Memorandum

TO:    D. Arrington
       D. Boyles
       K. Felling
       H. Fong
       D. Heglund

From:  R. Winter

CC:    J. Puszynski

RE:    ACS Five-year Revaluation Report and Program Certification

Please find attached a letter I recently received from the ACS Committee on Professional Training. As you know this committee is responsible for recommending certification of your program. There are several points for which you will need to develop a response. I am requesting that you have your responses to me in the form that ACS requires by November 1, 2003. As I read the letter from ACS here is what I see that you will need to respond to:

1) faculty loads
2) library holdings
3) operating and infrastructure support
4) advance course requirement for student certification
5) quality of student research reports

If you see other items that you need to respond to then of course please address them too. I recognize that 1) and 3) will need to be addressed in discussions with me and perhaps with Dr. Puszynski in regards to 3). So I ask that you include us in your meetings when it is appropriate. You have a history of a strong program and I will do what I can to help you continue that history and your certification. You will probably need to work with others, for example Ms P. Anderson, Director of the Devereaux, when formulating your responses to the ACS committee’s request. Please let me know what you need and I will do my best to help.
Dr. Robb Winter, Chair
Department of Chemistry and Chemical Engineering
South Dakota School of Mines and Technology
501 East St. Joseph
Rapid City, SD  57701

Dear Dr. Winter:

At our last meeting the Committee reviewed your department’s five-year reevaluation report and asked me to write to you for additional information on certain aspects of your program. According to item 15a on page 4 of your five-year report form, teaching loads range up to 16 contact hours per week. The ACS guidelines specify that under no circumstance should teaching loads rise above 15 contact hours per week for any faculty member, and the Committee recommends considerably lower loads. Please complete the enclosed teaching load form for all courses taught by chemistry faculty, including temporary staff, for the 2002-03 academic year. An electronic version of the form can be found at:  http://center.acs.org/cpt/cpt_forms.html. The username is carbon14 and the password is radioactive.

According to the list provided with your report, your library maintains only 13 current chemistry journal subscriptions, and the list does not satisfy the topical distribution. The Committee would like for you to describe your plans to bring your library holdings up to the minimum requirement for ACS-approved schools.

The Committee commended the high level of external funding your department receives. However, external funds do not supplant the need for strong financial support from the institution. The Committee recommends that your administration discuss your current operating budget needs and the related infrastructure support that is required to operate a solid undergraduate chemistry program. The concerns that were identified with safety equipment, hoods, and ventilation in your laboratory facilities serve to limit the instructional and research activities of the chemistry. The Committee would be interested to know if you anticipate any improvements to the chemistry program’s financial situation in the near future.

The Committee was unable to determine the advanced course requirement for student certification. The information provided in Table II of your five-year report form does not correspond with the degree requirements that are listed in your catalog. Please identify how your certified students fulfill the advanced course requirement for certification by clearly indicating the number of credit hours that are required and the courses that may be selected as advanced work.
After reviewing the reports that you submitted, the Committee commented that the quality of the student research reports should be improved. Specifically, the Committee commented that the reports are not comprehensive and poster presentations are not acceptable substitutes for a written research report. The Committee suggested that you develop guidelines for students to follow when writing their reports and require more than initial drafts to be prepared with faculty review at each stage. The enclosed research report supplement outlines the Committee's expectations for written reports.

The Committee would appreciate receiving your response to the above questions by November 21 so that I may schedule this material for review at our next meeting. Thank you for your patience and cooperation during the reevaluation process. If you have any questions or comments, please feel free to contact me.

Sincerely,

Cathy A. Nelson
Secretary
Committee on Professional Training

CAN/daa

Enclosures (2)
Table IV. Teaching Loads. Please provide below the current teaching load (actual hours per week) for each faculty member involved in undergraduate instruction. Please list part-time, adjunct, and temporary faculty last and identify them with asterisks. Do not include graduate teaching assistants in this listing. If the average teaching load for your department is less than 12 contact hours per week, only complete Table IV for those individual faculty members with greater than 12 contact hours per week.

<table>
<thead>
<tr>
<th>Faculty Member</th>
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<th>3*</th>
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<th>2*</th>
<th>3*</th>
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3* Total of columns 1 and 2 for a grand total for each faculty member
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<th>Catalog Number and Course Title</th>
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</thead>
</table>

1* Number of class hours scheduled per week.
2* Number of contact hours of laboratory per week.
3* Total of columns 1 and 2 for a grand total for each faculty member.
GUIDELINES FOR PREPARING A RESEARCH REPORT

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty advisor. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Ideally, undergraduate research should focus on a well-defined project that stands a reasonable chance of completion in the time available. A literature survey alone is not a satisfactory research project. Neither is repetition of established procedures.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student. It is important to realize that science depends on precise transmission of facts and ideas. Preparation of a comprehensive written research report is an essential part of a valid research experience, and the student should be aware of this requirement at the outset of the project. Interim reports may also be required, usually at the termination of the quarter or semester. Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty advisor and corrected by the student at each stage.

Guidelines on how to prepare a professional-style research report are not routinely available. For this reason, the following information on report writing and format is provided to be helpful to undergraduate researchers and to faculty advisors.

Organization of the Research Report

Most scientific research reports, irrespective of the field, parallel the method of scientific reasoning. That is: the problem is defined, a hypothesis is created, experiments are devised to test the hypothesis, experiments are conducted, and conclusions are drawn. This framework is consistent with the following organization of a research report:

Title
Abstract
Introduction
Experimental Details or Theoretical Analysis
Results
Discussion
Conclusions and Summary
References

Title and Title Page

The title should reflect the content and emphasis of the project described in the report. It should be as short as possible and include essential key words.

The author’s name (e.g., Mary B. Chung) should follow the title on a separate line, followed by the author’s affiliation (e.g., Department of Chemistry, Central State College, Central, Arkansas, 67123), the date, and possibly the origin of the report (e.g., In partial fulfillment of a Senior Thesis Project under the supervision of Professor Danielle F. Green, June, 1997).

All of the above could appear on a single cover page. Acknowledgments and a table of contents can be added as preface pages if desired.
Abstract

The abstract should, in the briefest terms possible, describe the topic, the scope, the principal findings, and the conclusions. It should be written last to reflect accurately the content of the report. The length of abstracts vary but seldom exceed 200 words.

A primary objective of an abstract is to communicate to the reader the essence of the paper. The reader will then be the judge of whether to read the full report or not. Were the report to appear in the primary literature, the abstract would serve as a key source of indexing terms and key words to be used in information retrieval. Author abstracts are often published verbatim in Chemical Abstracts.

Introduction

"A good introduction is a clear statement of the problem or project and why you are studying it." (The ACS Style Guide. American Chemical Society, Washington, DC, 1986.)

The nature of the problem and why it is of interest should be conveyed in the opening paragraphs. This section should describe clearly but briefly the background information on the problem, what has been done before (with proper literature citations), and the objectives of the current project. A clear relationship between the current project and the scope and limitations of earlier work should be made so that the reasons for the project and the approach used will be understood.

Experimental Details or Theoretical Analysis

This section should describe what was actually done. It is a succinct exposition of the laboratory notebook, describing procedures, techniques, instrumentation, special precautions, and so on. It should be sufficiently detailed that other experienced researchers would be able to repeat the work and obtain comparable results.

In theoretical reports, this section would include sufficient theoretical or mathematical analysis to enable derivations and numerical results to be checked. Computer programs from the public domain should be cited. New computer programs should be described in outline form.

If the experimental section is lengthy and detailed, as in synthetic work, it can be placed at the end of the report or as an appendix so that it does not interrupt the conceptual flow of the report. Its placement will depend on the nature of the project and the discretion of the writer.

Results

In this section, relevant data, observations, and findings are summarized. Tabulation of data, equations, charts, and figures can be used effectively to present results clearly and concisely. Schemes to show reaction sequences may be used here or elsewhere in the report.

Discussion

The crux of the report is the analysis and interpretation of the results. What do the results mean? How do they relate to the objectives of the project? To what extent have they resolved the problem? Because the "Results" and "Discussion" sections are interrelated, they can often be combined as one section.
Conclusions and Summary

A separate section outlining the main conclusions of the project is appropriate if conclusions have not already been stated in the "Discussion" section. Directions for future work are also suitably expressed here.

A lengthy report, or one in which the findings are complex, usually benefits from a paragraph summarizing the main features of the report - the objectives, the findings, and the conclusions.

The last paragraph of text in manuscripts prepared for publication is customarily dedicated to acknowledgments. However, there is no rule about this, and research reports or senior theses frequently place acknowledgments following the title page.

References

Literature references should be collated at the end of the report and cited in one of the formats described in The ACS Style Guide or standard journals. Do not mix formats. All references should be checked against the original literature.

Preparing the Manuscript

The personal computer and word processing have made manuscript preparation and revision a great deal easier than it used to be. Students should have the opportunity to use a word processor and have access to graphics software which allows numerical data to be graphed, chemical structures to be drawn, and mathematical equations to be represented. These are essential tools of the technical writer. All manuscripts should routinely be checked for spelling (spellcheck programs are helpful), and all manuscripts should be carefully proofread before being submitted. Preliminary drafts should be edited by the faculty advisor before the report is presented in final form.

Two Useful Texts

Writing the Laboratory Notebook, Kanare, Howard M., American Chemical Society, Washington, DC, 1985.

This book describes among other things the reasons for notekeeping, organizing and writing the notebook with examples, and provides photographs from laboratory notebooks of famous scientists.


This volume is an invaluable writer's handbook in the field of chemistry. It contains a wealth of data on preparing any type of scientific report and is useful for both students and professional chemists. Every research laboratory should have a copy, and it should be as accessible as the Handbook of Chemistry and Physics. It gives pointers on the organization of a scientific paper, correct grammar and style, and accepted formats in citing chemical names, chemical symbols, units, and references. There are useful suggestions on constructing tables, preparing illustrations, using different type faces and type sizes, and giving oral presentations. In addition, there is a brief overview of the chemical literature, the way in which it is organized and how information is disseminated and retrieved. A list of other excellent guides to technical writing is also provided. See also The Basics of Technical Communicating. Cain, B. E.; ACS Professional Reference Book. American Chemical Society: Washington, DC: 1988.
December 02, 2002

American Chemical Society
Committee on Professional Training
1155 Sixteenth Street, N.W.
Washington, D.C. 20036

Attention: Cathy A. Nelson

Dear Ms. Nelson:

Enclosed are the materials for our 5-year accreditation review. Please find the following items.

- Accreditation Reevaluation Report Form and two copies
- Folder containing Addenda to the Accreditation Reevaluation Report Form
- Folder containing Addendum 10 – Biochemistry Materials
- Folder containing Addendum 11 – Student Research Reports/Presentations
- Folder containing selected Final Examinations
- Folder containing selected Course Syllabi
- Two (2) copies of the 2000-2001 SDSM&T undergraduate/graduate catalog
- Two (2) copies of the current SDSM&T undergraduate/graduate catalog

Thank you for your understanding and patience as the data was collected and these materials were prepared. Please accept my apologies for our misunderstanding in the timelines and some of the procedural steps.

If any clarification is needed or if additional information is required, please do not hesitate to contact me by any of the avenues given below.

Thank you again for your patience.

Sincerely yours,

M. Steven McDowell, Ph.D.
Associate Professor of Chemistry
Department of Chemistry and Chemical Engineering
South Dakota School of Mines and Technology
501 E. St. Joseph, Rapid City, SD 57701-3995
1-605-394-1229, 1-605-394-1232 (Fax)
Steve.McDowell@sdsmt.edu

501 EAST SAINT JOSEPH STREET • RAPID CITY, SD 57701-3995 • USA

*An Equal Opportunity and Affirmative Action Institution*
Dear Dr. McDowell:

Thank you for submitting your department’s 2001 five-year report to the ACS Committee on Professional Training. However, in preparing your report for review by the Committee, I feel the submission of some additional materials at this time will strengthen your report before the Committee first reviews it.

1. In question 1 on page 1 of the five-year report form you reported that the only degree offered by your program is a Bachelor’s degree. However, your program is listed in the ACS Directory of Graduate Research, which this office publishes, as having a Master’s program. Please clarify this discrepancy. If your department no longer has a Master’s program, please notify us in writing as soon as possible so that we remove your listing from the 2003 edition of the DGR prior to publication.

2. In question 15a on page 4 you reported that the teaching loads range from 5-16 contact hours per week with an average load of 10.15 hours. However, you did not report the teaching loads for faculty with greater than 12 contact hours per week as requested in Table IV. Please complete the enclosed forms.

3. There appear to be several differences between the list of required courses reported in Tables I and II on pages 5-7 of the five-year report form and the college catalog you submitted. Therefore, please verify that all courses listed in Table I and all courses listed in Table II as “Required Advanced Courses Used for Certification” are required to obtain an ACS certified degree from your program.

4. The total number of laboratory hours was not reported for CHEM 343 (Experimental Physical Chemistry I) and CHEM 435 (Experimental Instrumental Analysis). Please provide the total lab hours for each of these courses.

5. I noted that you did not appear to include course materials from all of your courses that do not use a standard textbook as requested in footnote 2 of Table I. Please submit final exams and syllabi, including lists of
experiments for lab courses, for the following courses: CHEM 113, CHEM 182, and CHEM 343.

6. Thank you for submitting the final exams for CHEM 420 and CHEM 482. However, the Committee also needs the syllabi for these courses.

Thank you for your cooperation. I would appreciate a response by February 26, 2003. If you have any questions or comments, please do not hesitate to contact me at 202-872-4599 or m_thompson@acs.org.

Sincerely,

[Signature]

Matt E. Thompson
Staff Associate
Office of Professional Training
Dr. Robb Winter, Chair
Department of Chemistry and Chemical Engineering
South Dakota School of Mines and Technology
501 East Saint Joseph Street
Rapid City, SD 57701-3995

Dear Dr. Winter:

Thank you for the February 24 email sent by Dr. McDowell informing us of the status of your graduate program. However, I have not yet received any of the additional information I requested concerning your department’s five-year reevaluation. A copy of my February 5 letter is enclosed.

Your five-year report will be reviewed at the Committee’s March meeting. Ms. Nelson will be back in touch with your department by late August concerning the Committee’s evaluation of your program at this month’s meeting.

If you have any questions, please feel free to contact me.

Sincerely,

M. E. Thompson
Staff Associate
Office of Professional Training

cc: Dr. M. Steven McDowell, Associate Professor

Enclosure
Table IV. Teaching Loads. Please provide below the current teaching load (actual hours per week) for each faculty member involved in undergraduate instruction. Please list part-time, adjunct, and temporary faculty last and identify them with asterisks. Do not include graduate teaching assistants in this listing. If the average teaching load for your department is less than 12 contact hours per week, only complete Table IV for those individual faculty members with greater than 12 contact hours per week.

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Integrated Core Material % Breakdown

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1. Total Hours refers to actual/total contact hours per term. Do not put in credit hours or contact hours per week.
2. If no textbook is listed, please send course syllabi and final examinations if given.
3. If course titles are ambiguous or if courses cover more than one core area, please apportion approximately those courses to the five areas: Analytical and Instrumental (A), Inorganic (I), Organic (O), Physical (P) and Biochemical (B).

Recommended Year
Table I, Con’t. List below all required courses in your chemistry CORE in the sequence suggested for certified students. Refer to pgs. 6-7 in the 1999 ACS guidelines for the ACS definition of CORE courses.

<table>
<thead>
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<th>Course Number</th>
<th>Course Title</th>
<th>Total Hours</th>
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</tbody>
</table>

1. Total Hours refers to actual/total contact hours per term. Do not put in credit hours or contact hours per week.
2. If no textbook is listed, please send course syllabi and final examinations if given.
3. If course titles are ambiguous or if courses cover more than one core area, please apportion approximately those courses to the five areas: Analytical and Instrumental (A), Inorganic (I), Organic (O), Physical (P) and Biochemical (B). If you use an integrated approach to cover core topics (classroom or lab work), please send course syllabi and examinations.

Recommended Year
2001 FIVE-YEAR REPORT TO THE
ACS COMMITTEE ON PROFESSIONAL TRAINING

Please remember that the information contained in this report should pertain only to your undergraduate program.

College or University ____________________________
South Dakota School of Mines & Technology

City, State, and Zip Code ____________________________
Rapid City, SD 57701

Report Prepared by (Name and Title) ________________
Dr. M.S. McDowell, Chair

Date Report Submitted ____________________________
December 1, 2002

Chemistry Department/Program Chair or Head __________
Name ____________________________
Dr. M.S. McDowell
Title ____________________________
Chair and Associate Professor of Chemistry

President or Principal Administrator of Institution __________
Name ____________________________
Dr. Richard Gowen
Title ____________________________
President

Note: Two significant figures are adequate for all numbers requested. Limits applying to certain items are given in parentheses. Please consult the enclosed guidelines booklet before filling out this report. A copy is also available at http://www.acs.org/education/cpt/guidelines.html

1. Degrees Offered in Chemistry (check those offered)
   Bachelor [ ]
   Master [ ]
   Ph.D. [ ]

2. Number of Calendar Weeks (Not Counting Final Exams)
   Semester ____________________________
   Quarter ____________________________
   4-1-4 [ ]
   Other ____________________________

3. Number of Students in Current Year
   Entire Campus 2423
   Chemistry Seniors 16
   Sum of Enrollments in All Chemistry Courses in the Fall Term 1164

4. Number of Chemistry Graduates (Five-year total)
   Went to:
   Chemistry Graduate School [ ]
   Medical School 2 [ ]
   Other Professional Schools [ ]
   Industry 1 [ ]
   Teaching [ ]
   Other/Unknown 5 [ ]
   TOTAL 11 [ ]
   Non-Certified 3 [ ]
   Certified 12 [ ]
   2 [ ]
   8 [ ]
   3 [ ]
   31 [ ]
5. Faculty:
   a. Number of Chemistry Faculty (If you have no faculty in a particular category, please record a "0" in the column for that category.)
   
<table>
<thead>
<tr>
<th></th>
<th>All Faculty</th>
<th>Male</th>
<th>Female</th>
<th>African American</th>
<th>American Indian</th>
<th>Asian American</th>
<th>Hispanic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-Time Total</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>With Ph.D.</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tenured</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tenure-Track</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Permanent Non-Tenure-Track</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
   
   | Part-Time Total      | 0           | 0    | 0      | 0                | 0               | 0              | 0        |
   | With Ph.D.           | 0           | 0    | 0      | 0                | 0               | 0              | 0        |
   | Tenured              | 0           | 0    | 0      | 0                | 0               | 0              | 0        |
   | Tenure-Track         | 0           | 0    | 0      | 0                | 0               | 0              | 0        |
   | Permanent Non-Tenure-Track | 0       | 0    | 0      | 0                | 0               | 0              | 0        |
   
   | Adjunct              | 0           | 0    | 0      | 0                | 0               | 0              | 0        |
   | Temporary            | 4           | 3    | 1      | 0                | 0               | 0              | 1        |

   b. Please check the minimum salary for each rank for chemistry faculty (nine months):

   
<table>
<thead>
<tr>
<th>Salary Range</th>
<th>Professor</th>
<th>Associate Professor</th>
<th>Assistant Professor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below $41K</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>$41 - $50K</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>$51 - $65K</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>$66 - $80K</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over $80K</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   c. Describe the sabbatical or professional leave program at your college/university.

   Please see addendum 5.c.

   Number of chemistry department sabbaticals or professional leaves in the last five years: Requested 1

6. Chemistry Expenditures (rough estimates - 2 significant figures):
   If your expenditures are over $60,000 per year, excluding internal and external grants, salaries, and library budget, please check here □ And go to item 7

<table>
<thead>
<tr>
<th>Expenditure Type</th>
<th>Current</th>
<th>Five-Year Annual Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Operating Expenditures Exclusive of Salaries</td>
<td>52.5K</td>
<td>55.7K</td>
</tr>
<tr>
<td>b. Maintenance, Repair</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Grants</td>
<td>1.7 million</td>
<td>400K</td>
</tr>
</tbody>
</table>

   d. Please comment, on a separate piece of paper, if your department has any serious funding problems.

   Please see addendum 6.d.
7. Support Staff:

Number Secretarial: 1.5
Number Stockroom: 2
Number Instrumental Technicians: 0
Number Other: 0

8. Library and Literature Access

a. Number of Chemistry Journal Subscriptions in Your Library:

*Fewer than 20  x  20-30  □  31-50  □  Over 50  □

*Attach list of titles and format of subscription (print, online) if fewer than 31.

b. Chemical Abstracts: hard copy  x  Online through SciFinder  □  Online through STN  x
Other Access (briefly specify): Online through DIALOG

i. Report the number of Chemical Abstract Searches per year or the expenditure for searches per year. Please see addendum 8

ii. Describe briefly how undergraduate students and faculty access titles and abstracts on a regular basis (offices, library, other). Please see addendum 8

c. Literature Access: How do students learn to use the chemical literature, print and electronic? (Check appropriate items)

Dedicated course in chemical literature  x
In research and/or independent study  x
Integrated in other chemistry courses  x

9. Safety:

a. Do all laboratories meet OSHA requirements regarding:

Safety Shower(s)  □ Yes  x No
Eye Wash(es)  □ Yes  x No
Fire Extinguisher(s)  x Yes  □ No
Adequate Hoods  □ Yes  x No
Adequate Ventilation  □ Yes  x No

b. Does the department/university have:

Established Safety Rules  x Yes  □ No
Emergency Reporting Procedures  □ Yes  □ No

C. Are there adequate facilities and arrangements for disposal of chemical waste?  □ Yes  x No

d. If no is checked for any of the above, please explain. If you need more room please include your response with item 10. Please see addendum 9b

e. How is lab safety taught to undergraduates (mark appropriate items)?

x Dedicated course in laboratory safety
x Introduction to all chemistry laboratories
x In research and/or independent study
Student participation in safety committees

Please also see addendum 9e.

10. Please submit syllabi and exams for all courses used to meet the new biochemistry requirement. Please see addendum 10
11. Undergraduate Research:
   a. If undergraduate research is used as one of your advanced courses for certification, please submit a
      sampling of the required, comprehensive research reports or theses (prepared by students),
      representative by discipline and faculty, with the grade the student received indicated on each.
      Number submitted 5. Should we return these reports? □ Yes ☑ No
   b. Participation in undergraduate research (all chemistry degree options) during the last five years.
      Number of Chemistry Students Involved 30; Faculty Involved 6

12. Please comment on the adequacy of the facilities and space available for the undergraduate chemistry
    program.
    Please see addendum 12

13. a. Indicate (with an X) the instrumentation and equipment used by your certified graduates.

   NMR Spectrometer ☑ Radiochemistry (including counting equip. and sources) □
   UV-Vis Spectrometer ☑ Atomic Absorption, Flame Emission ☑
   Gas Chromatograph ☑ Thermal Analysis Equipment □
   Liquid Chromatograph ☑ Gel Electrophoresis □
   IR Spectrometer ☑ Electrochemical Instrumentation ☑
   Mass Spectrometer ☑ GC-Mass Spectrometer ☑

   b. Please comment on the adequacy and condition of your equipment. If your institution does not grant a
      Ph.D. in chemistry, please include a list of functional major departmental instrumentation with make,
      model number, a year of acquisition.
      Please see addendum 13b

14. If your department is not listed in the ACS Directory of Graduate Research, please provide Faculty
    Personal History Record forms for all faculty members hired in the last five years and currently on your
    faculty. Also, if your department is not listed in the Directory, please provide a list of all faculty and
    student publications in the last five years.

15. Teaching Loads (classroom and laboratory):
   a. Contact hours/week:
      Range from 5 to 16; Average 10.15
   b. Are maximum and minimum teaching loads established as an institutional policy? ☑ Yes □ No
      If so explain briefly:
   c. Do teaching loads include time spent supervising undergraduate research? □ Yes ☑ No

16. Please outline and comment on (in as much detail as you wish) changes in last five years in faculty,
    facilities, support personnel, curriculum, capital, professional development and any other items related to
    your program that you believe would be of interest to CPT. We would be especially interested in
    any new programs you are about to undertake. Attach as many additional sheets as you wish.
    Also, SEND US TWO COMPLETE COPIES OF YOUR CURRENT COLLEGE CATALOG
Table I. List below all required courses in your chemistry CORE in the sequence suggested for certified students. Refer to pgs. 6-7 in the 1999 ACS guidelines for the ACS definition of CORE courses.

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Total Hours</th>
<th>Textbook and Author</th>
<th>%</th>
<th>Integrated Core material % Breakdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>112</td>
<td>General Chemistry I</td>
<td>45</td>
<td>General Chemistry: Essential Concepts Chang</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>113</td>
<td>General Chemistry I Lab</td>
<td>45</td>
<td>Handouts</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>114</td>
<td>General Chemistry II</td>
<td>45</td>
<td>Chemistry Chang</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>115</td>
<td>General Chemistry II Lab</td>
<td>45</td>
<td>General Chemistry Lab Manual - Fitzgerald</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>182</td>
<td>Chemical Computations</td>
<td>45</td>
<td>Quantitative Chemical Analysis - Harris</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>232</td>
<td>Analytical Chemistry I</td>
<td>45</td>
<td>Same as Chem 232</td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>233</td>
<td>Experimental Analytical Chemistry I</td>
<td>45</td>
<td>Inorganic Chemistry - Howecraft &amp; Sharpe</td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>252</td>
<td>Systematic Inorganic Chemistry</td>
<td>45</td>
<td>Organic Chemistry - Solomons</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>292</td>
<td>Chemistry Outreach</td>
<td></td>
<td>No text</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>293</td>
<td>Chemistry Seminar</td>
<td></td>
<td>No Text</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>326</td>
<td>Organic Chemistry I</td>
<td>45</td>
<td>Organic Chemistry - Solomons</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>327</td>
<td>Exp. Organic Chemistry I</td>
<td>90</td>
<td>Organic Experiments Fieser &amp; Williamson</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>328</td>
<td>Organic Chemistry II</td>
<td>45</td>
<td>Organic Chemistry - Solomons</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>329</td>
<td>Exp. Organic Chemistry II</td>
<td>90</td>
<td>Organic Experiments Fieser &amp; Williamson</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>342</td>
<td>Physical Chemistry I</td>
<td>45</td>
<td>Principles of Physical Chemistry - Raft</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>343</td>
<td>Exp. Physical Chemistry I</td>
<td></td>
<td>No Text</td>
<td>3</td>
<td>100</td>
</tr>
</tbody>
</table>

1. Total Hours refers to actual/total contact hours per term. Do not put in credit hours or contact hours per week.
2. If no textbook is listed, please send course syllabi and final examinations if given.
3. If course titles are ambiguous or if courses cover more than one core area, please apportion approximately those courses to the five areas: Analytical and Instrumental (A), Inorganic (I), Organic (O), Physical (P) and Biochemical (B).

If you use an integrated approach to cover core topics (classroom or lab work), please send course syllabi and examinations.

*Recommended Year
Table I, Con't. List below all required courses in your chemistry CORE in the sequence suggested for certified students. Refer to pgs. 6-7 in the 1999 ACS guidelines for the ACS definition of CORE courses.

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Total Hours</th>
<th>Textbook and Author</th>
<th>Integrated Core material % Breakdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>344</td>
<td>Physical Chemistry II</td>
<td>45</td>
<td>Principles of Physical Chemistry - Raft</td>
<td>3</td>
</tr>
<tr>
<td>370</td>
<td>Chemical Literature</td>
<td>45</td>
<td>How to Find Chemical Information - Mitzell</td>
<td>3</td>
</tr>
<tr>
<td>424</td>
<td>Spectrometric Methods of Analysis</td>
<td>45</td>
<td>Spectrometric Identification of Organic Compounds Silverstein &amp; Webster</td>
<td>4</td>
</tr>
<tr>
<td>434</td>
<td>Instrumental Analysis</td>
<td>45</td>
<td>Principles of Instrumental Analysis - Skoog, Holler &amp; Nieman</td>
<td>4</td>
</tr>
<tr>
<td>435</td>
<td>Exp. Instrumental Analysis</td>
<td></td>
<td>Chemistry Exp. for Instrumental Methods - Sawyer, Heineman, Beebe</td>
<td>4</td>
</tr>
<tr>
<td>452</td>
<td>Inorganic Chemistry</td>
<td>45</td>
<td>Inorganic Chemistry - Housecraft &amp; Sharpe</td>
<td>4</td>
</tr>
<tr>
<td>453</td>
<td>Exp. Inorganic Chemistry</td>
<td>45</td>
<td>Microscale Inorganic Chemistry Szafran, Pike</td>
<td>4</td>
</tr>
<tr>
<td>460</td>
<td>Biochemistry</td>
<td>45</td>
<td>Concepts in Biochemistry Boyer</td>
<td>4</td>
</tr>
<tr>
<td>493</td>
<td>Chemistry Seminar</td>
<td></td>
<td>No text</td>
<td>4</td>
</tr>
</tbody>
</table>

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3. If course titles are ambiguous or if courses cover more than one core area, please apportion approximately those courses to the five areas: Analytical and Instrumental (A), Inorganic (I), Organic (O), Physical (P) and Biochemical (B).

If you use an integrated approach to cover core topics (classroom or lab work), please send course syllabi and examinations.

*Recommended Year
Table II. ADVANCED Courses Used for Certification. List below only those courses in your chemistry program that fulfill the requirement of "six semester hours of advanced courses that include sufficient laboratory work to bring the total number of laboratory hours to 500" (pg. 7, 1999 ACS guidelines). Do not include ACS-defined CORE courses in this table.

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Total Hours</th>
<th>Textbook and Author</th>
<th>P Chem Prereq?</th>
</tr>
</thead>
<tbody>
<tr>
<td>420</td>
<td>Organic Chemistry II</td>
<td>45</td>
<td>Organic Chemistry by Solomons</td>
<td>N</td>
</tr>
<tr>
<td>480</td>
<td>Toxicology for Scientists and Engineers</td>
<td>45</td>
<td>Environmental Toxicology &amp; Chemistry by Donald Crosby</td>
<td>Y</td>
</tr>
<tr>
<td>426</td>
<td>Polymer Chemistry</td>
<td>45</td>
<td>Polymer Science &amp; Technology by R. Fried</td>
<td>Y</td>
</tr>
<tr>
<td>482</td>
<td>Environmental Chemistry</td>
<td>45</td>
<td>Environmental Chemistry by Colin Baird</td>
<td>N</td>
</tr>
</tbody>
</table>

Required ADVANCED courses used for certification

To be certified, students must select _____ courses or _____ credit hours from the below list

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Total Hours</th>
<th>Textbook and Author</th>
<th>P Chem Prereq?</th>
</tr>
</thead>
<tbody>
<tr>
<td>455</td>
<td>Advanced Inorganic Chemistry</td>
<td>45</td>
<td>Inorganic Chemistry by Miessler &amp; Taggart</td>
<td>Y</td>
</tr>
<tr>
<td>446</td>
<td>Industrial Organic Chemistry</td>
<td>45</td>
<td>No textbook</td>
<td>N</td>
</tr>
<tr>
<td>443</td>
<td>Heterocyclic Organic Chemistry</td>
<td>45</td>
<td>No textbook</td>
<td>N</td>
</tr>
<tr>
<td>641</td>
<td>Geochemistry</td>
<td>45</td>
<td>No textbook</td>
<td>Y</td>
</tr>
</tbody>
</table>

1. Total Hours refers to total contact hours per term. Do not put in credit hours or contact hours per week.
2. Please send your most recent syllabi and final examinations for all chemistry courses in Table II that do not have a physical chemistry prerequisite.
Table III. Cognate Courses (physics, mathematics, biology, and computer science) required for certified students.

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Total Hours</th>
<th>Department</th>
<th>Recommended Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>123</td>
<td>Calculus I</td>
<td>60</td>
<td>Mathematics</td>
<td>1</td>
</tr>
<tr>
<td>124</td>
<td>Calculus II</td>
<td>60</td>
<td>Mathematics</td>
<td>1</td>
</tr>
<tr>
<td>225</td>
<td>Calculus III</td>
<td>60</td>
<td>Mathematics</td>
<td>2</td>
</tr>
<tr>
<td>211</td>
<td>Physics I</td>
<td>60</td>
<td>Physics</td>
<td>1</td>
</tr>
<tr>
<td>213</td>
<td>Physics II</td>
<td>60</td>
<td>Physics</td>
<td>2</td>
</tr>
<tr>
<td>214</td>
<td>Physics II Lab</td>
<td>55</td>
<td>Physics</td>
<td>2</td>
</tr>
</tbody>
</table>
Table IV. Teaching Loads. Please provide below the current teaching load (actual hours per week) for each faculty member involved in undergraduate instruction. Please list part-time, adjunct, and temporary faculty last and identify them with asterisks. Do not include graduate teaching assistants in this listing. If the average teaching load for your department is less than 12 contact hours per week, only complete Table IV for those individual faculty members with greater than 12 contact hours per week.

<table>
<thead>
<tr>
<th>Faculty Member</th>
<th>Catalog Number and Course Title</th>
<th>1^*</th>
<th>2^*</th>
<th>3^*</th>
<th>Catalog Number and Course Title</th>
<th>1^*</th>
<th>2^*</th>
<th>3^*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

1^* Number of class hours scheduled per week.
2^* Number of contact hours of laboratory per week.
3^* Total of columns 1 and 2 for a grand total for each faculty member
Table IV. Teaching Loads. Please provide below the current teaching load (actual hours per week) for each faculty member involved in undergraduate instruction. Please list part-time, adjunct, and temporary faculty last and identify them with asterisks. Do not include graduate teaching assistants in this listing. If the average teaching load for your department is less than 12 contact hours per week, only complete Table IV for those individual faculty members with greater than 12 contact hours per week.

<table>
<thead>
<tr>
<th>Faculty Member</th>
<th>Catalog Number and Course Title</th>
<th>¹</th>
<th>²</th>
<th>³</th>
<th>Catalog Number and Course Title</th>
<th>¹</th>
<th>²</th>
<th>³</th>
</tr>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ Number of class hours scheduled per week.
² Number of contact hours of laboratory per week.
³ Total of columns 1 and 2 for a grand total for each faculty member
Addendum 16. Final Comments (Page 1 of)

Support Personnel

1.5 individuals (one full-time, one-half-time) handle the daily operation of the office. Their duties cover such assignments as preparation of course and examination materials, clerical matters, accounting, and coordination of department activities. Both positions are 9-month positions that cover the academic year. The full-time person also works an intermittent schedule during the summer months, usually coming to the office once or twice a week for most of the weeks during the summer. The office staff continue their development as employees by regularly attending workshops and tutorials on topics such as new software, accounting practices, and policies and procedures.

Two individuals maintain the operations of the laboratories and stockroom and their associated issues. A full-time Chemical Material Manager and a full-time Laboratory Storekeeper handle these operations. This year the latter position was just upgraded from a half-time position to a full-time position. Both positions are 12-month assignments.

Work-study students, usually 4 – 8 per semester, provide assistance to the stockroom personnel.

There is no specific instrument technician associated with the department. The Chemical Material Manager and the Laboratory Storekeeper handle minor repairs and routine maintenance on most of the basic equipment and minor instrumentation. Faculty members, particularly Dr. Heglund (Analytical Chemistry), have responsibility for the major instrumentation with respect to their continuous operation. In the event of major repair or maintenance, external trained service technicians are brought to campus for the repairs and maintenance. Several electronic technicians are present on campus and are available to assist with repairs and maintenance.
Addendum 16. Final Comments (Page 1 of )

Curriculum

- The South Dakota Board of Regents implemented a small section (7/10) policy regarding minimum enrollment in undergraduate and graduate courses.

Small Section Limitation

(http://www.sdbor.edu/policy/5_FinanceBusiness/5-17.doc)

Effective the Summer 1996 term no selected schedule type undergraduate and dual listed sections with fewer than 10 students and graduate sections with fewer than 7 students may be offered. Any exceptions to this policy must be authorized by the institutional President and justified to the Board each semester.

In no circumstances shall the annual exception limit be more than four percent of all state support selected schedule type sections effective the Summer 2000 term. The four percent exception limit is an annual average of Summer, Fall, and Spring terms.

Selected schedule types include: Discussion/Recitation; Seminar; Large Ensemble; Laboratory and Alternate Laboratory; Physical Education Activity; and Lecture Courses.

The impact of this policy has been the rescheduling of some required and elective upper level courses from an annual offering to a biennial offering. This new scheduling has not prevented any student from completing degree requirements by their intended graduation date.

- Chemical Computations (CHEM 182), a sophomore level course, was granted permanent course status after it was initially introduced as an experimental course. It is a required course in the ACS-Accredited B.S. in Chemistry curriculum.

CHEM 182 CHEMICAL COMPUTATIONS

(2-0) 2 credits. Prerequisite or corequisite: CHEM 114. Data acquisition and analysis, instrument interfacing, and chemical computations (including but not limited to molecular modeling, kinetic analysis, thermochemical calculations, and structure drawing.) This course may also be applicable to degrees other than chemistry. Students in other departments should consult their advisor.
Curriculum (continued)

- Chemistry Outreach (CHEM 292) was added to the curriculum and is a required course for the ACS-Accredited B.S. in Chemistry degree. The course must be taken a minimum of two times to satisfy this requirement.

**CHEM 292/292L CHEMISTRY OUTREACH**

(0.5-0.5) 1 credit. Prerequisite: CHEM 106L or CHEM 112L. This course affords students the opportunity to pursue individual chemistry demonstrations, projects, experiments, or presentations for community outreach in schools and organizations, including specific times such as National Chemistry Week. The course is repeatable for up to four total credits toward the B.S. in Chemistry.

- Chemistry Seminar (CHEM 290 and CHEM 490) was added to the curriculum and made a part of the requirements for the ACS-Accredited B.S. in Chemistry degree. At present, these two seminar courses meet concurrently with two presentations scheduled per meeting. The student presentations have occasionally been supplemented with seminars presented by faculty (internal and external to the department) and industrial speakers. All chemistry majors are required to enroll in one of the two seminar courses each semester.

**CHEM 290 CHEMISTRY SEMINAR**

(.5-0) .5 credits. Prerequisite: Freshman or sophomore standing in the chemistry curriculum. A seminar in which students will present library and laboratory research on current topics in chemistry. Repeatable for a maximum of two credits

**CHEM 490 SENIOR SEMINAR**

(.5-0) .5 credits. Prerequisite: Junior or senior standing in the chemistry curriculum. A seminar in which students will present library and laboratory research on current topics in chemistry. Repeatable for a maximum of two credits.

- A new service course was developed and added to the department’s course offerings. Fundamentals of Organic Chemistry (CHEM 316) was added to the curriculum in support of a new B.S. in Environmental Engineering degree. This course is not a requirement for the ACS-Accredited B.S. in Chemistry degree and cannot be used as an elective of any type for this degree.

**CHEM 316 FUNDAMENTALS OF ORGANIC CHEMISTRY**

(3-0) 3 credits. Prerequisite: CHEM 114. A one-semester introductory course in
organic chemistry. Functional classes of organic compounds are discussed in terms of characteristic functional group, properties, structure, nomenclature, synthesis, and reactivity.

- A track in biochemical engineering was initiated within the B.S. in Chemical Engineering degree. This effort is supported by an enhanced cooperation by the faculty members of the biology, chemistry, and chemical engineering programs. One aspect of this cooperation is an ongoing review of topics presented in the three principal courses that form this track – Industrial Microbiology (BIOL 431), Biochemistry (CHEM 460), and Fundamentals of Biochemical Engineering (CHE 484). The goal of this review is to minimize some repetition between the three courses without sacrificing the individual identities of each course.
Addendum 16. Final Comments (Page 1 of 2)

Capital

Department-based funding has remained nearly constant during the evaluation period. A summary of these funds is given below with an explanation of each category.

<table>
<thead>
<tr>
<th>AY</th>
<th>Dept Budget</th>
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<td>5000</td>
<td>8400</td>
<td>57400</td>
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<td>5000</td>
<td>8500</td>
<td>52500</td>
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</table>

Department budget: Annual distribution given to the department for its daily operation and regular expenses incurred during the academic year. Also includes funds for maintenance and repair.

Capital Equipment: Annual distribution of funds given to the department for acquisition of equipment. Funds most often spent on new not replacement computers for the department. Replacement computers are given to the faculty on a two to three year rotation.

Lab Fee: Annual collection of funds based upon fees paid by student enrolled in department laboratory courses.

During the review period, the department has acquired additional funds that support the department and its operation. These funds include federal funding such Title III and private funds such as Cargill.

The department has recently initiated a plan to develop and implement a major capital fundraising campaign specifically intended to improve the infrastructure of the department, with goals such as major equipment replacement (for example, NMR), student financial aid (for example scholarships and fellowships), building renovation and replacement.
Addendum 16. Final Comments (Page 1 of 2)

Major Professional Development Activities of Department Personnel

Arrington

- Authorware Workshop (2001)
- General Education Assessment Workshop (2002)

Boyles

- Vienna International Summer University, University of Vienna, First Vienna International Summer University, SWC: Scientific World Conceptions, Unity and Plurality in Science (2001)

Cranston

- M.S. in Chemistry
- HAZWOP Certification

McDowell

Addendum 12. Comments on Adequacy of Facilities and Available Space

Four classrooms are present in the Chemistry building and each one being equipped with a wall mounted Periodic Table. Three of the rooms are smaller in their capacity (maximum of 52 students) and one is a large lecture hall (maximum capacity is 176). Most of the lecture courses are taught in these classrooms, although on occasion, rooms elsewhere on campus are employed. These rooms lack a wall mounted Periodic Table. Requests have been made to have such an item installed in these rooms. Three of the four classrooms in the Chemistry building, including the large lecture hall that is frequently used for general, remedial, service, and organic chemistry courses, are equipped with multimedia stages (computer with CD/DVD, ELMO, VCR, overhead projector, Internet connection). The fourth room is scheduled for installation of same equipment in the next two years. Each room is equipped with demonstration benches fitted with water and gas plumbing.

Six teaching laboratories are available. Each is equipped with Periodic Table and modern safety equipment, including safety showers, eyewashes, fire extinguishers, fire blankets, and fume hoods. Each laboratory holds a manual containing MSDS documentation for the reagents and materials used in the experiments. Three of these laboratories are assigned to general chemistry and service related courses, such as nursing chemistry. Of the remaining three laboratories, one is dedicated to organic chemistry, a second is dedicated to analytical (both wet and instrumental), and the third is shared by inorganic, physical, and environmental chemistry. There is workspace in this last laboratory that is equipped for use by a wheelchair bound student. Each laboratory is fitted with at least two large fume hoods. Distilled and deionized water are not plumbed into these laboratories. The former is available from general access spigots located in the main hallways on each floor of the building. The latter is available from the stockroom.

Several rooms are dedicated to instrumentation. One room houses NMR and FTIR instrumentation. Another houses AA, GC-MS, ICP, and HPLC equipment. A third room houses the electronic spectrometer and high precision, analytical balances, and a prep area for FTIR samples. Smaller pieces of specialty equipment are housed in either teaching laboratories (e.g. TGA-DSC) or faculty research areas (voltammograph, sonication equipment).

A general stockroom area provides materials and equipment. In conjunction to the general issue area, there are three internal storage rooms and one external storage area. A glassblowing shop supports the stockroom activities. A glass saw and lathe are housed within this shop.

A general access computer bay with 10 computers is housed within the building. The room is maintained by SDSM&T’s Information Technology Services. Junior and senior level students may request outside door keys for after hour access to the building and this computer room. Keys to teaching and research laboratories are presently not issued to undergraduate students, including those engaged in undergraduate research.
Each faculty member has a private office and at least one small (1-2 person) research laboratory. Some have several such small labs. Several faculty members also share a large research laboratory, which was converted from a seventh teaching lab. Undergraduate research is conducted in the responsible faculty member's research area.

Overall, the space is just adequate for the needs of the undergraduate program, its students, and its faculty; however, the available space remaining in the building is quite limited and the building itself is very old and has many shortcomings. Newer and more modern infrastructure would enhance the efforts of the faculty both in the areas of teaching and research.

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<tr>
<th>Item</th>
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<tr>
<td>PTI Timemaster Time-resolved Spectrofluorometer</td>
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<td>TA Instruments SDT 2960 Simultaneous DSC-TGA</td>
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<td>BioAnalytical Systems CV-50 Voltammetric Analyzer</td>
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<tr>
<td>Bruker QE-300 Multinuclear Broad Band 300 MHz FT-NMR Spectrometer</td>
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<td>1991</td>
</tr>
<tr>
<td>BioRad FTS-40 FT-IR Spectrometer w/ microscope and multiple detectors (MCT and DTGS)</td>
<td>Very good</td>
<td>1993</td>
</tr>
<tr>
<td>BioRad FTS-40 FT-IR Spectrometer w/o microscope and multiple detectors (MCT and PbSe)</td>
<td>Very good</td>
<td>1993</td>
</tr>
<tr>
<td>HP 8452A Diode-Ray Electronic Spectrophotometer</td>
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<td>1990</td>
</tr>
<tr>
<td>HP 5890 Gas Chromatograph-HP 5970 Quadruple Mass Spectrometer (GC-MS)</td>
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</tr>
<tr>
<td>HP 6890 Gas Chromatograph</td>
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</tr>
<tr>
<td>HPLC: in-house hybrid instrument with Shimadzu 6-A pump and Hitachi UV/Visible detector</td>
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<td>Jarrell Ash AtomComp Series 800 Inductively Coupled Plasma Spectrometer</td>
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<td>? (donation in 2001)</td>
</tr>
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<td>Optical Technology Devices System 3 Spectrofluorometer</td>
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<td>ISCO 260D syringe pump</td>
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<td>1994</td>
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<tr>
<td>Ace Glass High Intensity 600-Watt Ultrasonic Processor with Sound Abatement Cabinet</td>
<td>Excellent</td>
<td>1994</td>
</tr>
<tr>
<td>Cary 14R Electronic Spectrophotometer with Near-IR capability</td>
<td>Good</td>
<td>?</td>
</tr>
</tbody>
</table>

Other Major Instrumentation Available on the Campus: X-Ray Diffraction - Qualitative Analysis and Quantitative (Modal) Analysis; Scanning Electron Microscope Transmission Electron Microscope(TEM); Scanning Transmission Electron Microscope STEM; Electron Microprobe; Fluid Inclusion Microthermometer; Atomic Force Microscope; Interfacial Force Microscope; Scanning Tunnel Microscope; Micro-Raman Spectrometer; Fiber and Polymer Analyzers; Mechanical Testing Instrument
Addendum 15b. Institutional Workload Policy

FACULTY WORKLOAD

POLICY

SDSM&T attempts to equalize the workload of each faculty member in the assigned responsibilities of teaching, research, scholarship and services. This policy was prepared in compliance with an agreement between the South Dakota Board of Regents and the Council on Higher Education.

PROCEDURES

1. Each department chair is responsible, with the concurrence of the Dean of the College and the Vice President, for the assignment of faculty workload for faculty members in the department. In the assignment of teaching workload, due regard will be given for the level, preparation, section size, number of credit hours and contact hours of courses taught.

2. The assignment of faculty teaching workload will be monitored through the SDSM&T faculty service report. The SDSM&T administration is responsible for the collection of data for the preparation of the faculty service report. The faculty service report will normally be prepared using the 10th day of class as the day of record for a particular semester. Not later than the publication of mid semester grades, the SDSM&T administration will publish the following summary data:

A. The summary list by departments of the average, median, high and low value of the data in the following categories:

1. Number of course preparations for each faculty member.
2. Section size.
3. Number of credit hours taught by each faculty member.
4. Number of contact hours taught by each faculty member.

B. The same data as in A, but for individual faculty members including an identification of faculty unit members.

3. Priority will be given to reducing the number of different class preparations and the number of contact hours assigned to each faculty. A goal shall be to assign no more than three different course preparations per semester averaged over the contract period.
Addendum 16. Final Comments (Page 1 of )

Faculty

Five individuals currently comprise the full-time tenure/tenure-track Chemistry faculty – Dr. Dale Arrington, tenured Professor of Chemistry (Inorganic); Dr. David Boyles, tenured Professor of Chemistry (Synthetic Medicinal); Dr. Daniel Heglund, tenure-track Assistant Professor of Chemistry (Analytical), Dr. Steven McDowell, tenured Associate Professor of Chemistry (Inorganic); and Dr. Scott Williams, tenure-track Assistant Professor of Chemistry (Physical). A sixth faculty position is unfilled and a search is currently under way to fill this position with person who holds a Ph.D. in Chemistry (or a related field, i.e., Material Science, Polymer Science). There are four individuals with temporary assignments who are assisting with instruction in the remedial and service Chemistry courses. This number of temporary teaching faculty is high; usually there are only two persons with this assignment.

Dr. Heglund will be reviewed for his promotion and tenure during AY 2002/03.

During the majority of the evaluation period, six individuals comprised the full-time tenure/tenure-track Chemistry faculty – the aforementioned Drs. Arrington, Boyles, Heglund, and McDowell along with Dr. John Bendler, Associate Professor of Chemistry (Theoretical/Computational) and Dr. Cathleen Webb, Associate Professor of Chemistry (Physical). Drs. Bendler and Webb both left the department at the end of AY 2000/01. Dr. Webb left for personal reasons (an opportunity to live and work closer to her husband and children became available) and Dr. Williams replaced her. Dr. Bendler left to join the U.S. Naval Academy. An offer was presented to him by the Academy that was difficult to refuse. The administration at SDSM&T made the available maximum offer to him to encourage him to stay at SDSM&T; however, this maximum offer remained short of the offer made by the Academy. Dr. Bendler’s former position is the open one that we are currently seeking to fill with a qualified individual.

Several individuals have served as department chair during the evaluation period. Dr. James Munro, Professor of Chemical Engineering, was chair at the beginning of the evaluation period. Dr. McDowell was appointed chair for AY 1998/99 and he served as chair for four years. Dr. Robb Winter, Professor of Chemical Engineering, was appointed chair for AY 2002/03. His tenure as chair is expected to run for at least three years.

Dr. Arrington currently holds the position of Chemistry program coordinator. He assumed this position, which was previously held by Dr. McDowell, when Dr. McDowell was appointed department chair.
Addendum 16. Final Comments (Page 1 of)

Facilities

The building that houses the department and the program is one that is approaching its 50th anniversary. The building is old and does not meet all the needs of the department. Most of the electrical and plumbing physical plant of the building consists of the original plant. The building was designed at a time when large pieces of instrumentation were not a consideration; consequently, most rooms are small and many of the rooms have had to be refitted and reconfigured to accommodate this equipment. The building is not fitted with central air and most of the air conditioning and climate control is lacking in amount and efficiency. Recently, several major improvements in the area of climate control have been made to key rooms - ones that hold equipment such as the NMR and FTIR instruments and lecture rooms. A new compressed air handling unit has been installed on the campus and it provides a steady, clean, and constant flow of air for the laboratories in the building. The distilled water preparation unit has been upgraded and a deionized water preparation unit has been installed.

ADA issues are not fully addressed within the building. Again, owing to the time when the building was conceived and erected, items such as a passenger elevator and handicapped access facilities were not installed. Only a small elevator is available to move freight but not passengers. Some work has been performed to upgrade the accessibility to the building. The ground floor of the building is accessible by handicapped and wheelchair bound individuals via an automated door. Entrance to the ground floor provides access to the major lecture hall in the building as well as two teaching laboratories. One of these laboratories has been fitted with a workspace that can accommodate a wheelchair bound student.

A flammable storage room was erected during the evaluation period. This room is external to the building and now holds the bulk containers of solvents and smaller bottles of flammables. This storage room alleviated the concern over the former mode of storage of these materials, which was to house them within the main stockroom areas in the building.

Three of the four classrooms in the Chemistry building, including the large lecture hall that is frequently used for general, remedial, service, and organic chemistry courses, have been equipped with multimedia stages (computer with CD/DVD, ELMO, VCR, overhead projector, Internet connection). The fourth room is scheduled for installation of same equipment in the next two years.

Overall, available space within the building is now very limited. The faculty and the equipment housed within the building have maximized the use of the space within the building. The Dean of the College of Materials Science and Engineering, who is responsible for space utilization within the Chemistry program, has recently began to use space in other campus buildings so that space needs of the department and its faculty are being met.
Addendum 5.c. Description of Sabbatical/Professional Leave Program (Page 1 of 2)

From South Dakota Board of Regents – Council of Higher Education Agreement

Article 21.6 (http://www.sdbor.edu/COHE_Agree_202000/xxi.htm)

21.6 SABBATICAL, FACULTY UNIT MEMBER IMPROVEMENT AND CAREER REDIRECTION LEAVES

A faculty unit member may be granted sabbatical leave after six (6) or more consecutive years of full-time employment in the system. A faculty unit member may be granted faculty unit member improvement or career redirection leave after three (3) consecutive years of full-time employment in the system. Approval for such leave will be contingent upon the faculty unit member presenting plans for formal study, research, or other experiences which are designed to improve the quality of service of the faculty unit member to the institution, to the Board and to the state of South Dakota. The number of all faculty unit member improvement, career redirection or sabbatical leaves granted by an institution during any fiscal year will not exceed five percent (5%) of the faculty unit members or one (1) FTE, whichever is greater, in any one year, unless additional awards are recommended by the president and approved by the Board. Sabbatical leave for nine (9) month faculty unit members will be for not more than two (2) semesters at one-half the salary which would have been paid had the faculty unit member been on full-time employment, or not more than one (1) semester at the full salary which would have been paid had the faculty unit member been on full-time employment.

Sabbatical leave for twelve (12) month faculty unit members will be for not more than twelve (12) months at one-half the salary which would have been paid on full-time employment, or not more than six (6) consecutive months at the full salary which would have been paid on full-time employment.

Faculty unit member improvement or career redirection leave for nine (9) month faculty unit members will be for not more than two (2) semesters at eight percent (8%) of the salary which would have been paid on full-time employment, for each full academic year of consecutive full-time service, up to a maximum of fifty percent (50%) of salary, or not more than one (1) semester at sixteen percent (16%) of the salary which would have been paid on full-time employment, for each full academic year of consecutive full-time service, up to a maximum of one hundred percent (100%) of salary, for each year of consecutive service.

Faculty unit member improvement or career redirection leaves for twelve (12) month faculty unit members will be for not more than twelve (12) months at eight percent (8%) of the salary which would have been paid on full-time employment, for each full year of consecutive full-time service, up to a maximum of fifty percent (50%) of salary, or not more than six (6) consecutive months at sixteen percent (16%) of the salary which would have been paid on full-time employment, for each full year of consecutive service up to a maximum of one hundred percent (100%) of salary.
Addendum 5.c. Description of Sabbatical/Professional Leave Program (Page 2 of 2)

All faculty unit members receiving faculty unit member improvement, career redirection, or sabbatical leave are required to return to the institution granting the leave for at least two (2) academic years of full-time service or to refund the full salary and institutional costs of fringe benefits received while on leave. If a faculty unit member returns, but fails to perform the full two (2) years return-to-service obligation, then the repayment obligation will be prorated. Any repayment obligation will be due in full one (1) calendar year after the end of the leave period or any subsequent, successive leave periods. Any repayment obligation which remains unpaid after falling due shall earn interest at a rate equal to the monthly average prime rate of interest offered by the First Bank system during the leave period plus two percentage points. Interest will be compounded semi-annually on all unpaid balances. A faculty unit member who cannot perform return-to-service obligations due to death or permanent and total disability or reduction in force will be released of all repayment obligations. Determination of whether a faculty unit member is to be considered disabled will be made by the Board.

All faculty unit members, upon return from faculty unit member improvement, career redirection, or sabbatical leave will be returned to their former positions or be assigned to positions of like nature and status and will be granted increment increases that were given during their leave. As noted in § 19.1(2)(H), for purposes of performance-based salary increases, absent more current documentation, faculty unit members who were on approved leave during the year being evaluated for purposes of determining salary increases will be presumed to have continued to serve at the levels and with the assignments recorded on their most recent evaluation documents. Documentation of relevant professional accomplishments during approved leaves taken during the previous calendar year must be considered if received by the last working day in January. They may be considered for merit increases as if they had served at the institution during such period. They will maintain tenure, insurance benefits, accumulated sick leave, and all other accrued benefits. If the faculty unit member is on less than fifty percent (50%) compensation, service for retirement is not accumulated during the period of such leave.

Nothing in this article will be construed to abrogate other provisions of this agreement which affect employment status.

The following criteria will be considered in selecting the candidates for faculty unit member improvement, career redirection or sabbatical leave:

1. The merit of the objectives as they relate to improving the instructional program and enhancing the professional growth of the application, and where other institutions are involved, evidence of acceptance of the faculty unit member's program or project by the institution offering the advanced study or research.
2. Years of experience in the system.
3. Previous leaves.
4. Distribution of applicants by academic area.
5. Anticipated program changes.

All grantees of faculty unit member improvement, career redirection or sabbatical leave will execute a promissory note with the Board which is consistent with the terms of this article.
Addendum 6.d. Comments on Serious Funding Problems

Three areas exist within the department that can be considered in need of significant funding enhancement. They are 1) monies to acquire and license chemistry related software such as structure drawing software and specialty computational software; 2) monies to support the library holdings, particularly journal subscriptions; and 3) monies for the repair, upgrading, and replacement of major instrumentation.

Regarding item 1 – Standard software such as text/word processing (e.g., Word), spreadsheet (e.g. Excel), presentation (e.g. PowerPoint), data storage (e.g. Access), computational (e.g. MathCad) is available to students via SDSM&T’s network services and is found on all computers distributed across the campus. Specialty software such as ChemWindows and HyperChem is available on a limited basis owing to the high cost of licensing (often as high as 1 K or 2 K) such software on SDSM&T’s network. This software is available to the students on selected computers that are housed within the chemistry department. During those semesters when CHEM 182 (Chemical Computations) is scheduled, the specialty software has been placed on the network so that students have ready and widespread access to the software; however, this did require licensing and did impact the operating budget for those years.

Regarding item 2 – The department is designated approximately 2 – 3 K for its annual budget intended for the acquisition of library materials (new texts, reference materials, new journals, etc.). This cost of the hard copy Chemical Abstracts comes from a different pool of money and does not impact this 2 – 3 K budget; however, three programs – Chemistry, Chemical Engineering, and Biology, share this money. After distribution of the 2 – 3 K among these three programs, there is little money available to the Chemistry program, especially in light of the high cost of library subscriptions. The funding is usually so limited that approximately 4 to 8 new or continued additions to the library holdings represent the annual Chemistry acquisitions. As such, the holdings of many annual reviews, proceedings, and journals are sporadic and are annually in danger of becoming more sporadic. Funds are needed for maintenance of current subscriptions and the acquisition of the fill-in materials to reduce or remove the “holes” in the library holdings.

Regarding item 3 – The department does not have a standing or designated budget for the issues associated with instrumentation, especially repair and maintenance. When the need has arisen for a major repair or upgrade, monies from several sources, including the annual operating budget, overhead, Title III funding, instrument user fees, and laboratory fees, are often pooled together to cover the cost. No instrumentation has been lost owing to the failure to acquire funding to maintain and repair; however, budgets are growing tighter and more limited. In anticipation of continued tighter funding for instrument related issues, the department has initiated a Capital Campaign intended to raise monies for many items, including a new building. Instrumentation is an integral part of this campaign, including the acquisition of funds to maintain, upgrade, and eventually replace older equipment and instrumentation.
Addendum 8. Library and Literature Access (page 1 of 2)

a. List of Active Titles and Format Subscription

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<th>Format</th>
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<tr>
<td>Analytical Chemistry</td>
<td>Print</td>
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<tr>
<td>Chemical &amp; Engineering News</td>
<td>Print</td>
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<td>Chemistry Innovation/CHEMTECH</td>
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<td>Print</td>
<td>Active</td>
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<td>Journal of Chemical Physics</td>
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<td>Journal of Colloid and Interface Science</td>
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<td>Scientific American</td>
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In addition to the active titles listed above, the library holds a number of journals with lengthy runs; however, most of these titles were terminated in the early to mid 1990’s with a few with early termination dates. The holdings are combination of hard copy and microfilm. Included titles are Chemical Communications, Dalton Transactions, Faraday Transactions, Inorganic Chemistry, Perkins Transactions, Chemical Reviews, Journal of Chromatography, Synthesis, and Tetrahedron Letters. The principal reason for termination was increased costs of subscription exceeding funds budgeted to the library.

Some faculty carry personal subscriptions for some of these terminated journals such as Inorganic Chemistry.

b. Chemical Abstracts

   Hard Copy – indices and full abstracts (active subscription)
   Online through STN
   Online through DIALOG

i. Regarding our course on Chemical Literature (CHEM 370), no lectures are presented per se on Chemical Abstracts. Students learn by doing assignments involving Chemical Abstracts and asking instructor or librarian for assistance as
Addendum 8. Library and Literature Access (page 1 of 2)

needed. About half of the 13 assignments given during the semester involved specific searches using Chemical Abstracts. Examples: finding abbreviation for journals, country of publication, frequency of publication, etc. Given title of articles, find authors, journal of publication, etc. References to patents in Chemical Abstracts (given a patent number, find the patent, authors, equivalent patent in another country, etc.) Use of Ring System Handbook (given name, find ring structure and numbering of atoms); Given the name of an organic group or radical, find the formula and vice versa. Given formula or name of an inorganic compound, find references to it in Chemical Abstracts for a given year. Demonstration of online searching is given by library staff during one class period and the cost of the search is covered by the department (approximately $250). Otherwise, online searching and expenditure of funds to cover the cost is restricted to personal use, i.e., faculty researchers and their grant money. Searching of Chemical Abstracts is still primarily a manual search. The library does not have exact numbers on the manual searches but notes that Chemical Abstracts is annually our heaviest use paper index.

ii. Manual searching of Chemical Abstracts is still student primary access to this reference. Faculty members employ a mix of manual and electronic searching of Chemical Abstracts with the former method being the more frequent one. Titles not available in the library or on-line are available through Interlibrary Loan with MINITEX as the first source of availability.
Addendum 9. Comments on Safety (page 1 of 2)

a. Safety showers are present in all teaching laboratories and large research laboratories and absent from individual (1-2 person) faculty research labs. Eyewashes are present in all teaching laboratories and large research laboratories and absent from individual (1-2 person) faculty research labs. Fire Extinguishers are present in all teaching laboratories, research laboratories, classrooms, and building hallways. Adequate hoods are present in all teaching laboratories with a ratio of approximately 1 hood per 10 persons in these laboratories. Draw is approximately 130 feet per minute; however, location of the hoods is sometimes not optimal owing the age of the building and the retrofitting of hoods into some of these laboratories. Hoods are present in most individual (1-2 person) faculty research labs with the installation of hoods in some of the laboratories without them planned for the near future. Adequate ventilation exists in consideration of the building and its antiquated ventilation system.

e. Experimental General Chemistry I (CHEM 112L) students are shown the ACS "Starting with Safety" video at the start of the course. Each laboratory experiment includes statements concerning the hazards, if any, of the chemicals used. Safety is reinforced by the laboratory teaching assistants.

Experimental General Chemistry II (CHEM 114L) students are given a thorough review of safety and proper laboratory procedure. During the course, students are quizzed repeatedly on safety and related matters, including MSDS, safety equipment, and situational response.

Note that CHEM 112L and 114L are prerequisites for higher-level laboratory courses and thereby provide a solid introduction on safety for these courses as well. This introduction is reinforced and supplemented in these courses via the course coordinator, laboratory teaching assistant, and the textbook content.

In Experimental Analytical Chemistry (CHEM 232L) and Experimental Instrumental Analysis (CHEM 434L), safety is reviewed and discussed during the first meeting of each laboratory. The CHEM 232L safety discussion is further enhanced by a specific safety lecture that is presented in the accompanying lecture course in Analytical Chemistry (CHEM 232).

In Experimental Organic Chemistry (CHEM 326L and 328L), students are given an introductory safety lecture at the beginning of the semester and a reading assignment on the safety chapter of the textbook. Safety hazards in individual experiments are noted in the pre-laboratory lectures given before each experiment throughout the semester.

Experimental Physical Chemistry (CHEM 343) dedicates the first laboratory period to the review of safety expectations and the operation and location of safety equipment found in the laboratory.
Addendum 9. Comments on Safety (page 2 of 2)

In Experimental Inorganic Chemistry (CHEM 452L), students are given continuous information on safety procedure during the course and are also required to investigate the handling and hazards of the materials with which they work by obtaining and then summarizing the data found in the material’s associated MSDS document.
Addendum 10. Biochemistry Materials

Please see separate folder.
Addendum 11. Undergraduate Research

Please see separate folder for the following materials.

a. Undergraduate Research Reports/Presentations – class standing of the student at the
time of report/presentation is given with student’s name

i. Martha Billingsley – Junior Chemistry major

Final report for her CHEM 400 project under direction of M. S. McDowell.
Represents Inorganic Chemistry. Final Grade: A.

ii. Jacob Colvin – Junior Chemical Engineering/Physics double major

Final presentation for his CHEM 400 project under direction of S. A. Williams.
Represents Physical Chemistry. Final Grade: A

iii. Lori Corth – Senior Chemistry major

Final report for one CHEM 400 project and final presentation for another CHEM
400 project under direction of D. L. Heglund. Represents Physical Chemistry.
Final Grade: A for both efforts

iv. Nicole Grove – Freshman Chemistry major

Final presentation for her CHEM 200 project under direction of M. S. McDowell.
Represents Inorganic Chemistry. Final Grade: A.

v. Celeste Mercado – Senior Chemistry major

Final presentation for her CHEM 400 project under direction of D. A. Boyles.
Represents Organic Chemistry. Final Grade: A.