

PROGRAM REVIEW

February 7, 2011

UNIT Chemistry DEPARTMENT Chemistry COLLEGE College of Science & Math

GRADUATE X UNDERGRADUATE X

UNIT CONTACT PERSON _____

CHAIRPERSON SIGNATURE _____

DEAN SIGNATURE _____

EXECUTIVE SUMMARY UNDERGRADUATE

The major points highlighted in this response are as follows:

- (1) The Department is committed to academic excellence and offers high quality chemistry programs, and our faculty are committed to the teacher/scholar model and involve students in their scholarly activities.
- (2) Our number of majors has increased by 74% since 2004, and our number of minors is among the highest at Southeast. In addition, our SCHR has grown by over 50% since that time. The average number of Southeast chemistry graduates compares favorably with other schools in Missouri and the Ohio Valley Conference with ACS-approved programs.
- (3) Revenues generated by the Department exceed costs by over \$340,000. The Department has four endowed scholarships, with a total net worth of \$120,000.
- (4) The mean cost per chemistry major is \$2153, which is less than both the COSM and University mean cost per major (\$3915 and \$2908, respectively) over the time period from AY07-AY09. In addition, our cost per major is less than the Department's cost per major provided in the Phase II data (\$2730). Our cost per major is typical for laboratory sciences.
- (5) The Department is committed to supporting the University Studies (US) Program, and offers a number of US courses. In addition, the SCH from US courses has been increasing each of the last three years.
- (6) Our programs attract high quality students to the University. Our students have higher average ACT, WP003, and CBase scores than the University, and our Department has the 6th largest number of merit scholarships at Southeast.
- (7) Chemistry graduates do well in the pursuit of their professional goals. Since 2000, 40% of our graduates have been accepted into graduate/professional programs of study, and most of those who go into the work force immediately upon graduation find jobs related to the major.
- (8) The chemistry curriculum meets the guidelines established by the American Chemical Society that define high quality undergraduate chemistry programs. We are currently revising our chemistry curriculum in response to changes in these guidelines to make sure that chemistry curriculum provides students with the education and training required to compete in a global 21st century society.
- (9) Our programs are integral to the mission of the University. Chemistry is an essential part of the science core, and supports other science programs, nonscience programs, and the University Studies Program. Many students from outside the Department take our courses, many of which are also required for chemistry majors.

EXECUTIVE SUMMARY GRADUATE

The Applied Chemistry Area of Emphasis of the Master of Natural Science Degree program at Southeast is administered by the Department of Chemistry. Half of our students are enrolled in the Forensic Chemistry option and the other half, which are largely international students, are in the General option. The program consists of 32 semester hours of coursework, comprised of lectures, laboratory courses, internships, and thesis research credits. The response is summarized as follows:¶8232;

1. The program's real costs to the University are minimal. There is only one course requiring faculty contact time that is not also cross-listed with our undergraduate program. Our graduate assistants perform teaching and other activities at least equivalent to a full time instructor for a similar cost. Removal of assistantships would require the hiring of an additional Instructor, adjuncts and student workers.
2. We have started to increase enrollment for the program and the number of students without assistantships by modifying the format of our program to attract more international students to the general option. This will be valuable to international students by providing relevant hands on experience and allow them to develop a track record at an American institution before applying to a Ph.D. program.
3. This program provides synergism with our undergraduate program and collaboration with the Regional Crime Lab. The research portion of the teacher/scholar model improves the quality of our undergraduate program by keeping faculty current in the changing areas of chemistry.

Program Review Final University Committee Chair Comments

I. SIZE, SCOPE, AND PRODUCTIVITY OF THE PROGRAM

Briefly describe the depth and breadth of your unit's offerings (Undergraduate).

The Department administers the BS in CH (Chemistry, American Chemical Society Certified Chemistry, Biochemistry, Forensic Chemistry, and Business options), CHE, MT; the BA in CH (Chemistry, Forensic Science, and DNA Analysis options); the CH minor; and PP programs. The BS in CH program has retained certification by the American Chemical Society (ACS) since 1964 by meeting the guidelines developed by the ACS for high quality UG chemistry programs. In addition, the BS in CHE meets the MO Department of Secondary and Elementary Education program requirements for teacher certification, and the MT program is based on guidelines and standards established by the National Accrediting Agency for Clinical Laboratory Sciences. The Department also serves at least 20 other programs of study (both science and nonscience) by offering courses required by those programs.

Briefly describe the depth and breadth of your unit's offerings (Graduate).

The chemistry graduate program consists of two options, Forensic Chemistry and a General Option. Our focus has been in the Forensic area since the Chemistry MNS offerings were revived in 1997. Southeast is the only institution in Missouri to offer a graduate degree in forensic chemistry. The forensic program attracts 3-5 new students each year. Recently we have seen dramatically increased demand for the General option, including analytical, organic, and inorganic chemistry, from international students. We currently have 17 students in the program. Two of the current students will finish the program this summer. We have accepted an additional 11 students to start in Fall 2010.

SIZE and SCOPE DATA UNDERGRADUATE

Measure	Minimum	Aspirational Target	Year				
			AY07	AY08	AY09	4	5
Majors UNIT Total	50	210	197	173	170		
Chemistry (ACS Approved) [BS/BS/CHAP]			4	5	2		
Chemistry (BA) [BA/BA/CHBA]			20	19	18		
Chemistry [BS/BS/CHEM]			35	25	32		
Chemistry Education [BSE-HS/BSEHS/CHED]			6	1	2		
Chemistry Education [PRE EDUC/BSE/CHED]			5	3	3		
Chemistry Educatn:Unified Sci [BSE-HS/BSEHS/CUSE]			1	1	1		
Chemistry Educatn:Unified Sci [PRE EDUC/BSE/CUSE]			0	1	1		
Chemistry: Biochemistry Opt [BS/BS/CHBC]			6	17	15		
Chemistry: Business Opt [BS/BS/CHBU]			0	0	1		
Chemistry: DNA Analysis (BA) [BA/BA/CHDN]			2	2	3		
Chemistry: Forensic Chem (BS) [BS/BS/CHFC]			20	17	19		
Chemistry: Forensic Sci (BA) [BA/BA/CHFS]			7	8	9		
Medical Technology [BS/BS/MDTC]			36	24	21		
Pre-Pharmacy [PREPROF/PPROF/PRPH]			55	50	43		
Minors UNIT Total			139	140	125		
Chemistry			67	63	44		
Science Concentration-21 hour			38	45	48		

Science Concentration-30 hour			4	2	1		
Science Specialization			30	30	32		
Completers UNIT Total	2	38	20	11	17		
Chemistry (ACS Approved) [BS/BS/CHAP]			1	2	1		
Chemistry (BA) [BA/BA/CHBA]			7	3	7		
Chemistry [BS/BS/CHEM]			3	1	2		
Chemistry Education [BSE-HS/BSEHS/CHED]			2	0	0		
Chemistry Educatn:Unified Sci [BSE-HS/BSEHS/CUSE]			0	0	1		
Chemistry: Biochemistry Opt [BS/BS/CHBC]			0	0	2		
Chemistry: Business Opt [BS/BS/CHBU]			0	0	1		
Chemistry: DNA Analysis (BA) [BA/BA/CHDN]			1	0	0		
Chemistry: Forensic Chem (BS) [BS/BS/CHFC]			1	0	0		
Chemistry: Forensic Sci (BA) [BA/BA/CHFS]			1	2	1		
Medical Technology [BS/BS/MDTC]			4	3	2		
% Completion Rate 6 YR	27	40	27	50	35		
Unit - % Retention FS YR 1 -- F YR 2	10	80	29	36	43		
Unit - % Retention FS YR 3 -- F YR 4	20	80	57	73	68		
UNIV - % Retention FS YR 1 -- F YR 2			55	59	71		
UNIV - % Retention FS YR 3 -- F YR 4			71	88	77		
SCH On Campus FS			4,853	4,713	5,182		
SCH Off Campus FS			570	709	764		
SCH Total FS			5,423	5,422	5,946		
SCH Summer On and Off Campus			497	468	434		
SCHR (SCH ratios) On Campus Fall/Spring	153	218	289	313	333		
SCHR (SCH ratios) Off Campus Fall/Spring	131	174	171	221	244		
SCHR (SCH ratios) Total	153	218	270	297	318		
Delaware SCHR			226	224			
% of Sections with Enrollment < 10 (GR < 8)	10	5	13	22	15		

Area of Concern for Size and Scope Data (Undergraduate)

Comparison of the AY07-AY09 data (104 CH/CHE, 27 MT, 49 PP) with those from Phase II (68 CH and CHE, 15 MT, 16 PP) shows that our numbers have grown since AY02. The number of CH majors alone is over 50% greater now than in AY02. The Majors Unit Total averaged 180 UG, 85.7% of our aspirational goal. Our SCHR has increased by 45% since AY02. Our SCHR averaged 295 (312 on campus), well above that for COSM, Southeast, and the Delaware SCHR, and is above our AY02 target of 218, as well as our SCHR (187-211) from Phase II. The Minors Unit Total averaged 135, including 58 CH minors. There are no major concerns in these areas from the data listed above. Main areas of concern in the size and scope data include the average Completers Unit Total, the % Completion Rate 6 YR (25.7), and the unit retention rates (FS YR 1-FS YR 2, 32.5%; FS YR 3-FS YR 4, 65%; Note that AY09 data is not available, but was incorrectly included in the means provided in the data). Only 33% of our majors are continuing beyond FS YR 1 and 65% beyond FS YR 3. This could be somewhat misleading, however, given that the PP students do not intend to complete a degree at Southeast and typically transfer within 3 years, and we increased the Majors Unit Total without lowering our academic standards. The average Completers Unit Total was 16 (CH and CHE, 13; MT, 3). The number of CH graduates compares favorably with other schools in MO, the OVC, and the Midwest with ACS-approved programs, including Murray State University and SIU. (See Table in Additional Data or Comments.) The %

of sections with enrollments < 10 is 17%, higher than the aspirational goal. However, this data is complicated by the dual use of UG and graduate enrollments for many upper division courses.

SIZE and SCOPE DATA GRADUATE							
Measure	Minimum	Aspirational Target	Year				
			AY07	AY08	AY09	4	5
Majors UNIT Total	2	15	12	13	20		
Chemistry [MNS/MNS/CHEM]			12	13	20		
Completers UNIT Total	3	5	2	5	2		
Chemistry [MNS/MNS/CHEM]			2	5	2		
UNIV - % Retention FS YR 1 -- F YR 2			0	0	0		
UNIV - % Retention FS YR3 -- F YR 4			0	0	0		
SCH On Campus FS			148	127	200		
SCH Off Campus FS			0	0	0		
SCH Total FS			148	127	200		
SCH Summer On and Off Campus			29	12	28		
SCHR (SCH ratios) On Campus Fall/Spring	153	218	59	57	58		
SCHR (SCH ratios) Off Campus Fall/Spring			0	0	0		
SCHR (SCH ratios) Total	153	218	59	57	58		
Delaware SCHR			226	224			
% of Sections with Enrollment < 10 (GR < 8)	10	5	88	81	83		

Area of Concern for Size and Scope Data (Graduate)

The original focus in forensic chemistry is based on strong historic ties with the Southeast Missouri Regional Crime Lab. Crime labs prefer applicants with advanced degrees in the hard sciences. The program was built using many existing courses and added a few forensic courses to create the forensic option. Historically, we have accepted students with backgrounds other than chemistry. These students take refresher courses to increase their chemistry knowledge. This policy has allowed us to increase enrollment in the program and in some of the cross listed refresher courses. This policy has been highly successful. In the past 4 years many of our incoming students needed the refresher courses, but are now strong forensic chemists.

TEACHING PERSONNEL DATA UNDERGRADUATE							
	Minimum	Aspirational Target	AY07	AY08	AY09	Year 4	Year 5
Unit Full Time Faculty Number	8.00	13.00	12.00	12.00	12.00		
Unit Full Time Faculty Adjusted for Release	6.00	12.00	10.75	10.88	11.00		
Unit Full Time Faculty UG FTE			17.90	16.31	17.63		
Unit Regional Campus Faculty Number					1.00		
Other Teaching Personnel UG Number	0.00	4.00	6.00	8.00	13.00		
Other Teaching Personnel UG PTFTE	0.00	2.00	2.20	1.93	1.07		

Area of Concern for Teaching Personnel Data (Undergraduate)

There were 11 FT faculty on campus and 1 at the regional campuses between AY07-AY09. Because of the cut of a faculty line in Aug 2009 by the administration, we currently have only 10 FT faculty on campus. This decision was based solely on the current budget situation, i.e. the mandate to cut 2% from academic budgets, rather than on departmental needs, enrollments, or productivity. The fall 2009 teaching load for this faculty line is being carried by other faculty and an adjunct. Our major concern is that the loss of this position will seriously decrease our ability to offer services to students in the future. 2 faculty officially receive ½ time release due to administrative duties. However, since AY07 neither has been able to take the full release time due to the demands for our courses. From AY02-AY09, the chair taught uncompensated overloads averaging 5 contact hours each academic year. This situation has been worsened by the loss of a faculty line. Our situation is somewhat ameliorated by the COSM dean's willingness to teach 1 course each semester, which would not be possible if he were not a chemist. We also cannot depend on the availability of adjuncts to help cover course loads since there is not a qualified pool of adjuncts available locally. All 3 of the adjuncts hired recently have driven more than an hour one way, and have been of untested quality and experience. We anticipate that the loss of our faculty line will result in additional overloads, increased contact hours, decreased faculty productivity and satisfaction, decreased course availability, fewer course sections, and student dissatisfaction. We also have an allocation of 6 GA's which helps teach some 1st semester labs.

TEACHING PERSONNEL DATA GRADUATE							
	Minimum	Aspirational Target	AY07	AY08	AY09	Year 4	Year 5
Unit Full Time Faculty Number			0.00	0.00	0.00		
Unit Full Time Faculty Adjusted for Release			0.00	0.00	0.00		
Unit Full Time Faculty GR FTE			2.10	2.02	3.29		
Unit Regional Campus Faculty Number					0.00		
Other Teaching Personnel GR Number			2.00	2.00	2.00		
Other Teaching Personnel GR PTFTE			0.40	0.20	0.17		

Area of Concern for Teaching Personnel Data (Graduate)

The MNS in chemistry has been sustained for eleven years without the benefit of any full-time graduate faculty. There has been collaboration in our department to supervise forensic research projects. In the last five years Dr. Jim McGill became our forensic chemistry specialist mostly through self study. He taught the forensic chemistry course, supervised many forensic thesis topics and served as graduate coordinator. Recently Jim left the University for a position with the US DEA. His departure in August 2009 left the program at a significant disadvantage this year, but the department has increased faculty collaboration to maintain the program. Three faculty team-taught the forensic chemistry course this fall and other faculty have taken over supervision of thesis projects currently underway. The problem with other faculty filling Jim's role is that other, ongoing teaching, research, and service activities must be reduced. To alleviate the additional workload on current faculty we conducted an unsuccessful search for a tenure-track faculty member with extensive forensic expertise this past fall. We plan to run another search this fall. We envision this new faculty member to serve as graduate coordinator, be the instructor for the Forensic Chemistry course and other forensic courses, and supervise forensic related graduate thesis research. 

COMPARISONS UNDERGRADUATE										
	AY07		AY08		AY09		Year 4		Year 5	
	COLL	UNIV	COLL	UNIV	COLL	UNIV	COLL	UNIV	COLL	UNIV
% Completion Rate 6 YR	50.94	50.77	49.74	50.82	43.70	47.04				
Unit - % Retention FS YR 1 -- F YR 2	46.37	62.68	45.72	63.69	57.56	66.03				

Unit - % Retention FS YR 3 -- F YR 4	74.73	82.78	76.79	83.34	70.52	82.34				
UNIV - % Retention FS YR 1 -- F YR 2	64.73	62.81	64.95	63.69	73.06	66.13				
UNIV - % Retention FS YR 3 -- F YR 4	83.33	83.02	85.63	83.73	82.08	82.40				
SCHR (SCH ratios) On Campus Fall/Spring	269.00	262.00	275.00	261.00	273.00	248.00				
SCHR (SCH ratios) Off Campus Fall/Spring	215.00	227.00	183.00	290.00	203.00	213.00				
SCHR (SCH ratios) Total	258.00	242.00	279.00	265.00	253.00	242.00				
% of Sections with Enrollment < 10 (GR < 8)	19.22	17.54	18.56	17.42	16.85	22.70				

COMPARISONS GRADUATE										
	AY07		AY08		AY09		Year 4		Year 5	
	COLL	UNIV	COLL	UNIV	COLL	UNIV	COLL	UNIV	COLL	UNIV
UNIV - % Retention FS YR 1 -- F YR 2	64.73	62.81	64.95	63.69	73.06	66.13				
UNIV - % Retention FS YR 3 -- F YR 4	83.33	83.02	85.63	83.73	82.08	82.40				
SCHR (SCH ratios) On Campus Fall/Spring	269.00	262.00	275.00	261.00	273.00	248.00				
SCHR (SCH ratios) Off Campus Fall/Spring	215.00	227.00	183.00	290.00	203.00	213.00				
SCHR (SCH ratios) Total	258.00	242.00	279.00	265.00	253.00	242.00				
% of Sections with Enrollment < 10 (GR < 8)	19.22	17.54	18.56	17.42	16.85	22.70				

SIZE and SCOPE DATA SUMMARY UNDERGRADUATE				
Measure	Mean	5 year Outcome	% of Aspiration Target	Trend
Majors UNIT Total	180.0	Needs Improvement	85.71	Declining
Chemistry (ACS Approved) [BS/BS/CHAP]	3.7			Irregular
Chemistry (BA) [BA/BA/CHBA]	19.0			Declining
Chemistry [BS/BS/CHEM]	30.7			Irregular
Chemistry Education [BSE-HS/BSEHS/CHED]	3.0			Irregular
Chemistry Education [PRE EDUC/BSE/CHED]	3.7			Irregular
Chemistry Educatn:Unified Sci [BSE-HS/BSEHS/CUSE]	1.0			Static
Chemistry Educatn:Unified Sci [PRE EDUC/BSE/CUSE]	0.7			Irregular
Chemistry: Biochemistry Opt [BS/BS/CHBC]	12.7			Irregular
Chemistry: Business Opt [BS/BS/CHBU]	0.3			Improving
Chemistry: DNA Analysis (BA) [BA/BA/CHDN]	2.3			Improving
Chemistry: Forensic Chem (BS) [BS/BS/CHFC]	18.7			Irregular
Chemistry: Forensic Sci (BA) [BA/BA/CHFS]	8.0			Improving
Medical Technology [BS/BS/MDTC]	27.0			Declining
Pre-Pharmacy [PREPROF/Pprof/PRPH]	49.3			Declining
Minors UNIT Total	134.7			Irregular
Chemistry	58.0			Declining
Science Concentration-21 hour	43.7			Improving

Science Concentration-30 hour	2.3			Declining
Science Specialization	30.7			Improving
Completers UNIT Total	16.0	Needs Improvement	42.1	Irregular
Chemistry (ACS Approved) [BS/BS/CHAP]	1.3			Irregular
Chemistry (BA) [BA/BA/CHBA]	5.7			Irregular
Chemistry [BS/BS/CHEM]	2.0			Irregular
Chemistry Education [BSE-HS/BSEHS/CHED]	0.7			Irregular
Chemistry Educatn:Unified Sci [BSE-HS/BSEHS/CUSE]	0.3			Improving
Chemistry: Biochemistry Opt [BS/BS/CHBC]	0.7			Improving
Chemistry: Business Opt [BS/BS/CHBU]	0.3			Improving
Chemistry: DNA Analysis (BA) [BA/BA/CHDN]	0.3			Irregular
Chemistry: Forensic Chem (BS) [BS/BS/CHFC]	0.3			Irregular
Chemistry: Forensic Sci (BA) [BA/BA/CHFS]	1.3			Irregular
Medical Technology [BS/BS/MDTC]	3.0			Declining
% Completion Rate 6 YR	37.3	Needs Improvement	93.32	Irregular
Unit - % Retention FS YR 1 -- F YR 2	36.0	Needs Improvement	45	Improving
Unit - % Retention FS YR 3 -- F YR 4	66.0	Needs Improvement	82.5	Irregular
UNIV - % Retention FS YR 1 -- F YR 2	61.7			Improving
UNIV - % Retention FS YR 3 -- F YR 4	78.7			Irregular
SCH On Campus FS	4,916.0			Irregular
SCH Off Campus FS	681.0			Improving
SCH Total FS	5,597.0			Irregular
SCH Summer On and Off Campus	466.3			Declining
SCHR (SCH ratios) On Campus Fall/Spring	311.7	Aspiration	142.96	Improving
SCHR (SCH ratios) Off Campus Fall/Spring	212.0	Aspiration	121.83	Improving
SCHR (SCH ratios) Total	295.0	Aspiration	135.32	Improving
% of Sections with Enrollment < 10 (GR < 8)	16.7	Aspiration	333.2	Irregular

SIZE and SCOPE DATA SUMMARY GRADUATE

Measure	Mean	5 year Outcome	% of Aspiration Target	Trend
Majors UNIT Total	15.0	Aspiration	100	Improving
Chemistry [MNS/MNS/CHEM]	15.0			Improving
Completers UNIT Total	3.0	Red Flag	60	Irregular
Chemistry [MNS/MNS/CHEM]	3.0			Irregular
UNIV - % Retention FS YR 1 -- F YR 2	0.0			Static
UNIV - % Retention FS YR3 -- F YR 4	0.0			Static
SCH On Campus FS	158.3			Irregular
SCH Off Campus FS	0.0			Static
SCH Total FS	158.3			Irregular

SCH Summer On and Off Campus	23.0			Irregular
SCHR (SCH ratios) On Campus Fall/Spring	58.0	Red Flag	26.6	Irregular
SCHR (SCH ratios) Off Campus Fall/Spring	0.0			Static
SCHR (SCH ratios) Total	58.0	Red Flag	26.6	Irregular
% of Sections with Enrollment < 10 (GR < 8)	84.0	Aspiration	1680	Irregular

UNDERGRADUATE

Brief Conclusion from Data

The department continues its long tradition and history of quality instruction, high standards, and breadth of offerings, all while maintaining the academic rigor that continue to make our graduates attractive to employers. Although our Majors Unit Total is not yet at our aspirational goal, it has grown substantially since AY02, and it has grown at a higher percentage than that of the University as a whole since that time. We believe that this growth is the result of actions implemented in response to the previous program review. Our degree programs have attracted new students because they have become more interdisciplinary in nature, e.g. biochemistry, forensics, DNA analysis, and business. Some of these students might not have majored in chemistry or even attended Southeast at all if they had not had these options to choose from. In addition to our own department, these options have also had a positive impact on other departments since our students are required to take courses for some of the options offered by other departments, i.e. Biology, Mathematics, Business, etc. Our SCHR has grown substantially since AY02, and is above our aspirational goal and well ahead of the COSM and University averages. This demonstrates that demand for our courses remains high, a demand we will have difficulty meeting in the future as a result of the loss of our faculty line. The Minors Unit Total shows that demand for the chemistry minor remains high, despite the fact that Biology dropped the chemistry minor as a requirement for their degree programs. The number of CH minors, although slightly lower than in AY02, has remained fairly stable since that time. Thus, students still see value in the chemistry minor. The data provided for the Completers Unit Total between AY07-AY09 shows the need for improvement in this area. Our number of graduates fluctuates from year to year, but on average compares favorably to the number of chemistry graduates at similar regional universities, despite the fact that we have fewer faculty than most. (See table in Additional Data or Comments.) The major areas of concern for us are the 6 Yr %Completion Rates and the retention rates of our students. In the case of the retention data, note that the AY09 data is not yet available, but AY09 was incorrectly included in the means provided in the data. Correcting for this error shows that 33% of our majors are continuing beyond FS YR 1 and 65% beyond FS YR 3. In addition, these numbers themselves could be somewhat misleading because the PP students do not intend to finish at Southeast and typically transfer within 3 years. As a result, our retention rates may actually be higher than those shown. Regardless, these are areas that need to be addressed.

Additional Data or Comments

Data available from the ACS, as well as web sites for other universities, demonstrates that our productivity compares favorably with other Chemistry departments in Missouri, the OVC, and the Midwest in terms of the number of BS CH degrees awarded. The data also shows that Southeast generally has fewer Chemistry faculty than other comparable universities in terms of mission and size, i.e. UT-Martin, Murray State, Truman State, Illinois State, and Tennessee Tech.

UG CH Degrees (BS/BA) Awarded by ACS-Approved Universities in Missouri, the OVC, and Other Selected Schools, 2006-2007*

University	# CH Deg. AY07*	# CH FT Faculty in AY10**	AY07 Enrollment	# CH Deg. as % Total Enrollment	#CH/#Faculty
Truman State	32	20	5866	0.55	1.6
Tennessee Tech	34	18	10321	0.33	1.9
Missouri Western St	22	8	7286	0.3	2.8
Missouri-St. Louis	26	20	12147	0.21	1.3
Austin Peay	17	8	9094	0.19	2.1
Southeast	17	10***	10665	0.16	1.5

Middle TN State	32	28	21296	0.15	1.1
Murray State	14	13	10156	0.14	1.1
UT-Martin	10	12	7173	0.14	0.8
Missouri S & T	8	25	6167	0.13	0.3
Missouri State	19	16	19348	0.10	1.2
Missouri-Columbia	27	19	28477	0.09	1.4
SIU-Edwardsville	12	18	13398	0.09	0.7
Iowa State	19	34	23710	0.08	0.6
Wisconsin-Milwaukee	24	23	29358	0.08	1.0
SIU-Carbondale	14	16	20983	0.07	0.9
Eastern Illinois	7	15	12179	0.06	0.5
Iowa	16	25	30409	0.05	0.6

*ACS data; latest available. Nationwide, there were 12888 UG CH degrees awarded by 642 institutions with ACS-approved programs. Average graduates per CH program = 20.1.

**Fulltime; adjunct faculty not included in count.

***10 on main campus

Plan to Address

The Department plans to address our concerns in this area in the following ways:

(1) Although our Majors Unit Total is up since AY02, we would like to reach our aspirational goal of 210. In this regard, we will continue our recruitment efforts by:

(a) Work with Admissions and the COSM Advising Center to have representatives at all on-campus recruiting events. (b) Continue to send a recruitment letter to regional high schools (HS) which describes our programs and chemistry career opportunities, and provides contact information for interested students. (c) Revise and update our Web page on a regular basis so that interested students can access up-to-date information about our programs online, and add new sections on “How to Join the Department” and career opportunities for chemists. (d) Reinstate our annual Chem Bowl for regional HS students. (e) Recruit off-campus as opportunities arise, and work with area HS chemistry classes that would like to visit the Department. (Note that recruitment efforts are severely limited by our available resources and teaching loads.) (f) Improve the science lab facilities. To this end, several faculty coauthored an NSF grant proposal for a \$2 million lab renovation, and we have made an earmark request for a forensic science education lab. We would like to see a commitment on the part of the administration similar to that shown to the River Campus, which would attract science majors in the same way as it did to the Visual and Performing Arts. (2) Although our Completers Unit Total is in line with the number of chemistry graduates at other universities, we want to improve this number without lowering academic standards by improving retention rates. Efforts here will include: (a) Increase participation in supplemental instruction programs. (b) Explore the development of a chemistry learning center for UG students in freshman chemistry courses. (c) Monitor student learning in the first two years of our programs by using standardized exams to assess student progress. This will aid in the identification of problem areas in the curriculum, and will help us address these areas. (d) Revise our curriculum to meet the new ACS guidelines for approved programs. (e) Increase awareness about chemistry careers and the financial realities students face. (f) Add information about chemistry-related careers to our website. (g) List scholarship programs offered by the ACS and other organizations on our website, especially those that target underrepresented populations. (h) Hold departmental social occasions each year for faculty and our students to help build a feeling of community among our students. (i) Explore the development of a mentoring program for new majors, i.e. pairing new majors with upperclassmen. (3) In an attempt to increase enrollments in our upper division courses, we will pursue the following: (a) Implement plans for recruitment and retention since increasing the number of majors and improving retention are the best ways to increase enrollments in our upper division courses. (b) Offer certain courses less frequently, and fewer sections of other courses where lab safety and space are not an issue. Because the chemistry laboratory is an inherently dangerous place, the total number of lab sections must remain flexible in order to maintain a safe laboratory environment for our students. ACS certification requires that certain courses be offered on an annual basis, so any changes in the frequency of our course offerings must be done with this in mind. (4) Given the loss of our faculty line, we will attempt to

Brief Follow Up on Outcomes of Plans to Address from Last Review

Since the last program review, we have implemented the following plans in order to attract students to our Department: (1) 8 new options have been implemented under the BS and BA in CH programs so that students can better tailor their educations to meet their educational goals: ACS Certified Chemistry (BS), Biochemistry (BS), Business (BS), Chemistry (BS/BA), Forensic Chemistry (BS), Forensic Science (BA), and DNA Analysis (BA). With the exception of one course, these options were assembled from existing courses already offered at Southeast. The forensic options have been especially successful, generating more majors than any of the other options.

(2) We increased recruitment efforts in several ways: (a) The chairperson mails out informational letters to about 200 HS chemistry teachers each year that describes our programs and provides contact information for interested students. (b) Our revised department brochures are distributed at Show Me Days and other recruiting events. (c) The chair and other faculty have gone on recruiting trips off-campus. (d) On several occasions the chair has hosted regional high school chemistry classes to discuss chemistry as a career option and our academic programs. (e) Emails or letters are sent to prospective students who visit campus or attend Show Me Days. (3) With one exception, we reduced the hours required for completion of our degree programs to 120. We believe that these and other recruitment efforts have been successful in attracting new majors to our programs since our Majors Unit Total has increased dramatically since AY02.

In an attempt to increase enrollments in our upper division courses, we have implemented the following plans: (1) We increased our recruiting efforts. Increasing the number of majors in our programs should lead to increased enrollments in upper division courses. (2) Our degree options require students to take additional upper division chemistry courses besides those already included in the chemistry core. Prior to the development of these options, the Department only offered the BS and BA in CH, and the BS in CH (ACS Certified). The BS and BA in CH did not require any chemistry courses outside of the core, and most CH majors chose not to take any more chemistry courses than required. Development of the options requires all CH majors to take chemistry courses outside of the core. These efforts have been successful for certain courses over the last few academic years, i.e. Biochemistry II and Biochemistry Lab. However, even greater success could be achieved if retention rates were increased.

To serve the increased numbers of students enrolled in our courses, we have begun to use graduate assistants (GAs) to teach lab sections of some chemistry courses. However, these assignments must be handled judiciously since not every GA entering the program is qualified to teach chemistry courses. The forensic chemistry option of our MNS program attracts students from other academic fields besides Chemistry. A number of these students require our chemistry refresher courses to strengthen their chemistry-related skills. Assigning these GAs to teaching duties prior to completing the refresher courses would be deleterious to the quality of the academic labs.

Program Review Final University Committee Chair Comments

GRADUATE

Brief Conclusion from Data

The data indicate that >80% of the graduate courses have enrollment less than eight students. This statistic does not mean that our faculty are teaching courses with less than eight students. Many of our graduate courses are either 500 level and required by some of our undergraduate programs or are cross listed as 400/600 level courses.  

The following 500 level courses are offered regularly, but serve both the undergraduate and graduate programs (cross listing are shown in parenthesis): CH511 (CH310), CH531 (UI331), CH532, CH533, CH540 (CH341/CH342), CH563, CH571 (CH271), CH575, FS550, FS552. The following 600 level courses are offered regularly, but serve the undergraduate program with cross listing as a 400 level (cross listing are shown in parenthesis): CH607 (UI443), CH620 (CH420).  
CourseUG CrosslistingRequired for UG Faculty Cont Hrs CH511CH310YesYes 
CH531UI331YesYes CH532YesYes CH533YesYes 
CH540CH341/CH342YesYes CH563YesYes 
CH571CH271YesYes CH575YesYes FS550YesYes FS552YesYes 
232;
CH607 UI443YesYes CH608No CH609No 

CH620CH420YesYes CH675Yes CH676No CH688No CH691
No CH692No CH693No CH694No CH695No
 FS601No  

These listed graduate courses typically have less than eight graduate students enrolled, but are required of our undergraduate program and must still be offered regardless of the existence of the graduate program. Some of the other graduate courses are offered and have low enrollments, but require no faculty contact hours. These classes include: CH608, CH609, CH676, CH688, CH691, CH692, CH693, CH694, CH695, FS 601. The only course required exclusively by the chemistry graduate program, offered regularly, and requires faculty contact hours is CH675. Our point is that eliminating low enrollment graduate chemistry courses will not free up large numbers of faculty contact hours. Our graduate program adds enrollment to many of our senior level undergraduate courses with very little additional cost to the University.

Additional Data or Comments

Since the last program review Southeast has transferred operations of the Southeast Missouri Regional Crime Lab to the Missouri Highway Patrol over our objections. This move has weakened ties with the Regional Crime lab in Cape Girardeau, but we have found ways of working around this problem. We have worked out agreements for formal internships with the State Highway Patrol, which opened internship possibilities across the state. Additionally we have found a way to enable Crime Lab staff to teach some of our forensic course as they did prior to the transfer. Additionally, we still share some equipment and we continue informal collaboration on research projects. These new arrangements with the Regional Crime Lab have not cost the University any money and we will continue to develop the collaboration in the future.  In Spring 09 we gained an additional ten international graduate students interested in traditional areas of chemistry. They have begun thesis research projects with four faculty members in our department. The large increase in students, resulting from the activity of a recruiter engaged by the University, caught us by surprise: lack of campus-wide planning for the influx of students attracted by the recruiter left us with no expectation that the many applicants generated by the recruiter would actually come to the Department, and we received no guidance on the evaluation of student transcripts from universities overseas. We nevertheless welcomed these students – and the opportunity that they represented - into the Department. However, our experience with these students (additional time spent supervising research) has caused us to re-evaluate our current program. A recent survey of all chemistry faculty found that most can only handle one graduate student research project at a time based on undergraduate teaching obligations. In order to accommodate the increased demand for our graduate program with the available faculty resources we will modify our program in the near future (See I.Plan to Address.)

Plan to Address

As the program stood during Fall 2009 we felt that we could only accommodate about 15-20 graduate students, based on our ability to provide adequate supervision of student thesis research. However, we have seen a large increase in international applications and feel that this can be an area of growth for us if pursued in a manner that still provides a valuable experience to all students.  We have already started to expand the non-thesis option that is currently on the books, but has previously been used only for weak students. We intend to turn this negative option into a positive option to give these international students practical experience in the traditional areas of chemistry through graduate courses, including laboratory courses. Our revised program addresses deficiencies in content knowledge, adapts international students to American academic culture and provides hands-on lab experience which is typically lacking in students from developing nations during the first year. By these steps, students will develop a record of success. Then the students will be at a cross roads to transfer to a more prestigious program in the US, stay at Southeast and pursue a nonthesis MNS degree, or stay at Southeast and pursue a thesis MNS degree.  We will meet with each student at the end of their first year to advise them on the choices available to them. The highest ranking students, based on GPA and other criteria, will have the option of pursuing the thesis option. The number of students that will be allowed to pursue the thesis option each year will be dependent on the number of students each faculty member is willing to mentor. The remaining students will continue in the nonthesis option. Many of the international students would thus be enrolled in courses for a year before requiring faculty research supervision. Additionally, many of these students will pay tuition and will not have a graduate assistantship. While some may argue that this may turn a two year program into a three year program, it will allow these students to gain experience and amass a record of successful graduate-level study before applying to a Ph.D. program in the US. While not all students would be successful and complete our program, it would allow us to accept more students meeting minimum standards initially and spend our finite resources with those who have a successful track record

at an American university. It will also reduce faculty research supervision when the students actually start research because the student will be more capable as a result of the first year work. Without the thesis requirement, our program will be able to grow without a large increase in faculty lines. We feel that these changes will allow us to grow our program to about 35-45 students.

Brief Follow Up on Outcomes of Plans to Address from Last Review

One of the plans addressed on the last program review was to increase recruiting efforts at other schools. Mohammed Ali gives small recruiting workshops at international conferences and promotes our program at domestic workshops he attends. Additionally Mike Rodgers promotes our undergraduate and graduate programs with high school AP chemistry teachers. Throughout the course of each year he makes about 100 teacher contacts. Another plan was to increase our MNS program web presence. In the last two years our department website has migrated to the University's Red Dot system to increase reliability, consistency, and make for easier searching by prospective students.

Program Review Final University Committee Chair Comments

II. REVENUE AND OTHER RESOURCES GENERATED BY THE PROGRAM

REVENUE DATA UNDERGRADUATE					
Measure	AY07	AY08	AY09	Year 4	Year 5
All Courses - SCH Revenue					
On Campus FS	962,563.13	1,019,237.80	1,202,315.44		
Off Campus FS	78,518.60	114,664.38	132,596.72		
Summer On and Off Campus	102,291.38	105,306.34	102,674.12		
Subtotal Revenue SCH	1,143,373.11	1,239,208.52	1,437,586.28		
All Courses - Fees Revenue					
On Campus FS	8,940.00	8,460.00	9,600.00		
Off Campus FS	1,100.00	970.00	1,040.00		
Summer On and Off Campus	820.00	860.00	750.00		
Subtotal Revenue FeeS	10,860.00	10,290.00	11,390.00		
All Courses - Total SCH and Fees	1,154,233.11	1,249,498.52	1,448,976.28		
Univ Studies Crses - SCH Revenue					
On Campus FS	568,543.26	599,510.90	733,120.44		
Off Campus FS	78,518.60	114,664.38	132,596.72		
Summer On and Off Campus	61,612.19	70,759.14	69,775.56		
Subtotal Revenue SCH	708,674.05	784,934.42	935,492.72		
Univ Studies Crses - Fees Revenue					
On Campus FS	5,730.00	5,540.00	6,440.00		
Off Campus FS	1,100.00	970.00	1,040.00		
Summer On and Off Campus	630.00	660.00	580.00		
Subtotal Revenue FeeS	7,460.00	7,170.00	8,060.00		
Univ Studies - Total SCH and Fees	716,134.05	792,104.42	943,552.72		
SER/BC/ROM Crses - SCH Revenue					
On Campus FS	284,067.57	309,391.78	344,630.24		
Off Campus FS	0.00	0.00	0.00		
Summer On and Off Campus	33,956.37	32,603.92	26,411.52		
Subtotal Revenue SCH	318,023.94	341,995.70	371,041.76		
SER/BC/ROM Crses - Fees Revenue					
On Campus FS	2,580.00	2,450.00	2,560.00		
Off Campus FS	0.00	0.00	0.00		
Summer On and Off Campus	190.00	200.00	170.00		
Subtotal Revenue Fees	2,770.00	2,650.00	2,730.00		
SER/BC/ROM - Total SCH and Fees	320,793.94	344,645.70	373,771.76		
Major Courses - SCH Revenue					

On Campus FS	109,952.30	110,335.12	124,564.76		
Off Campus FS	0.00	0.00	0.00		
Summer On and Off Campus	6,722.82	1,943.28	6,487.03		
Subtotal Revenue SCH	116,675.12	112,278.40	131,051.80		
Major Courses - Fees Revenue					
On Campus FS	630.00	470.00	600.00		
Off Campus FS	0.00	0.00	0.00		
Summer On and Off Campus	0.00	0.00	0.00		
Subtotal Revenue FeeS	630.00	470.00	600.00		
Major Courses - Total SCH and Fees	117,305.12	112,748.40	131,651.80		
Unit Revenue External Grants	19,188.00	0.00	100,000.00		

REVENUE DATA GRADUATE					
Measure	AY07	AY08	AY09	Year 4	Year 5
All Courses - SCH Revenue					
On Campus FS	35,543.68	31,535.37	52,440.00		
Off Campus FS	0.00	0.00	0.00		
Summer On and Off Campus	6,964.64	2,979.72	7,341.60		
Subtotal Revenue SCH	42,508.32	34,515.09	59,781.60		
All Courses - Fees Revenue					
On Campus FS	60.00	70.00	150.00		
Off Campus FS	0.00	0.00	0.00		
Summer On and Off Campus	0.00	0.00	0.00		
Subtotal Revenue FeeS	60.00	70.00	150.00		
All Courses - Total SCH and Fees	42,568.32	34,585.09	59,931.60		
Major Courses - SCH Revenue					
On Campus FS	35,543.68	31,535.37	52,440.00		
Off Campus FS	0.00	0.00	0.00		
Summer On and Off Campus	6,964.64	2,979.72	7,341.60		
Subtotal Revenue SCH	42,508.32	34,515.09	59,781.60		
Major Courses - Fees Revenue					
On Campus FS	60.00	70.00	150.00		
Off Campus FS	0.00	0.00	0.00		
Summer On and Off Campus	0.00	0.00	0.00		
Subtotal Revenue FeeS	60.00	70.00	150.00		
Major Courses - Total SCH and Fees	42,568.32	34,585.09	59,931.60		
Unit Revenue External Grants	0.00	0.00	0.00		

SUMMARY UNDERGRADUATE

Measure	Mean	Trend
All Courses - SCH Revenue		
On Campus FS	1,061,372.12	Improving
Off Campus FS	108,593.23	Improving
Summer On and Off Campus	103,423.95	Irregular
Subtotal Revenue SCH	1,273,389.30	Improving
All Courses - Fees Revenue		
On Campus FS	9,000.00	Irregular
Off Campus FS	1,036.67	Irregular
Summer On and Off Campus	810.00	Irregular
Subtotal Revenue FeeS	10,846.67	Irregular
All Courses - Total SCH and Fees	1,284,235.97	Improving
Univ Studies Crses - SCH Revenue		
On Campus FS	633,724.87	Improving
Off Campus FS	108,593.23	Improving
Summer On and Off Campus	67,382.30	Irregular
Subtotal Revenue SCH	809,700.40	Improving
Univ Studies Crses - Fees Revenue		
On Campus FS	5,903.33	Irregular
Off Campus FS	1,036.67	Irregular
Summer On and Off Campus	623.33	Irregular
Subtotal Revenue FeeS	7,563.33	Irregular
Univ Studies - Total SCH and Fees	817,263.73	Improving
SER/BC/ROM Crses - SCH Revenue		
On Campus FS	312,696.53	Improving
Off Campus FS	0.00	Static
Summer On and Off Campus	30,990.60	Declining
Subtotal Revenue SCH	343,687.13	Improving
SER/BC/ROM Crses - Fees Revenue		
On Campus FS	2,530.00	Irregular
Off Campus FS	0.00	Static
Summer On and Off Campus	186.67	Irregular
Subtotal Revenue Fees	2,716.67	Irregular
SER/BC/ROM - Total SCH and Fees	346,403.80	Improving
Major Courses - SCH Revenue		
On Campus FS	114,950.73	Improving
Off Campus FS	0.00	Static
Summer On and Off Campus	5,051.04	Irregular

Subtotal Revenue SCH	120,001.77	Irregular
Major Courses - Fees Revenue		
On Campus FS	566.67	Irregular
Off Campus FS	0.00	Static
Summer On and Off Campus	0.00	Static
Subtotal Revenue FeeS	566.67	Irregular
Major Courses - Total SCH and Fees	120,568.44	Irregular
Unit Revenue External Grants	39,729.33	Irregular

SUMMARY GRADUATE

Measure	Mean	Trend
All Courses - SCH Revenue		
On Campus FS	39,839.68	Irregular
Off Campus FS	0.00	Static
Summer On and Off Campus	5,761.99	Irregular
Subtotal Revenue SCH	45,601.67	Irregular
All Courses - Fees Revenue		
On Campus FS	93.33	Improving
Off Campus FS	0.00	Static
Summer On and Off Campus	0.00	Static
Subtotal Revenue FeeS	93.33	Improving
All Courses - Total SCH and Fees	45,695.00	Irregular
Major Courses - SCH Revenue		
On Campus FS	39,839.68	Irregular
Off Campus FS	0.00	Static
Summer On and Off Campus	5,761.99	Irregular
Subtotal Revenue SCH	45,601.67	Irregular
Major Courses - Fees Revenue		
On Campus FS	93.33	Improving
Off Campus FS	0.00	Static
Summer On and Off Campus	0.00	Static
Subtotal Revenue FeeS	93.33	Improving
Major Courses - Total SCH and Fees	45,695.00	Irregular
Unit Revenue External Grants	0.00	Static

UNDERGRADUATE

Brief Conclusion from Data

Overall, the Department benefits the University by generating much more in revenue than it costs to run our programs. This is done primarily by serving other programs as well as our own students. Because chemistry is considered to be the central science, our program plays an essential role in supporting other science programs, as well as many nonscience programs for which a basic understanding of chemistry is necessary. In addition, the Department supports the University Studies (US) Program by offering three Physical Systems courses, one UI 100 first year seminars, a 300 level university studies course, and a 400 level senior seminar. As a result, a large number of students in other majors take our courses because these courses have broad appeal to programs outside of chemistry. Most of these courses are also required for CH majors. (See Table in Additional Data or Comments) In fact, only a few of the courses required by our majors are not also taken by students in other programs. According to the data provided, revenue generated from SCH and fees in all courses increased from \$1,154,233 to \$1,448,976 between AY07-AY09, and the mean revenue generated from SCH and fees in all courses was \$1,284,236. This number exceeds the net cost for the chemistry program by \$344,838. Thus, because so many of our courses benefit students in other programs, the Department generates 25% more revenue than it costs to run our chemistry programs. Of the total mean revenues generated by the Department, an average of \$817,264 comes from US Courses, \$346,404 comes from SER/BC/ROM courses, and \$120,568 comes from Major Courses. Overall, revenues are up substantially in AY09 versus AY07 and AY08 in all categories. As a result, total revenue for all courses is improving. Between AY07-AY09, an average of \$10,847 in student fees was generated by the Department annually. Most of our courses have laboratory components for which students pay an additional \$10 lab fee. These fees are used to help defray the costs associated with our academic labs, i.e. chemicals, equipment, glassware, etc. However, these fees cover only about 1/3 or less of the annual cost of running our lab courses. If the University would raise the lab fee to \$15 or \$20, more revenue would be generated by our program.

In addition to other sources of revenue generated by the Department, an average of \$39,729 has been generated through grants written by departmental faculty since AY07. So far in AY09, faculty have written or coauthored grant proposals amounting to over \$2,000,000. The Department also has four endowed scholarships, the David Nunley Scholarship, the Chemistry Alumni Scholarship, the Earnest Yeakey Chemistry Scholarship, and the M. and A. Evens Chemistry Scholarship, with a total endowed value of over \$120,000. These are used to fund scholarships for 4-6 deserving CH majors (and PP students in the case of the Nunley Scholarship) each academic year, typical awards being between \$1000-2000. These scholarships have certainly helped students afford Southeast, and in certain cases have made the difference between a student staying at Southeast or dropping out. In addition to the endowed scholarships, \$1000-3000 in donations are received each year from chemistry alumni and other donors in support of our programs. These funds are used to help maintain program quality and to supplement shortfalls in our budget allocations, which have been increasing each year, because the University does not adequately support the mission of the Department, freeing donations to major initiatives.

Additional Data or Comments

Department of Chemistry Courses Serving Other Programs of Study

Course	Programs Served
CH180 Chemistry in Our World+	US, Communication Disorders, General Studies, Health Management (Health Promotion), Nursing, Physics Ed.
CH181 Basic Principles of Chemistry+	US, Applied Science Computer Technology (AA), Agribusiness, Communication Disorders, General Studies, Health Management (Health Promotion), Human Environmental Studies (Dietetics), Physics Ed.
CH185 General Chemistry I*	US, Agribusiness, Biology (various options), Chem. Ed. Chem. minor, Computer Science, Ed. (Unified Sci.) Environmental Sci., MT, Eng. Physics, Physics Ed., Physics, Pre-professional (medical, dental, etc.)
CH186 General Chemistry II*	Biology (various options), Chem. Ed., Chem. minor Ed. (Unified Science), Environmental Sci., MT, Pre-professional
CH187 Qualitative Analysis*	Biology (various options), Chemistry Ed.,

	Chem. minor, Environmental Sci., MT, Pre-professional
CH234 Organic & Biological Chemistry	Human Environmental Studies (Dietetics)
CH271 Quantitative Analysis*	Chem. Ed., Chem. minor, Environmental Sci., MT
CH341 Organic Chemistry I*	Biology (various options), Chemistry Ed., Chem. minor, Environmental Sci., MT, Pre-professional
CH342 Organic Chemistry Lab I*	Biology (various options), Chemistry Ed., Chem. minor, Environmental Sci., MT, Pre-professional
CH343 Organic Chemistry II*	Pre-professional
CH344 Organic Chemistry Lab II*	Pre-professional
CH350 Environmental Chemistry*	Environmental Sci.
CH531/UI331 Biochemistry I*	US, MT, Pre-professional
UI100 First Year Seminar	US
UI443 Professional Experience in Chem.	US

*Required for BS/BA in CH options, +online and face-to-face

Plan to Address

In order to keep the revenues generated by the Department strong, we propose the following plan of action. (1) Continue our recruiting efforts, as outlined in the previous section. Increasing the number of departmental majors, as well as the number of students enrolled at the University, is one of the best ways to meet the challenges posed by budgetary shortcomings. (2) Encourage faculty to write grant proposals to bring in more revenues. During fall 2009, faculty coauthored grant proposals totaling \$2,150,000, and 3 faculty attended the NSF workshop on grant writing. However, the administration needs to be aware that many grants for major pieces of equipment and instruments require matching funds from the University. Unless the administration is committed to supporting grant writing efforts with matching funds, these efforts will not be successful. (3) Because retention of our majors is a concern, i.e. only 33% of our majors continue beyond FS YR 1, we propose that incoming freshman majors take a placement exam similar to the Math and English placement exams. Students who have never had chemistry or who do not demonstrate basic proficiency in chemistry based on their high school experiences will be required to complete the non-science majors chemistry course through Aleks, the Web-based, artificially intelligent assessment and learning system. (The Department of Mathematics is currently using Aleks to teach MA101/102.) This will require a commitment on the part of the University to obtain the software license and provide a computer facility in which to run the course. We believe that this would help increase retention and improve graduation rates since students would be more carefully placed in 1st semester courses that better match their background and abilities. Students experiencing 1st semester success are more likely to stay in the program. (4) We are currently revising our curriculum according to new ACS guidelines for approved programs. We believe these revisions will help with recruiting and retention because they will provide students with a cutting edge, 21st century curriculum in chemistry that is current with the latest developments in content and pedagogy according to the world's largest, professional scientific organization, and will also meet the interdisciplinary nature of science. (5) In order to boost donations from alumni, we propose to build up our alumni network. We will keep in more regular contact with our alumni by reinstating the publication of a departmental newsletter, published over the web and emailed to alumni where possible, and by inviting alumni back to campus and the department for special events, such as homecoming and Alumni Monday.

Brief Follow Up on Outcomes of Plans to Address from Last Review

The following outcomes of plans to address from the last review were implemented by the department:

(1) The department increased its recruitment efforts to attract new majors to the department. These efforts have been summarized in the preceding section. (2) Since we received so much interest from potential UG students in forensics, we developed three new forensic options under the BS and BA in Chemistry programs during the spring 2005 semester: Forensic Chemistry (BS), Forensic Science (BA), and DNA Analysis (BA). This move was designed to profit from interest in forensic sciences generated by forensics-related television shows such as "CSI". With the exception of one course, these options were assembled from existing courses already offered at Southeast, and all three of these options require only 120 credit hours for graduation. These options have been attractive to students: more chemistry majors have declared a forensic option than any of our other options. Other options have been introduced also. (3) With one exception, we reduced the

hours required for completion of our degree programs to 120, so that students can graduate in four years with one of our degrees averaging only 15 credit hours per semester. Most chemistry programs at other institutions of higher education require more than 120 credit hours to graduate. This fact has been emphasized in recent recruiting efforts. (4) We developed online University Studies Physical Systems courses (CH180 and CH181) to support the online BGS degree. (5) We have supported SE PM by offering CH180 in the evenings between AY07-AY09 to accommodate nontraditional students.

Program Review Final University Committee Chair Comments

GRADUATE

Brief Conclusion from Data

AY09 showed a large increase in revenue most likely caused by an increase in international student enrollment. Most of these students do not have assistantships and pay their own tuition. We plan on recruiting more of these students to further increase revenue (see II.Plan to Address.)

Additional Data or Comments

Plan to Address

Revenues can be increased by boosting international student enrollment. These students generally do not receive graduate assistantships. We plan to continue recruiting international students (See I.Breif Follow up.) and have already begun to change the structure of our program to accommodate these students with minimal additional faculty time (See I.Plan to Address.)

Brief Follow Up on Outcomes of Plans to Address from Last Review

In the last program review we mentioned that an effort would be made to secure outside funding through grant writing and other funding resources. A \$2,000,000 grant was accepted by the National Science Foundation to renovate research space in Magill Hall that will be used for faculty and student research. A federal earmark was submitted to build a forensic chemistry teaching center. This earmark for \$700,000 was approved by the US Senate in Summer 2009. Another grant was approved by Hitachi for the purchase of a chemical instrument with a value of \$140,000. This was a matching funds grant. Unfortunately the university did not match the funds and the funding was lost. Other grants have been submitted to the Department of Justice to improve our forensic resources.

Program Review Final University Committee Chair Comments

III. COSTS AND OTHER EXPENSES ASSOCIATED WITH THE PROGRAM

COSTS DATA UNDERGRADUATE					
	AY07	AY08	AY09	Year 4	Year 5
Cost Per Major	1,901.00	2,197.00	2,362.00		
Unit Costs per Major SCH - On campus FS	312.00	326.00	308.00		
Unit Costs per Major SCH - Off campus FS	0.00	0.00	0.00		
Unit Costs per Major SCH - Summer	276.00	301.00	227.00		
Unit Costs per Major SCH - Overall	309.00	324.00	303.00		
Unit Costs for Major Crses - On campus FS	343,819.00	354,645.00	382,190.00		
Unit Costs for Major Crses - Off campus FS	0.00	0.00	0.00		
Unit Costs for Major Crses - Summer	30,764.00	25,441.00	19,313.00		
Unit Costs for Major Crses - Overall	374,583.00	380,087.00	401,503.00		
Unit Costs per Univ Studies SCH - On campus FS	86.00	70.00	71.00		
Unit Costs per Univ Studies SCH - Off campus FS	198.00	191.00	169.00		
Unit Costs per Univ Studies SCH - Summer	130.00	134.00	142.00		
Unit Costs per Univ Studies SCH - Overall	107.00	98.00	94.00		
Unit Costs for Univ Studies Crses - On campus FS	246,857.00	193,221.00	223,858.00		
Unit Costs for Univ Studies Crses - Off campus FS	112,799.00	135,455.00	128,890.00		
Unit Costs for Univ Studies Crses - Summer	39,306.00	42,444.00	41,587.00		
Unit Costs for Univ Studies Crses - Overall	398,961.00	371,120.00	394,335.00		
Unit Costs per SER/BC/ROM SCH - On campus FS	197.00	179.00	207.00		
Unit Costs per SER/BC/ROM SCH - Off campus FS	0.00	0.00	0.00		
Unit Costs per SER/BC/ROM SCH - Summer	221.00	245.00	258.00		
Unit Costs per SER/BC/ROM SCH - Overall	200.00	185.00	210.00		
Unit Costs for SER/BC/ROM Crses - On campus FS	150,226.00	133,762.00	161,738.00		
Unit Costs for SER/BC/ROM Crses - Off campus FS	0.00	0.00	0.00		
Unit Costs for SER/BC/ROM Crses - Summer	18,695.00	18,481.00	14,704.00		
Unit Costs for SER/BC/ROM Crses - Overall	168,922.00	152,243.00	176,442.00		
Unit Costs per All SCH - On campus FS	157.00	148.00	148.00		
Unit Costs per All SCH - Off campus FS	198.00	191.00	169.00		
Unit Costs per All SCH - Summer	178.00	181.00	174.00		
Unit Costs per All SCH - Overall	163.00	156.00	152.00		
Unit Costs for All Crses - On campus FS	740,902.00	681,628.00	767,786.00		
Unit Costs for All Crses - Off campus FS	112,799.00	135,455.00	128,890.00		
Unit Costs for All Crses - Summer	88,765.00	86,366.00	75,605.00		
Unit Costs for All Crses - Overall	942,466.00	903,449.00	972,280.00		

COSTS DATA GRADUATE

	AY07	AY08	AY09	Year 4	Year 5
Cost Per Major	8,756.00	8,650.00	7,682.00		
Unit Costs per Major SCH - On campus FS	914.00	976.00	751.00		
Unit Costs per Major SCH - Off campus FS	0.00	0.00	0.00		
Unit Costs per Major SCH - Summer	377.00	788.00	123.00		
Unit Costs per Major SCH - Overall	861.00	961.00	674.00		
Unit Costs for Major Crses - On campus FS	100,542.00	105,359.00	150,207.00		
Unit Costs for Major Crses - Off campus FS	0.00	0.00	0.00		
Unit Costs for Major Crses - Summer	4,525.00	7,096.00	3,440.00		
Unit Costs for Major Crses - Overall	105,067.00	112,455.00	153,647.00		
Unit Costs per Univ Studies SCH - On campus FS	0.00	0.00	0.00		
Unit Costs per Univ Studies SCH - Off campus FS	0.00	0.00	0.00		
Unit Costs per Univ Studies SCH - Summer	0.00	0.00	0.00		
Unit Costs per Univ Studies SCH - Overall	0.00	0.00	0.00		
Unit Costs for Univ Studies Crses - On campus FS	0.00	0.00	0.00		
Unit Costs for Univ Studies Crses - Off campus FS	0.00	0.00	0.00		
Unit Costs for Univ Studies Crses - Summer	0.00	0.00	0.00		
Unit Costs for Univ Studies Crses - Overall	0.00	0.00	0.00		
Unit Costs per SER/BC/ROM SCH - On campus FS	0.00	0.00	0.00		
Unit Costs per SER/BC/ROM SCH - Off campus FS	0.00	0.00	0.00		
Unit Costs per SER/BC/ROM SCH - Summer	0.00	0.00	0.00		
Unit Costs per SER/BC/ROM SCH - Overall	0.00	0.00	0.00		
Unit Costs for SER/BC/ROM Crses - On campus FS	0.00	0.00	0.00		
Unit Costs for SER/BC/ROM Crses - Off campus FS	0.00	0.00	0.00		
Unit Costs for SER/BC/ROM Crses - Summer	0.00	0.00	0.00		
Unit Costs for SER/BC/ROM Crses - Overall	0.00	0.00	0.00		
Unit Costs per All SCH - On campus FS	914.00	976.00	751.00		
Unit Costs per All SCH - Off campus FS	0.00	0.00	0.00		
Unit Costs per All SCH - Summer	377.00	788.00	123.00		
Unit Costs per All SCH - Overall	861.00	961.00	674.00		
Unit Costs for All Crses - On campus FS	100,542.00	105,359.00	150,207.00		
Unit Costs for All Crses - Off campus FS	0.00	0.00	0.00		
Unit Costs for All Crses - Summer	4,525.00	7,096.00	3,440.00		
Unit Costs for All Crses - Overall	105,067.00	112,455.00	153,647.00		

COSTS COMPARISONS UNDERGRADUATE

	AY07	AY08	AY09	Year 4	Year 5
College Cost per Major	4,816.00	5,019.00	1,911.00		
University Cost per Major	3,297.00	3,345.00	2,083.00		
Delaware Study Cost/SCH Unit	207.00	225.00	0.00		
College Cost per Major SCHR	282.00	322.00	325.00		
University Cost per Major SCHR	204.00	214.00	231.00		
College Cost per Univ Studies SCHR	142.00	116.00	107.00		
University Cost per Univ Studies SCHR	153.00	108.00	106.00		
College Cost per SER/BC/ROM SCHR	103.00	106.00	109.00		
University Cost per SER/BC/ROM SCHR	121.00	130.00	117.00		
College Cost per all SCHR	142.00	147.00	143.00		
University Cost per all SCHR	153.00	155.00	161.00		

COSTS COMPARISONS GRADUATE

	AY07	AY08	AY09	Year 4	Year 5
College Cost per Major	4,816.00	5,019.00	1,911.00		
University Cost per Major	3,297.00	3,345.00	2,083.00		
Delaware Study Cost/SCH Unit	207.00	225.00	0.00		
College Cost per Major SCHR	282.00	322.00	325.00		
University Cost per Major SCHR	204.00	214.00	231.00		
College Cost per Univ Studies SCHR	142.00	116.00	107.00		
University Cost per Univ Studies SCHR	153.00	108.00	106.00		
College Cost per SER/BC/ROM SCHR	103.00	106.00	109.00		
University Cost per SER/BC/ROM SCHR	121.00	130.00	117.00		
College Cost per all SCHR	142.00	147.00	143.00		
University Cost per all SCHR	153.00	155.00	161.00		

SUMMARY UNDERGRADUATE

	Mean	Trend
Cost Per Major	2,153.33	Improving
Unit Costs per Major SCH - On campus FS	315.33	Irregular
Unit Costs per Major SCH - Off campus FS	0.00	Static
Unit Costs per Major SCH - Summer	268.00	Irregular
Unit Costs per Major SCH - Overall	312.00	Irregular
Unit Costs for Major Crses - On campus FS	360,218.00	Improving
Unit Costs for Major Crses - Off campus FS	0.00	Static
Unit Costs for Major Crses - Summer	25,172.66	Declining

Unit Costs for Major Crses - Overall	385,391.00	Improving
Unit Costs per Univ Studies SCH - On campus FS	75.66	Irregular
Unit Costs per Univ Studies SCH - Off campus FS	186.00	Declining
Unit Costs per Univ Studies SCH - Summer	135.33	Improving
Unit Costs per Univ Studies SCH - Overall	99.66	Declining
Unit Costs for Univ Studies Crses - On campus FS	221,312.00	Irregular
Unit Costs for Univ Studies Crses - Off campus FS	125,714.66	Irregular
Unit Costs for Univ Studies Crses - Summer	41,112.33	Irregular
Unit Costs for Univ Studies Crses - Overall	388,138.66	Irregular
Unit Costs per SER/BC/ROM SCH - On campus FS	194.33	Irregular
Unit Costs per SER/BC/ROM SCH - Off campus FS	0.00	Static
Unit Costs per SER/BC/ROM SCH - Summer	241.33	Improving
Unit Costs per SER/BC/ROM SCH - Overall	198.33	Irregular
Unit Costs for SER/BC/ROM Crses - On campus FS	148,575.33	Irregular
Unit Costs for SER/BC/ROM Crses - Off campus FS	0.00	Static
Unit Costs for SER/BC/ROM Crses - Summer	17,293.33	Declining
Unit Costs for SER/BC/ROM Crses - Overall	165,869.00	Irregular
Unit Costs per All SCH - On campus FS	151.00	Irregular
Unit Costs per All SCH - Off campus FS	186.00	Declining
Unit Costs per All SCH - Summer	177.66	Irregular
Unit Costs per All SCH - Overall	157.00	Declining
Unit Costs for All Crses - On campus FS	730,105.33	Irregular
Unit Costs for All Crses - Off campus FS	125,714.66	Irregular
Unit Costs for All Crses - Summer	83,578.66	Declining
Unit Costs for All Crses - Overall	939,398.33	Irregular

SUMMARY GRADUATE

	Mean	Trend
Cost Per Major	8,362.66	Declining
Unit Costs per Major SCH - On campus FS	880.33	Irregular
Unit Costs per Major SCH - Off campus FS	0.00	Static
Unit Costs per Major SCH - Summer	429.33	Irregular
Unit Costs per Major SCH - Overall	832.00	Irregular
Unit Costs for Major Crses - On campus FS	118,702.66	Improving
Unit Costs for Major Crses - Off campus FS	0.00	Static
Unit Costs for Major Crses - Summer	5,020.33	Irregular
Unit Costs for Major Crses - Overall	123,723.00	Improving
Unit Costs per Univ Studies SCH - On campus FS	0.00	Static
Unit Costs per Univ Studies SCH - Off campus FS	0.00	Static

Unit Costs per Univ Studies SCH - Summer	0.00	Static
Unit Costs per Univ Studies SCH - Overall	0.00	Static
Unit Costs for Univ Studies Crses - On campus FS	0.00	Static
Unit Costs for Univ Studies Crses - Off campus FS	0.00	Static
Unit Costs for Univ Studies Crses - Summer	0.00	Static
Unit Costs for Univ Studies Crses - Overall	0.00	Static
Unit Costs per SER/BC/ROM SCH - On campus FS	0.00	Static
Unit Costs per SER/BC/ROM SCH - Off campus FS	0.00	Static
Unit Costs per SER/BC/ROM SCH - Summer	0.00	Static
Unit Costs per SER/BC/ROM SCH - Overall	0.00	Static
Unit Costs for SER/BC/ROM Crses - On campus FS	0.00	Static
Unit Costs for SER/BC/ROM Crses - Off campus FS	0.00	Static
Unit Costs for SER/BC/ROM Crses - Summer	0.00	Static
Unit Costs for SER/BC/ROM Crses - Overall	0.00	Static
Unit Costs per All SCH - On campus FS	880.33	Irregular
Unit Costs per All SCH - Off campus FS	0.00	Static
Unit Costs per All SCH - Summer	429.33	Irregular
Unit Costs per All SCH - Overall	832.00	Irregular
Unit Costs for All Crses - On campus FS	118,702.66	Improving
Unit Costs for All Crses - Off campus FS	0.00	Static
Unit Costs for All Crses - Summer	5,020.33	Irregular
Unit Costs for All Crses - Overall	123,723.00	Improving

UNDERGRADUATE

Brief Conclusion from Data

The mean cost per chemistry major in the data tables provided is given as \$2153 (improving). Note that this figure is significantly less than both the COSM and University mean cost per major. In addition, our cost per major is less than the Department's cost per major provided in the Phase II data (\$2730). This cost per major is typical for a laboratory science program, and is necessary for maintaining high academic quality. Lab sciences tend to be more expensive than many nonscience programs due to costs associated with (1) purchasing required supplies and chemicals; (2) purchasing, operating, and maintaining equipment and instrumentation; and (3) support personnel required for safe handling and storage of chemicals and preparation of lab experiences. However, these expenses benefit all students enrolled in chemistry lab courses, not just the chemistry majors. Every student in our chemistry lab courses uses the equipment, chemicals, and instruments, and benefits from having support personnel prepare the labs ahead of time. Taking this into account actually lowers the cost per major for the chemistry programs since most of our expenditures (operations, equipment, etc.) are used for courses taken primarily by students in other programs. The mean unit cost for majors courses is \$385,391 between AY07-AY09, for University Studies courses is \$388,139, and for SER/BC/ROM courses is \$165,869

Additional Data or Comments

A few additional points regarding costs should be addressed. (1) The Chemistry Department has functioned for a number of years on a "bare-bones" budget, and has had to use Foundation accounts to help cover expenses during some fiscal years because the University does not adequately support the mission of the Department.

Out of necessity, we have taken steps to control costs. For example, each summer we purchase the bulk of the chemicals and equipment required for the following academic year. This “big” order always goes out on bid rather than purchasing the items required in a “piece-meal” fashion over a period of several months. We have also cut costs by providing no paper to students for the printer in our computer lab, moving materials for distribution to students to course Web sites to reduce copy charges, by reducing risks associated with academic labs (e.g., removing mercury thermometers from lab drawers), by switching to less breakable lab supplies where possible, and by practicing “green” chemistry in academic labs to cut back on chemical waste generation. (2) There is an inherent cost to maintain and operate certain instruments regardless of whether or not they are used on a regular basis. These instruments are used for our academic labs and for research projects, even when there are no classes meeting. For example, the Department’s \$180,000 superconducting nuclear magnetic resonance spectrometer must be kept on at all times and requires that liquid nitrogen and helium be added at regular intervals. Turning the instrument off or failing to add the liquid nitrogen and helium will damage the instrument, requiring expensive repairs. Furthermore, faculty perform most of the maintenance of our chemical instrumentation themselves. Only in rare instances are technicians brought in to repair or maintain instruments. In so doing, the Department helps to contain the costs associated with our programs. (3) The Department’s equipment budget is pitifully and unrealistically small considering the costs associated with purchasing scientific equipment and instruments. Our equipment budget only allows for less expensive (<\$2000) pieces of equipment and instruments, i.e. pH meters, Spectronic 20’s, etc., to be purchased each year. More expensive instruments and equipment required to maintain high quality education in Chemistry are beyond the financial capabilities of the Department because of our inadequate equipment budget. For the most part, “big ticket” items must be acquired through grant proposals. However, the administration’s reluctance since 2002 to provide the matching funds required by many science-related granting agencies makes this process even more difficult. One faculty member left the Department in August 2009 in part due to the general lack of support by the administration in this regard.

Plan to Address

In order to reduce costs, the Department proposes the following plan of action: (1) To reduce the costs associated with our online chemistry courses, CH180 Chemistry in Our World and CH181 Basic Principles of Chemistry, we propose to use commercial lab kits. Because commercially-produced kits were not available in AY00-AY02 when the courses were first taught online, we currently require students to borrow lab kits that we produce. Local students pick up the kits, and we mail kits to students who live further than 30 miles away. Use of commercial lab kits would reduce our operating costs in the following ways: (a) The lab kits we provide contain approximately \$150-160 of University-owned equipment and chemicals. Each semester, 2-6 lab kits are not returned, and, because we have no practical way to get these kits back, we lose \$300 - \$900 as a result. Since students would buy the commercial kits, we would eliminate this unnecessary cost to the Department and University. (b) The use of online lab kits would make it easier to increase the caps for our online courses from 25 to 30 or even 35, or to offer more online sections in general. Currently, the time involved in preparing, processing, and mailing the kits makes it difficult to process more than 25 kits per online course in a semester. (c) Stockroom workers spend 115-120 hours each semester in which the online courses are taught preparing, processing and mailing the lab kits, i.e. 6 weeks per AY are spent dealing only with online lab kits. This requires substantial costs in terms of student and staff labor. (2) To help compensate for the loss of our current faculty line in August 2009, we propose to teach either CH180 Chemistry in Our World or CH181 Basic Principles of Chemistry in alternating semesters using the Aleks system, the Web-based, artificially intelligent assessment and learning system, for lecture. (The Department of Mathematics is currently using Aleks to teach MA101/102.) Although students would still be required to attend lab, this would allow the Department to continue to serve large numbers of students in these courses without cutting sections or courses due to the loss of our faculty position, because GAs could be used to man the computer labs and students would be able to access Aleks from home. However, this would require a major commitment on the part of the administration to obtain the software license and provide the necessary computer facilities in which to run the course.

Brief Follow Up on Outcomes of Plans to Address from Last Review

To reduce costs, the Department has implemented several measures: (1) Operating cost reductions: (a) Each summer we purchase the bulk of the chemicals and equipment required for the following academic year. This “big” order always goes out on bid rather than purchasing required items in a “piece-meal” fashion. Buying in bulk provides significant savings during the year, but requires diligence and discipline on our part, as the big order only works with Department-wide planning and record keeping. (b) We no longer provide paper to students for the printer in our computer lab. Students were using 3-4 reams of paper a day in our computer lab prior to implementing this policy. (c) We have moved materials for distribution to students to course Web sites to reduce copy charges. (d) We have reduced risks associated with academic labs by switching to less breakable lab supplies where possible, and by practicing “green” chemistry in academic labs to cut back on waste generation. (2) In order to increase enrollments in our upper division courses, reduce overall costs for our majors courses, and attract new students to the university,

we have developed 8 new options for our BS/BA CH program. Each option requires that students take at least one additional upper division course offered by the department compared with the original degree requirements that were in place prior to these new options. (3) The newly renovated general chemistry labs were designed to Department specifications so that students share equipment in common lab drawers, rather than each student having their own lab drawer. This has reduced the amount of equipment and glassware we are required to purchase at the start of each academic year, and has reduced the amount of lab breakage. In addition, fewer hours are required by stockroom personnel to check lab drawers in the new labs at the end of each semester. (4) A faculty line was cut from the Department by the administration in August 2009. Obviously, this will save on personnel costs for the University, even though we deeply disagree with the decision because it will hinder our ability to maintain service to students and the quality of our programs. (5) We have increased our recruiting efforts in order to increase the number of majors and increase total enrollments in our courses. These efforts have been described previously.

Program Review Final University Committee Chair Comments

GRADUATE

Brief Conclusion from Data

Unit costs for all courses increased dramatically in AY09. This increase is inconsistent with our experience in the department.

¶ We believe an honest evaluation of the chemistry graduate program should focus on the program's real costs. Most courses used by the MNS are cross-listed with courses in our undergraduate program (see I.Brief Conclusion from Data.) The ONLY course that is required exclusively for the graduate program and is allocated faculty contact hours is CH675. This means that with one additional course we are offering a graduate program consisting of two quite distinct options: every other course used by our MNS program is already being offered in support of other programs.

¶ The other real cost of this program is the graduate assistantships. The chemistry graduate program currently has six GAs. At one time, these were research assistantships, but they have been largely converted to teaching assistantships, where the GA is instructor of record for a freshman chemistry laboratory section in addition to helping faculty in the lab and with grading. Some of the GA work is also applied in the chemistry stockroom in preparation for freshman labs. The GA stipend is only \$7000/year, which is already less than one half the stipend offered at other universities (\$18,000 - \$21,000). With six GAs this amounts to an annual cost of \$42000, which is very close to the cost of one instructor. The GAs typically teach one lab course of 2 contact hours, which means the GAs cover almost all of the contact time of a full time instructor (15 contact hours) in addition to all the other work they do for full time faculty. Exchanging these assistantships for a full time instructor would result in little or no savings to the University. However, the loss of GA students to the program would certainly reduce the likelihood that cross-listed courses serving the MNS program would attain full enrollment. The canceling of these courses due to low undergraduate enrollment would reduce university income overall. Moreover, our history of difficulty finding local adjuncts and instructors qualified to teach undergraduate chemistry courses suggests that replacing the GA's with an instructor would lead to higher faculty recruiting costs and lower consistency in our staffing levels. In any event, cost savings from eliminating the GA's would be partially offset by increased student labor costs, as would have to hire additional undergraduate students to support the freshman chemistry lab instruction. Undergraduate students have less experience and chemical knowledge and often can't help in upper level lab courses.¶

Another item required of the graduate program is laboratory space and instrumentation. All of our major instruments are also needed in support of our undergraduate program. Eliminating the graduate program would not significantly diminish the equipment needs of this department. Additionally the graduate program requires faculty time for supervising thesis research. Other than professional development, our faculty receive no compensation whatever for this work. Eliminating the graduate program would not result in significant savings in faculty costs.

Additional Data or Comments

Plan to Address

Brief Follow Up on Outcomes of Plans to Address from Last Review

Program Review Final University Committee Chair Comments

IV. CONTRIBUTION TO UNIVERSITY STUDIES AND COURSES SERVING OTHER PROGRAMS

UNIT SCH FROM UNIVERSITY STUDIES AND COURSES SERVING OTHER PROGRAMS					
	AY07	AY08	AY09	Year 4	Year 5
University Studies: On Campus FS	2,862	2,770	3,158		
University Studies: Off Campus FS	570	709	764		
University Studies: Summer	303	317	292		
University Studies: Total	3,735	3,796	4,214		
Services: On Campus FS	87	63	78		
Services: Off Campus FS	0	0	0		
Services: Summer	0	0	0		
Services: Total	87	63	78		
ROM: On Campus FS	1,349	1,369	1,409		
ROM: Off Campus FS	0	0	0		
ROM: Summer	169	151	114		
ROM: Total	1,518	1,520	1,523		
Business Core: On Campus FS	0	0	0		
Business Core: Off Campus FS	0	0	0		
Business Core: Summer	0	0	0		
Business Core: Total	0	0	0		

UNIT SCH SUMMARY		
Measure	Mean	Trend
University Studies: On Campus FS	2,930.0	Irregular
University Studies: Off Campus FS	681.0	Improving
University Studies: Summer	304.0	Irregular
University Studies: Total	3,915.0	Improving
Services: On Campus FS	76.0	Irregular
Services: Off Campus FS	0.0	Static
Services: Summer	0.0	Static
Services: Total	76.0	Irregular
ROM: On Campus FS	1,375.7	Improving
ROM: Off Campus FS	0.0	Static
ROM: Summer	144.7	Declining
ROM: Total	1,520.3	Improving
Business Core: On Campus FS	0.0	Static
Business Core: Off Campus FS	0.0	Static

Business Core: Summer	0.0	Static
Business Core: Total	0.0	Static

UNDERGRADUATE

Brief Conclusion from Data

The physical sciences are an essential part of a liberal education designed to make students more well-rounded individuals capable of understanding and interacting with the world around them. Therefore, the Department is committed to supporting the University Studies Program, and offers three Physical Systems courses (CH180, CH181, and CH185), one UI100 first year seminar (taught by the COSM dean), a 300-level university studies course (UI331), and a 400-level senior seminar (UI443). Students majoring in chemistry and a large number of students in other academic majors, take our University Studies offerings. In addition, many of our courses are required in other academic programs. For example, our physical systems offerings are specifically required of students majoring in Agriculture, Biology, Communications Disorders, Computer Science, Science Education, Environmental Science, Health Management, Human Environmental Studies, Industrial Technology, Nursing, Physics and Engineering Physics, and pre-professional programs. In addition, many of the same courses taken by chemistry majors are also taken by students from other departments. (Table 2 in Section II) The data for AY07-AY09 shows that our unit average SCH from University Studies courses is 3915 (improving), that from Services Courses is 76 (irregular), and that from ROM courses is 1520 (improving). In addition, the SCH from University Studies courses has been increasing each of the last three years. Based on the data and the demand for our courses, we have no major concerns with regard to our contribution to University Studies and courses serving other programs. Our record makes it clear that we take University Studies seriously, and seek to actively participate in the University Studies program.

Additional Data or Comments

Plan to Address

To continue our long term support of the University Studies program and serve other programs, the Department proposes the following plan of action: (1) We will continue to offer our three Physical Systems courses (CH180, CH181, and CH185), UI 100 first year seminar, 300 level university studies course (UI331), and 400 level senior seminar (UI443). (2) We are revising our chemistry curriculum to meet new ACS guidelines for approved programs. This will require some upper division courses to be revised and some new upper division courses to be developed. Because of the increasingly interdisciplinary nature of our degree options, we will explore development of new UI3XX/UI4XX courses during this process. (3) The Department has received several requests from the Honors program to offer an honors section of CH185. Due to lack of adequate staffing we have never been able to do this for the entire course. However, we will explore development of an honors section of CH085 to support the Honors program. Since this section would fit in the existing CH185 course framework, it would require no increase in contact hour load for the department. (4) Because Forensic Science is interdisciplinary by nature, we will explore the development of a UI3XX forensic science course with broad appeal to support the University Studies program.

Brief Follow Up on Outcomes of Plans to Address from Last Review

The last program review did not specifically address this area, so no specific plans were implemented in this regard as a result of Phase II. However, the Department has supported the University Studies program from its inception by offering three physical systems courses, one UI100 first year seminar, one UI3XX course, and one UI4XX course.

Program Review Final University Committee Chair Comments

V. EXTERNAL DEMAND

EXTERNAL DEMAND DATA UNDERGRADUATE										
	AY07		AY08		AY09		Year 4		Year 5	
ACT DATA										
	N	ACT	N	ACT	N	ACT	N	ACT	N	ACT
No. Identifying Planned Major										
UNIT Totals			1040	23.75						
BIOCHEMISTRY&BIOPHYSICS [833]			101	26.30						
CHEMISTRY [836]			173	25.10						
MEDICAL LAB/TECHNOLOGY [749]			32	21.00						
PHARMACY [758]			348	23.10						
SCIENCES(BIO&PHYS) GEN [830]			386	23.30						
No. of ACT Scores to Southeast										
UNIT Totals			97	22.38						
BIOCHEMISTRY&BIOPHYSICS [833]			5	22.00						
CHEMISTRY [836]			19	22.50						
MEDICAL LAB/TECHNOLOGY [749]			3	20.30						
PHARMACY [758]			27	23.20						
SCIENCES(BIO&PHYS) GEN [830]			43	22.00						
Yield: No. Enrolled at Southeast										
UNIT Totals			37	23.40						
BIOCHEMISTRY&BIOPHYSICS [833]			1	26.00						
CHEMISTRY [836]			6	27.00						
MEDICAL LAB/TECHNOLOGY [749]			1	20.00						
PHARMACY [758]			11	22.00						
SCIENCES(BIO&PHYS) GEN [830]			18	23.10						

SUMMARY UNDERGRADUATE		
	Mean	Trend
Yield: No. Enrolled at Southeast		
UNIT Totals	23.4	
BIOCHEMISTRY&BIOPHYSICS [833]	26.0	
CHEMISTRY [836]	27.0	
MEDICAL LAB/TECHNOLOGY [749]	20.0	
PHARMACY [758]	22.0	
SCIENCES(BIO&PHYS) GEN [830]	23.1	

UNDERGRADUATE

Brief Conclusion from Data

Many students decide on an academic major based on current employment trends, and on the success of recent graduates from that major in obtaining employment in the field. According to the U.S. Department of Labor, the number of chemistry positions available in the U.S. is expected to grow 9% through 2016, and does not include position openings that result from retirement and other reasons. Based on the approximately 93,000 such jobs held in 2006, the number of these positions available will increase by roughly 8000-9000. Likewise, according to Missouri Economic Research and Information Center, the number of chemistry positions in the State is projected to increase from 1990 in 2006 to 2110 in 2016, not including those created annually by growth and persons leaving the workforce. Part of this increased demand for chemists in the workforce is driven by the interfacing of chemistry with other emerging scientific fields, such as biotechnology, materials science, forensic science, and environmental science. (According to the ACS' 2006 Employment Outlook Report, 85% of chemists are employed by organizations other than chemical companies.) As a result, external demand for the chemistry program would be expected to increase through 2016, thus enhancing opportunities for those enrolling in and graduating from our programs.

The external demand for any program of study is difficult to quantify, particularly by counting incoming students. Certainly the data provided, i.e. the number of Missouri high school students who indicated on the ACT that they planned on chemistry as a major, cannot be taken as a true measure of external demand. This is particularly true for our programs. Being interdisciplinary (as in Forensic Chemistry), students are likely to be unaware of the attractive opportunities when first considering a major. The ACT is not sensitive to our interdisciplinary options. In addition, many high school students simply have not decided what their majors will be at the time of the ACT, and many of these change their majors within the first year of college. Keeping this in mind, the data indicates that 1040 students taking the ACT in MO expressed an interest in chemistry, pharmacy, and medical technology as an academic major. Of these, 97 sent their scores to the University. Of the latter, 37 (38%) are now enrolled at Southeast. Compared to the Phase II data, in which 4 students out of 17 (24%) who sent their ACT scores to Southeast actually enrolled, a greater percentage of those reporting their ACT scores are now enrolled in our programs. The physical sciences at many institutions of higher education typically have lower enrollments than many other academic disciplines because of their perceived difficulty compared to other disciplines, and also because of the poor science and math backgrounds of many high school students. Many students simply do not major in the physical sciences because of the rigor of the chemistry, physics, and mathematics courses required. Although this tends to hold enrollments in the physical sciences down somewhat, it does boost the overall quality of the students in those programs because generally only the best and brightest students consider these fields as career options. Diluting the rigor of our programs to increase enrollments is a very unattractive option, and would only serve to decrease the academic standing of the Department and University.

Additional Data or Comments

Plan to Address

As stated previously, external demand for any academic program is certainly difficult to quantify, particularly by counting incoming students or students taking the ACT in MO who expressed an interest in a particular academic major. And academic departments really do not have much control on the societal and economic issues which control the external demand for their programs. However, we will respond to a rapidly changing societal and economic environment through the following action plan: In order to keep external demand for our programs as high as possible, we propose the following plan of action: (1) We will increase the quality and reach of our recruitment efforts, as described previously, to develop and maintain interest in our programs and department. (2) We are currently revising our curriculum according to new ACS guidelines for approved programs, as described previously, in order to keep our program relevant to the 21st Century. We believe these revisions will help with recruiting and retention because they will provide students with a cutting edge, 21st Century curriculum in the chemical sciences that is current with the latest developments in content and pedagogy according to the world's largest, professional scientific organization, and will also meet the increasingly interdisciplinary nature of science. Staying current with the latest trends and developments in chemical education, while maintaining the high standards and respect for rigor that has long characterized our Department, will ensure that our students are prepared to meet the ever-changing challenges of the workplace, and should increase interests in our programs. Students may be drawn to "cheap"

programs, featuring easy terms (low standards) for a time, but it is the high quality, rigorous program that students and employers respect, and it is the rigorous program that endures.

Brief Follow Up on Outcomes of Plans to Address from Last Review

In order to increase the external demand for our programs, we implemented the following actions as a result of the last program review: (1) We developed 8 new options under the BS and BA in CH programs so that students can better match their educations to their professional goals: ACS Certified Chemistry (BS), Biochemistry (BS), Business (BS), Chemistry (BS/BA), Forensic Chemistry (BS), Forensic Science (BA), and DNA Analysis (BA). (2) We increased recruitment efforts, as described previously. (3) With one exception, we reduced the hours required for completion of our degree programs to 120. We believe that these and other efforts are the reasons that our programs have grown dramatically since 2004.

Program Review Final University Committee Chair Comments

VI. QUALITY OF PROGRAM INPUTS

UNDERGRADUATE					
Measure	AY07	AY08	AY09	Year 4	Year 5
ACT	23.26	24.20	24.48		
Selected Merit Scholarships	17.00	13.00	13.00		
High School GPA	3.58	3.66	3.58		
CBASE Composite	284.00	0.00	370.00		
CBASE English	285.00	0.00	332.00		
CBASE Math	267.00	0.00	414.00		
CBASE Science	324.00	0.00	413.00		
CBASE Social Studies	260.00	0.00	320.00		
CBASE Writing	314.00	0.00	344.00		

GRADUATE					
Measure	AY07	AY08	AY09	Year 4	Year 5
GMAT Total	0.00	0.00	0.00		
GMAT Total Converted	0.00	0.00	0.00		

COMPARISONS UNDERGRADUATE															
	AY07			AY08			AY09			Year 4			Year 5		
	COLL	UNIV	NAT	COLL	UNIV	NAT	COLL	UNIV	NAT	COLL	UNIV	NAT	COLL	UNIV	NAT
ACT	23.53	22.24	21.10	24.08	22.38	21.20	24.49	22.59	21.10						
High School GPA	3.47	3.31		3.52	3.29		3.68	3.40							
CBASE Composite	311.33	283.42		0.00	0.00		348.00	304.82							
CBASE English	283.08	287.05		0.00	0.00		316.30	298.45							
CBASE Math	349.50	309.80		0.00	0.00		389.70	329.57							
CBASE Science	333.08	298.96		0.00	0.00		358.40	305.89							
CBASE Social Studies	282.67	268.80		0.00	0.00		326.70	292.36							
CBASE Writing	302.00	295.93		0.00	0.00		329.90	303.43							

COMPARISONS GRADUATE															
	AY07			AY08			AY09			Year 4			Year 5		
	COLL	UNIV	NAT	COLL	UNIV	NAT	COLL	UNIV	NAT	COLL	UNIV	NAT	COLL	UNIV	NAT
GMAT Total	0.00	0.00		0.00	0.00		0.00	0.00							
GMAT Total Converted	0.00	0.00		0.00	0.00		0.00	0.00							

SUMMARY UNDERGRADUATE

Measure	Mean	Trend
ACT	23.90	Improving
High School GPA	3.56	Irregular
CBASE Composite	327.00	Irregular

SUMMARY GRADUATE

Measure	Mean	Trend
GMAT Total	0.00	Static
GMAT Total Converted	0.00	Static

UNDERGRADUATE

Brief Conclusion from Data

We measure the quality of program inputs in several ways. The chemistry programs attract high quality students to Southeast, and in so doing enhance the overall academic status of Southeast by helping to reduce “bright flight” of top students from our service region and by attracting top students from outside our service region. Our chemistry students have outperformed their peers at the University on the ACT, CBASE, and WP003. Chemistry students have been above the Southeast average for each measure each year during AY07-AY09. The CBASE Math and CBASE Science scores for our students are significantly above the University means. Furthermore, the number of chemistry students with merit scholarships is one of the highest at the University, with only 5 programs having more during AY07-AY08, the latest dates for which data are available. Our faculty members are active in both teaching and scholarship/professional development, and engage students in UG research projects that provide them with valuable real-world experiences. Over 90% of our chemistry majors participate with faculty on UG research projects. Our faculty published over 15 peer-reviewed articles and 8 non-refereed articles, made over 30 presentations and invited lectures at professional meetings, presented over 30 workshops, and reviewed over 20 papers, grant proposals, and books during the past three years. Since 2004, students have given over 35 presentations on their research projects at professional meetings (American Chemical Society National and Regional Meetings, SEMO Student Research Conference, etc.) and have coauthored more than 8 publications in professional chemistry journals with faculty. Thus, the experiential learning opportunities that our faculty provides to students are of high quality, meaningful, and frequently recognized outside of campus.

The chemistry curriculum continues to meet the guidelines established by the ACS that define high quality UG chemistry programs. These guidelines ensure that the chemistry curriculum offered is up-to-date and provides students with the chemistry education and training required to compete in a global society. We have met these rigorous standards every five years since 1964. The CHE program meets the Missouri Department of Secondary and Elementary Education program requirements for teacher certification. Thus, graduates from the CHE program are qualified to teach chemistry in high schools, pursue advanced chemistry degrees, work as chemists in industry, or pursue many careers outside the physical sciences, for which critical thinking and problem-solving are essential. All chemistry lecture courses offered in the curriculum between AY07-AY09, with the exception of a few section of CH180 Chemistry in Our World and CH181 Basic Principles of Chemistry, have been taught by full-time faculty, which is important for the program if faculty members are to maintain the “continuity, stability, and ongoing rigor required of full and active participation in academic planning, programming, advising, scholarship, and service necessary to sustain the academic program preeminence.” (Robert C. Dickinson, *Prioritizing Academic Programs and Services*, 1999, p. 63.) Reliance on adjuncts to teach a large proportion of the courses offered by any department only weakens the quality and integrity of the programs offered by that department.

Additional Data or Comments

Plan to Address

In order to attract even better students to our programs, we propose the following: (1) We will specifically target students from MO who have very high ACT scores and who indicate an interest in chemistry and science by sending them recruiting letters describing our chemistry programs and career opportunities. This will also be done for students from MO with high ACT scores who indicate an interest in MT and life sciences. This will involve obtaining lists of students in MO who have had their ACT scores sent to Southeast from admissions. We will also specifically target students with high ACT scores who visit campus during Show Me Days. (2) We will provide students with high ACT scores and excellent grades opportunities to work for the Department as lab assistants, graders, stockroom workers, etc. This will be included in any recruiting mailing sent out by the Department. (3) We will send letters describing our programs and the ideal high school preparation for our programs to regional high school guidance counselors and chemistry teachers. (4) We will consider recruiting visits by faculty to regional high schools to discuss our programs directly with guidance counselors or students. However, severe limitations in resources (manpower, time, funds, etc.) will restrict what we can do in this regard. (5) We will develop a packet of information about our programs that faculty and students can take with them to various meetings (professional, recruiting, chemical magical shows, etc.) for distribution. (6) We will continue hosting high school science class visits to our Department for demonstrations of chemical instrumentation and techniques and for tours of our renovated facilities. Recruiting materials will be distributed to all students who visit us. Since science classes typically have academically excellent students enrolled, these students will be introduced first-hand to our advanced instrumentation, active and externally-validated UG research program, and opportunities for extra-curricular career development. (7) We will consider reviving our Chemistry Bowl competition.

Brief Follow Up on Outcomes of Plans to Address from Last Review

Because there were no glaring problems in the quality of program inputs during the last program review, and also because the phase I program review did not specifically ask for plans in this area to be addressed, no plans were developed and implemented specifically in this area.

Program Review Final University Committee Chair Comments

GRADUATE

Brief Conclusion from Data

Our program has always attracted many female students. This is contrary to findings by the American Chemical Society that women are largely under represented in chemistry graduate programs. We believe that part of this is due to our policy of allowing students with deficiencies in certain areas to take refresher courses, thus students entering with a background in other areas can achieve success and become a competent chemist. Many of our past students have started in backgrounds other than chemistry, but gotten jobs as chemists after graduating from our program.

Additionally, we provide a service to graduate students from other departments, such as biology. For example several Biology graduate students have taken CH607 and CH575 as electives for their program. These other students increase provide different points of view in our courses and enhance the experience of our own chemistry students.

Additional Data or Comments

Plan to Address

To improve the quality of students entering our program we are planning on contacting the schools in India that are currently sending students to Southeast. We plan to make contact with professors who write letters of recommendation for students applying to our program. We are hoping to better understand the chemistry background of these students and to promote our program so that these professors will encourage their best students to apply at Southeast. Additionally, M. Ali and B. Olesen have received a grant to send some of our undergraduate students to an institution in India to conduct chemical research. This

collaboration between Southeast and Indian schools might help recruit students into our graduate program. During his travels to India, M. Ali will also visit other universities to contact professors and recruit students.  

We are also proposing changing the structure of our program to increase the skills of deficient students after arriving at Southeast, but before entering into a thesis project. This will focus on theory as well as hands on laboratory experience that is lacking in many international students. See I.Plan to Address. for our plans.

Brief Follow Up on Outcomes of Plans to Address from Last Review

On plan suggested in the last program review was to add a bachelors forensic degree to our undergraduate program. We thought this would allow us to recruit students in our undergraduate program to continue on into our graduate program. This plan was implemented and our first students are starting to graduate. We have recruited one of our undergraduate students into our graduate program this year.

Program Review Final University Committee Chair Comments

VII. QUALITY OF PROGRAM OUTPUTS

WP003 UNDERGRADUATE										
	AY07		AY08		AY09		Year 4		Year 5	
	N	%	N	%	N	%	N	%	N	%
>= 9.5 (superior)	2	8.33	0	0.00	3	15.00				
8.0 - 9.0 (proficiency)	13	54.16	11	91.66	13	65.00				
7.0 - 7.5 (marginal pass)	9	37.50	1	8.33	4	20.00				
< 7.0 (fail)	0	0.00	0	0.00	0	0.00				
Unit First Time Pass Rate	24	100.00	12	100.00	19	95.00				
Unit Mean	24	8.04	12	8.16	20	8.37				

WP003 COMPARISONS UNDERGRADUATE					
	AY07	AY08	AY09	Year 4	Year 5
College Mean	8.26	8.40	8.67		
College Pass Rate	100.00	99.31	98.13		
University Mean	8.25	8.34	8.35		
University Pass Rate	97.99	98.74	98.23		

DISCIPLINE SPECIFIC UNDERGRADUATE						
		AY07	AY08	AY09	Year 4	Year 5
Praxis Tests (Majors Only)						
PX08: PRX Chemstry Ck 245-Total	Southeast	155.00	0.00	154.00		
	Comparison					
Praxis Tests (All Majors)						
PX08: PRX Chemstry Ck 245-Total	Southeast	161.25	148.00	147.00		
	Comparison					
MFAT (Majors Only)						
MF11: MFAT Chemistry-Tot	Southeast	127.00	148.43	142.00		
	Comparison					
MFAT (All Majors)						

MF11: MFAT Chemistry-Tot	Southeast	127.00	147.20	141.72		
	Comparison					

WP003 SUMMARY UNDERGRADUATE		
Method	Mean	Trend
WP003 Mean	8.20	Improving

DISCIPLINE SPECIFIC SUMMARY UNDERGRADUATE		
Method	Mean	Trend
Praxis Tests (Majors Only)		
PX08: PRX Chemistry Ck 245-Total	154.50	Irregular
Praxis Tests (All Majors)		
PX08: PRX Chemistry Ck 245-Total	152.90	Declining
MFAT (Majors Only)		
MF11: MFAT Chemistry-Tot	143.25	Irregular
MFAT (All Majors)		
MF11: MFAT Chemistry-Tot	143.10	Irregular

UNDERGRADUATE

Brief Conclusion from Data

The data show that our students do well on the WP003, with an AY07-AY09 Unit First Time Pass Rate of 98%. Of the students who took this exam, 42/56 scored at or above the core proficiency level with the mean being comparable to that of COSM and the University. Based on these results, there are no perceived weaknesses in our students' writing proficiency. We attribute our majors' performance on the WP003 to 1) the University studies program, and 2) strong lab report writing instruction and assignments in our lab courses. The Praxis test in Chemistry, given to BS in CHE majors prior to graduation, tests knowledge in the various areas needed to teach chemistry at the secondary level, i.e. fundamental principles of analytical, biochemistry, inorganic, organic, and physical chemistry. Between AY07-AY09, our departmental average is 154.5 (irregular) for the few students who took it, above the value (152) required for passing. Since 1999, 14/15 CHE majors who have taken this exam have passed. Thus, our CHE majors are well-prepared to teach chemistry at the secondary level. One area of concern is the MFAT scores for the Department. The MFAT in Chemistry has been administered to graduating BS and BA in CH majors for over twenty years as a means of assessing our chemistry program. Prior to 2004, the MFAT was voluntary, but is now a graduation requirement as part of CH498, Professional Presentation in Chemistry. Overall, the results for AY06-AY07 are disappointing, with a mean score of 143.25 (irregular), well below the national median score of 149, and institutional scores ranging from 127-148 during this period of time. Individually, we have had some students who performed very well on this exam, scoring at or above the 80th percentile between AY07-AY09, with several scoring at the 95th and 99th percentiles. We believe that the problem is due in part to the fact that most students do not take this comprehensive test seriously, and do not prepare for it prior to taking it. And there is some question as to the suitability of the MFAT for BA in CH students since these programs have fewer chemistry and math requirements than the BS in CH programs. CH498 merely requires that students take the test; performance on the test is not reflected in the CH498 grade. Some students have expressed resentment to us at having to take it at all. We know that our students are capable of doing much better overall on the MFAT.

Additional Data or Comments

Additional quality measures include: 1) The success of our MT graduates on the national registry exam required to become a licensed MT. Since 1993, 46 of 49 students passed the registry exam on their first attempt. As of this time, two of the students that failed have no plans to retake the exam and the outcome of the third is unknown. In addition, since 1993 our MT majors have been highly successful being admitted into clinical programs, with 98% of those who applied being accepted. Thus, hospitals offering clinical programs know that our students are well prepared for their rigorous programs. 2) ACS standardized exams are voluntarily used by some faculty. The ACS Analytical Chemistry exam (form 1994) has been administered regularly as the final exam in CH271 Quantitative Analysis since 2002. Since that time 141/239 (59%) students who took the exam scored above the 50th percentile, including 60/105 students who took it between AY07-AY09. These results are good considering that the exam includes material not typically covered in CH271. CH271 only has two lectures per week, so the amount of material which can be covered is limited. 3) All CH program graduates between AY07-AY09 had at least one credit hour of transcribed experiential learning while at Southeast. BA/BS CH students are required to do either UG research or an internship. MT students complete a clinical program, and BS CHE majors do student teaching. One of the best ways to judge the overall quality of program outputs for any academic program is by considering job placement of recent graduates, and admission of recent graduates into professional or graduate schools. Since job placement and admission into graduate or professional schools is competitive, the success of our students in these areas provides a valuable measure of overall program quality. Our graduates continue to do well in the pursuit of their professional goals, especially related to acceptance into graduate and professional programs. Since 2000, 40% of our BA/BS CH graduates have been accepted into graduate or professional programs of study upon graduation, including some very prestigious institutions, e.g., University of Illinois, Washington University, and Johns Hopkins University. To our knowledge, all of these individuals have successfully completed their respective programs of study. Although we have been unable to track all of our CH graduates, 70-80% of those we are able to track find full-time jobs related to their major, including employment at companies such as Eli Lilly, Proctor and Gamble, and Abbot Laboratories. Our MT graduates are remarkably successful in finding employment in their chosen field. Since 1993, 100% of program graduates have been employed in the field immediately upon graduation. Likewise, 100% of our CHE graduates since 2002 have found employment either as chemistry teachers or as chemists. Despite the disappointing results of our students on the MFAT, we believe based on other measures that our programs successfully prepare students for their chosen careers. Our chemistry students do well finding employment as chemists, and those who do not usually are not willing to relocate to other regions or choose to do something different. Likewise, our CH graduates are successful at getting accepted into post-graduate programs of study. Our MT and CHE graduates have done superbly well in finding professional employment, with a 100% placement rate in their field.

Plan to Address

In order to address the performance of many of our BS/BA CH students on the MFAT, we propose the following in addition to the MFAT reviews mentioned in the “Brief Followup” section below: (1) The chemistry curriculum has met the guidelines established by the American Chemical Society that define high quality UG CH programs since 1964. In 2008, the ACS approved new guidelines for UG programs that reflect changes in the chemistry profession and chemistry education. As noted previously, these new guidelines are designed to “promote the development of modern innovative curricula by chemistry departments” and “encourage innovations in pedagogy that promote student learning and success.” In response to these new guidelines, we are currently revising our chemistry curriculum to meet these new standards, and hope to have the process completed by the end of the spring 2010 semester. These revisions will keep our chemistry curriculum up-to-date and relevant to the 21st century, and should improve student learning and retention of chemical knowledge and skills needed to compete in a global society. In addition, the curriculum redesign is at least in part a response to advancements in chemical education, learning theory, and pedagogy in recent years. Our participation in the reaccreditation is, therefore, designed to improve teaching and learning in our programs. (2) We will consider changing CH498 from P/F to a course in which students earn a letter grade, and make the MFAT a larger proportion of the course grade in an attempt to get our students to take this test more seriously. We believe that students will take the MFAT more seriously if it translates into a letter grade that appears on their transcripts. (3) We will also consider making the MFAT practice exam and/or the GRE practice exam part of the class requirements in an attempt to get students to take the test more seriously. (4) We will consider using ACS standardized exams in certain critical courses in order to assess the curriculum.

Brief Follow Up on Outcomes of Plans to Address from Last Review

The major weakness in the assessment data over the last 4-5 years has been the MFAT results for our CH students, and is an area of concern for the Department. In an attempt to encourage students to take the exam more seriously, the Department made the MFAT a requirement of CH498 Professional Presentation in Chemistry.

This P/F course, which was added to the Chemistry curriculum in Fall 2001, is now required of all Chemistry majors. Student MFAT performance is not linked to the successful completion of CH498, only actually taking the exam. Thus, a student can do poorly on the MFAT and still pass the course if he/she does well enough in the rest of the course. In an effort to improve overall MFAT results, MFAT review was included as part of the course for the first time during the fall 2006 semester, and students are provided with available copies of the GRE chemistry subject exam and the practice MFAT. However, most students in CH498 do not work through the practice exams prior to taking the MFAT, and only about 5-6 MFAT review sessions are possible before the MFAT is scheduled to be administered each semester.

Program Review Final University Committee Chair Comments

GRADUATE

Brief Conclusion from Data

Many of our students have obtained jobs in chemistry or forensic science after graduation. We often hear from employers that our students are well prepared for a job in a crime lab after graduation. In the words of Pamela M. Johnson, Director of the Southeast Missouri Regional Crime Lab, "Of the graduates that have taken jobs in crime laboratories I have heard nothing but praise and have had agencies ask if we will be having any graduates."

Additional Data or Comments

Plan to Address

Brief Follow Up on Outcomes of Plans to Address from Last Review

One plan was to add a forensic chemistry course to improve the value of our student's degree. This course has been added, CH420/CH620. Another plan suggested in the last program review was to increase partnerships. The Senate has passed a federal earmark to build a forensic science teaching lab that will enhance our partnerships with federal agencies (Summer 09).

Program Review Final University Committee Chair Comments

VIII. CURRENCY OF CURRICULUM

UNDERGRADUATE

What steps have you taken to ensure that your programs and courses are up-to-date and effective?

(1) In 2008, the ACS issued new guidelines for UG programs that reflect changes in the chemistry profession and chemistry education. In response to these new guidelines, we are now revising our curriculum to meet the new standards. (2) The CHE program meets the MO Department of Secondary and Elementary Education program requirements for teacher certification. Because the BS in CHE has the same chemistry requirements as the BA in CH, CHE graduates are qualified to teach HS chemistry, pursue advanced degrees, or work as chemists in industry. (3) The MT program is based on guidelines and standards established by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS). (4) We have developed 8 options for our UG chemistry programs, as noted in previous sections, which allow students to more closely tailor their chemistry programs according to their educational and career goals. These options responded to current strong trends in chemistry and science, as well as demand from prospective students, and most are interdisciplinary in nature. (5) The following measures are used to gauge the effectiveness of our programs/courses. (a) Results of the CCTST and WP003, the exit exam and MFAT in chemistry (BS/BA in CH), the PRAXIS exam in chemistry (BS in CHE), and the MT registry exam (BS in MT). MT grads must pass the latter in order to become certified and licensed. (b) Results of ACS standardized exams used voluntarily in some courses. (c) Acceptance into advanced programs of study and professional employment. (d) Successful completion of the clinical training program for MT majors and blocks 3 and 4 for CHE majors. (e) Student presentations at professional meetings and co-authorship of professional papers.

Program Review Final University Committee Chair Comments

GRADUATE

What steps have you taken to ensure that your programs and courses are up-to-date and effective?

We will be conducting a search for a faculty with forensic chemistry credentials in Fall 2010. This will help ensure that courses and content are appropriate for student success after leaving Southeast.

Additionally, we have recently learned that the textbook for our forensic chemistry course (CH420/CH620) is the same textbook that the US DEA uses for all their new forensic chemist hires. This ensures that our graduates will have relevant background when applying for forensic chemistry jobs.

Also, graduates of our program comment on the good education received at Southeast and how it has helped them gain employment in areas of chemistry or forensic science.

Program Review Final University Committee Chair Comments

IX. IMPACT, JUSTIFICATION, AND OVERALL ESSENTIALITY TO THE SOUTHEAST MISSION

UNDERGRADUATE

The Chemistry Department supports the Southeast mission in many ways. The sciences are essential to society at large, and in many respects, chemistry is the central science because an understanding of chemistry is essential to many other scientific areas. Thus, chemistry is an essential part of the “science curricula” at the University. As such, the Department plays a vital role in supporting other programs. Many courses that serve our own majors also serve students in other academic disciplines. Nine of 13 chemistry courses required for the BS in CH and 7 of 9 courses required for the BA in CH are also required by other academic programs. Our deep commitment to US through course offerings also signals our alignment with the goals of liberal education. As such, we serve BOTH professional and liberal arts imperatives. Our programs attract high quality students, and in so doing enhance the academic status of the University. This is evident from the ACT scores, CBase scores, and WP003 scores of our students. In each of these, our students score higher than the University average. In addition, an average of 14 CH majors have merit scholarships, which is one of the highest among the programs at Southeast. Since 2000, 40% of our CH graduates have been accepted into advanced programs of study upon graduation, and most of the CH graduates that we have been able to track find jobs closely related to their major. 100% of our MT graduates over the last 10 years have found employment in the field upon graduation, many serving the health care needs of our region and state. In addition, the CHE major is essential for training people qualified to teach HS chemistry, and helps to address the well-documented critical shortages of science teachers at the secondary level. Thus, our programs help Southeast serve the economic life of the region, state, and nation by producing graduates who earn good salaries that help support communities, industry, the economy, and government.

The Department is committed to academic excellence, and has met the ACS guidelines that define high quality UG chemistry programs continuously since 1964. The CHE program meets the MO Department of Secondary and Elementary Education program requirements for teacher certification. Our faculty is committed to the teacher/scholar model that has become the standard at the University. Our faculty published over 15 peer-reviewed articles and 8 non-refereed articles, made over 30 presentations and invited lectures at professional meetings, presented over 30 workshops, and reviewed over 20 papers, grant proposals, and books during AY07-AY09. These activities further enhance the academic status of the University. Furthermore, our faculty engages students in scholarly activities by involving them in UG research projects. Since 2004, students have given over 35 presentations at professional meetings and been coauthors of more than 8 publications with faculty. Thus, students gain valuable professional experiences and credentials that help them meet their career goals. We know of several CH graduates who received offers of employment based partly on the experiential learning opportunities provided to them by the Department. We certainly contribute significantly to the University’s priority of offering top-quality academic programs. Our Department was committed to experiential learning long before it became the campus standard. We have involved students in research projects, as lab assistants and graders, stockroom workers, etc., for over 40 years.

Program Review Final University Committee Chair Comments

GRADUATE

Our graduate program supports the mission of Southeast by providing a professional graduate education in chemistry and forensic chemistry. Our students gain practical experience through relevant lecture topics, laboratory experiments, internships and research with faculty. We are striving towards being the University of First Choice by continuing to provide a strong program in Forensic chemistry. We are the only graduate forensic chemistry program in Missouri. Recently we have attracted forensic graduate students from Missouri, Illinois, Arkansas, Mississippi, and Alaska.

There is also the synergy with the popular undergraduate programs that focus on forensic chemistry: the MNS program helps to keep the UG programs and their faculty current (through research, as promoted in the Teacher-Scholar model), through grants (as in the earmark), and through interaction between students (because the MNS students and the undergrads are in classes together, working in research groups together, etc.) Thus, the MNS program strengthens the UG programs of proven popularity. The General Option’s ability to attract international students manifestly enhances the diversity of the campus, and the wider community. If Missouri is to be a leader in world trade, etc., and SE is truly an important facilitator, then we can argue that our pipeline to international students should be retained

and indeed, nurtured.

Program Review Final University Committee Chair Comments

X. PLANNING FOR THE FUTURE

Given impending personnel and environmental changes, how do you envision the configuration of your unit in five years? What components would be phased out? What components would be reduced in size? What components will have grown? What new components will have been developed? What other units might be involved in the new components?

UNDERGRADUATE

Rather than plan to phase out or reduce the size of “components”, which might seem beneficial in the short term but will have negative consequences for the University in the future, it seems far more prudent to plan for growth since strong programs and state-of-the-art facilities constitute the best way to weather external challenges. As mentioned previously, our number of majors has grown substantially since phase I, as have the number of students from other academic programs taking our courses. We expect these numbers to continue to grow based on current trends and interest. Because the data indicate no major problems or deficiencies within our UG program, we do not propose to reduce or phase out any “components” within our programs or department beyond our faculty line that was cut during August 2009. In fact, the program review data seems to indicate that the Department actually needs that faculty line and support in the way of resources to meet demands with quality. This is especially true considering that we also have a MNS program, and providing both graduate students and UG students with research opportunities requires intense faculty engagement. The loss of a faculty line has already hindered our efforts in this regard. Even before the program review process was mandated, we were planning for the future in the following ways. (1) Because of changes in the ACS guidelines for approved programs, we are revising our CH program to meet the challenges of the 21st century. (2) To help us attract new students to the Department, as well as support and improve program quality, we have developed plans to establish a Forensic Science Education Laboratory. This fully operational model crime lab would strengthen forensics education and research, and would be the first lab of its kind in Missouri. This idea was submitted as an earmark proposal to Sen. Kit Bond, and has already passed the U.S. Senate as a \$700,000 earmark. Congressional approval is still pending at this time. (“Congress considers \$700K for SEMO forensics lab”, Southeast Missourian, Saturday, June 27, 2009). (3) The administration recently committed to renovating all academic and research labs in Magill Hall, an effort we fully support. With substantial departmental input, the two chemistry academic labs that have been renovated were designed with modern safety standards and pedagogical developments in mind. In addition, the new labs are more open and aesthetically appealing, and because of improved efficiency in the layout and design, have allowed new lab activities to be introduced into freshman chemistry labs. These labs serve as a recruiting showcase for prospective students who visit the Department. Future academic labs will be designed in the same manner. (4) In Fall 2009, our faculty worked with Lisa Howe and Teresa Wilke to write a \$2,000,000 grant proposal to the NSF for a major renovation of existing research space into an Analytical and Forensic Research Center, which will consolidate related research areas, transform and improve research training by promoting a new, synergistic approach to research among faculty and students, and enhance opportunities for collaborative and interdisciplinary research. (5) Because biotechnology is a rapidly growing field, and because enrollments in our biochemistry option are increasing, we must enhance and strengthen our biochemistry capabilities. We believe that our numbers support reinstating our 11th faculty line now, and we hope to be able to hire a biochemist in the future to support this aspect of our program.

Program Review Final University Committee Chair Comments

GRADUATE

In the future we expect that our forensic option will become increasingly important. There will likely be an increasing reliance by the courts on forensic evidence in prosecutions. Additionally, law enforcement agencies at every level are becoming stronger, suggesting increases in the number of positions for forensic chemists in the future. As forensic methods advance, growth in hiring will come as forensic chemists begin to specialize: labs will need to hire multiple specialists to perform all the analyses that the evidence demands. This increase in outside demand will encourage students to pursue graduate degrees in forensic chemistry. Thus in five

years we see the forensic chemistry part of our program increase from the current 10 students. We will also probably see an increase in the number of students interested in the traditional areas of chemistry. This pool of students will be largely made up of international students. By restructuring this part of the program to a nonthesis option we hope to see enrollments of about 25-35 students. This will cause our entire program to be sized at 35-45 students or a little more than double our current enrollment. 

Program Review Final University Committee Chair Comments

DEANS' COMMENTS

Since only the MS degree is under review, my comments are limited to this section of the Program Review Report. This program is currently in the midst of change. The department recognized the problem with low enrollment and has instituted changes to accommodate 35-45 students without increasing the number of faculty in the department. Even before the changes, the program operated having only one class per year (CH675) that was taught in-load and was solely a graduate course. No money can be saved by eliminating the six graduate assistantships. The stipends amount to \$42K. With benefits, a replacement RNTT faculty member would cost more. Please remember that the fee waiver may be a budget line in the Graduate School but it is revenue in the E&G budget and is really cost neutral. In this time of budget concern, the Department of Chemistry has revised its MNS program to increase revenue with NEW students who are not on assistantship and thus are paying graduate fees while not increasing the base cost of the personnel to deliver the degree! This is exactly what the entire University should be focused on. I think the department should be commended for this effort. I fully expect the cost of this program to drop significantly over the next two years.

This department has already lost a faculty line. I can find no reason to impose any additional cost reduction on this program.

Final University Committee Chair Comments on Entire Document

Provost's Decision