

Chemistry

**Program Review**

**Chemistry Department Report**

**Dr. Matt Monzyk**

Chemistry Program Review

1. General Program Information  
   i) Chemistry Department Mission Statement:

The personnel associated with the chemistry department at East Central College strive to educate students using accurate and up to date information, methods, and instrumentation, in a caring and respectful environment.

ii) Organization and Structure:

The chemistry department is part of the Science Division. The Science Division contains the departments of: Biology, Chemistry, Geology, BioTechnology and Chemical Technology. The division has regularly scheduled meetings in addition to the individual department meetings.  
iii) Staffing and Credentials: Personnel, Facilities, and Equipment   
a) the chemistry department has three full-time instructors and four adjunct instructors. All instructors collaborate on teaching introductory chemistry. In addition to teaching introductory chemistry the two full time instructors teach the remaining courses offered by the department. One of the adjunct instructors, a previous instructor that has a doctorate in chemistry and had retired, at times, teaches general chemistry I (CH1303/CH1312) courses and fundamentals of chemistry (CH1003). The newly hired full-time instructor will teach other chemistry courses as this instructor is integrated into the program.

b) The department has three laboratories, an instrumentation room, a chemical storage room, and a chemical preparation room. All rooms have modern hoods and safety equipment. The two larger laboratories have approximately 2400 square feet, and a capacity of 24 students. With the added laboratory room, more students do the experiments as individuals whereas before they done the experiments in pairs, or as a group of three. This has helped the students work on their laboratory skills, and more experiments where the students work as individuals are planned for the future. Some experiments where the students work as part of a group will be kept to work on the team building skills. The third laboratory room is approximately 1500 square feet. Organic chemistry is taught in this room, where more complicated apparatus can be setup and used for multiple laboratory periods. This meets the needs of the more challenging and lengthy experiments performed in the courses that comprise organic chemistry.

The instrument room has approximately 1300 square feet and currently houses the gas chromatograph – mass spectrometer (GC-MS), and the high-performance liquid chromatograph (HPLC). These instruments are used in the separation and identification of substances that are in the gas phase (GC-MS) or in the liquid phase (HPLC). Also in this room are three ultraviolet-visible spectrophotometers (UV- vis), and an infrared spectrophotometer (FT-IR). These instruments aid in the identification of substances, and the amount of the substance present, based on the absorbance of specific wavelengths of electromagnetic radiation.

iv) External accreditation:  
Currently there are no external accreditation organizations for the chemistry program. There are guidelines published for two-year colleges by the American Chemical Society (ACS), details can be found at acs.org.

1. Learning Outcomes  
   i) Program Goals:  
   The program goals are to provide quality, current instructions in chemistry for students. To aid in this effort, the program review process will identify areas of needed improvement and develop action plans to resolve any deficient or areas of concern.  
     
   ii) Course/Curriculum Info:  
   Descriptions of Courses offered by the Chemistry Department at East Central College. A selection of chemistry courses are offered that would be expected for the first two years of a four year program. MT1303 is the course number for Intermediate Algebra, and MT1403 is the course number for College Algebra. Please see Appendix A for the actual course descriptions.  
   iii) Careers/Transfer Info  
   Transfer of the chemistry courses: Introductory Chemistry, General Chemistry I and II, and Organic Chemistry I and II, as well as associated laboratories courses have transferred to four year schools. These courses are well structured and guidelines suggested by the ACS are used and assessment exams produced by the ACS are employed.  
     
   iv) Recent changes/Updates:  
   a) Spring 2009 – the science and nursing departments moved into the new Health Science Building. The chemistry department expanded from one laboratory to three laboratories and an instrument room.   
   b) Spring 2010 - the development of a new Chemical Technology Program was initiated.  
   c) Summer 2010 – the hiring of a new full time chemistry faculty.  
    - new introductory laboratory manual and experiments are installed into the curriculum.  
   d) Fall 2010 – introductory chemistry is a prereq. for Principals of Biology.
2. Students:  
   i) Enrollments

Class Enrollment Figures:The statistical data compiled for the chemistry department for the years 2008 through spring of 2010, show an increase of 20% for the enrollment headcount and the full year equivalency (FYE). This increase in enrollment parallels the trends seen in the average sections size and the student to faculty ratio. The percent successful parameter is a value indicating the number of students receiving a grade of A, B, or C, divided by the total number of students. The percent successful results show a slight increase over this period, while the percent withdrawal show a reverse trend of about the same amount.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| No dual credit or articulated data are used in this study | | | | | | | |
|  |  |  |  |  |  |  |  |
|  |  | **Enrollment: Headcount** | | | |  |  |
|  |  | **Department** | **2008** | **2009** | **2010** |  |  |
|  |  | CH | 502 | 568 | 606 |  |  |
|  |  |  |  |  |  |  |  |
|  |  | Note: Student count is duplicated. |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  | **Enrollment: FYE** | | | |  |  |
|  |  | **Department** | **2008** | **2009** | **2010** |  |  |
|  |  | CH | 42.40 | 47.73 | 50.80 |  |  |
|  |  |  |  |  |  |  |  |
|  |  | Note: FYE = Full Year Equivalency; calculated by dividing total credits by 30. | | | |  |  |
|  |  |  |  |  |  |  |  |
|  |  | **Course Frequencies** | | | |  |  |
|  |  | **title** | **2008** | **2009** | **2010** |  |  |
|  |  | # of Courses | 11 | 11 | 11 |  |  |
|  |  | # of Sections | 40 | 41 | 43 |  |  |
|  |  | # Enrolled | 502 | 568 | 606 |  |  |
|  |  | Average Section Size | 12.55 | 13.85 | 14.09 |  |  |
|  |  | # of Seats Offered | 794 | 818 | 782 |  |  |
|  |  | % Seats Filled | 63% | 69% | 77% |  |  |
|  |  |  |  |  |  |  |  |
|  |  | Note: Arranged sections are excluded. | |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  | **Class Size Distribution** | | | |  |  |
|  |  | **class size** | **2008** | **2009** | **2010** |  |  |
|  |  | 1-10 | 17 | 9 | 12 |  |  |
|  |  | 11-15 | 8 | 14 | 16 |  |  |
|  |  | 16-20 | 7 | 12 | 11 |  |  |
|  |  | 21-30 | 8 | 6 | 4 |  |  |
|  |  | 31-40 |  |  |  |  |  |
|  |  | Over 40 |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  | Note: Arranged sections are excluded. | |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  | **Course Completion & Withdrawals** | | | |  |  |
|  |  |  | **2008** | **2009** | **2010** |  |  |
|  |  | Grades of A, B, C | 334 | 375 | 420 |  |  |
|  |  | Grades of D, F | 50 | 67 | 63 |  |  |
|  |  | Withdrawal | 119 | 126 | 123 |  |  |
|  |  | % Successful | 66% | 66% | 69% |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  | **Student/Faculty Ratio** | | | |  |  |
|  |  |  | **2008** | **2009** | **2010** |  |  |
|  |  | Student FYE | 42.40 | 47.73 | 47.73 |  |  |
|  |  | Faculty FTE | 3.37 | 3.43 | 3.60 |  |  |
|  |  | Student/Faculty Ratio | 12.6 | 13.9 | 13.3 |  |  |
|  |  |  |  |  |  |  |  |
|  |  | Note: Faculty FTE = add each course section credit and divide the sum by 30. | | | |  |  |
|  |  |  |  |  |  |  |  |
|  |  | **Department Costs** | | | |  |  |
|  |  | **Cost Center** | **2008** | **2009** | **2010** |  |  |
|  |  | 10114 Chemistry | $190,783 | $209,300 | $238,890 |  |  |
|  |  | Cost per Student FYE | 4499.60 | 4385.08 | 4702.56 |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

ii) Graduates: There currently are no chemistry graduates in the program. The program mainly serves to provide the chemistry knowledge foundation needed for many other areas in the science and health fields.  
iii) Placement: No placement efforts are in place due to the lack of chemistry majors in the program. If there were a chemistry major the next step in the process would involve transferring to a four year institution.  
iv) Feedback/Survey of Graduates: No effort in this area due to the reasons listed above.

1. Advisory Committee Info  
     
   i) Minutes, Meetings: None  
     
   ii) Membership:

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Institution | Name | Institution |
| Matt Monzyk | ECC Program Coordinator | Barry Bookout | ECC Pre-Engineering |
| Fatemeh Nichols | ECC Science Division Chair | Jennifer Chitwood | ECC Laboratory Manager |
| Jean McCann | ECC VP Dean of Instructions | Debbi Schatz | UMS&T |
| Mary Beth Huxel | ECC Division Chair Edu/Bus/SS | William Abraham | Monsanto |
| Judy Bieker | ECC Nursing | Richard or Judy Ritz | RD Laboratories |
| Kevin Dixon | ECC Biology |  |  |

1. Assessment Plan and Data:   
   i) Results:Assessment of the Chemistry Courses

Grade distribution for chemistry courses from 2007 through 2009 are given in Figure 1. Percent Successful (% Successful) indicates the percentage of students that received letter grades of an A, B, or C, compared to the total students in the course after the first four weeks of the course.





The data in Figure 2 indicates that the first member of a sequence course adequately prepares students for the next course in the sequence (i. e. General Chemistry I followed by General Chemistry II, or Organic Chemistry I followed by Organic II). The lower % success rates for Fundamentals of Chemistry and Introductory Chemistry warrants the investigation into the preparatory courses for these classes or other factors that affect the percent successful values.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 1:** | **CH1303** | **General Chemistry I** |  |  |  |  |  |  |
| **Term** | **Final** | **Posttest Final Type** | **ACS Norm** | **Pretest** | **Type of Pretest Exam** | **% Retention** | **BPAN** | **FPSS** |
| FS2008 | **65** | ACS2002 | **60** | 37 | ACS2001HS | 90 | 58 | No |
| FS2007 | **72** | ACS2002 | **60** | 41 | ACS2001HS | 91 | 65 | Yes |
| FS2006 | **73** | ACS2002 | **60** | 36 | ACS2001HS | 85 | 62 | Yes |
| FS2005 | **63** | ACS2002 | **60** | 40 | ACS2001HS | 81 | 51 | No |
|  |  |  |  | **38** | **Average** |  |  |  |
| FS2004 | **59** | ACS2000 | **57** | 32 | ACS1997 Gen. Chem. I | 46 | 27 | No |
| FS2003 | **51** | ACS1997 | **56** | 23 | ACS1997 Gen. Chem. I | 88 | 45 | No |
| FS2002 | **56** | ACS1997 | **56** | 24 | ACS1997 Gen. Chem. I | 78 | 43 | No |
| FS2001 | **56** | ACS2000 | **57** |  |  | 85 | 48 | No |
| FS2000 |  |  |  | 28 |  | 70 |  |  |
| **Average** | **62** | **Average** | **58** | **27** | **Average Average** | **79** | 50 | **Average** |
| Pretest to Final Percent Increase: | | | **131** |  |  |  |  |  |
| **Term** | **Final** | **Posttest Final Type** | **ACS Norm** | **Pretest** | **Type of Pretest Exam** | **% Retention** | **BPAN** |  |
| SP2008 | **59** | ACS2002 | **60** | 40 | ACS2001HS(55.99norm) | 88 | 52 |  |
|  |  |  |  |  |  |  | 52 | **Average** |

ACS – American Chemical Society, BPAN – biparameter assessment number = (retention rate x final exam score)/100, FPSS – Friday Problem Solving Sessions.

Table 1 compares various student data for fall semester 2000 through fall semester 2008, and for one spring semester for the year 2008. This data is taken from an individual instructor. The American Chemical Society (ACS) creates and markets standardized exams for use as assessment tools. Specific ACS exams for General Chemistry I courses were used and identified in Table 1 along with the mean score (norm). All scores are shown as percentages, unless stated differently. For the fall semester data, the average East Central College (ECC) students’ final average is 62 compared to the average ACS norm of 58. Pretest average score of 27 is noted for years 2000, and 2002 through 2004. This compares to a posttest average of 62 using the data from years 2001 through 2008. This shows a 131 percent increase in the students’ performance. If we look only at the years 2002 and 2003 in which the identical exam was given for the pretest and posttest, the result is a 127 percent increase. Pretest examinations were changed for years 2005 through 2008. ACS high school exams were given to spot students’ weaknesses going into the semester and attempts were made to emphasis these areas of instruction more heavily. Percent retention values have been defined as the number of students taking the final divided by the number of students taking the first exam. This result is then multiplied by 100. This is different from the more recently introduced percent successful previously defined. The biparameter assessment number (BPAN) is an attempt to combine factors that measure both the number of students making it through a course and the quality of their performance in the course. The impact of the Friday Problem Solving Sessions (FPSS) shows a marked increase in students’ performance as seen for years 2006 and 2007. The average final score was 72.5 compared to the ACS norm of 60, over a twenty percent increase. If these two years are compared to the pretest/posttest results it shows a 168 percent increase in the students’ performance. These results support efforts to schedule students with Monday and Wednesday laboratories to include a mandatory problem solving session on Friday mornings. Combined with placement results, this option of including a problem solving session on Fridays could benefit students that have lower placement scores, and enhance efforts to increase retention rates. Ongoing collection of spring semester data is underway to mass a meaningful set of data.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 2: CH1403 General Chemistry II** | | |  |  |  |  |  |
| **Term** | **Final** | **Posttest Final Type** | **ACS Norm** | **Pretest** | **Type of Pretest Exam** | **% Retention** | **BPAN** |
| SP2008 | **61** | ACS2001GenChemII | **52** | 61 | ACS2002, 59.6, GenChemI | 100 | 61 |
| SP2007 | **60** | ACS2001GenChemII | **52** | 68 | ACS2002, 59.6, GenChemI | 100 | 60 |
| SP2006 | **50** | ACS2001GenChemII | **52** | 41 | ACS2002, 59.6, GenChemI | 71 | 36 |
|  |  |  |  | **57** | **Average** |  |  |
| SP2005 | **65** | ACS1999GenChemII | **57** | 24 | ACS1999GenChemII | 100 | 65 |
| SP2004 | **54** | ACS2001GenChemII | **52** | 41 | ACS1999GenChemII | 86 | 46 |
| SP2003 | **65** | ACS2001GenChemII | **52** | 36 | ACS1999GenChemII | 82 | 53 |
| SP2002 | **56** | ACS2001GenChemII | **52** | 36 | ACS1999GenChemII | 59 | 33 |
| SP2001 | **55** | ACS2001GenChemII | **52** | 36 | ACS1999GenChemII | 72 | 40 |
| **Average** | **58** | **Average** | **52** | **35** | **Average Average** | **84** | 49 |
| Pretest to Final Percent Increase: | | | **67** |  |  |  |  |
| **Term** | **Final** | **Final Type** | **ACS Norm** | **Pretest** | **Type of Pretest Exam** | **% Retention** | **BPAN** |
| FA2007 | **55** | ACS2001GenChemII | **52** | 47 | ACS2002, 59.6, GenChemI | 100 | 55 |
| FA2006 | **71** | ACS2001GenChemII | **52** | 54 | ACS2002, 59.6, GenChemI | 71 | 51 |
| **Average** | **63** | **Average** | **52** | **50** | **Average Average** | **86** | **53** |

ACS – American Chemical Society, BPAN – biparameter assessment number = (% retention x final exam score)/100.

Table 2 compares various student data for spring semester 2001 through spring semester 2008, and for two fall semesters for the years 2006 and 2007. This data is taken from an individual instructor. Specific ACS exams for General Chemistry II courses were used and identified in Table 2 along with the mean score (norm). All scores are shown as percentages, unless stated differently. For the spring semester data, the average East Central College (ECC) student final average is 58 compared to the average ACS norm of 52. A pretest average score of 35 is noted for years 2001 through 2005. This compares to a posttest average of 58, using the data from years 2001 through 2008. This shows a 67 percent increase in the students’ performance. If we look only at years 2001 through 2005, in which the identical exam or the same caliber exam was given for the pretest and posttest, the result is a 68 percent increase. Pretest examinations were changed for years 2006 through 2008. ACS General Chemistry I exams were given to spot students’ weaknesses going into the semester and attempts were made to emphasis or review these areas of instruction more heavily. Percent retention values are slightly higher than those observed for the General Chemistry I data. The BPAN numbers are given and are being assessed to determine target values for specific courses. Ongoing collection of fall semester data is underway to mass a meaningful set of data.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 3: CH1103 Introductory Chemistry** | | | | | | | |
| **Term** | **Final** | **Posttest Final Type** | **ACS Norm** | **Pretest** | **Type of Pretest Exam** | **% Retention** | **BPAN** |
| SP2008 | **48** | ACS2003HS | **58** | 31 | ACS2001HS(55.99) | 78 | 37 |
| SP2007A | **51** | ACS2003HS | **58** | 36 | ACS2001HS MWF | 88 | 45 |
| SP2007B | **52** | ACS2003HS | **58** | 33 | ACS2001HS TTH | 79 | 41 |
| SP2006 | **53** | ACS2001HS | **56** | 29 | ACS2001HS | 85 | 45 |
| SP2005 | **46** | ACS2001HS | **56** | 31 | ACS2001HS | 82 | 37 |
| SP2004 | **49** | ACS1999HS | **51** | 18 |  | 92 | 45 |
| SP2003 | **41** | ACS2001HS | **56** | 23 | HWx0.5(Man. Help. Sec.) | 95 | 39 |
| SP2002 | **53** | ACS2001HS | **56** | 25 |  | 56 | 29 |
| SP2001 |  |  |  |  |  | 90 |  |
| **Average** | **49** | **Average** | **56** | **28** | **Average Average** | **83** | 41 |
| Pretest to Final Percent Increase: | | | **73** |  |  |  |  |
| **Term** | **Final** | **Posttest Final Type** | **ACS Norm** | **Pretest** | **Type of Pretest Exam** | **% Retention** | **BPAN** |
| SS2008 | **50** | ACS2001HS | **56** | 30 | ACS2001HS(55.99) | 80 | 40 |
| SS2007 | **53** | ACS2001HS | **56** |  |  | 70 | 37 |
| SS2004 | **49** | ACS2001HS | **56** |  |  | 84 | 41 |
| SS2003 | **52** | ACS2001HS | **56** |  |  | 87 | 45 |
| SS2002 | **57** | ACS2001HS | **56** |  |  | 100 | 57 |
| SS2001 |  |  |  |  |  | 90 |  |
| **Average** | **52** | **Average** | **56** | **30** | **Average Average** | **85** | 44 |
| Pretest to Final Percent Increase: | | | **74** |  |  |  |  |
| **Term** | **Final** | **Posttest Final Type** | **ACS Norm** | **Pretest** | **Type of Pretest Exam** | **% Retention** | **BPAN** |
| FS2008 | **54** | ACS2003HS | **58** | 33 | ACS2001HS: Exm Library. | 91 | 49 |
| FS2007 | **55** | ACS2003HS | **58** | 34 | ACS2001HS: Exm Library. | 73 | 40 |
| FS2006 | **56** | ACS2003HS | **58** | 33 | ACS2001HS: Exm Library. | 86 | 48 |
| FS2005 | **51** | ACS2001HS | **56** | 31 | Recom 2yrs HS Chem for Chem I | 77 | 39 |
| FS2004 | **49** | ACS1999HS | **51** | 29 |  | 80 | 39 |
| FS2003 | **50** | ACS2001HS | **56** | 18 |  | 88 | 44 |
| FS2002 | **45** | ACS2001HS | **56** | 22 |  | 62 | 28 |
| FS2001 |  |  |  | 20 |  | 55 |  |
| FS2000 |  |  |  |  |  | 68 |  |
| **Average** | **52** | **Average** | **56** | **28** | **Average Average** | **80** | 41 |
| Pretest to Final Percent Increase: | | | **87** |  |  |  |  |

ACS – American Chemical Society, BPAN – biparameter assessment number = (retention rate x final exam score)/100.

The ACS selection of various standardized test for different chemistry courses doesn’t include an Introductory Chemistry exam. This may be due to the wide variation on the content and concepts covered by different institutions that offer a Fundamental or Introductory Chemistry course. The goals of the Introductory Chemistry course offered at East Central College is to provide an equivalent of a two year high school chemistry instruction in one semester, to provide a chemistry foundation for students lacking a proper chemistry background that they need to take a general chemistry and/or higher sequence, and to provide nonscience majors with a chemistry background that will assist them with understanding the chemistry applied to their field of study. With this said, the ACS high school exams used to assess students in the Introductory Chemistry courses is not as good as an assessment tool as the previously mentioned ACS exams employed to assess students in General Chemistry I and II, and Organic Chemistry. The ACS exams do give us an assessment tool that we can compare courses within our school. These results are taken from a single instructor and are listed in Table 3. The average final exam scores compared with the ACS exam norms show a – 8.93 percent decrease. For spring 2003, the assigned homework problems were decreased by one-half. The final result showed a -16.3 % decrease in student performance compared to all other students taking Introductory Chemistry at ECC in the spring semester. A set of previous Introductory Chemistry exams were placed in the school library beginning in the spring of 2005. The final average including spring 2005 through fall of 2008 was 52.4% compared to the average value before 2005 of 49.3, this shows a 6.34 % increase. No questions on the exams placed in the library were used on the exams given to the students from 2005 and on. No answers or solutions accompanied the exams placed in the library. Friday problem solving sessions were employed from spring 2003 and on where possible for Monday/Wednesday/Friday (MWF) classes. Classes that meet on Tuesday and Thursdays (TTh) were informed of their access to these sessions. All students were required to meet with the tutors in the Learning Center to become acquainted with resources available to help them be successful. Percent retention improved with these actions after the poor values noted for years 2000 through 2002, exceptions being spring of 2001 and summer classes which tend to have more motivated students. Comparing years 2007A MWF and 2007B TTh, the only change in the courses were the MWF and TTh meeting times. While the final scores are nearly identical, the percent retention is significantly higher for the MWF section compared to the TTh class.

ii) Recommendations:   
a) Course assessment to determine where improvements to the curriculum can be made.  
b) Placement test need to be used to guide students to the correct entry course in chemistry.  
c) Student to teacher ratios need to be lowered since more students are working as individual in the laboratory. This required much more time to properly instruct students in laboratory safety, laboratory skills, the scientific method, and generation of reports.  
  
iii) Improvements

1. Facilities

SWOT Analysis  
i) Strengths**:**

Main campus:

First, the Chemistry department’s biggest strength is our new building. The Department was moved to the Health Science building in spring of 2009. With two General Chemistry labs and one organic lab it has helped us to offer multiple sections of Introduction to Chemistry and General Chemistry I. The Department also has an instrument room with instruments Such as gas chromatography- mass spectrometry(GC-MS), high performance liquid chromatography (HPLC), ultraviolet-visible spectrometry (UV-Vis), infrared spectrometry (IR) and gas chromatography (GC), for students to use.

Second, our commitment in the alignment of laboratory experiments with lecture topics. General chemistry I, II, and Introduction Chemistry experiments are custom made. We have designed every lab to coincide with the chapters in the text book.

Our third strength is the Department is faculty and their credentials. The department has two experienced teachers and has recently added a third a new faculty member, all with PhD in different fields of chemistry, which allows the department to use the right instructor with the right course. Also, two of the faculty have an industry background.

Another strength of the department is the support of the administration. We have been able to offer major courses such as General Chemistry II and Organic Chemistry. Although, we have had low enrollment in the past three years, fall of 2010 enrolment in Organic jumped to 9, compared to 3 to 6 of previous years. Those jumps are due to the commitment of administration to major courses, and allowing courses to be offer consistently even with low enrollment. This helps students to make long term plans as to which courses to take at East Central College, if a course is not offered in a predictable manner, students may plan to transfer earlier to a four year institution.

ii) WeaknessesMain campus:

The majority of department’s students are Nursing, Health Science, Biology, and pre-engineering students.

Low enrolment in General Chemistery II and Organic is one of department’s weaknesses.

Internal factors have always been, incorrect advising of students by consolers, and bad advising of students by other departments. In the last year, the chemistry department has been watching very closely the advising of Health Science and Biology students, in the hopes of improving enrolment.

An external factor is UM S & T curriculum change in their chemistry requirement for engineering students. Mechanical engineering students no long required to take General Chemistry II.

Another weakness in the Introduction Chemistry course is the capacity for the course. Room Capacity is 24, therefore, students must work with Lab partner, which would influence the learning outcome. If students work alone, they would have to rely only on themselves and be forced to seek instructors for help. Since Introductory Chemistry laboratory is the first laboratory class for many students, it is important that they receive proper instructions on laboratory safety, data analysis, scientific methods, and generation of laboratory reports. Also, it is very difficult for faculty to monitor 24 students

Rolla:

Chemistry department’s major weakness is lack of space at the Rolla campus. There is only one lab at the Rolla campus which is used for all science classes (Chemistry, Biology, Anatomy, Microbiology, Intro to Human Anatomy, and Physiology). Sharing space with Biology labs, limits space for chemicals and equipment. We cannot perform a number of experiments that main campus students carry out due to the lack of specialized equipment, and proper ventilation. Specialized equipment used for each lab must be shuffled around from period to period when in use and not in use. This can cause damage to equipment, especially when the person moving the equipment may not be familiar with how it must be handled.

There is no full-time Faculty at Rolla campus. Someone with a full time commitment would be more capable of addressing the problems as it comes up, not waiting to get response from main campus.

1. Quality Improvement Efforts  
   Other recommendations
2. Summary

Future goals for the chemistry program:

1. Finish revamping the introductory chemistry laboratory curriculum (Fall 2010).
2. Develop common syllabus for chemistry courses taught by more than one instructor (Spring 2010).
3. Update the general chemistry I laboratory curriculum (Fall 2011)
4. Update the general chemistry II laboratory curriculum (Fall 2012)
5. Update the organic chemistry I laboratory curriculum (Fall 2010)
6. Update the organic chemistry II laboratory curriculum (Spring 2011)
7. Monitor assessment results for all courses and discuss solutions to improving student performance for difficult concepts. (Spring 2010)
8. Structure common concepts and consistency in grading for various instructors teaching the same course(Fall 2010).
9. Increase use of technology in all laboratories classes (Summer 2010).
10. Purchase equipment for the chemistry laboratories (Fall 2010).
11. Pursue American Chemical Society (ACS) accreditation of two-year college chemistry programs (Fall 2012).
12. Network all instruments in HS238 to a printer in the room and to office computers of instructors.
13. Create procedure manuals for all instruments used in the chemistry program.
14. Have log books for all instruments in the chemistry program.
15. Strive to increase enrollments in the upper level chemistry courses.

Appendix A

|  |  |
| --- | --- |
| CH 1003 | 3.0 |
| Fundamentals of Chemistry | |
| A non-laboratory course emphasizing elementary principles of chemistry with a strong emphasis on applications of chemistry in society and in our individual lives. Students will learn to appreciate the chemical nature of our everyday world. The applications studied may include agriculture, body chemistry, cosmetics, energy, genetic engineering, household chemicals, medicine, polymers, poisons, pollution, and a variety of other issues currently in the world, national, and local news. This course is intended for non-science majors. HOT, VAL, LPS  Prerequisite: Minimum grade of "C" in [MT 1303](http://www.eastcentral.edu/acad/classes/catalog/deptPages/MT.html#MT1303) or appropriate placement score to enter [MT 1403](http://www.eastcentral.edu/acad/classes/catalog/deptPages/MT.html#MT1403). | |
|  |  |
| CH 1103 | 3.0 |
| Intro Chem Lec | |
| An introduction to the basic principles of chemistry, including inorganic, analytical, physical, and organic chemistry. Three hours of lecture and two two-hour laboratory periods per week. This course is designed for the student with no background in chemistry. HOT, VAL, LPS  Prerequisite: Minimum grade of "C" in [MT 1303](http://www.eastcentral.edu/acad/classes/catalog/deptPages/MT.html#MT1303) or appropriate placement score to enter [MT 1403](http://www.eastcentral.edu/acad/classes/catalog/deptPages/MT.html#MT1403). Corequisite: [CH 1112](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH1112) | |
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| CH 1112 | 2.0 |
| Intro Chem Lab | |
| An introduction to the basic principles of chemistry, including inorganic, analytical, physical, and organic chemistry. Three hours of lecture and two two-hour laboratory periods per week. This course is designed for the student with no background in chemistry. MAI, LPS  Prerequisite: Minimum grade of "C" in [MT 1303](http://www.eastcentral.edu/acad/classes/catalog/deptPages/MT.html#MT1303) or appropriate placement score to enter [MT 1403](http://www.eastcentral.edu/acad/classes/catalog/deptPages/MT.html#MT1403). Corequisite: [CH 1103](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH1103) | |
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| CH 1303 | 3.0 |
| Gen Chem I Lec | |
| A study of atomic and molecular structure, bonding, chemical equations, stoichiometry, gases, solutions, and an introduction to organic chemistry. Three one-hour lecture periods and two two-hour laboratory periods per week. HOT, VAL, LPS  Prerequisite: Minimum grade of "C" in [MT 1403](http://www.eastcentral.edu/acad/classes/catalog/deptPages/MT.html#MT1403) or appropriate placement score to enter [MT 1605](http://www.eastcentral.edu/acad/classes/catalog/deptPages/MT.html#MT1605) and [CH 1103](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH1103)/1112 or two years of high school chemistry. Corequisite: [CH 1312](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH1312) | |
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| CH 1312 | 2.0 |
| Gen Chem I Lab | |
| A study of atomic and molecular structure, bonding, chemical equations, stoichiometry, gases, solutions, and an introduction to organic chemistry. Three one-hour lecture periods and two two-hour laboratory periods per week. MAI, LPS  Prerequisite: Minimum grade of "C" in [MT 1403](http://www.eastcentral.edu/acad/classes/catalog/deptPages/MT.html#MT1403) or appropriate placement score to enter [MT 1605](http://www.eastcentral.edu/acad/classes/catalog/deptPages/MT.html#MT1605) and [CH 1103](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH1103)/1112 or two years high school chemistry. Corequisite: [CH 1303](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH1303) | |
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| CH 1403 | 3.0 |
| Gen Chem II Lec | |
| A continuation of [CH 1303](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH1303) & 1312, including the study of chemical equilibria, acid-base chemistry, complex ions, thermodynamics, oxidation-reduction reactions, nuclear chemistry, and qualitative analysis. Three one-hour lecture periods and two two-hour laboratory periods per week, emphasizing quantitative techniques.  Prerequisite: Minimum grade of "C" in [CH 1303](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH1303)/1312, and [MT 1403](http://www.eastcentral.edu/acad/classes/catalog/deptPages/MT.html#MT1403). Corequisite: [CH 1412](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH1412) | |
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| CH 1412 | 2.0 |
| Gen Chem II Lab | |
| A continuation of [CH 1303](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH1303) & 1312, including the study of chemical equilibria, acid-base chemistry, complex ions, thermodynamics, oxidation-reduction reactions, nuclear chemistry, and qualitative analysis. Three one-hour lecture periods and two two-hour laboratory periods per week, emphasizing quantitative techniques.  Prerequisite: Minimum grade of "C" in [CH 1303](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH1303)/1312, and [MT 1403](http://www.eastcentral.edu/acad/classes/catalog/deptPages/MT.html#MT1403). Corequisite: [CH 1403](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH1403) | |
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| CH 2203 | 3.0 |
| Org & Biochemistry Lec/Biotech | |
| This course serves as an introduction to the basic principles of organic chemistry, including the identification of different classes of organic compounds and their reactions. The biochemistry portion of the course will involve the static and dynamic aspects of carbohydrates, lipids, proteins, and nucleic acids. This will be followed by a discussion of metabolic pathways, energy production, and metabolic regulatory mechanisms. This course is the second in a series of two Chemistry courses required for the Biotechnology AAS degree. This course is limited to Biotechnology AAS majors. LPS  Prerequisite: Minimum grade of "C" in [CH 1103](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH1103)/1112 and [MT 1303](http://www.eastcentral.edu/acad/classes/catalog/deptPages/MT.html#MT1303) or appropriate placement score to enter [MT 1403](http://www.eastcentral.edu/acad/classes/catalog/deptPages/MT.html#MT1403). Corequisite: [CH 2212](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH2212) | |
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| CH 2212 | 2.0 |
| Org & Biochemistry Lab/Biotech | |
| This course serves as in introduction to the basic principles of organic chemistry, including the identification of different classes of organic compounds and their reactions. The biochemistry portion of the course will involve the static and dynamic aspects of carbohydrates, lipids, proteins, and nucleic acids. This will be followed by a discussion of metabolic pathways, energy production, and metabolic regulatory mechanisms. This course is the second in a series of two Chemistry courses required for the Biotechnology AAS degree. This course is limited to Biotechnology AAS majors. LPS  Prerequisite: Minimum grade of "C" in [CH 1103](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH1103)/1112 and [MT 1303](http://www.eastcentral.edu/acad/classes/catalog/deptPages/MT.html#MT1303) or appropriate placement score to enter [MT 1403](http://www.eastcentral.edu/acad/classes/catalog/deptPages/MT.html#MT1403). Corequisite: [CH 2203](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH2203) | |
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| CH 2303 | 3.0 |
| Organic Chem I Lec | |
| A study of the basic principles of organic chemistry including acid-base theory, carbonium ions, stereochemistry, electrophilic aromatic substitution, spectroscopy, and reaction mechanisms. Three hours of lecture and two three-hour laboratory periods per week.  Prerequisite: Minimum grade of "C" in [CH 1403](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH1403)/1412. Corequisite: [CH 2312](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH2312) | |
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| CH 2312 | 2.0 |
| Organic Chem I Lab | |
| A study of the basic principles of organic chemistry including acid-base theory, carbonium ions, stereochemistry, electrophilic aromatic substitution, spectroscopy, and reaction mechanisms. Three hours of lecture and two three-hour laboratory periods per week.  Prerequisite: Minimum grade of "C" in [CH 1403](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH1403)/1412. Corequisite: [CH 2303](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH2303) | |
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| CH 2403 | 3.0 |
| Org Chem II Lec | |
| A continuation of [CH 2303](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH2303) & 2312, including application of basic principles to the study of the important classes of organic and biochemical compounds. Three hours of lecture and two three- hour laboratory periods per week.  Prerequisite: Minimum grade of "C" in [CH 2303](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH2303)/2312. Corequisite: [CH 2412](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH2412) | |
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| CH 2412 | 2.0 |
| Org Chem II Lab | |
| A continuation of [CH 2303](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH2303) & 2312 including application of basic principles to the study of the important classes of organic and biochemical compounds. Three hours of lecture and two three- hour laboratory periods per week.  Prerequisite: Minimum grade of "C" in [CH 2303](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH2303)/2312. Corequisite: [CH 2403](http://www.eastcentral.edu/acad/classes/catalog/deptPages/CH.html#CH2403) | |
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| CH 2701-2705 | 1.0-5.0 |
| I.S.-Chemistry | |
| A specialized program of study directly related to the department's area of expertise. The course is arranged between a faculty member and student and takes into consideration the needs, interests and background of the student.  Prerequisite: Consent of instructor | |
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| CH 2711-2715 | 1.0-5.0 |
| Spec Topics-Chemistry | |
| Courses are offered to accommodate special interests of students and/or faculty. Typically, the course will cover new material not currently contained in the curriculum at ECC.  Prerequisite: None | |