 2/3 of the current Chemistry and Biochemistry BA students learned about the programs from Ferris faculty. The Honors students also participate in an Honors Symposium where they present results of a research project to their peers and to the faculty.

6) Current Research and Practice for Infusing Teaching and Learning

Current research in pedagogy emphasizes the active involvement of the learner in the process. A large percentage of the chemistry courses in the program have a laboratory component which is almost entirely hands-on learning. The efforts for improvement listed above also all involve hands-on engagement on the part of the student.

7) Effects of Program's Actions on the Quality of Teaching and Learning

If the student perceptions of the quality of instruction in Part 1 above are any indication of the effects of the active learning strategies employed by our faculty, then we have been fairly successful. We are in the process of developing multiple means of assessment of the learning in our core courses.

Section 3, Part H COMPOSITION AND QUALITY OF FACULTY

1) Tenured and Tenure-Track Faculty

a) Rank and Qualifications

Faculty	Tenured/Tenure-Track	Rank	Qualifications
Adsmond, Dan	Tenured	Professor	Ph.D. Chemistry
Balanda, Peter	Tenured	Professor	Ph.D. Chemistry
Colvert, Kim	Tenured	Professor	Ph.D. Biochemistry
Di Raddo, Pasquale	Tenured	Professor	Ph.D. Chemistry
Hiel, Gary	Tenure-Track	Assistant Professor	Ph.D. Chemistry
Killian, Bill	Tenured	Professor	M.S. Chemistry
Partigianoni, Colleen	Tenured	Associate Professor	Ph.D. Chemistry
Prakasam, Piram	Tenure-Track	Associate Professor	Ph.D. Chemistry
Shetty, Prabhakara	Tenured	Professor	Ph.D. Chemistry
Thomson, Mark	Tenure-Track	Assistant Professor	Ph.D. Chemistry

b) Promotions/Merit Awards

In the past five years, 4 of the 10 tenured or tenure-track faculty members for the Chemistry and Biochemistry BA programs have received a promotion, and 3 have received merit.

c) Professional Activities

Below is a table of the professional activities taken part in by the Chemistry BA program faculty over the past five years:

Professional Activity	Number of Faculty
External Conferences/Workshops Attended	25
External Presentations Given	15
Positions in Professional Organizations	1
Publications Written	2

In the past five years, faculty members for the Chemistry BA program have given several external presentations at leading conferences, such as: The American Chemical Society Regional and National Conferences, the Biennial Conference on Chemical Education, the Gordon Research Conference on Chemical Education, and the United Nations Educational, Scientific and Cultural Organization Conference, . In addition to presenting at these conferences, several more faculty members have also been in attendance. Other conferences and workshops which the faculty members have attended are: the International Conference on Chemistry of the Organic Solid State, the American Association of Higher Education National Conference, the Indiana University-Purdue University Indianapolis Assessment Conference, the Higher Learning Commission Assessment Academy Roundtable, the National Science Foundation Workshop in Theoretical and Computational Chemistry, and the National Science Foundation Sponsored POGIL ("Process Oriented Guided Inquiry Learning") Workshops for both the classroom and the laboratory. Additionally, assistant chemistry professor Dr. Mark Thomson serves as an official speaker for the American Chemical Society, delivering several talks annually nationwide. A number of the faculty have been involved in a variety of laboratory research projects, many involving students. During the past 5 years two faculty members have been granted 1-year sabbaticals for purposes of carrying out laboratory research.

2) Workload

a) Teaching Load

The teaching load in the Physical Sciences Department is calculated by a fairly complicated formula using a point system where 27-29 points is full time. The Full-load Worksheet used for the calculations is attached in Appendix B. Two points are awarded for each lecture hour, one point is awarded for each laboratory hour and one point is awarded for each laboratory section taught. The number of different lab preps and the number of students in the lecture class are also figured into the formula. A 4-hour lecture course with the corresponding four 3-hour labs is considered a full load. In any given semester approximately 1/3 of the faculty are teaching overloads. A typical overload is 2-4 points (an average of 10% overload for that third of the faculty.)

b) Activities for Release Time

The only release time associated directly with this program is 0.25 FTE release time for the chemistry BA coordinator for one semester during the year. The biochemistry BA coordinator (who has a smaller number of students in the program) does not currently have release time. The duties for this release time are detailed in the Chemistry BA coordinator agreement, which is attached.

3) Recruitment

a) Recruiting Process

We follow the same recruiting process for new tenure-track chemistry faculty as we do for other faculty in the department. We advertise and recruit nationwide. We select candidates who have the best qualifications for telephone and on-campus interviews. During our last tenure-track interview, we asked on-campus interviewees to make a teaching presentation that was the scheduled lecture for the day for students in a general chemistry class.

b) Qualifications for New Faculty

One qualification that is required for new faculty in the Chemistry BA program is a Ph.D. in chemistry or a closely-related area. Also, the new faculty must demonstrate the potential for undergraduate teaching excellence, must be able to contribute to the ongoing development of the department, and must show strong interpersonal and communication skills needed to work effectively with a diverse array of students and colleagues.

c) Diversity Goals for Faculty

The diversity goal of the Chemistry and Biochemistry BA programs is to have the faculty reflect the gender and ethnicity balance within the field of chemistry nationwide.

d) Efforts to Attain Diversity Goals

During each of our last two searches, our interviewed candidates (either by phone or on campus) included both males and females, as well as candidates of diverse ethnic background. One of the candidates we hired during the last two searches, Dr. Mark Thomson, has extensive prior teaching experience in a historically black college or university in the greater New Orleans area.

4) Orientation

New faculty go through new faculty orientation through the Center for Teaching, Learning, and Faculty Development. New faculty are also assigned a mentor within the department.

5) Reward Structure

All tenured/tenure-track members of the program have access to promotion and merit pay through the College of Arts and Sciences promotion process. According to the college's guidelines, the applying faculty member must show achievements in the areas of teaching excellence, service and professional development. Salary ranges for entering faculty are determined, in part, by comparison with CUPA-data salaries for other entry-level chemists at similar institutions. Because student-credit hour production is an explicit part of the department's workload formula (see above), faculty who teach large numbers of students may be "rewarded" with fewer teaching preparations or less time in the classroom. In addition to salary, all tenure-track faculty have access to professional development/travel funds (allocated by a committee of departmental faculty). Other faculty support themselves or their work through TIMME travel grants, grants received through participation in activities sponsored by the Faculty Center, and other grant/professional development opportunities.

6) Graduate Instruction

This program does not include instruction at the graduate level.

7) Non-Tenure-Track and Adjunct Faculty

a) Non-Tenure-Track and Adjunct Faculty List

Faculty	Length of Appointment	Years of Service at FSU
Burns, Francis	2 years	4
Kerr, Tracy	2 years	4
Weaver, James	1 semester	13

b) Percentage of Courses Taught by this Faculty

Of the courses in the Chemistry BA program, approximately 12% were taught by non-tenure-track faculty in the Fall 2008/Spring 2009 school year. These courses taught by non-tenure-track faculty included Chemistry 121 and Chemistry 122 (General Chemistry 1 and 2) lecture and lab and Chemistry 317 (Instrumental Analysis) lab.

c) Qualifications for this Faculty

The qualifications for two-year faculty are the same as the qualifications for those who are tenure-track. A Ph.D. in chemistry or a closely-related field is required, along with their demonstration of the potential for undergraduate teaching excellence, contribution to the ongoing development of the department, and possession of strong interpersonal and communication skills needed to work effectively with a diverse array of students and colleagues.

The qualifications for semester-by-semester faculty are possession of an M.S. degree in chemistry; other qualifications remain the same.

d) Appropriateness of Using Non-Tenure-Track Faculty

Non tenure-track faculty teach in the areas in which they have the background to do so. In particular, James Weaver (who holds a degree in Industrial Chemistry Technology) teaches one or more lab sections of Instrumental Analysis each spring. Bill Killian is the lecturer for this class. Students in this course have the benefit of Prof. Weaver's "real-world" slant on the use of chemical instrumentation.

e) Position of Accrediting Body on Using Non-Tenure-Track Faculty

The Chemistry BA program is not accredited, so this is not applicable.

Section 3, Part I SERVICE TO NON-MAJORS

a) General Education Service Courses Provided

Courses typically used to fulfill the scientific understanding area in programs.

Introduction to General Chemistry (Chem 114) – taken by a variety of students in Life/Allied Health Sciences and Technology programs including biology, nursing, dental hygiene, pre-mortuary science; automotive, welding and mechanical technology, technical writing (full name: Technical /Professional Communications/Scientific and Medical Writing). NOTE: Chem 114 (one semester general chemistry) serves perhaps the largest range of programs of all Ferris Chemistry courses.

General Chemistry 1 (Chem 121) – taken by a variety of students including chemistry, chem. ed, ICT, pre-pharm, pre-med, pre-optometry, pre-vet, and other biology majors.

General Chemistry 2 (Chem 122) taken by a variety of students including chemistry, chem. ed, ICT, pre-pharm, pre-med, pre-optometry, pre-vet, and other biology majors.

Introduction to Organic & Biochemistry (Chem 124) taken by students in biology, biology teaching, and premortuary science.

Fundamentals of Organic & Polymer Chemistry (Chem 211)- taken by the plastics engineering technology students.

Fundamentals of Organic Chemistry (Chem 214) is taken by biology and medical technology majors.

b) Non-General Education Service Courses

Preparatory Chemistry (Chem 103) not a college level course, used to prepare students for college-level chemistry

Quantitative Analysis (Chem 231) - taken by a variety of students including chemistry, chem. ed, ICT, biochemistry

Instrumental Analysis (Chem 317) - taken by chemistry and ICT students

Organic Chemistry 1(Chem 321) - taken by a variety of students including chemistry, biochemistry, chem. ed, ICT, prepharm, premed, preop, and prevet

Organic Chemistry 2 (Chem 322) - taken by a variety of students including chemistry, biochemistry, chem. ed, ICT, prepharm, premed, preop, and prevet.

Fundamentals of Biochemistry (Chem 324) is commonly taken by students in med tech, biology teaching, and biology.

Biochemistry Lab 1 (Chem 332) taken by biochemistry and biotechnology students

Biochemistry (Chem 364) taken by chemistry, premed, preop, biotechnology, and biochemistry students

Introduction to Physical Chemistry (Chem 451) – taken by chemistry, biochemistry and chem. ed. students

c) Program Impact from the Provision of General and Non-General Education Courses

All the courses in the program were first developed to be service courses for other programs.

d) Plans to Increase/Decrease/Keep Constant the Level of Service Courses

The enrollment in our service course is continually and steadily rising. We continually add new sections of courses to meet the rising needs of a large number of degree programs. One of the strengths of the chemistry and biochemistry BA programs is that students frequently rub shoulders with students from other programs. This takes place in both upper-division and lower-division courses. In fact, all of the upper division courses for both majors are also required for one or more majors. These majors are named in the list below:

CHEM 317 – industrial chemistry technology, chemistry education
CHEM 332 – biotechnology
CHEM 333 – biotechnology
CHEM 364 – biotechnology, chemistry education, several other biology programs
CHEM 451 – chemistry education
CHEM 474 – biotechnology

The additional students provided by the chemistry and biochemistry BA degrees have helped add students to what would otherwise be underpopulated courses, or in some instances (particularly with regard to CHEM 451) have provided a large enough audience to increase the frequency of the course offering.

Section 3, Part J DEGREE PROGRAM COST AND PRODUCTIVITY DATA

The program is too new to have this data available.

Section 3, Part K ASSESSMENT AND EVALUATION

All of the outcomes for both programs (as listed in the opening section of this report) will be measured and tracked. We intend to use direct measures of student achievement for the outcomes. As part of our assessment efforts, we intend to devise or use already-established rubrics to evaluate work that students produce in courses. For example, students in Dan Adsmond's organic chemistry classes carry out research projects in their labs; they make presentations on their results to chemistry faculty and fellow students. We will keep records of how they do as part of the assessment of this program.

The Examinations Institute of the American Chemical Society (ACS) prepares subject matter exams at various levels of chemistry. The exams are prepared by teaching faculty from across the country, and norms are developed for the exams following their administration to the appropriate classes in community colleges, colleges and universities. We will use our students' scores on select exams (general chemistry, organic chemistry and physical chemistry) as a measure of their "working knowledge" in these areas.

In biochemistry we intend to develop an exit exam that will touch on several of the program outcomes. This exam will be given to graduating seniors as part of their CHEM 474 (Advanced Biochemistry) class.

For details on the assessment process for both programs, refer to the attached program assessment documents.

At this time, due to the newness of these programs and due to the fact that many of the assessment tools need to be development, we don't have trend data to report. An exception to this is with regard to the ACS standardized examinations. In this year's examination, students in CHEM 122 (the second semester of general chemistry) had an average score that equated to the 60th to 80th percentile of all

general chemistry students across the country (depending on which section of the course they were enrolled in). We have been tracking these scores for the ICT program, and this result is comparable to ACS scores from the last two or three years. This year's CHEM 451 class (physical chemistry) took the one-semester thermodynamics ACS examination at the end of their course; their average equated to the 60th percentile. Starting next spring, one or more of the organic chemists intend to administer the year-long organic chemistry exam in CHEM 322.

In future years, trend data to compare FSU students to chemistry performance nationwide will come from the ACS exams that we administer. Other trend data will be strictly internal as we use locally devised instruments to measure our program outcomes.

Section 3, Part L ADMINISTRATION EFFECTIVENESS

1) Adequacy of Administrative and Clerical Support

The program coordinator has release time (0.25 FTE per semester) to carry out many of the local administrative tasks associated with the program, including advising, program assessment, and recruitment. The department head provides additional support. In the department office, either the secretary or her student workers have been able to provide clerical assistance. In addition, the department has a scientifically-trained laboratory technician, who provides (together with her staff) a significant amount of support for the laboratory portion of the program. This support is clearly adequate to assist the coordinator in meeting the needs of students.

2) Are the Program and/or Department Run in an Efficient Manner?

The program is efficient, especially in its minimization of program specific courses. Because most of the courses in the program are multi-section, multi-program courses, students not only have ease of transfer into the program, but they also can complete the program in a variety of ways. For example, any student who has followed the checklist for the pre-pharmacy program for one or two years can easily transfer to the Chemistry BA program without being significantly behind in the required courses. This, in fact, has been one of the biggest "selling points" for the program.

3) Preparation of Class and Teaching Schedules

Classes have been arranged in cooperation with the department head and program coordinator.

4) Are students able to take the courses they need in a timely manner?

Students can complete this program in a timely fashion (see above). Some of the lower-enrolled courses are offered only once a year, so the typical "warnings" apply: as long as students achieve the

grades they need for course progression, they can remain on track for graduation within a four-year time period.

Section 4 Facilities and Equipment

Section 4, Part A INSTRUCTIONAL ENVIRONMENT

Status of classroom instructional equipment

This department has access to two large lecture rooms: SCI 102 (which we use all day long) and SCI 120 (which we share for half a day with the biology department). Large-lecture classes in chemistry (including general chemistry and organic chemistry) are usually taught in one of these two rooms. The department also has access to a variety of small-to-medium size classrooms (seating 30 to 65 students) in Science and Starr.

All of our classrooms have been upgraded in the last five years. The sole exception is our large lecture hall, SCI 102, which is undergoing renovation this summer. The entire department had input into the type of instructional equipment that will be available in this lecture hall. Depending on the style of the professor and the type of class taught, our needs for supporting equipment can run the gamut. Several professors who teach general and organic chemistry need board space (preferably chalk boards, in some cases)—and plenty of it. Professors may solve several problems or write several organic syntheses on the board during one class, and students need to see a step that was written ten minutes ago when a professor gets to the end of the problem. Other classes—such as biochemistry—require equipment for projecting images so that students can examine the complex structures (sometimes in 3D).

For the most part, the classrooms in which we teach are well equipped with enough technology so that instructors can use a variety of teaching strategies. While the remodeling of SCI 102 hasn't been completed, we believe that this room will better meet our needs this fall than it has in previous years.

Chemistry lab equipment

Our chemistry equipment supports a variety of programs. A large portion of the departmental budget supports week-to-week chemical and glassware needs, especially in general and organic chemistry. In general chemistry classes, much of the equipment needs include an adequate supply of balances, pH meters, centrifuges and tabletop visible spectrophotometers. Singly, these items are not expensive, but if several need to be replaced at once the cost quickly adds up.

Major pieces of equipment are first encountered by students when they take quantitative analysis — CHEM 231 (HPLC, or liquid chromatography) or organic chemistry—CHEM 321/322 (GC-gas chromatography, FTIR-infrared spectroscopy, NMR-nuclear magnetic resonance spectrometry).

Equipment in these classes (especially in organic chemistry) serves a variety of programs beyond chemistry and biochemistry, including industrial chemistry technology (ICT), chemistry education, biotechnology, pre-pharmacy, pre-optometry, pre-medicine, to name a few. Unlike pH meters used in general chemistry, we don't have multiple numbers of items in these classes, and students need more intensive training to use this equipment properly.

Partly due to the fact that our equipment serves a variety of programs (and we had most of the equipment in place before the chemistry BA degree even began) we have an adequate variety of equipment to serve the needs of our students. One item that many undergraduate chemistry departments possess that we do not have is mass spectrometer (referred to as "mass spec" by most chemists). A mass spec assists with the identification and characterization of chemicals—particularly organics—synthesized in a lab. Such an instrument could be useful to students in organic chemistry and industrial chemistry, as well as for students completing individual research projects.

A list of our department's major items of equipment follows later in this section.

Biochemistry lab equipment

Because our department has provided courses in biochemistry to support the biotechnology program since its inception, we have a good variety of instruments for these programs. All of the courses that we run out of the biochemistry labs are intended for juniors or seniors, so these students have a high level of prior experience with chemicals and instruments. These labs tend to be smaller than other labs (sixteen students) so the number of instruments usually isn't a problem. Having the right mix of working items is a major concern, and this equipment is sophisticated and expensive. When we needed to replace a high speed centrifuge recently, Kim Colvert identified a source that could provide refurbished models. The new-to-us centrifuge (more than a decade old) was installed last year to replace a failing model, and it has been working well.

Departmental equipment list

The following table shows the major equipment holdings in the chemistry/biochemistry area of the department, sorted by room and area of instruction in that room. Equipment listed as biochemistry/biotechnology tends to be reserved for those two areas. Much of the equipment in the other areas is shared across the department, and is stored in particular room due to primary use in that space. For example, the NMR is housed in an ICT laboratory, but this spectrometer is heavily used by students in organic chemistry as well. As much as possible, we share equipment across the department, and professors work with each other to make sure that a particular item will be available for their labs.

Table: Chemistry/Biochemistry Equipment in the Department of Physical Sciences

ROOM	AREA	INSTRUMENTS
SCI 301	ICT	2 Büchi Rotovaps/waterbath
SCI 309	ICT	Perkin-Elmer AA (atomic absorption) spectrometer 3100 FT-nmr (nuclear magnetic resonance) spectrophotometer (Anasazi upgrade) Nicolet 6700 FT-IR (Thermo Scientific) Carey 1E UV-visible spectrophotometer (Varian) Nicolet 5 DXC FTIR spectrophotometer Nicolet 510P FTIR spectrophotometer Hitachi auto sampler L-7200 Varian pro star solvent delivery model 210 with uv-vis detector model 320 Varian 3300 gas chromatograph (2) Varian 430 gas chromatograph
SCI 313	Instrumental	Beckman 127 solvent module system gold-166 detector Beckman 110B solvent module Waters associate model 441 absorbance detector Hitachi column oven L7300 (uv detector L-7400; RI detector L-7490) HP 6890 series GL system
SCI 321 A	Analytical (Quantitative)	Waters 501 HPLC pump (model 430 conductivity detector)

		Beckman 110B solvent delivery module Millipore waters-differential refractometer R401 (differential electronic unit; Waters model 441 absorbance detector)
SCI 338	Biochemistry and Biotechnology	Milton Roy Spectronic 1200 Perkin Elmer series 200 diode array detector 235c PC Nelson 600 series Perkin Elmer series 200 autosampler (series 200 pump, series vacuum degasser) Beckman system gold (127 solvent module; 166 detector)
SCI 337	Biochemistry & Biotechnology	Hoshizaki ice maker F251B Beckman L8-80M ultracentrifuge Labco freeze dry system Gallenkamp orbital incubator DuPont Sorvall RC-5B refrigerated super speed centrifuge Eppendorf centrifuge 5414C & model 5415D Perkin-Elmer gene amp PCR system 2400 Varian Carey 50810 uv-vis spectrophotometer Fisher Biotech electrophoresis system FB650 Boeker Scientific incubator/shaker – model 136400 Varian Carey single cell peltier accessory 2 Carey 50 Bio uv-vis spectrophotometer
SCI 330	Organic	Perkin Elmer IR spectrophotometer 297

		Agilent 6850 network GC system Perkin Elmer FTIR spectrophotometer (Pantoon 1000)
SCI 328	Organic	5 Büchi rotovap R-3000
SCI 328A	Organic	Varian 3300 gas chromatograph SRI 8610C Gas chromatograph
SCI 332	Organic	Büchi RC 120 rotovap
SCI 332A	Organic	Heidolph rotovap

Departmental equipment—summary

Two years ago, we reviewed the adequacy of our space and equipment with respect to the Industrial Chemistry Technology program. Our overall conclusions remain the same. We characterize our classroom technology, our lab spaces and our lab equipment as adequate for our needs, but the lab equipment is the least adequate of the three.

1) Adequacy of Classrooms, Labs, and Technology

Our classrooms have been mostly refurbished and the technology installed in the new classrooms has enabled professors to use a greater variety of teaching techniques. In terms of number, we are "maxed out" in the fall semesters with regard to access to large lecture spaces designed for chemistry classes (SCI 102 and SCI 120). If student demand for our lower-level chemistry classes continues to increase, then we'll need to teach some large lectures outside of these two rooms. Other spaces aren't necessarily conducive to teaching in a manner appropriate for chemistry classes; use of chemical demonstrations must be curtailed in a room that doesn't have a sink.

Similarly, our lab spaces are adequate in number to serve the students enrolled in chemistry and biochemistry classes.

The equipment in the labs is also adequate, but we have to work hard to ensure that it remains current. Several items in both chemistry and biochemistry were purchased more than fifteen years ago. Manufacturers do not officially support outdated equipment, and it's difficult to find the parts needed for repairs. In addition, due to the numbers of students we now serve we need sufficient numbers of certain items for all the students in a lab. Our students actually run the instruments they learn about in

class (even if they're not chemistry majors), and students are sometimes backed up waiting to use certain items.

2) Condition of Facilities for Program Delivery

For the most part, the variety of instructional and laboratory equipment that we have has a favorable impact on our instruction overall. The new computers in the smaller classrooms, for example, allow professors to show computer projected images; we didn't have this capability prior to the room upgrades. One of the problems with the computers has been reliability; some of our computers are aging and boot up slowly. Similarly, with the exception of a mass spectrophotometer, we have a decent variety of equipment for chemistry and good variety of equipment for biochemistry. In the second-semester organic chemistry classes Ferris students have the opportunity to conduct a short-term and a long-term research project; such an endeavor is often postponed to the junior or senior years at other institutions.

Because we share equipment across chemistry disciplines and because it is housed in different rooms, it can be awkward to teach some classes that require the full use of this equipment. This isn't a big problem in biochemistry (where the three labs are in close proximity), but in organic chemistry labs some of the equipment is a hallway's distance from the main laboratory.

3) Projected Needs for Instructional Facilities

Our greatest need is with regard to laboratory equipment—repair of items that can be repaired, replacement of items that need to be replaced, purchase of additional instruments where the numbers of students justify this expense, and the purchase of new items to expand our equipment holdings into areas that chemistry and biochemistry majors should experience before they graduate. Such purchases are too expensive to be made from our department's annual S&E budget. Our dean is aware of the unique nature of chemical instrumentation, and he has been supportive of our needs. The dean has helped to provide funding in the past and has advocated for keeping our equipment up to date.

A secondary need is with regard to the amount of space. Large lecture space is currently adequate for our numbers of students; but it could be at a premium in the future. Additionally, we have little space that we can use for student research projects. This may be a bigger problem in chemistry than in biochemistry, because the biochemistry labs have limited student access and could be used for ongoing research, even if a lab class is being conducted in the space at the same time. Such is not true for chemistry. We have one designated research space for analytical/instrumental chemistry, and one space for organic chemistry. If we have increasing numbers of students who intend to go on to graduate school (as appears to be the case), we may need to support greater amount of undergraduate research to prepare these students well.

4) Plans for Facilities Improvements

As described earlier, SCI 102 is being renovated this summer.

5) How Improvements to Facilities will Enhance Program Delivery

We hope that the SCI 102 upgrade will significantly affect the variety of strategies that professors can use in this room, while maintaining some old functionality that some instructors need or prefer. The "old" piece would be adequate writing space (to be provided by whiteboards rather than chalkboards) at the front of the room. But we'll have the ability to project images from two cameras (rather than two overheads) in addition to other enhancements.

Section 4, Part B COMPUTER ACCESS AND AVAILABILITY

1) Allocated Computing Resources

We have a variety of computers, including computers that are directly connected to instruments to enable analysis of results. There are also some computers available in the Science Building for student use for research/internet purposes. Chemistry students can go to one of two locations: the ICT open lab (SCI 309), which has computers and a small resource library; this area is open from 8-5 Monday through Friday. While this is technically an ICT area, many chemistry BA students have also completed an ICT degree and they feel comfortable working in this area. On the first floor, the Reitz Reading Room is another resource area that has scientific literature and computers for students to use. This room is jointly run by the biology and physical sciences departments. Students in the biochemistry program have access to computers in the smaller biochemical laboratory (SCI 338), and they do some literature and research work when they're working on long labs in this room.

2) Use of Computing Resources

As described above, the computers in labs are used as an integral part of data-taking and data-interpretation. Other computers are used for research and other purposes.

3) Adequacy of Computing Resources and Needed Additional Resources

We would characterize the replacement of old equipment and the acquisition of new equipment as a higher priority than stand-alone computers. Of course, much of the new equipment requires new computers as well.

4) Acquisition Plan to Address Needed Additional Resources

Most of our computer replacement needs are addressed through our computing consortium. We have occasionally worked with them when we need to replace a laboratory computer (or need to add additional lab computers). We don't need the latest computer model in a lab, and sometimes a

computer that is no longer adequate for an office can be used in a lab. The computer consortium has helped us acquire such computers.

5) Efficacy of Online Services

Online services are adequate to meet the needs of both programs.

6) Adequacy of Computer Support

Our computer consortium has been responsive to our needs when problems have arisen. In fact, we have sometimes had problems with the consortium's desire to update computers that are still functioning for us. Some of our instruments are more than fifteen years old; if the computers attached to this equipment are replaced with modern models, it is possible that we'd have to purchase a software upgrade that could cost more than 50% the value of the instrument itself.

Section 4, Part C OTHER INSTRUCTIONAL TECHNOLOGY

Because major items of lab equipment and computer resources have been addressed in earlier sections, in this section we'll address other types of instructional technology (both classroom and laboratory) that our professors have used.

1) Other Allocated/Available Instructional Technology Resources

Chemistry professors have used a variety of instructional technologies, including Ferris Connect, online homework, personal response systems (i.e., "clickers"), wikis, online journals, Stella software and Vernier probes.

2) Use of Other Resources

Ferris Connect is used in some manner by a majority of our chemistry instructors. All of our chemistry classes are currently face-to-face delivery, so Ferris Connect is used to enhance this aspect of the courses. Currently we do not have plans to deliver chemistry instruction online. (Our department does have some experience with online physics classes.)

Online homework is packaged by several publishers with the textbooks they sell. One of the most popular online homework systems is the OWL system; Several faculty use it with general and organic chemistry classes. Professors assign online homework to encourage students to complete an adequate amount of homework and to provide students with immediate feedback as they solve problems.

Clickers have been used by some of our professors, especially in the larger classes. By asking a series of questions, professors have determined if they need to cover another example of a concept or problem, or if sufficient students understand the concept to move on. Some instructors have used clickers to administer quizzes or tests.

Stella software is a modeling package that has been used in general and physical chemistry classes to help students visual molecules and their movements.

One professor has experimented with the use of wikis for writing lab reports. He assigns students within a group to write different sections of a lab report, and the students collaborate through the use of a wiki to compile a finished product.

One of our professors asks students to make regular entries in an online journal, in which they reflect on what they've learned in a reading or a lecture and comment on what they understand and do not understand.

Vernier probes are used by an increasing number of our general chemistry faculty. The probes help them interface basic laboratory equipment with computers. Since students can collect a greater amount of data in a shorter period of time, students who use the probes can often analyze their results in a richer and more meaningful fashion.

3) Adequacy of Other Resources and Needed Additional Resources

These resources have made it easier to instruct students in a variety of ways. Ferris Connect, in particular, has enabled faculty to efficiently communicate with their entire classes and to distribute information to them. And many (but not all) faculty have noted that when they implemented online homework, student performance on examinations went up. Student reaction to the use of these technologies has also been generally positive. Some students, however, have said that they have to do too much homework (online homework can be a portion of their grade) and some dislike the use of clickers for exams.

4) Acquisition Plan to Address Needed Additional Resources

Equipment needs (including the laboratory equipment addressed earlier in this section and the smaller pieces of instructional equipment addressed here) have been part of our planning process for several years. Due to the fact that students need to actually *use* equipment to become chemists and biochemists, we have a section of the departmental plan that specifically mentions equipment. In addition, we keep a running list (updated annually or more frequently, as needed) of our department's equipment needs on a prioritized basis.

5) Program Impact from Adequacy and Support of Other Resources

Resources have been adequate to meet our basic needs and to keep items in good basic working condition. Our department's S&E budget usually helps us with our chemical supplies and smaller instructional/laboratory equipment needs. Some of the Vernier purchases were made through the use of professional development incentive funding earned by the faculty involved. Larger equipment items

have been supported in a variety of ways: requests for equipment made through (and passed along by) the dean's office, use of development funds, and successful grant applications.

Section 4, Part D LIBRARY RESOURCES

1) Adequacy of Print, Electronic, and Other Resources in FLITE

With the increasing move to on-line formats for delivery of information, we have been pleased with the support we have received from FLITE for our program. In fact, we may be in a better position than many institutions of our size outside the state. Several years ago, FLITE obtained on-line versions of all the major journals of the American Chemical Society. This access was obtained through a consortium arrangement with other state-supported universities throughout Michigan. Rather than having access to just a few of the ACS journals in paper format (as was the case in the past), our students now have instant online access to more than twenty-five professional journals—current and past issues alike. They have access to a wealth of information that would not have been readily available in Big Rapids a decade ago. In addition to the online journals, our biochemistry students (especially when they're enrolled in CHEM 474—Advanced Biochemistry) can make use of inter-library access to obtain information that isn't directly here on campus.

One other service that we've made use of is the computer and presentation space in the library. We don't have a room outfitted with thirty computers, so when our professors need to teach a computer-based laboratory lesson, they reserve one of the FLITE rooms. Similarly, when students make project or report presentations to fellow students and they need Power Point facilities, we often reserve a room in FLITE. While we do have classrooms in which this could be done, we seldom have a single classroom available for the three-hour block required by a lab.

2) Service and Instruction by Library Faculty and Staff

FLITE faculty have been extremely helpful in terms of working with our students and showing them how to find the information they need. In particular, our liaison librarian (Rick Bearden) has a degree in chemistry himself; he understands our needs and proactively serves us. Bill Killian regularly takes his students to the library in the fall for a session with Rick in which he helps them learn about the resources available in FLITE and how students can access them.

3) Adequacy and Impact of Budget Allocation Provided by FLITE

We have no problems with the budget expended by FLITE to support our program. The online ACS journals is a valuable service to our department. And we regularly have the opportunity to review and recommend the purchase of resources books for the library.

Section 5: Conclusions

Section 5, Part A RELATIONSHIP TO FSU MISSION

As stated in Section 1, Part A, the Chemistry and Biochemistry BA program goals relate very strongly to the mission of the university which is to prepare students for successful careers, responsible citizenship, and lifelong learning. The Chemistry and Biochemistry BA programs provide students with the requisite knowledge and experience for *successful careers* in chemistry or in science-related fields. The programs emphases on teamwork and communication provides students with skills required for *responsible citizenship* and the emphasis on critical thinking helps prepare the students for a *lifetime of effective learning*.

Section 5, Part B PROGRAM VISIBILITY AND DISTINCTIVENESS

Our Chemistry and Biochemistry BA programs are distinct from similar programs in competing institutions in several ways as stated in Section 1, Part B of this report. We offer smaller class sizes, more hands-on instrumental experience, and the opportunity to participate in extended team research projects in the Organic Chemistry 2 laboratory. We also stand alone among our competitors in offering the opportunity to improve job marketability through the Associates degree in Industrial Chemistry Technology (ICT), requiring an additional 10 credits.

Our Chemistry/Biochemistry programs have enjoyed national attention in the chemical community over the past few years. Ferris' large (50+ students) Student Affiliate Chapter of the American Chemical Society (ACS) has received recognition at national meetings of the ACS and in the national weekly news magazine of the ACS. The group is one of only several officially designated "Green" Chapters.

Local visibility has been enhanced as two chemistry faculty have been awarded the distinguished teacher honor during the past 5 years. Another junior faculty member was recently lauded with an article in our local newspaper for his enthusiastic approach to chemistry and related activities both within and outside the classroom.

Section 5, Part C PROGRAM VALUE

The programs are indispensible to the university in several ways. They provide valuable degree opportunities for students switching out of other science-related fields. The courses in the Chemistry/Biochemistry programs are critical to the university because of the huge numbers of student credit hours they generate. In addition, the faculty have given a number of presentations that have been open to the Ferris community and have contributed their leadership to a wide variety of university committees.

The value of the Chemistry and Biochemistry programs to those outside of the university includes hosting of professional meetings; bringing in outside speakers; sending out speakers to other universities and conferences; reviewing manuscripts for professional journals; and participating in the local K-12 classrooms by giving presentations, tutoring, and serving as science fair judges.

Many of the ways in which the program is exceptionally valuable to the students have been listed above in Section 5, Part B. In addition, the survey data and open-response comments highlight a high level of appreciation for the availability, helpfulness, friendliness, and concern of the program faculty.

Section 5, Part D ENROLLMENT

The current enrollment in the Chemistry/Biochemistry BA programs is approximately 45 students. This represents unpredicted rapid increase since the programs were established in 2003 and has allowed us to make changes in the program that we couldn't have done without these numbers (Section 3, Part B)

Section 5, Part E CHARACTERISTICS, QUALITY, AND EMPLOYABILBITY OF STUDENTS

As discussed in Section 3, Part A, the body of students enrolled in the Chemistry and Biochemistry programs is fairly traditional in composition. The average age is 23; all of our current students are full time; 96% are in-state; 50% male and 50% female; and 15% are ethnic minorities. The typical program student is bright, motivated, and interested in science. The average ACT for graduating students is 25 and the average GPA is 3.33, both higher than the Ferris average. A majority (2/3) of our students transfer into the Chemistry/Biochemistry programs after initially pursuing other science-related degrees. Our students who also obtain the ICT degree for 10 extra credits have a definite advantage in the job market over those at competing institutions. Because of the young age of our program we do not, at this time, have a significant body of data showing graduate success in related careers. Six of the seven alumni responding to our survey have been accepted to or are attending graduate school. Those in graduate school report a high level of success in their programs.

Section 5, Part F QUALITY OF CURRICULUM AND INSTRUCTION

Surveys of current students, graduating seniors, and alumni show a high level of satisfaction with the quality of instruction. Current students report an especially high level of satisfaction on instructor helpfulness and approachability. This may partially explain the fact that 2/3 of our majors switch to our programs *after* coming to Ferris. As discussed in Section 3, Part H of the report, our faculty are continually experimenting with various teaching innovations and participating in conferences in chemical education where they present their work and become updated on current trends thinking in science pedagogy. In addition to maintaining teaching excellence we are also interested in the competence of our graduates. We have recently completed a plan through which we will assess students' progress toward our program goals at various stages of their undergraduate experience.

Section 5, Part G COMPOSITION AND QUALITY OF FACULTY

There are a total of 13 chemistry and biochemistry faculty of which 11 hold PhDs and 2 hold the MS degree. Ten of the faculty are tenure track and three are non-tenure track or adjunct. As described in this report, the faculty have demonstrated a high level of involvement over the past 5 years through activities such as engaging students in laboratory research, experimenting with innovative pedagogy and instructional technology, advising the award-winning ACS group, and presenting at professional

meetings. During the past 5 years there have been 7 promotions, 25 external conferences attended, 15 presentations at external conferences, 3 grants awarded, and 2 sabbaticals.

Appendix A: Program Check sheet and Course Syllabi

Appendix B: Full-load Worksheet

Appendix C: Faculty CVs

Appendix D: Chemistry BA Assessment Plan

Appendix E: Biochemistry BA Assessment Plan