CHEMISTRY PROGRAM REVIEW

2007-2008

Department Abbreviation: CHEM

Recorder: Cynthia Weishapple **Date:** 3/10/2008

Participants in the Program Review Process: Judith Chamberlain; Jason Thoen; Neil Palosaari

Please answer each question and give justification and explanation for your response. Also indicate any proposed changes that your review has prompted within each category. Resources for responding to questions are located in J:/Program Review/FY2008/~Information/Where to look for information.doc.

Alignment:

- Review your department's mission, vision, goal, intent, content, and completer statements. Records show that your department's statement is incomplete. A fill-in-form ' Mission Vision Goals Form.doc ' is located in J:\Program Review\FY2008. Updated statements should be saved to J:\Program Review\FY08\Chemistry\.
- To what degree do your department statements align with those of Inver Hills CC and MnSCU?

The department mission aligns with the mission of the college and the system. The chemistry department mission includes to "prepare the student…for attaining a degree in fields such as medicine, pharmacy, chemistry, engineering, etc." This mission aligns well with the mission of Inver Hills Community College to "prepare students for success in specific careers" (Catalog, p. 4) and the MnSCU strategic direction to "promote increased participation in science, technology, engineering, and math, known as STEM, fields" (http://www.mnscu.edu/about/actionplan.html). .

Curriculum:

- Review your courses and offerings from other community colleges and area 4-year schools. Are your courses consistent with what is offered at the other schools? Do they represent lower division course work at the universities? Do they transfer as equivalent courses in the major? Do they fulfill general education requirements? Or do they only count as electives? If some schools do not count a course toward the major or as an equivalent and you think it should be counted, please contact the transfer specialist at that school and pursue changing the designation.

Faculty have established an emphasis area for chemistry in completion of an AA degree; that degree option is included in the catalog. Investigation will be undertaken to determine whether that degree option should be formalized through the Office of the Chancellor and included in the IHCC inventory.

There does not appear to be any misalignment in the curriculum as reflected in college publications or brochures. Transfer and articulation are addressed later in this report.

Course Outlines:

- To what degree do all of your courses align with your department mission, vision, and goals?
- Is the course description still accurate?
- Review each outline to be certain all learning outcomes are measurable and use learning-centered verbs. Also, review semester indication to be certain it truly represents when the course is consistently offered. Try to avoid variable whenever possible. For example, it is fine to indicate that a course is offered every other fall.
- Discuss any listed prerequisites – are they necessary, is recommended a better term, if there isn't one listed should there be, etc.?

- Review the MnTC goal(s) and competencies listed for each course. Discuss how the competencies are a major part of the course and how faculty teach and assess each competency.

Course outlines were reviewed as follows:

CHEM 1010 No content change; check prerequisites

CHEM 1061 No content change; check prerequisites

CHEM 1062 Add thermochemistry and thermodynamics; check prerequisites

CHEM 2061 No content change; check prerequisite

CHEM 2062 Eliminate common monosaccharides and their reactions, disaccarides, and polysaccharides; check prerequisite

All learning outcomes are measurable.

All courses are substantively equivalent to university courses and transfer throughout the MnSCU system. No recommendations for updating current courses (other than that listed above) or creating new courses were made.

Course Syllabi:

- A syllabus should be an accurate reflection of the common course outline allowing for individual faculty discretion for teaching methods, class procedures, assignments, and grading policy. Review individual syllabi for each course.
- Does each section list the learning outcomes the same as on the course outline? Are the assessment methods consistent with the course outline? Are the MnTC competencies listed on the syllabus as additional outcomes, if they are not already part of the course outcomes? Does the syllabus accurately reflect the course outline?

All syllabi reflect the learning outcomes identified in the common course outlines. Syllabi are on file in Academic Administration.

Articulation:

- List any articulation agreements your department has. When was each last reviewed? If it has been longer than five years, please negotiate updated agreements using the new standardized form (see Anne Johnson).
- Does your department have a pre-major track for the AA degree? If not, please consider developing a sequence of courses (10-20 credits) that an Inver Hills CC student should take in order to transfer into the major at a 4-year school at the junior level.

An Associate in Arts with a pre-major track in chemistry has been developed and is outlined in the catalog.

No articulation agreements currently exist specifically for chemistry; articulations and transfers for the associate in arts degree encompass potential chemistry majors.

Internal Partnerships:

- Describe academic partnerships your department has with other departments on campus with emphasis on courses required in your program from another department and vice versa. Are there any concerns from either department concerning this coursework or student academic achievement within these courses?

Listed below is the number of students concurrently enrolled in chemistry classes and other classes at the college between Summer 2004 and Spring 2007:

Chemistry Class	Number of students concurrently enrolled in other classes
CHEM 1010	625
CHEM 1061	302
CHEM 1062	158

During that time frame, the most common courses concurrently enrolled in appeared to be:

Chemistry Class	Concurrently Enrolled Class (number concurrently enrolled)
CHEM 1010	ENG 1108 Wrt/Research Skills (70) MATH 0099 Inter Algebra (49) BIOL 2201 Anat & Phys 1 (43)
CHEM 1061	BIOL 1154 Gen Cell/Org (41) MATH 1118 Clg Algebra I (35)
CHEM 1062	MATH 1133 Calculus I (24)

Enrollment:

- Examine the past three year enrollment trend in all courses and sections. Look at faculty/student ratio. Evaluate composition of students by gender, racial-ethnic background, and disabilities. Make any recommendations concerning scheduling for the next few years.

Enrollments appeared to peak in FY03 with 80.6 (from 65.9 in FY02). The last three year FYE enrollments are listed below:

Year	FYE	No. of Sections	Seats Available	%Filled	Average Size
2006	59	21	546	72%	19
2007	60	20	520	77%	20
2008	63	19	494	85%	22

From these data, it appears that the chemistry department has made a deliberate attempt to match scheduling with the needs of students. The number of sections has decreased, but percentage of fill, average class size, and FYE have increased.

Anecdotal evidence (informal polls of students entering introductory chemistry classes) indicates that fewer nursing students take chemistry classes: from approximately 60% composition to approximately 20% composition. Although fewer nursing students seem to be taking the chemistry classes (due to chemistry being pulled as a prerequisite for the nursing program), enrollments appear to have stabilized.

Completers:

- Review Occupational employment statistics for graduates or transfers within your program.

Not applicable.

Cost Analysis:

- Evaluate program cost within Inver Hills CC and across MnSCU. If your program is above the mean, what factors influenced it? What possible ways are there to reduce cost and maintain the standards student learning? What are the areas of campus function below the mean that might offset the cost? Review department budget and expenditures for the past three years. Devise a three year plan for equipment and supply purchasing.

According to the most recent data available, the average cost per student to deliver chemistry (FY2007) was $3,814. In FY 2006, this cost per student was $3,948; the MnSCU average (FY06) was $3,484.

It should be noted that the college makes efficient use of the chemistry labs by renting the facilities to Northwestern College.

Student Learning:

- Review past SAAP forms. Examine failure/withdrawal rates for all courses. Review internship agreements. Examine level of success student have upon transfer from your program.

The department SAAP for FY 2007 was to assess student skill levels in essential math and required prerequisites. A math pretest, to assess entry level skill, and a math posttest, to see if students acquired additional skills, were administered. "Most students did fairly well on the pretest (with 70% or greater score). Those who did not do well were counseled on options. … At the end of the semester, the same pretest (posttest) was given and more students received higher scores than what they obtained on the pretest. From what we could tell, all students increased their problem-solving skills, comprehension, and ability as far as the math was concerned" (Chamberlain, 2007).

The full-time faculty member and one part-time faculty member filed individual SAAPs. Of those SAAP reports, the following were noted:

Goal 2:
After implementing inquiry activities in chemistry, students' scores on exams improved, averaging 6-25 points higher than the previous exam (Chamberlain, 2007).

Most recent aggregate data (from the terminal server) on successful completion of all sections of chemistry are included below:

Semester Successful (%) Unsuccessful (%) Withdrew (%) Total

Fall 2004	143	(76.1%)	16	(8.5%)	29	(15.4%)	188
Spring 2005	128	(73.6%)	19	(10.9%)	27	(15.5%)	174
Fall 2005	134	(81.2%)	15	(9.1%)	16	(9.7%)	165
Spring 2006	141	(73.1%)	25	(13.0%)	27	(14.0%)	193

Student Feedback on Teaching and Learning:

- All students are surveyed annually. Special groups of students are asked to complete additional surveys. Review the survey findings. Where Inver Hills CC performs significantly better than the national average, indicate what your department has done to foster these attitudes. Where Inver Hills CC performs significantly worse than the national average, indicate what your department can do to close the gap.

In the most recent Student Satisfaction Survey (Noel-Levitz) administered at IHCC, the following items were identified as having statistical significance between how students rated their satisfaction with that item and that item's importance to them:

Faculty provide timely feedback about student progress in a course.
Students are notified early in the term if they are doing poorly in the class.
Faculty take into consideration student differences as they teach a course.

Chemistry faculty participate in mid-semester progress reports that notify students of their academic progress to date.

Resources:

- Review library holdings for your department.
- Review the web site, catalog, faculty web sites, and promotional material for your department. If any errors are found, notify your dean. Supply the URLs for websites.

Library holdings including videotapes, scientific periodicals, resource books, reference materials, and textbooks. The list of library holdings is included in the program review binder.

The chemistry department website needs updating. This updating could be facilitated as an IT student project.

Laboratory facilities:

Gas Chromatograph is up and running.

The IR Spectrophotometer is 15-20 years old and it is imperative that it be replaced. The maintenance agreement is over $3,000 annually; that agreement should be discontinued and a new IR Spectrophotometer purchased.

A Nuclear Magnetic Resonance machine is standard for organic chemistry, but runs approximately $40,000 to $60,000. Knowing how to run the machine is less important than knowing how to interpret the results. An alternative to purchasing a Nuclear Magnetic Resonance machine would be to have the samples run at another lab. The University of Minnesota charges $13.25/spectrum (200 mhz). Adding the cost of solvent and tubes, this would run approximately $15.00 per sample for 10-12 samples per semester. The results would be emailed in a pdf file.

A software (Insight) does not function on two computers in HH 320 and the company that sold the software is no longer in business. An updated software is being investigated by IT and will be evaluated for purchase.

Vernier data acquisition hardware and software is used in the labs for experiments and as a communications tool.

Faculty:

- List faculty members, full-time and adjunct, and their academic profiles, including strengths and areas of expertise. What are the faculty development needs for your department?

Faculty, their status, and their credentials are listed below:

Judith Chamberlain, unlimited full-time faculty member, M.S. Chemistry
Neil Palosaari, part-time faculty, Ph.D. Biochemistry
Jason Thoen, part-time faculty, Ph.D. Chemistry

A major strength of the program is the faculty. Faculty employ creative ways to highlight chemistry, including National Chemistry Week and Halloween (where students dress up as chemical elements/compounds). Faculty attend Open House, Kick Off Day, and Student Success Day and often employ fun demonstrations to attract students and demonstrate the importance of chemistry in everyday life. Ms. Chamberlain participates in "Experiment with a Chemist in the Library" at various libraries in the Metropolitan area and in "3M Visiting Wizards" through the American Chemical Society.

Faculty are active in professional development and are members of the American Chemical Society (national and state), the Division of Chemical Education of the American Chemical Society, the National Science Teachers Association, and 2YC3. Faculty subscribe through membership to the Journal of College Science Teaching and the Journal of Chemical Education.

Faculty have been awarded Awards for Excellence for the following projects:

1. Faculty project:

To show that chemistry is a science that can be interesting, fun, and relevant to everyone's daily life through celebration of National Chemistry Week. The American Chemical Society promotes National Chemistry Week (NCW) to educate the general public on the relevance of chemistry to everyday lives. This yearly celebration provided a template for members of the IHCC chemistry department to develop a detailed set of displays and interactive demonstrations. The theme for NCW 2006 was "Your Home:It's All Built on Chemistry" (Chamberlain, Thoen, Palosaari, 2007).

2. Jason Thoen's project:

To provide motivated students with the opportunity to gain experience working independently on a chemistry research project; specifically,

1) Design of a "Mystery Lab" for organic students where they solve a problem based on a real-world situation described in a short story. Students have been performing this lab in the Organic I course and it is often their favorite lab.

2) Add experiments to and reworking an existing Organic I lab based on extraction.

3) Design of a chemistry study game based loosely on the format of Trivial Pursuit. This is used mostly in Organic II, which can require lots of memorization and review can get monotonous for students.

4) Setup and investigation of uses for the new GC (Thoen, 2007).

[A current student project involves working on adapting labs for GC analysis of products. We have accomplished this for a couple of experiments and will likely make it possible to incorporate GC into at least 4 of the labs for Organic I and II next year.]

Goals:

- Define your departmental goals for the next three years.

Pursue an NSF grant to support STEM fields.

Continue to evaluate math skills of entering students.

Incorporate use of gas chromotography in organic chemistry labs.

Increase technology in lab experiments for a state-of-the-art chemistry lab; maintain and improve computer technology and software.

Investigate feasibility of expanding student research in organic chemistry.

Consider dedication of computer resources for chemistry students.

Explore development of hybrid introductory chemistry class.

Incorporate more inquiry-based activities both in lecture and in lab.

Attachments: