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Chemistry Department Assessment
April, 2006

Executive Summary

The Chemistry Department continues to provide a well-balanced ACS-approved curriculum that serves chemistry majors, science majors and the general university population. The staff has increased the level of professional activity in recent years. The Department was heavily involved in the design of the new Keil Wing and now enjoys new general chemistry, organic, analytical, inorganic, research and biochemistry lab spaces. Many of our capital needs were met in the Barbara Deer Kuss Science Center Phase I project although the absence of a high-field FT NMR is a glaring omission in our program. Students in our classes are meeting course learning goals and our chemistry majors continue to prosper upon graduation. Our staffing remains minimally adequate but we are unable to participate fully on campus in the University curriculum. A recently-revised Mission Statement and Strategic Plan, along with this Assessment, will provide a roadmap for the Department to maintain what it does well and address improvements that have been identified.

Prelude

The general structure of most of this report will be an analysis, by topic below, of the questions:

- Where were we in 1997 (based on the 1997 Department Assessment)?
- Where are we now?
- Where do we wish to be?

The review of the department will include the topics:

- Facilities
- Staffing
- Students
- Curriculum
- Budget
- Alumni
- University connections (Admission, Advancement, Career Center, etc)

In the fall of 2004 the University engaged Dr. A. William Johnson who served as a consultant to the Department as we began the process of hiring a tenure-track replacement for Nelson Sartoris. Dr. Johnson’s report is attached as Appendix 1 and we make frequent reference to this in our comments below. In general, we found this visit to largely confirm what we already knew about ourselves. We agree with most of Dr. Johnson’s recommendations with the exception of some comments about curriculum revision.

Mission Statement and Learning Goals

The Mission Statement for the Chemistry Department was revised in 2004. It is:

“The mission of the Chemistry Department is to provide a challenging and supportive environment for students to learn chemical principles and laboratory skills, enhance their critical thinking and communication skills, and become responsible in their use of scientific knowledge.”
The Chemistry Department Learning Goals were drafted in 1997 and have not undergone any serious review or modification since then; they are still embraced by the staff. Appendix 2 shows a matrix of these learning goals and the various courses in which they are met.

The Chemistry Department has also constructed a Vision Statement that has been a guiding document for a variety of deliberations. This is a document that will undergo periodic review. It is attached as Appendix 3.

Facilities

In 1997 the Chemistry Department was housed entirely in the 1973 wing of the Science Center. The physical plant of these aging facilities was continuing to deteriorate. The Chemistry Department was fully engaged in the process of the building-wide program review that led to the design and construction of the new wing of the Barbara Deer Kuss Science Center (BDKSC). The Keil Wing of the BDKSC represents the three floors of new construction. Some limited renovation was possible in the two older wings of the BDKSC. Amil Anderson was one of two building shepherds that devoted countless hours of time over a period of three years.

In Spring 2003 the Chemistry Department moved all of the general chemistry, organic chemistry, analytical chemistry and inorganic chemistry labs from the third floor of the 1973 wing to the second floor of the Keil Wing. The biochemistry lab was similarly relocated to the third floor of the Keil Wing (to better work in concert with the molecular biology program). A new research lab is located adjacent to the organic labs. These new facilities represent state-of-the-art academic chemistry labs that beautifully combine form and function. These are safe, computer-rich, instrument-rich labs that are aesthetically pleasing to occupy and provide a useful stop on the campus tour for prospective students and their parents. The Chemistry Stockroom was also relocated to the second floor, in proximity to the new and old labs. Additionally, our three main classrooms are technology-rich and our smaller classroom was modestly renovated. Finally, as noted elsewhere below, part of the BDKSC budget was allocated for additional instrumentation and our needs were reasonably well met at the time (2004). We will highlight here the urgent and dramatic need for a high-field NMR spectrometer. This will be discussed further below in response to observations made by our consultant.

The joy of occupying the new Keil Wing has been muted by some engineering problems that have emerged. There were several problems with the hood system, particularly in the organic labs. The house vacuum system does not operate to the specifications outlined. Several steam lines have been replaced already and some electrical circuit boards have failed. It is not clear that the HVAC system at large is capable of maintaining an adequate balance of pressures in and out of the labs.

There has yet to be, almost two years after occupying the building any useful conversation with folks from Physical Plant about how the “building works.” We see the building, and its integrated safety components, as a tool and we need to know how the tool works and how it might malfunction so that we can respond quickly (if possible) and safely to any problems that occur. These conversations will be pursued.

Despite the clear upgrade to our program that the Keil Wing offers, we still face some considerable challenges. Indeed, the Chemistry Department realized no net square footage increase when the Keil Wing was built. The instrumentation lab (Room 247) in the 1973 wing is over-crowded and now houses the laser lab. The research lab (Room 249) is crowded and currently not optimally organized. The new stockroom is smaller and we use part of the old stockroom (third floor, shared with Biology) as a satellite storage area. Our main teaching classroom (Room 248) is still in need of a considerable "face-lift." Plans for that renovation were discussed with Donna Pickleshimer in 2004 but no action has been taken. Our 2004 consultant observed:
“The old laboratory teaching space (249) is cluttered, uninviting and out-of-date. There is inadequate space for equipment and its maintenance. The practice of commingling such space with research space (for Cline and Ellison) is ill advised. The research space for Hanson (257) is excellent. The fact that there is independent research space for only three faculty portends a major problem in attempting to recruit new research-active faculty for the department.”

Since the time that was written, Justin Houseknecht has replaced Nelson Sartoris (who was research inactive) and there is no good research space for Justin. Kristin Cline has moved her research projects to one of the benches in Room 255B, the lab spaces allocated to general chemistry, analytical chemistry, and inorganic chemistry. For the time being, this is a workable situation but hardly represents the intended use of that lab and enrollments in general chemistry and analytical chemistry could compromise the viability of this arrangement.

Overall, the Chemistry Department, in concert with other BDKSC departments, will continue to keep the need for "Phase II" of the Science Center renovation (i.e., a refurbishing of the 1966 and 1973 wings) on the physical plant agenda for the next decade. However, until that time (which we envision is many years hence) we feel a strong need to attend to some interim renovation steps. We expect that a modest renovation of old research space (Room 249) and the instrumentation lab (Room 247) may cost under $100,000 yet significantly improve these critical spaces. Further, we propose that the Science Library space be reviewed in light of the new electronic modes of accessing the chemical literature on-line and that that space be re-allocated to a better building-wide use. This discussion would need to occur in concert with all BDKSC occupants. The first step in this process will require a needs analysis within the Chemistry Department followed by an engineering analysis of the affected spaces. This will include an analysis of the current hood systems in Rooms 247 and 249.

Staffing

After fairly stable staffing throughout the 1980s, the decade of the 1990s saw an increase in FTE demand that led to nearly annual hiring of visiting professors and adjunct instructors to cover both sabbatical leaves and the need for additional FTE. The 1997 assessment articulated the need for additional staffing beyond the historical 5 FTE tenure-track lines.

Also, the 1990s saw a series of actions that led to additional tasks for the Lab Coordinator, including the shift to the semester calendar in 1995 that increased our lab time considerably and led to many additional lab preparations per week. The need for additional technical assistance in the department was articulated in 1997.

From 1997-2000 we hovered around 6.5 FTE with five tenured/tenure-track positions. The remaining FTEs were filled in the visiting persons (coupled with sabbatical leaves.) In 2000 we hired a second tenure-track organic chemist (Pete Hanson) who received tenure in 2005.

In 2003-2004 Nelson Sartoris began his first of (possibly up to) three years of reduced teaching load in a phase-out program. In fact, Nelson retired in the spring of 2005, after only two years of his three-year phase-out program. In 2005 the tenure-track line that Nelson vacated was renewed and Justin Houseknecht was hired. Simultaneously, and unexpectedly, Mark Ellison resigned his position in the spring of 2005 at the same time he was granted tenure. Ray Dudek was hired to replace Mark in a visiting position for 2005-2006 and has recently been appointed as a tenure-track candidate.

Currently, and likely in the near future, we will hover between 5.0 and 7.0 actual FTE (with 6.0 tenure-track lines) due to the on-going combinations of full- and part-year sabbatical leaves and the university’s
ability to replace absent FTE with visiting persons. At the low end of this range, we are barely able to staff the essential courses (and numbers of sections) demanded by the chemistry major program and our "service courses" for science majors, (i.e., Chem 121, Chem 162, Chem 201, Chem 302 and Chem 271). Some of this ability depends upon the university enrollment (which is dropping, although it is not clear that the numbers of science students is decreasing in a proportional sense.) When we have 6.5 FTE, we are able to teach sections of Chem 100. We have not been able to participate in WittSems (or Common Learning) for many, many years nor does our staffing allowing for any release-time based activity elsewhere on campus. Our 2004 consultant recommended expansion to 7.0 tenure/tenure-track FTE. The current staffing climate on campus makes expansion to 7.0 tenure/tenure-track lines unlikely.

We also note that our consultant strongly recommended that there be some mechanism by which faculty who are mentoring students in research labs receive some teaching credit. This is a long-standing issue that the University seems unable or unwilling to address. Further, he recommended that research-active and research-inactive faculty have different teaching loads.

Despite earlier requests to the Provost for more technical assistance (not just for Chemistry, but along with other departments in the sciences) the Department continues with only Dick York whose main tasks are now lab preparation and crisis-management. This leaves no time for a host of other activities that are essential to the long-term health of the department. Our consultant summarized our situation:

“The present single Laboratory Coordinator position, which occupied by a well prepared, experienced and significant contributor to the department’s program, can no long meet the increased departmental needs.”

The Provost invited another proposal from us in late 2004 but we have not yet responded to this.

In 2003, a “revision” of the department assistant configuration in the science building left us with fewer hours devoted to Chemistry for the combined Chemistry/Physics Department Assistant. Fortunately, Kay Reed’s ability to use time well and serve both the Chemistry and Physics department while oscillating back and forth between them in space has not created an environment where the department feels less served. Replacing Kay with a nominally-qualified person would likely render this situation unworkable.

The activity of the chemistry staff can be reviewed with respect to teaching, professional activity and committee service. Profiles of each staff member are included in Appendix 4.

The level of professional activity in the department has increased in the past five years as compared to the decades of the 80s and 90s. Appendix 5 shows list of faculty and faculty-student publications and presentations. Appendix 6 shows lists of students who have been mentored by faculty in academic year and summer research projects. Appendix 7 shows lists of meetings and workshops attended, grants, and other measures of professional activity.

The Department should encourage and support faculty and staff to attend off-campus meetings, conferences and presentations that make the Wittenberg Chemistry Department known more at the regional and national levels.

Appendix 8 lists of committee service on campus. The Department believes that is it making a reasonable and proportionate contribution to faculty governance.

Appendices 9 and 10 list grants and other funding procured by members of the Chemistry Department and Other Professional Activities.
Ultimately, the measure of the teaching in the Department is and should be evaluated in light of what students learn, how they perform in various assessments and how their post-Wittenberg activities are supported by their experience here. In general, as noted above, we believe that most indicators are positive in these areas. Another local mode of assessment is the use of student evaluations. While it may be philosophically possible to disconnect evaluations from the “success” of a course in practice, we, like most teachers, would be uneasy with poor student evaluations even in the context of other measures indicating that the students had learned chemistry. Clearly, unpopular courses and unpopular teachers will have a deleterious effect on a program. The university has recently adopted the IDEA evaluation system and the chemistry staff is slowly adapting to this new methodology of evaluation. Only in the Fall of 2005 did we get useful comparative information about students reviews of teaching on campus. These evaluations represented a wide range of responses indicated both excellent teaching and very poor feedback from students. The staff has discussed this extensively. We note that in 2005-2006 we have three new teachers on staff; student feedback indicates that they (and others) will need to make some adjustments to their courses. The Department goal is to exhibit excellence in teaching, reflected by student feedback that indicate "absolute measures" of teaching quality that are strong as well as on-campus comparative evaluations indicating average or above-average student evaluations.

Students: Chemistry Majors and Students Taking Service Courses

The report, “Ambitious for the Place,” (Tom Taylor and Tim Bennett, 2004) documents what we have known for years: students who select Chemistry as a major are generally more capable (as measured by SAT/ACT scores and the like). Thus, as in many years past, we recognize that our graduates are destined to do well as they leave Wittenberg. We have many reasons to believe that their experience as chemistry majors represents a “value-added” education, so that their talents combined with our curriculum almost always produces a successful graduate.  

In 1997 we reported the results of a major survey of our graduates that validated what we had come to believe based on anecdotal reports over several decades: our graduates largely applaud our curriculum and make special note of the value of seminar program. Placement rates into graduate schools, medical school, and jobs are extraordinarily high. Anecdotal evidence in the past decade seems to largely confirm these earlier conclusions.

The number of chemistry majors fluctuates from year-to-year; for the years 1997-2005 the average was 10. The gender balance is 66% male and 34% female. (The 2003 national averages for chemistry majors are 50% male and 50% female.) The Department makes conscious efforts not to have any features associated with “chilly climate” issues that have traditionally dissuaded women from entering the physical sciences. With Kristin Cline being the only female faculty member, the gender balance in the faculty does not reflect the gender balance in the chemistry profession overall. However, we hope that the male faculty members avoid any behaviors or attitudes that might discourage women from selecting a chemistry major and, over the years, we have no evidence that any such behavior is occurring.

In an unusual display of data-sharing, the Admission office distributed a report, “Three-Year Comparison of Primary Career Goals (Science).” This report listed (by science subdiscipline) the number of prospects, applicants, acceptances and deposits for the years 2003-2005. In chemistry, the numbers of students indicating an interest in a chemistry major who attended Wittenberg were 7, 11 and 9. The

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1 We note with some distress that the current group of juniors and seniors, not generally included in this report, seem unusually irresponsible and unmotivated and we expect our “placement rate at graduation” to suffer as a result. It seems unlikely that this has anything to do with our program per se, but rather changes in the cohorts of students that are coming to campus and selecting chemistry as a major. Whether this is a new trend or an aberration remains to be seen.

2 http://www.chemistry.org/portal/resources/ACS/ACSCContent/industry/chementerprise2015/ce2015_socedbackground.pdf
average (9) of these numbers is close to the average number of majors we graduate each year. Since we know that some chemistry majors didn't intend to major in chemistry when they arrived on campus, we assume that about as many decide not to major in chemistry (despite their initial intention) as those who elect chemistry yet had another initial intention. (The numbers 9 and 10 are too close to assume that we really gain more than we lose.)

These data led to a survey in the Spring of 2005 that asked our current chemistry majors 1) why they choose chemistry, 2) how they would suggest "recruiting" chemistry majors, and 3) why they think other folks are discouraged from selecting chemistry. The raw answers are in Appendix 11. A synopsis of the answers is:

1. Why did you choose to major in chemistry?”

   Students choose chemistry for one, or more, of three reasons:
   It is practical, (for jobs, medical school, etc.) (It is a means to an end.)
   It is intrinsically interesting.
   The smaller, more-friendly and student-focussed department is appealing to them.

2. “How would you suggest that we invite more students to consider majoring in chemistry?”

   Explain more in early classes about the value of the major in getting a job, getting into medical school, or into graduate school.

3. “Why do you think more student don’t major in chemistry?”

   Chemistry is hard. The workload for a chemistry major is high. Some students had a poor experience with chemistry in high school.

The Department continues to discuss ways, primarily in Chem 121 and Chem 162, to systematically "advertise" the value and benefits of selecting chemistry as a major at Wittenberg. We have no interest in recruiting students whose attitudes and skills will pre-destine an unsavory experience as a chemistry major but we believe that for talented and interested students, a chemistry major is a wonderful academic option that is both intrinsically engaging and an excellent preparation for many post-graduation options.

The ranks of chemistry majors have, over the years, contained few minority students. As with women, we hope and believe that this is a result of factors beyond our control and strive to avoid any circumstances that might discourage minority students from selecting chemistry as a major. The minority students who have selected chemistry have become alumni with whom we stay in contact and who have also succeeded handsomely. In 2005, Kristin Cline met with Forest Wortham and two female, black chemistry majors to discuss these issues. A report on that meeting is attached as Appendix 12.

Alumni records from the time during 1997-2005 reveal the following statistics:
Total Chemistry majors graduating | 86
Average class size (range = 7 – 14) | 10
Percent with jobs or medical/graduate school at the time of graduation | 97%
Percent with jobs | 37%
Percent to graduate school | 30%
Percent to medical school | 28%
Other* | 2%
Uncertain post-graduate destination** | 2%
Percent applying to medical school who were accepted | 100%
Percent applying to graduate school who were accepted | 100%

Research project at Witt | 59%
Research project at another academic institution | 24%
Internship in an industrial lab | 10%
Overall (non-additive since some students did more than one of these) | 74%
Percent of student who presented or co-authored a paper or presentation (2002-2005) | 35%

*One to MBA school, one to law school, one to MFA in Scenic Design.
** These three students were seeking employment as chemists. We have no definitive information about their status, although we considered them “employable.”

In terms of assessment, the data above (97-100% placement rate) indicates that the value of majoring in chemistry at Wittenberg is exceedingly high. The rigor of our program and the quality of the students who select the chemistry major are likely the two most important factors in this happy situation.

A complete list of the post-graduate activities of Chem majors during 1995-2005 is give in Appendix 13.

Another measure of student academic success is performance on the GRE. It is not required that all graduates take the GRE, and some take only the three general sections. Thus, this data may not be representative of all chemistry majors.

**GRE Scores for Chemistry Majors, 1993-2005**

<table>
<thead>
<tr>
<th>Section</th>
<th>Average Percentile</th>
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<tbody>
<tr>
<td>Verbal</td>
<td>60</td>
</tr>
<tr>
<td>Quantitative</td>
<td>70</td>
</tr>
<tr>
<td>Analytical</td>
<td>70</td>
</tr>
<tr>
<td>Chemistry</td>
<td>42 (overall)</td>
</tr>
<tr>
<td>Chemistry</td>
<td>55 (students who went to graduate school)</td>
</tr>
<tr>
<td>Chemistry</td>
<td>55 (students who took the ACS/BS degree)</td>
</tr>
</tbody>
</table>

Not unexpectedly, chemistry majors would score well in the Quantitative and Analytical sections. The above-average score in the Verbal are is likely somewhat correlated with having taken their undergraduate degree at a liberal arts college with a reasonable focus on writing skills. The Chemistry results are slight below average (42nd percentile). We note that the spread of this data (not shown) is quite large with some students scoring above the 90th percentile and some in the 20th percentile. Overall, though, we have a 100% placement rate for students into chemistry graduate programs.

Appendix 14 lists the professional schools and graduate schools attended by our graduates of the years 2001-2005. These include some of the very top programs in the country.
Other evidence that we are fostering an environment that promotes student learning is seen in the results of classes that are administered standardized exams published by the Examinations Institute of the Division of Chemical Education of the American Chemical Society. Exam results from the general chemistry classes, organic classes, physical chemistry classes and inorganic chemistry classes indicate that our students regularly score at or above the national averages on these exams.

ACS Exam Results*

<table>
<thead>
<tr>
<th>Course</th>
<th>Year</th>
<th>Topic</th>
<th>ACS Exam</th>
<th>Percentile</th>
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<tr>
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<tr>
<td>121</td>
<td>2002</td>
<td>Intro</td>
<td>2000 First Term</td>
<td>50&lt;sup&gt;th&lt;/sup&gt;</td>
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<tr>
<td>162</td>
<td>2004(ME)</td>
<td>Sec Term, 2002</td>
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<td>162</td>
<td>2003</td>
<td>Intro</td>
<td>1998 Second Term</td>
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<td>162</td>
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<td>281</td>
<td>2000</td>
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<td>Analyt 1994</td>
<td>77&lt;sup&gt;th&lt;/sup&gt;</td>
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<td>281</td>
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<td>Analyt 2001</td>
<td>68&lt;sup&gt;th&lt;/sup&gt;</td>
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<td>281</td>
<td>2002</td>
<td>Analyt</td>
<td>Analyt 2001</td>
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<td>302</td>
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*Note also that these exams have been administered occasionally in courses while the exams are in the process of field testing. Dave Finster has served on six ACS committees and frequently engages Wittenberg general chemistry classes in norming the exams. Inherently, we cannot get exams norms from these field tests. For these many occasions it is not helpful to record class averages since normative comparisons cannot be made.

** Insufficient database for norming.

Several factors can influence the interpretation of these results. 1) Our students, on average, are probably at least as talented and perhaps slightly more talented than the national cohort of students taking these exams. (Witt students have an average ACT of 21; the national average is 21. Witt students have a verbal SAT average of 510; the national average is 510. Witt students have a math SAT average of 630;
the national average is 520.) Thus, we would expect to perform at least near the national average, or slightly above. 2) Our students are not trained to take multiple-choice exams in chemistry since such exams are absent from the courses in the department. This might lower the average we might otherwise expect. 3) The ACS exams can only assess the most "simple" forms of knowledge of recall/recognition, fairly rudimentary problem-solving (which can frequently be little more than "algorithm memorizing") or fairly simple analysis of understanding theories and their applications. While the Chemistry department embraces these learning goals, we also encourage much higher order thinking skills in our curriculum (appropriate at various levels of the curriculum), we foster an environment that encourage writing and thinking skills, we stress lab skills and lab report analysis/writing skills, chemical safety, and some appreciation of chemistry and science in our society. None of these latter issues appear on ACS exams. Since we are devoting time to these issues (rather than devoting more time to "basic knowledge and skills") we might expect a slightly lower performance on ACS exams as compared to the national cohort. All of these confounding factors lead to humility in interpreting the results. At the very least, though, results from these standardizes exams confirm that our students are learning at least the "mainstream" of chemical knowledge as determined by the community of nationwide chemical educators.

The Chemistry Club has resuscitated itself in recent years. The existence of this student group seems highly dependent upon having a few students who are interested in such an organization. (Officers in this group have always been women; our male chemistry majors universally display little interest in this manifesting of "community.") The Department should continue to support this group by supplying an energized advisor, helping develop projects and activities, and, it would seem, encouraging more female chemistry majors.

We note, finally, that in the Fall of 2005 we had a very useful and interesting discussion with the Chem 300/400 students about the Chemistry Department Mission Statement and the Strategic Plan. The found these documents to be reasonable and it was interesting to hear them reflect upon their own views of how they see the Department attempting to fulfill its Mission Statement. It may be worthwhile to plan to have this discussion annually (perhaps only with Juniors) or bi-annually with both the "current crop" of Juniors and Seniors to help them better see how the Department works as well as supply feedback to us about the chemistry major program and the Department.

**Curriculum**

In 1997, the Department had experienced the new semester curriculum for only a few years. The change from the term system had been primarily a “mechanical” switch from one calendar to another, involving little change in the course catalog in terms of the course taught in the Department. However, there was a significant change in the laboratory portion of all courses under the semester calendar. Almost all lab courses expanded from 10 weeks of lab per course to 13-15 weeks of lab per course. This allowed for considerable enrichment of the lab programs for these courses.

Since 1997 there has been relatively little change in our course offerings. We continue to offer the ACS-certified degree (having completed a five-year review in 2002). However, each course in the department continues to evolve and change as various teachers adapt new pedagogies and alter content. Several different sections of Chem 100 have been offered in recent years. Mark Ellison and Amil Anderson have taught topics courses. Dave Finster, Pete Hanson and Richard York have attended several workshops on the inclusion of computational chemistry throughout our curriculum. As a result, we are purchasing an annual site license for a very powerful computational chemistry package (CAChé) and this is seeing using in several courses in the curriculum from Chem 121 through the advanced courses. The department purchased three copies of Odyssey, another computational chemistry package specifically designed for classroom use. This has been used primarily in Chem 121 so far.
Currently, all Chem 100 sections are "N" courses. We agree with our consultant's recommendation that Chem 100 course should include some laboratory exercises. Our SCE Dean, Paul Parlato, has also expressed an interest in seeing Chem 100 as a “B” course to serve SCE students. Some sections make brief visits to the lab, but for far less than the minimum 20 hours required for General Education "B" status. We will continue to explore this possibility. It is worthwhile to note that the Keil Wing chemistry labs were not designed with the curriculum option in mind. Finding the time and space for Chem 100 labs is not trivial and we point out that this would further exacerbate the already-pressing demands on Dick York.

Enrollment in some upper-level courses has fluctuated considerably in recent years, sometimes leaving these at precariously low enrollments in a climate where such courses get cancelled. The need to offer these courses for ACS certification has helped us maintain their annual presence in the curriculum. And, the sequential nature of our curriculum argues against quickly deciding to offer low-enrollment courses on a biannual basis. This decision will need to be monitored. If curriculum paths involving alternate-year offerings can still fit reasonably into student’s schedules, this may a change worth considering. Chem 321, 352 and 382 are likely candidates for alternate-year scheduling.

The field of chemical education, nationwide, is undergoing some significant changes in pedagogy. The chemical education literature is replete with articles about cooperative and collaborative learning, non-lecture pedagogy and many thoughtful analyses of student learning styles and cognitive development issues. The chemistry faculty at Wittenberg primarily use the lecture method in chemistry, albeit a more interactive style than is usually possible in very large classes. Our curriculum is also fairly “standard” in terms of the small constellation of courses we are able to offer. For years we have thought about changes to the general chemistry courses and associated labs but have felt un compelled to change what appears to be working fairly well. Recently, the two-cycle organic curriculum has been re-thought (with the departure of Nelson Sartoris, who fathered this system at Wittenberg) and we expect some change in the organic curriculum in the near future. How this change dovetails with, or changes, the rest of the curriculum remains to be seen.

Changes to the licensure process for teaching chemistry in public schools in Ohio in 2002 led to a necessary revision of the local requirements for licensure. This process in started in 2003 but has not yet been completed; i.e., for the past three years Wittenberg has not had in place a program to allow students to become licensed to teach chemistry in Ohio. The Chemistry Department has completed what it understand we need to do; we have been waiting on the Education Department (for years) to help nurture along this process to completion. Fortunately (?), we have not had students recently who have elected to pursue this career goal. We will continue to contact the Education Department with the hope of more cooperation.

The Chemistry Department supports the BMB program by contributing two courses (Chem 271 and Chem 372) to the BMB curriculum. A few years ago the lab component of the biochemistry courses was changed from Chem 271 to Chem 372. The Department continues to support the BMB program not only through these courses but also in the form of having Amil Anderson and Pete Hanson participate as BMB faculty by serving on the BMB Program committee. Amil Anderson has also taught the BMB 400 course every other year. The Department recommended to the Provost in February 2004 that a BMB consultant be engaged that the BMB program conduct an Assessment.

**Budget**

The operating budgets for the Chemistry Department have remained relatively constant over the past several years, with the exception of a decrease a few years ago. Given inflationary increases in our costs, a more research-active faculty, and the addition of one tenure-track line these flat or downward trends are
not sustainable. While we are not experiencing any serious operating budget issues, we would like to return to at least inflationary increases as the University budget stabilizes. An item of particular importance in this regard is our annual site license for CACHe at a cost of $4000/year. This is substantial and represents a new annual cost that necessarily displaces other purchases from our operating budget.

For many years we had a significant "capital needs" list that annually experienced deletions and additions as new instruments were purchased and other needs arose. This capital needs list was handsomely addressed upon completion of Phase I BDKSC project, with the exception of the need to acquire a high-field FT NMR costing $300,000-$500,000. Conversations with NSF grant officers have not produced promising comments with regard to acquiring this instrument through an NSF grant at this time. All of the schools in our recruiting cohort have a high-field NMR; some are likely replacing earlier versions already. Our consultant, in 2004, noted:

"The University should plan for the addition of a high-field NMR instrument as quickly as possible."

We are concerned (as will be noted below) that connections with the Advancement office have been essentially severed with the high turnover of staff in that area, including the Vice President. It seems a certainty now that the only means of acquiring an NMR would be through a gift.

Another instrument on the list, representing a less dramatic need, is a Raman spectrometer (costing $20,000-$30,000).

We also note that new computers dribble into the department as new faculty arrive but there otherwise seems to be no campus-wide plan for replacing computers on a regular schedule. Many computers in the Chemistry Department that are connected to instruments are very old and use operating systems that prevent appropriate software updates. The Department also uses MacIntosh computers in several faculty offices but support for these hovers between limited and inadequate.

We will continue to monitor our capital needs list and communicate this with the appropriate offices on campus.

Alumni

The relatively small numbers of chemistry majors each year allows for most faculty and most majors to get to know one another fairly well. Most of us see most majors in more than one class over the course of four years. Thus, over many years, we have built strong ties with many alumni. They provide us with leads for internships and post-graduation jobs and we have built a strong network of connections at companies such as Lilly and Proctor & Gamble. Each year, Alumni Career Day is a special event for the Department.

Of particular note is the host of alumni connections maintained by Nelson Sartoris. He and Dave Finster were able to raise $38,000 in 2000 to provide matching money for the NSF NMR grant by selectively contacting a handful of alumni. The time may be soon when we can again contact our alumni to support us in some special project.

Nelson Sartoris' departure from the faculty represents a significant loss in terms of alumni contact. The Department needs to consciously re-build some relationships that will otherwise fade.
During Fall 2005, the Chemistry Department contemplated constructing an “alumni advising panel” that would serve to provide feedback and advice to the department regarding various issues. This would also provide a strong connection to the department for those alumni.

The Department is continuing to discuss how best (and how much it can) interact with alumni to serve their needs and ours.

**University connections (Admission, Advancement, CD&P, etc)**

The Chemistry Department has worked with other administrative offices on campus to attain common goals.

We biannually invite all of the Admission staff to meet with all of us so that they can know who we are and how we view our program. We work regularly with Admission staff to meet with prospective students and give occasional tours for prospective students and high school guidance counselors. Dave Finster has participated in many faculty panels for prospective students and their parents.

Nelson Sartoris has worked with the Advancement office to nurture some very important donor relationships (some of whom are alumni, some not). One dramatic example of this effort is the donation of over $150,000 by Virginia Franta. Dave Finster and the rest of the Chemistry staff worked with the Advancement office in Spring 2004 to organize and host (along with other science departments) a very successful Benjamin Prince Day on campus.

In the spring of 2005, we coordinated with the Advancement office to host a retirement celebration for Nelson Sartoris. Approximately 50 alumni attended a wonderful celebration of Nelson’s career. At that time we also announced the new *Nelson and Mary Lou Sartoris Fund*. In early 2006, this has collected slightly over $10,000.

In Fall 2005, thanks to Bob White, the Chemistry Department participated in hosting Ted Thompson and his wife who came to campus for Homecoming. Ted indicated to us an interest in supporting the Chemistry program at Wittenberg.

However, the Advancement office has seen a high turnover rate in the past two years and many of the folks with whom we have worked are now gone. Without connections to that office it seems unlikely that they will be able to help us forward our agenda in ways that they can. It is our hope that we can re-build new connections help Advancement articulate our needs to potential donors and benefactors.

The Department maintains regular contact with the Career Services office to allow annual exposure to the juniors and seniors (through Chem 300/400) and to monitor the placement activity of our seniors.

**Finale**

We conclude this Assessment with a list of “to do” items from the 1997 Assessment (with a progress report as commentary) and a “to do” resulting from this 2006 Assessment that will serve as a roadmap for the near future.

*List from 1997 Assessment*

1. The chair needs to inform new and part-time faculty better about department learning goals.

12
2. The department needs to monitor better ways in which the diversity requirement is met in Gen Ed courses.
3. Due to staffing limitations, the department has been unable to participate in Common Learning or, for that matter, any team-taught courses.
4. We need an FT-NMR.
5. There is inadequate support for summer research programs for students and for faculty.
6. There is no academic credit for mentoring students during the academic year. This is the most important limiting factor which prevents us from strengthening this part of our program.

In the list above, progress has been made on item #5. This is due largely to the largess of Virginia Franta who has provided funds that support an annual summer budget of nearly $28,000 for faculty and student stipends. We note also that we now have an FT-NMR, but this is not the high-field instrument that would be appropriate for supporting the academic program and various research interests.

Continue to Explore:

1. Annual Department newsletter to maintain better contact with alumni.
2. More internship possibilities.
3. Ways to enhance local student research opportunities.
4. Periodic review of learning goals.
5. Ways to recruit 30-50% more majors.
6. ACS certification for a Biochemistry major.
7. The department should monitor the variety of ways that the goal of diversity is met in various courses and share productive strategies amongst the faculty.
8. How to best assess lab skills.
9. The coherence in the department of developing writing skills in courses arranged in a linear fashion.
10. The department has briefly considered the notion of having Chemistry majors develop portfolios as they matriculate. In addition to the possibility of use of such during interviews for graduate programs and/or jobs, these may provide a focal point for students to periodically reflect upon the development of their own skills (and “profile”) as well as be useful as an advising tool.
11. As a result of assessment discussions, it was noted that students who place out of Chem 121 will not have taken a course that is usually designated in their programs as a Gen Ed course. Similarly, they will have missed the very important lab safety program in that course.
12. Assessment discussion raised again the notion which has seen much discussion in the past: the development of a single “advanced” course in general chemistry to substitute for Chem 121-162 for students with strong chemistry backgrounds. This discussion will likely be pursued more keenly next year.
13. Assessment discussion revealed that the Chemistry and cognate pre-requisites for various mid- and upper-level courses should be reviewed.
14. Weaknesses and recommendations noted by our seniors on their conversation with Drs. Waggoner and Ritter will be discussed further.

Only #3 has seen significant improvement. Kristin Cline, Pete Hanson and Mark Ellison have established on-going research programs that have involved students regularly in the summer and during the academic year. The financial support provided by the Franta Fund has been a fortuitous condition that has greatly assisted this process.
2006 “To Do” List

Mission Statement and Learning Goals
Continue to: Review the Department Mission Statement and Strategic Plan to monitor progress on planned tasks.

Facilities
New: Review Rooms 247 and 249 for wish list and renovation ideas; get cost estimate
Discuss high field FT-NMR with Advancement
Discuss “how the building works” with folks from Physical Plant
Continue to: Monitor physical facilities.

Staffing
New: Is there a viable plan for receiving credit for research mentoring?
Prepare proposal (with other BDKSC chairs) to request for more technical support
Continue to: Support and encourage professional activities of staff, both as chemists and teachers.
Participate appropriately in University governance system.
Monitor IDEA forms as a means of teacher and course evaluation.
Work internally to develop the teaching skills of all faculty.
The Department should encourage and support to attend off-campus meetings,
conferences and presentations that make the Wittenberg Chemistry Department known more at the regional and national levels.
Have more students present posters at Wittenberg and local/regional poster sessions

Students
New: Develop a plan for marketing the Chemistry major option more overtly in Chem 121/162/201
Continue to: Consider annual or bi-annual discussion with Chem 300/400 students about the Mission Statement.
Administer ACS exams in many courses as a means of assessment.
Support the Chemistry Club.

Curriculum:
New: Consider the revision of the organic courses.
Consider more lab work in Chem 100. (Chem 100 as a “B” course? Two versions of Chem 110”-N and “Chem 111”-B.)
Consider alternate-year options for 321, 352 and 321
Consider lab revisions in Chem 121/162 to be more interactive and process-oriented
Consider curriculum revisions in light of the University Strategic Plan

Budget:
New: Argue for annual increases in operating budgets based on inflation, having a more research-active faculty, and the need to “replace” money spent on the annual CAChe site license.
Return to the annual preparation (and internal dissemination of) a capital budget/request.

Alumni:
New: Pursue the “Chemistry Alumni Advisory Council”
Produce annual electronic newsletters for alumni
Continue to: Host Alumni Career Day
Maintain connections with Ted Thompson and Virginia Franta
University Connections:
New: Re-build connections with new persons in the Alumni Office.
Continue to: Meet with the Admissions staff regularly
Continue to work with the Career Center to support our chemistry majors before and after graduation

Other
Continue to: Maintain the Department webpage so that is presents and a current and positive image for internal and external consumption.
Matrix of Learning Goals in Chemistry Courses for Majors

Students in *all* chemistry courses will be able to:

1. discuss the natural world in language which reflects an atomic and molecular understanding of nature,
2. solve problems of both a mathematical and conceptual nature related to the structure and behavior of atoms, molecules, and large ensembles of atoms and molecules,
3. demonstrate familiarity with appropriate theories related to the chemical topics of a given course, and
4. demonstrate the logical thinking that is associated with interpreting natural phenomena at the atomic and molecular level.

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<th>Students who major in chemistry will additionally be able to</th>
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<td>5. demonstrate an understanding of reaction energetics and mechanisms</td>
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<td>6. explain structure/property relationships of molecules</td>
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<td>7. demonstrate an understanding of chemical nomenclature</td>
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<td>8. describe and use modern synthetic, separation and analytical techniques</td>
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<td>9. design scientific experiments and use good judgment in the design process,</td>
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<td>10. use computers as word processors, in data collection, reduction and analysis and as comp. chemistry tools</td>
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<td>11. predict and estimate the results of calculations and experiments,</td>
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<td>12. demonstrate critical thinking skills both orally and in writing</td>
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<td>13. demonstrate oral and written presentation skills needed as a practicing scientist</td>
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<td>14. demonstrate familiarity with the chemical literature and bibliographic searching skills</td>
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<td>15. demonstrate the ability to learn chemistry independently</td>
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<td>16. demonstrate an understanding of the hazard of chemicals and the safe use of chemicals</td>
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<td>17. demonstrate an understanding of ethical, historical, social and environmental aspects of chemistry</td>
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Number of learning goals met in each course

15 15 14 15 15 13 13 10 15 15 15 12 16 14 12 12

m = a minor component of the course; M = major component of the course
Appendix 3

Chemistry Department
Wittenberg University

Mission Statement

The mission of the Chemistry Department is to provide a challenging and supportive environment for students to learn chemical principles and laboratory skills, enhance their critical thinking and communication skills, and become responsible in their use of scientific knowledge.

Vision Statement

Campus image
The Chemistry Department will be recognized on campus and nationwide for its rigorous program, its dynamic and effective teaching, its modern curriculum, the quality of its graduates, and a high placement rate of its graduates in the chemical industry, graduate programs and professional programs.

The students
The Department will average 15 graduates/year and foster an environment that encourages student-faculty interactions in and out of the classroom and lab. The Department will support a Student Affiliate Chapter of the American Chemical Society. The Department welcomes a diverse student body and will support and assist in the recruitment of women and minorities and maintain percentages of these cohorts of students that are comparable to national norms. Chemistry majors will receive career counseling throughout their time at Wittenberg.

Chemistry curriculum
The Department will offer the BA and BS degrees and maintain certification by the American Chemical Society. The curriculum will be current with regard to the evolving nature of chemistry, science, and chemical education. All courses will involve interactive learning and the program will be lab-rich with extensive use of computers. All courses will promote the highest ethical standards in education and promote the responsible use of chemical knowledge and skills. The Chemistry Seminar Program will emphasize strong written and oral communication skills. Chemistry courses will present science as an open-ended inquiry with regard to the physical universe. Laboratory exploration associated with courses will emphasize hands-on activities. All chemistry courses will employ intentional and effective pedagogy that fosters student learning. The faculty will collaborate with students in research projects. The curriculum will be designed to recognize the cognitive and intellectual development of college students.

General Education participation
The Chemistry Department will participate in the General Education program through Chemistry 100, Chemistry 121 and regular participation in the WittSem program. Chemistry 100 will include a laboratory experience.

Teaching environment
The classrooms used for chemistry courses will be equipped with modern teaching technology. The labs will be equipped with modern instrumentation appropriate for introductory, intermediate and advanced classes and research projects involving faculty and students. The Department will maintain operating budgets that support the educational mission of the institution. The Department will support and use the Science Library and on-line information resources and databases.
**Campus-wide interaction**
The Department will interact in a supportive fashion with other academic departments on campus, with particular attention to the BMB program that it partially supports. The Department will support the administrative efforts of the Admission office, the Advancement office, the Registrar and the Career Center and work effectively with the Provost and the Provost’s support staff. The Chemistry faculty will participate in the University governance system. The Department will work with the Education Department to support the teacher education program.

**Local outreach**
The Department will provide outreach services to city and county schools to support chemistry and science education.

**Work environment and staffing**
The Chemistry Department will maintain a safe, healthy, supportive and collegial working environment for the faculty and staff. The number of faculty and staff will be maintained at a level that allows the chemistry curriculum to be taught effectively to the number of students who need our courses and to allow for all essential functions of the department to occur. Faculty and staff will receive the support they need to allow them to perform their jobs well and grow and adapt to changing needs. Faculty and staff will participate in faculty and staff development programs on and off campus.

**Alumni**
The Department will maintain an alumni database, stay in contact with alumni, and utilize alumni in career assistance for graduates and for fundraising.
Appendix 4

Faculty Profiles, 2006

Dr. Amil Anderson came to Wittenberg in 1989 and was tenured and promoted to Associate Professor in 1995. He served as Chemistry Chair from 2000 to 2002 and was one of two individuals in the science building to shepherd our $23 million building addition completed in 2004. He has served on the Budget and Compensation Advisory Committee, the Faculty Personnel Committee and currently serves on the Faculty Research Fund Board and Academic Computing Committee. He is a member of the Protein Society and his research interest revolves around protein structure-function relationships as addressed by molecular dynamics simulations. In consultation with the Ohio Supercomputer Center and Jim Noyes of the Mathematics and Computer Science Department, he developed the specification and oversaw the purchase and installation of our 30-processor parallel computing cluster, which he and his students are currently using for research. He has been supported with funding from the Petroleum Research Fund (ACS) for collaborations at Indiana University-Purdue University Indianapolis to work on a computational chemistry project and at OSU to work on protein structure determination using multi-dimensional NMR.

Dr. Kristin Cline was awarded tenure and promoted to Associate Professor in 2000. She was appointed as Chair of the Department in 2004. She has supervised several students in electrochemistry, solid phase microextraction and conservation science research, resulting in three presentations at national and local conferences since 1997. She presented work on experiments developed for courses at conferences in 1998 and 2002. She received a grant for an FTIR spectrometer in 1998 from the Pittsburgh Conference Memorial National College Grant Program. She assisted in preparing a successful $100,000 grant to the McGregor Fund in 1998 for student research fellowships on campus. She served as a content consultant for high school general chemistry text in 2001 and an external reviewer for and NSF grant in 2000. On campus she has served on the Educational Policies Committee, General Education Advisory Committee, Science Building Steering Committee, Freeman Advisory Committee, and chaired the Faculty Research Fund Board. In 2002, she took a sabbatical leave to learn about conservation science. During this leave, she attended several national conferences and workshops related to the chemistry of art and conservation. She worked with restoration architects on a local Frank Lloyd Wright house to determine the chemical composition of the pigments and coatings of the interior walls.

Dr. Raymond Dudek joined the Wittenberg Chemistry department as a temporary replacement for Dr. Marc Ellison who left in May of 2005. He was then offered the tenure track position in January of 2006. He has previous teaching experience from a one-year, sabbatical replacement position at Wellesley College in Wellesley Massachusetts. He will be attending and presenting a demonstration at the BCCE Conference in August of 2006. Previous to Wittenberg he did research at the Fritz-Haber-Intitute in Berlin Germany, working on ultrafast surface dynamics.

Dr. David Finster (Professor, 1995; Chemistry chair 1991-2000 and 2002-2004) is currently teaching Chem 121, 162 and 321. He continues to serve as the University Chemical Hygiene Officer and serves on the Study Abroad committee, Academic Advising Study Team, and the Teacher Education Advisory Committee. He has recently completed service as chair of the 2006 Second Term Exam Committee of the Exams Institute for the American Chemical Society and also been appointed as chair of the 2008 Inorganic Chemistry Exam. He has attended several workshops on the inclusion of computational chemistry in the curriculum and fostered that change locally. He is a member of the American Chemical Society and the Division of Chemical Education and Division of Chemical Health and Safety of the ACS. In 2004, 2005 and 2006 he conducted a week-long forensic workshops for all sixth-graders at Mills Lawn School in Yellow Springs and has served in a handful of task forces in the Yellow Spring school system. He has
been a firefighter for Miami Township Fire-Rescue since 1993. He was promoted to Sergeant in 1995, to Lieutenant in 1997 and to Captain in 2003.

**Dr. Peter Hanson** joined our department as a tenure-track Assistant Professor in 2000, following a one-year, full time position at Centenary College of Louisiana. He has published several articles in peer-reviewed publications on topics as diverse as organometallic catalysis, crystallography, protein folding and insect pheromones. In 2000 he was a co-recipient of a Merck/AAAS Undergraduate Science Research Program grant for interdisciplinary undergraduate research in the chemical and biological sciences. His research has also been internally funded by 5 FRFB grants. In 2001 Dr. Hanson was named a member of the Project Kaleidoscope Faculty for the 21st Century. He has served on several Wittenberg committees, participated in summer science programs for aspiring high school scientists, attended an NSF workshop on combinatorial chemistry and served as a volunteer judge at local high school science fairs.

**Dr. Justin Houseknecht** joined the chemistry department as a tenure-track organic chemist in 2005. He joined the faculty at Wittenberg after serving as an Adjunct Instructor of Chemistry at the University of Kentucky for a semester and a Visiting Assistant Professor of Chemistry at Centre College for two years. He has published 5 articles in ACS journals such as *Journal of the American Chemical Society, Journal of Physical Chemistry A*, and *Journal of Organic Chemistry* as well as several others in non-ACS journals. Since arrival on campus he has continued working with students to gain a better understanding of fundamental aspects of organic chemistry through research involving spectroscopic and computational methods. Dr. Houseknecht currently serves as the department representative on the Computational Science Advisory Committee.
Appendix 5A

Publications, 1997-2006
Wittenberg-based publications in boldface
Publications by junior faculty prior to arrival at Wittenberg

Ellison


“sp³d” Hybrid Orbitals and Molecular Geometry”, M. D. Ellison, Journal of Chemical Education, in press


Hanson


“Identification of 2,4-Dichlorophenol in Females of the American Dog Tick, *Dermacentor variabilis* (Acari-Ixodidae), and Its Possible Role as a Component of the Attractant Sex Pheromone” Hanson, P.E.; Yoder, J.A.; Pizzuli, J.L.; Sanders, C.I. *Journal of Medical Entomology* 2002, 39(6), 945-947.


Justin Houseknecht


Finster


York

Appendix 5B

Presentations

Finster

Reflective Judgment workshop at Ames BCCE, July 2004

Cline

Investigation of glassy carbon surface modification via diazonium ion reduction, Kristin Cline, Midwestern University Analytical Chemistry Conference, Miami University, October 15, 2005.

Effect of Surface Functional Groups on Electron Transfer Kinetics at Carbon Electrodes, Kristin Cline, Chemistry Department Seminar Series, Wright State University, May 13, 2005 (invited talk).


Analyzing the Walls of the Westcott House, Andy Palmer and Kristin K. Cline, Ohio Analytical Chemistry Consortium, The Ohio State University, Columbus, OH, November 8, 2002.

Exploring the Chemistry of Cyanotype Photography, Kristin K. Cline, PACT Fall Follow-up, Miami University, Middletown, OH, November 2, 2002.


Ellison

Co-organizer for PHYS/CHED symposium for the ACS National Meeting in Washington, DC in 2005

National Meeting of the American Chemical Society, Philadelphia, PA (August 26, 2004)
Chaired panel discussion on the use of symbolic computational chemistry in chemical education

American Chemical Society, Publications Department, Columbus, OH (June 23, 2004)

Central Regional Meeting of the American Chemical Society, Indianapolis, IN (June 3, 2004)
Mark D. Ellison, Ryan L. Spray,* Kaitlin E. Tate,* Michael Crotty,* and Dukho Koh*
“The Adsorption of Gases on Single-Walled Carbon Nanotubes”, poster
Roger Williams University, Bristol, RI (March 8, 2004), “The Adsorption of Gases on Carbon Nanotubes”, invited talk for the Science and Math Seminar Series

Central Regional Meeting of the American Chemical Society, Pittsburgh, PA (October 20, 2003) “The Adsorption of Gases on Single-Walled Carbon Nanotubes”, contributed talk

Central Regional Meeting of the American Chemical Society, Pittsburgh, PA (October 20, 2003) Ryan L. Spray,* Kaitlin E. Tate,* and Mark D. Ellison
“Infrared Studies of NH₃ and NO₂ Interaction with Single-Walled Carbon Nanotubes”, poster

Central Regional Meeting of the American Chemical Society, Pittsburgh, PA (October 20, 2003) Kaitlin E. Tate,* Ryan L. Spray,* and Mark D. Ellison
“Gas Desorption from Single-Walled Carbon Nanotubes Using TPD”, poster

Great Lakes Regional Meeting of the American Chemical Society, Chicago, IL (June 2, 2003)
“The Adsorption of Ammonia on Single-Walled Carbon Nanotubes”, contributed talk

3rd Annual Kentuckiana Undergraduate Research Symposium (March 8, 2003)
“The Adsorption of Ammonia on Single-Walled Carbon Nanotubes”, contributed talk

3rd Annual Kentuckiana Undergraduate Research Symposium (March 8, 2003)
Jay Scouten* and Mark D. Ellison
“Silicon Surface Insulation”, poster

17th Biennial Conference on Chemical Education (July 31, 2002)
"Using MathCad to Explore the Femtosecond Dynamics of a Harmonic Oscillator", contributed talk

University of Toledo Chemistry Department Seminar (November 28, 2001)
“Using Chemistry to Study and Design Electrical Properties of Materials”

Wright State University Chemistry Department Seminar (October 5, 2001)
“Using Chemistry to Study and Design Electrical Properties of Materials”

Wittenberg University Student Research Poster Session (September 28, 2001)
Michael Crotty* and Mark D. Ellison
“The Bonding of Ammonia to Single-Walled Carbon Nanotubes”, poster

University of Akron Physics Department Colloquium (January 25, 2001)
“Scanning Tunneling Microscopy for Undergraduates”

Lafayette College Chemistry Department Seminar (November 9, 2000)
“Using Chemistry to Study and Design Optical and Electrical Properties of Materials”

Central Ohio Undergraduate Research Symposium (COURS) (October 7, 2000)
Matthew E. Stewart,* Michael H. Stewart,* and Mark D. Ellison
“Topographical Imaging with STM”, poster

Central Ohio Undergraduate Research Symposium (COURS) (October 7, 2000)
Michael H. Stewart,* Matthew E. Stewart,* and Mark D. Ellison
“STM Spectroscopy: Investigating Energy Bands”, poster

Pete Hanson
“Protein Folding Using Artificial Chaperones” Hanson, P.E., Wright State University Chemistry Seminar Series, May 30 2003.
<table>
<thead>
<tr>
<th>Year</th>
<th>Authors</th>
<th>Title</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>Domingus, J.L.; Sanders, C.I.; Benoit, J.B.; Hanson, P.E.; Yoder, J.A.</td>
<td>Isolation of a New Sex Pheromone in the American Dog Tick</td>
<td>Wittenberg University Symposium, Springfield, OH.</td>
</tr>
<tr>
<td>2003</td>
<td>Hayman, M.; Hanson, P.E.</td>
<td>Detection of Dichlorophenols Using SPME and GC/MS Analysis</td>
<td>Wittenberg University Symposium, Springfield, OH.</td>
</tr>
<tr>
<td>2003</td>
<td>Sanders, C.I.; Domingus, J.L.; Benoit, J.B.; Hanson, P.E.</td>
<td>Identification of an Unusual Trichlorophenol in Ticks and Its Biological Function</td>
<td>Wittenberg University Symposium, Springfield, OH.</td>
</tr>
<tr>
<td>2003</td>
<td>Sanders, C.I., Domingus, J.L., Yoder, J.A. and Hanson, P.E. and Yoder, J.A.</td>
<td>Discovery of a new sex pheromone in ticks.</td>
<td>Ohio Academy of Sciences, Findlay, OH.</td>
</tr>
<tr>
<td>2003</td>
<td>Sanders, C.I., Domingus, J.L., Yoder, J.A. and Hanson, P.E.</td>
<td>Identification of a new attractant, 2,4-dichlorophenol, in the American dog tick.</td>
<td>Association of Southeastern Biologists, Washington, DC.</td>
</tr>
<tr>
<td>2003</td>
<td>Sanders, C.I.*; Pizzuli, J.L.; Yoder, J.A.; Hanson, P.E.</td>
<td>In Vitro/In Vivo Production and Implications of the Discovery of Two New Sex Pheromone in the American Dog Tick</td>
<td>American Association for the Advancement of Science, Denver, CO.</td>
</tr>
<tr>
<td>2003</td>
<td>Domingus, J.L., Sanders, C.I., Hanson, P.E. and Yoder, J.A.</td>
<td>First report of a trichlorophenol in ticks and its probable function.</td>
<td>Ohio Academy of Sciences, Findlay, OH.</td>
</tr>
<tr>
<td>2003</td>
<td>Yoder, J.A., Domingus, J.L., Sanders, C.I. and Hanson, P.E.</td>
<td>Biosynthesis of the tick sex pheromone (2,6-dichlorophenol) does not require tyrosine.</td>
<td>Association of Southeastern Biologists, Washington, DC.</td>
</tr>
<tr>
<td>2003</td>
<td>Domingus, J.L., Sanders, C.I., Hanson, P.E. and Yoder, J.A.</td>
<td>A physiological explanation for the presence of sex pheromone in immature and male ticks.</td>
<td>Association of Southeastern Biologists, Washington, DC.</td>
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<td>2003</td>
<td>Sanders, C.I., Domingus, J.L., Yoder, J.A. and Hanson, P.E.</td>
<td>Identification of a new attractant, 2,4-dichlorophenol, in the American dog tick.</td>
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<td>2003</td>
<td>Sanders, C.I.*; Pizzuli, J.L.; Yoder, J.A.; Hanson, P.E.</td>
<td>In Vitro/In Vivo Production and Implications of the Discovery of Two New Sex Pheromone in the American Dog Tick.</td>
<td>Annual meeting, American Association for the Advancement of Science, Denver, CO.</td>
</tr>
<tr>
<td>2002</td>
<td>Domingus, J.L., Sanders, C.I., Hanson, P.E. and Yoder, J.A.</td>
<td>Water conservation implication of 2,4,6-trichlorophenol sex pheromone in the American dog tick, <em>Dermacentor variabilis</em>.</td>
<td>Wittenberg Student Research Symposium, Springfield, OH.</td>
</tr>
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<td>2002</td>
<td>Sanders, C.I., Domingus, J.L., Yoder, J.A. and Hanson, P.E.</td>
<td>Detection of a new compound in the sex pheromone of the American dog tick.</td>
<td>Wittenberg Student Research Symposium, Springfield, OH.</td>
</tr>
<tr>
<td>2002</td>
<td>Burke, W.J., Johnson, A.E., Hanson, P.A. and Yoder, J.A.</td>
<td>Organic synthesis of a chlorophenol mixture that is highly attractive to ticks.</td>
<td>The Association of Southeastern Biologists, Boone, NC.</td>
</tr>
<tr>
<td>2002</td>
<td>Pizzuli, J.L., Sanders, C.I., Yoder, J.A. and Hanson, P.E.</td>
<td>Investigation on the timing of sex pheromone production and its detection in ticks.</td>
<td>The Association of Southeastern Biologists, Boone, NC.</td>
</tr>
<tr>
<td>2002</td>
<td>Pizzuli, J.L., Sanders, C.I.</td>
<td>Yoder, J.A. and Hanson, P.E. Timing and detection of sex pheromone production in ticks.</td>
<td>Ohio Academy of Sciences, Columbus, OH.</td>
</tr>
<tr>
<td>2002</td>
<td>Burke, W.J., Johnson, A.E., Hanson, P.A. and Yoder, J.A.</td>
<td>Synthetic preparation of a potent tick attractant for trap baits.</td>
<td>Ohio Academy of Sciences, Columbus, OH.</td>
</tr>
<tr>
<td>2001</td>
<td>Pizzuli, J.L., Sanders, C.I., Yoder, J.A. and Hanson, P.E.</td>
<td>Isolation and detection of the sex pheromone in American dog ticks.</td>
<td>Wittenberg Student Research Symposium, Springfield, OH.</td>
</tr>
<tr>
<td>2001</td>
<td>Johnson, A.E., Burke, W.J., Hanson, P.A. and Yoder, J.A.</td>
<td>Laboratory synthesis of the tick sex pheromone, 2,6-dichlorophenol.</td>
<td>Wittenberg Student Research Symposium, Springfield, OH.</td>
</tr>
<tr>
<td>2001</td>
<td>Pizzuli, J.L., Sanders, C.I., Yoder, J.A. and Hanson, P.E.</td>
<td>The investigation of sex pheromones in ticks.</td>
<td>Wittenberg Summer Seminar Series, Springfield, OH.</td>
</tr>
</tbody>
</table>
Appendix 6

Students mentored

Finster
Bill Schroeder, academic year, 1999-2000
Mark Juhasz, academic year, 2000-2001

Cline
Amanda Reno (fall 2005, spring 2006)
Emma Robinow (summer 2005)
Heather Griffith (spring 2004, fall 2004, spring 2005)
Adam Good (spring 2004, spring 2005)
Andrew Palmer (summer 2002)
Myra Fete (summer 2002)
Jennifer Smith (during academic year fall 1998-spring 2002, summer 2001)
Katherine Bloomer (summer 1999, summer 2000)
Matthew Schalnat (summer 1997, spring 1998)
Mathias Lindstrom (summer 1997, spring 1998)
Kevin Brockman (fall 1997)

Ellison
Jay Scouten
Mike Crotty
Matthew Stewart
Michael Stewart
Ryan Spray
Kaitlin Tate
Duhko Koh
Carrie Kinnaman
Nick Padgett
Jennifer Brigham
Kyle Kissell

Hanson
John Beckstedt (Summer 2005, Fall 2005)
Alan Vorst (Summer, 2005, Spring 2006)
Joey Schmees (Summer 2005)
Darren Smith (Summer 2004, 2005)
Fiorella Ghisays (Summer 2003, Spring 2003, Fall 2002).
Anthony Darr (Spring, 2004)
Silas Burdick (Summer, 2003)
Jeff Domingus (Summer 2003, Summer 2002)
Chris Sanders (Summer 2003, Spring 2003, Summer 2002, Summer 2001)
Miranda Hayman (Summer 2003)
Elisabeth Schuler (Summer 003)
Joshua Benoit (Fall, 2002)
Marissa Matarrese (Summer 2002)
Amanda Johnson (Summer 2001)
B.J. Burke (Summer 2001)
Jessica Pizzuli (Summer 2001)
Jennifer Exten (Summer 2000)

Anderson
Isaac Boye-Arthur (Spring 2005-present)
Thao Nguyen (Fall 2005-present)
Appendix 7
Workshops and Conferences Attended

Finster
Council on Undergraduate Research national meeting, Occidental College, June, 1998
American Chemical Society National meeting, Anaheim, March, 1999
Midwestern Association of Chemistry Teachers in Liberal Arts Colleges, (MACTLAC), Augustana College, October, 1999
17th Biennial Conference on Chemical Education, Western Washington, July, 2002
18th Biennial Conference on Chemical Education, Iowa State University, July, 2004
American Chemical Society National meeting, Anaheim, March, 2004
American Chemical Society National meeting, San Diego, March, 2001
Participant in week-long Faculty Familiarization Trip sponsored by IES to Australia, Spring 1999
Lilly Conference, November, 2001
Computational Chemistry for Chemical Educators NCSI workshop, San Jose State Univ., July 2003
Computational Chemistry for Chemical Educators NCSI workshop, Wittenberg University, July 2004
FDB workshop on peer review, November, 2002
Titan workshop (computational chemistry) November, 2001
NSF Chautauqua course, “Teaching the History of Chinese Medicine,” Harvard University, May, 2004
Advanced Computational Chemistry for Chemical Educators NCSI workshop, University of Northern Colorado, July 2005

Cline
NSF workshop on Chemistry and Art, Millersville, PA, June 1-6, 2003.
PACT Fall Follow-up, Miami University Center for Chemical Education, Middletown, OH, November 2002.
Infrared Microscopy, Haselhorst Academy, Madison, WI, September 2002.
Artful Chemistry, Miami University Center for Chemical Education, Middletown, OH, June 2002.
Midwestern Universities Analytical Chemistry Conference, Columbus, OH, October 15, 2004.
Restoration & Renovation Conference, Cleveland, OH, October 2002.

Anderson
Basic NMR: Theory and Applications, May 23-28,2004 (Pullman, WA)
Modern Biomolecular Crystallography, June 23-28, 2005 (Fullerton, CA)

Hanson
Ohio Supercomputing Center (OSC) workshop on parallel computing. Wittenberg University, August 2-3 2004.
National Science Foundation Workshop on Solid Phase Synthesis and an Introduction to Combinatorial Chemistry. Wright State University August 12-16 2002.
Faculty Development Board workshop on legal issues 03/21/02
Faculty Development Board workshop on advising, 03/07/02
Faculty Development Board workshop on classroom expectations 02/21/02
Faculty Development Board workshop on advising issues 01/31/02
Ellison
Developing, Testing, and Assessing On-Line Intercollegiate Cooperative Learning Activities, July 14-17, 2004
Council on Undergraduate Research (CUR) Institute on Proposal Writing, July 14-18, 2001
National Science Foundation Workshop on Lasers in Chemistry, May 19-24, 2001
Biennial Conference on Chemical Education, July 30-August 4, 2000; July 28-August 1, 2002
Council on Undergraduate Research (CUR) National Meeting, June 22-25, 2000
Appendix 8

Committees

Cline
Institutional Review Board, sabbatical replacement, spring 2004
Freeman Advisory Committee, spring 2002-, appointed

Anderson
Budget and Compensation Advisory Committee (2000-2005)
Co-director of the Biochemistry Molecular Biology program (1998-2005)
Academic Computing Committee (2005-present)
Faculty Research Fund Board (2005-present)
Biochemistry Molecular Biology Program Committee (2005-present)
Ohio Supercomputing Center State User Group representative (2004-present)

Hanson
Educational Policies Committee (elected 2004)
   EPC Representative to Assessment of Student Learning Committee, 2004, 2005.
Writing and Speaking Committee (2003-2004)
Pre-Health Professions Committee (2002-present)
Writing and Speaking Across the Curriculum group (ad hoc).
Steering Committee, NCA Accreditation (2005)
Biochemistry/Molecular Biology Advisory Committee, (2005-present)

Finster
Science Building Committee, 1998-
Chair of Science Chair meetings, Fall 2003
Educational Policy Committee, Fall 2000
Faculty Development Board, 2004-
Study Abroad Task Force, 2005-
Academic Advising Task Force, 2005-
Teacher Education Advisory Committee, 2005-
University Chemical Hygiene Officer, 1998-

Houseknecht
Computational Science Advisory Committee: 2006

Ellison
Faculty Research Fund Board (September 2003-Present)
IBM Lecture Committee (April 2002-Present)
General Education Committee (August 2002-Present)
Appendix 9

Grants and Funding

External Funding Applications

Hanson
QSPR of Phenolic Antioxidants. Awarded August 3, 2004. 200 computational units at the Ohio Supercomputing Center, Ohio State University.


Cline
“Sequential Integration of FT-NMR for Science Majors in the Chemistry Curriculum”, NSF-ILI Proposal (with chemistry department), 1998, $63,825, received.
“Wittenberg Research Fellowship Program”, McGregor Fund Private Liberal Arts Colleges and Universities Program, January 30, 1998. (with primary author Gary Gaffield, Robin Inboden, co-author), $100,000, received.

Ellison
Research Corporation Cottrell College Science Award, The Research Corporation, “Investigation of the Adsorption of Gases on Carbon Nanotubes”, May 2002 funded
“Extending Student Understanding of Science, Mathematics, and Technology through Computational Science”, co-PI, National Science Foundation, December 2002, not funded
“Calibrated Peer Review in Physical Chemistry”, co-PI, National Science Foundation, December 2002, not funded
“Investigation of the Adsorption of Gases on Carbon Nanotubes”, Research Corporation, November 2001, funded
“Investigation of the Adsorption of Gases on Carbon Nanotubes”, American Chemical Society Petroleum Research Fund, November 2001, not funded
“Attaching Organic Monolayers to Silicon”, Henry and Camille Dreyfus Foundation, May 1999, not funded

Anderson

Finster
Principal Investigator for NSF-ILI proposal for Chemistry Department FT-NMR upgrade, Fall 1997, $52,000, granted
Internal Funding Applications

Hanson

Laboratory Preparation of Newly Discovered Antifungal Compounds. FRFB Awarded April, 2005. Student: John Beckstedt.


Investigation of a possible entomopathogenic fungus from the American dog tick, Dermacentor variabilis (Say) for use in biocontrol. FRFB grant. Awarded Fall, 2002. Students: Fiorella Ghisays and Josh Benoit.


Preparation of Protein Folding Assistants. FRFB Grant. Awarded September, 2000. Student: Jennifer Exten

Cline

FDB PEG #27, spring 2005.
FDB PEG #71, spring 2003
Faculty Growth grant #40, spring 2002
FDO PEG # 65, March 2002

Finster

FDO PEG for professional activities at National ACS meeting, Dallas, March, 1998
FDO PEG for professional activities at National ACS meeting, Anaheim, March, 1999
FDO PEG, 2000
FDO PEG, 2001, San Diego ACS meeting
FDO PEG, 2002, Western Washington BCCE
FBD PEG, 2003, Chicago meeting of exam committee
FDB PEG, 2004, Anaheim ACS meeting
FDB PEG, 2005, NCSI workshop at University of Northern Colorado
FDB PEG, 2005, Washing DC meeting of ACS exam committee
Appendix 10

Other Professional Activities

Cline

External reviewer for NSF grant, March 2005.
Content consultant for high school general chemistry text (Glencoe-McGraw-Hill publication), March 2001.
External reviewer for NSF grant, March 2000.

Hanson

Research collaboration with Dr. Paul Seybold (Wright State University) and Dr. Don Warner (Boise State University) to investigate qualitative structure-property relationships (QSPR) of phenolic antioxidants. 2004.
Application of parallel (combinatorial) synthesis to the preparation of novel antioxidant compounds. 2004.
Grant reviewer, Civilian Research and Development Foundation (CRDF) 2003-present.
“The CRDF is a charitable foundation authorized by Congress to provide productive research opportunities for scientists and engineers in the former Soviet Union (FSU), to promote the conversion of its defense science resources to civilian use, and to foster industrial R&D cooperation.” website: www.crdf.org

Finster

Co-organizer of Inorganic Symposium at Ames, BCCE, July, 2004
Hosted NCSI CCCE workshop at Wittenberg, July 2004-09-13
American Chemical Society, 2002 Second Term General Chemistry Examination Committee 2000-2002, Sub-committee chair
American Chemical Society, 2002 Inorganic Chemistry Examination Committee, 2000-2002
American Chemical Society, 2006 Second Term General Chemistry Examination Committee 2003-2005, Chair of Exam Committee
American Chemical Society, 2008 Inorganic Chemistry Examination Committee 2006-2008, Chair of Exam Committee
Appendix 11

Responses to student survey, Spring 2005

Question #1
1) Why did you select chemistry as a major?

1) I chose chemistry as my major because I am interested in being a dentist. I came in expecting to do biology but after taking Chem 121 and Bio 200 I found chemistry to be more fascinating.

2) My main choices were chemistry and biochem because these interested me and I am planning to go to med school. I chose chem bc it was the easiest major to get when I looked at all the previous classes I had taken.

3) Seeing the world, so intricately woven, examining ever so closely how every particle makes up every compound, forming complex structures, infrastructures and the very foundations of our known existence and reality is absolutely astounding to me. That is why I am a chemistry major.

4) I am a sophomore chemistry major, and the reasons I chose chemistry are that it interests me and is somewhat natural to me, and also it is a good major for pre-med students. I also thought that advertising chemistry as a good major for pre-med students would be a good way for students to be attracted to the chemistry dept. The BA chemistry degree fulfills nearly all the math and science requirements for med school, and the BA in biology leaves many classes out, forcing students to take extra classes. One more way to attract students to chemistry would be some info on starting salaries out of undergrad and grad school, or other possible fields for chem majors. Good luck!

5) Originally I was planning to major in biology, but I selected chemistry because I was planning on going to medical school and most require more chemistry courses than biology courses. Also I did better in my first chemistry classes than I did in my biology class.

6) I selected chemistry as a major because I had little knowledge in this field and I wanted to gather a major that is worth my time. I also wanted to challenge myself with something difficult.

7) Well before I started college I thought what I might want to major in and I thought of chemistry because I was good at it, got very good grades in chemistry in high school, liked science, and I like mixing and creating new things. Also, I had a class in 8th grade called introduction to physical science, the class was basically a chemistry class and we got to do a lot of fun things like we had a contest to see who could make the best "hot house" to keep water warm-i won. Also, we did fun experiences like making ice cream, making perfume and burning different things in a bunsen burner. I think a way to attract possible chem majors is to show what you can do with a chem major after school, and the stuff you can make with chemistry, and possible careers. You could also show what medical stuff can be done with chemistry, and what cosmetic stuff-like making cosmetic products, which is another thing that attracted me. I was a show on TV that is all about how cosmetics are made. Another cool thing about chemistry is all the colorful stuff that can be made-like this weeks lab.

8) The reason why I wanted to be Chem major because I was advised by a doctor that it definitely helps my Pre-Med, also I want to concentrate in it to do good in MCAT. I like math and physics more than Chem, but Chem helps me better and those subjects are pretty much related. I could wait until junior year to declare my Chem major, but I thought I would make no difference, therefore I declared it now in my freshman year. So being a student in 261 would make no significance in my decision. Therefore, I think that being open to students in 121-162-201 courses would do no harm.
9) I wanted to be a chemistry major because it seemed to be the most interesting science major. This was aided by the support and teaching style of the faculty. They are very easy to work with and very open, knowledgable and helpful. Also, it seemed more personal than a biology major would be. I know all the faculty individually and they all know me. I don't think you get that personal touch out of other majors. Professors that get to know their students, especially during lab and outside of class make the chemistry major more enticing. I think the largest reservation people have about being a chem major is the workload and the type of quantitative work we do. It's not just simplying memorizing terms or even concepts from a textbook, but application of these things. Some people don't want to put in this kind of effort. However, some people do and those are the people we should be recruiting. If professors make it known up front that "it's tough, but it's worth it" I think more people would consider being a chem major. That way they aren't bowled over and resort to another major just because it's easier. We shouldn't let other science majors push us around! Most of wanting to be a chem major relies on the individual student and their desires, but if we can foster these ideas, and let them grow, we can show potential majors the enrichment the chemistry major has to offer in and out of the classroom. I hope this helps.

10) 'I am one of those people who always knew I wanted to be a chem major, but I stayed in the Chemistry Dept. because it truly prepares you for life. Being a chem major helps you to learn to be self-sufficient and to be able to "get it done" on your own.'

11) 1) I'm a chemistry major because it's the major the best fits with my career goal, forensics as you know. I'm particularly wanting to get into a forensics lab, which deals a great deal with instrumentation, and as a chemistry major, I'm able to focus a little more on the instruments that are commonly used better than I would in a biology or BMB major. Plus, chemistry seems to make you think a bit more than most biology classes that I would have taken as a bio or BMB major. Biology classes, at least to me, seem more like all you're doing is memorizing facts, which is all well and good, but I wanted to do a little more than that.

2) In what ways would you suggest that we "recruit" majors from the 121-162-201 courses?

2. i think that the best way to recruit students from lower levels is to remind them that the chemistry is more detailed in more advanced courses. this could cause the students to wonder EXACTLY how the chemistry that they are discussing works. just let them know that in gen chem you are just scratching the surface of chemistry.

5) Maybe have a chem major come into class for a short time one day and answer questions that students might have about the major. Possibly pass out information about the major in the courses listed above.

6) Show them the importants of the major and how it can be aplied to many bussiness in everyday life. It would be a good idea to also show how that you don't have to be a scientist with a chem. major it opens many doors in other fields. Finally point out the fact that a chemistry major is different and looks better in the bussiness world then that of a management major etc.

11) I think a good way to recruit chemistry majors in the beginning level classes is to for profs to figure out (either by themselves or asking other students) which students are still trying to figure out which major to pick, and then "brainwash" them into thinking that a chemistry major would be a good way to go. By brainwash I don't mean to trick them into picking a chemistry major (a chemistry major requires a lot of effort and you want people who are committed to the major), but just encourage them or tell them all the great things you can do with a chemistry major. If the prof knows a particular student would be especially good as a chemistry major, the prof should let said student know this. Encouragement like that can go a long way sometimes.

Also, if a student comes along that seems like he/she will be a good chem. major, a prof or other chem. majors could try to get that student interested in doing a summer research project in the chemistry department. For me, I know my first summer working in a research lab really concreted my decision about keeping my chem. major. I don't think some students realize how much fun being in a lab and actually making molecules can be. In the classroom and even in the labs that are apart of the classes, students don't get a real sense of the application of chemistry, but over a summer research project, a student can get a real sense of this which makes chemistry seem that much cooler.
3) What feature(s) of the major do you think are attractive to potential majors? (For example: very high placement rate in med school/grad school, very high placement rate and relatively good starting salaries for jobs, a positive academic environments in the department, the ability to get paid as an MS or PhD graduate student after Witt, the opportunity to explore the "why" and "how" of science, the opportunity to develop good problem-solving skills that scientists need, .... others???)

5. if you are lookig to go to med school and don't get in there are more opportunities with chemistry than many of the other majors that are offered.

6) I think all of these aspects should be focused on and pushed.

11) For me, the most attractive thing about graduating with a chem. major is that I will (hopefully) have no problem finding some kind of job. It may not be exactly in the field I want to get in to, but no matter what way I go, I'll find a job that will give me great experience and pay that isn't too shabby either (except for teachers). It takes a lot of the stress away from thinking of what to do after graduation. I think another good point is the fact that if a chem. major goes on to grad. school, he/she doesn't have to pay (or in most cases will get paid to go to grad. school). After paying for 4 years at Witt (which lets face it isn't cheap at all), the last thing a student wants to think about is paying for another 4-5 years of school. Most students don't have that kind of money, and taking out more loans isn't very appealing either.

One thing I'd like to add...I personally believe that the chemistry department is the strongest department on campus. There isn't a single professor that I really dread taking. Not to mention that every prof is very good a keeping a student's interest in the classroom. While I'm mainly speaking about profs. that I have had the pleasure of having in class, the ones I haven't had in class are also very good too from what I know of them from talking to them in the stockroom and at other times.

4) What factors discourage students (...who have the talent and initiative...) from selecting chemistry as a major?

5) I think that people have certain opinions about chemistry before they even come to Wittenberg. When I tell people I'm a chemistry major they either turn their face up and say why or respond that I must be extremely smart. Everyone assumes that chemistry is REALLY hard, which it is but it is not impossible.

6) The work load and the stigma that chem majors are different people. The lack of knowledge of how a chem major can help and individual in everyday life. Finally not knowing what we do and how they can benifit from a chem. major.

11) I know that the thing that probably discourages students the most from choosing a chem. major is everybody thinks that chemistry is about as difficult as it gets in the sciences. I think a lot of this comes from having a not so good chemistry teacher in high school, and then coming to college and struggling with gen. chem. because that student didn't have a good enough background in chemistry coming into college, which reaffirms in their minds that chemistry is really hard. It'd be kind of nice to have some way to determine which students have had this problem before the first day of classes, and then placing the students who didn't have a strong chem. program in high school in a class that maybe won't move quite as quickly (that way the students don't get scared away quite as easily). I doubt that this could ever happen, but it would be nice to place students who would have a difficult time moving quickly through the chemistry with a prof who could fit students learning abilities better.

I also think another thing that seems a bit unattractive to the chemistry major a Witt is the seminar program. As I'm sure you know, the seminar program is a little more involved than some of the other majors' programs. In my case, I seriously considered not becoming a chem. major because of this, because I hate talking in front of people more than anything (especially as a freshman before I gained a lot of confidence within the chemistry department). If it weren't for the fact that I really wanted to be a chem. major, I might not have stayed with the major. I honestly don't know how to combat this problem though. I feel that the seminar program is very helpful and looks really good when applying for a job, but it is also extremely daunting for someone coming into college.
On January 5, 2005, I met with Kia Armstrong and Ayisha Kinamore—two African American female chemistry seniors, and Forest Wortham—director of multicultural programs, to hear the perspective on the department of minority students. They did not have any serious negative comments to make about the department. Most of the conversation consisted of their suggestions for improving the academic climate for minority students, including many suggestions relevant to other areas of campus.

Some suggestions and observations:

1. They found the first semester to be a heavy, difficult schedule (Calc, Biology, Chem, Common Learning)

2. They observed a high dropout rate for African American students in Bio 200.

3. They suggested that professors establish study groups for courses such as Chem 121, perhaps assigning a tutor or “peer mentor” to groups of 6-7 students (rather than the chemistry workshop format we use with tutors there to help whomever shows up).

4. They suggested that professors split up cliques/groups or otherwise help students form relationships with others in the class where not all are of the same race. Kia and Ayisha noted that they always worked together in lab when they were in the same classes, and didn’t always meet other students who might have been more helpful.

5. They noted that CBS weekend is nearly devoid of academics (that participants don’t always attend classes as scheduled, and that there were no other academic activities).

6. They suggested we recruit students from Kia and Ayisha’ high schools. (Kia’s = Walnut Hills), or other schools with higher percentage of minority students, perhaps visiting the schools and bringing minority students along.

7. They wished for more preparation for seminar—such as prior experience researching information and class presentations. They were grateful for Nelson’s session in Chem 300 on giving presentations. They suggested requiring attendance at a seminar for Chem 121/162 students.
### Appendix 13: List of Post-graduate activities, Chemistry, 1995-2005

<table>
<thead>
<tr>
<th>Name</th>
<th>Year</th>
<th>Current or Past Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armstrong, Kia</td>
<td>05</td>
<td>Americorps – Children’s Hunger Alliance (Columbus, OH) 2006 – UK College of Public Health (Lexington) - Epidemiology</td>
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<tr>
<td>Good, Adam</td>
<td>05</td>
<td>San Francisco State U. – working toward M.S. degree</td>
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<tr>
<td>Griffith, Heather</td>
<td>05</td>
<td>Ohio U. Med School</td>
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<tr>
<td>Kinamore, Ayisha</td>
<td>05</td>
<td>Industry (Cincinnati, OH)</td>
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<tr>
<td>Kinnaman, Carrie</td>
<td>05</td>
<td>U. of Notre Dame grad school in physical chemistry</td>
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<tr>
<td>Muir, Natalie</td>
<td>05</td>
<td>Indiana U. School of Dentistry</td>
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<tr>
<td>Vrabel, Jerilyn</td>
<td>05</td>
<td>Analytical Chemistry Analyst at P&amp;G through Advanced Testing Laboratory</td>
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<tr>
<td>Burdick, Silas</td>
<td>04</td>
<td>Diversa Corporation (San Diego, CA) – Process Development Tech.</td>
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<tr>
<td>Darr, Anthony</td>
<td>04</td>
<td>2005 - Pre-med program at MCO MCO – Molecular Basis of Disease</td>
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<tr>
<td>Fete, Myra</td>
<td>04</td>
<td>Ohio University grad school</td>
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<tr>
<td>Hayman, Miranda</td>
<td>04</td>
<td>U. of Southern California grad school</td>
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<tr>
<td>Hillebrand, Kristen</td>
<td>04</td>
<td>U. of Cincinnati Pharm. D. program</td>
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<tr>
<td>Knierim, Kevin</td>
<td>04</td>
<td>Biology Masters Program at Toledo U; applying to dental school</td>
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<tr>
<td>Mehicic, Megan</td>
<td>04</td>
<td>Advocacy &amp; Protective Service; 2005 – Applying to Med School</td>
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<tr>
<td>Pretorius, Andrew</td>
<td>04</td>
<td>Wil Research Lab (Ashland, OH) necropsy lab  2005 – Iowa City, IA</td>
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<tr>
<td>Sanders, Chris</td>
<td>04</td>
<td>OSU Med School</td>
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<tr>
<td>Shellhouse, Jessica</td>
<td>04</td>
<td>Project Woman</td>
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<tr>
<td>Spray, Ryan</td>
<td>04</td>
<td>Purdue U. grad school (materials science)</td>
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<tr>
<td>Wilen, Jennifer</td>
<td>04</td>
<td>2005 – Kelly Scientific</td>
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<tr>
<td>Butler, Carl</td>
<td>03</td>
<td>Medical College of Ohio</td>
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<tr>
<td>Koh, Dukho</td>
<td>03</td>
<td>Washington U. at St. Louis grad school  2004 - Industry (Japan)</td>
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<td></td>
<td></td>
<td>2005 – Applying to law school (did not get in); senior analyst living in Chicago area</td>
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<tr>
<td>Matarrese, Marissa</td>
<td>03</td>
<td>U. of Washington (Seattle) med school</td>
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<tr>
<td>McCoy, Josh</td>
<td>03</td>
<td>U. of Virginia grad school</td>
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<tr>
<td>Miller, April</td>
<td>03</td>
<td>Bath &amp; Body Works chemist (Columbus)  2006 – Beauty Avenues, a Limited Brand Company</td>
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<td>Palmer, Andrew</td>
<td>03</td>
<td>Applied Sciences, Inc., Rsch Chemist (Cedarville, Ohio)</td>
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<td>Scouten, Jay</td>
<td>03</td>
<td>University of Toledo, MBA</td>
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<td></td>
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<td>2004 - MCO med school</td>
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<tr>
<td>Arner, Phil</td>
<td>02</td>
<td>OSU, College of Optometry</td>
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<tr>
<td>Crotty, Mike</td>
<td>02</td>
<td>Wait-listed at Case Western Med School and MCO; 2003 - MCO med school</td>
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<tr>
<td>Gardlik, Matt</td>
<td>02</td>
<td>OSU grad school</td>
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<tr>
<td>Johnson, Amanda</td>
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<td>Arizona University grad school  Master’s degree December 2004;</td>
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<td></td>
<td></td>
<td>Senior analytical chemist – Integrated Biomolecule Copr, Tucson, AZ</td>
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<td>Pizzuli, Jessica</td>
<td>02</td>
<td>OSU Vet School</td>
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<tr>
<td>Stewart, Alicia</td>
<td>02</td>
<td>Wright State Med School</td>
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<tr>
<td>Stewart, Matthew</td>
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<td>U. Michigan grad school  2003 – U. Illinois grad school</td>
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<td>Stewart, Michael</td>
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<td>U. Michigan grad school</td>
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<tr>
<td>Wright, Kojo</td>
<td>02</td>
<td>Yale Med School summer program;  2003 - Phoenix Chemicals (Columbus)</td>
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<tr>
<td>Bloomer, Katherine</td>
<td>01</td>
<td>U. of Illinois (MFA in Scenic Technology)</td>
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<tr>
<td>Extent, Jenny</td>
<td>01</td>
<td>Teaching high school chemistry &amp; physics (Akron Public Schools)</td>
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<tr>
<td>Fajgenbaum, Mark</td>
<td>01</td>
<td>U. of Edinburgh, Scotland, Medical School</td>
</tr>
<tr>
<td>Name</td>
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<td>Affiliation and Details</td>
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<tr>
<td>Good, Justin</td>
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<td>Teaching high school chemistry (Forest Hills School District)</td>
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<tr>
<td>Kissell, Kyle</td>
<td>01</td>
<td>Rice University (Materials Chemistry)</td>
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<td>Ryan, Shana</td>
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<td>U. of Cincinnati Medical School</td>
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<tr>
<td>Annett, David</td>
<td>00</td>
<td>Industry, Music Career</td>
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<tr>
<td>Gordon, Amanda</td>
<td>00</td>
<td>Medical College of Ohio 2005 – Riverside Hospital, Internal Medicine Resident</td>
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<td>Grant, Tyre</td>
<td>00</td>
<td>U. of Cincinnati (Analytical) 2004 - Senior Rsch Scientist at Eli Lilly</td>
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<td>Juhasz, Mark</td>
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<td>U. of California-Riverside (Inorganic) 2005 visiting asst. prof. Colby College</td>
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<td>Lytle, Justin</td>
<td>00</td>
<td>U. of Minnesota (Material Science) 2005 – postdoc at Naval Rsch Lab in D.C.</td>
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<tr>
<td>Nettles, Mike</td>
<td>00</td>
<td>Industry (EEI in Cincinnati); 2001 - Ecolochem (Texas); 2004 – Ecolochem (Norfolk, VA)</td>
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<td>Sobczak, Kristy</td>
<td>00</td>
<td>Cargill (Dayton, OH); 2004 - OSU, Pharm. D. program</td>
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<td>Spitler, Jeremy</td>
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<td>Eli Lilly (Lafayette, IN)</td>
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<td>Weygandt, Doria</td>
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<td>Fahlman, Dean - BMB</td>
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<td>Shiner, Katie - BMB</td>
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<td>Wade, Elisabeth - BMB</td>
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<td>U. of Arizona (Biomedical Science)</td>
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<td>Barnes, James</td>
<td>99</td>
<td>Indiana University - Ph.D. granted 2003 - Post-Doc Los Alamos Natl. Lab</td>
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<td>Broering, Julie</td>
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<td>Christoforou, Nicolas</td>
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<td>Johns Hopkins</td>
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<td>Deakyne, Emily</td>
<td>99</td>
<td>Gamma Phi Beta Consultant 2000 – Acct. Manager, Lab Support, (Cincinnati, OH)</td>
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<tr>
<td>Durrani, Sandy</td>
<td>99</td>
<td>Wright State Med School</td>
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<tr>
<td>Fogt, Chad</td>
<td>99</td>
<td>Industry, then Podiatry School FA/2000 OU Med School</td>
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<tr>
<td>Groth, Aaron</td>
<td>99</td>
<td>OSU Med School</td>
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<tr>
<td>Ingram, Cheryl</td>
<td>99</td>
<td>Teach for America (Baltimore, MD) 2000 - Eli Lilly (Indianapolis, IN) Scientific Communications Assoc.</td>
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<td>Lindstrom, Mathias</td>
<td>99</td>
<td>Miami U. Grad School (Paper Science); 2002 - No. Carolina State - PhD Program</td>
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<td>Schalnat, Matthew</td>
<td>99</td>
<td>ConSeal, Inc. (New Carlisle, OH); 2001 - Wright State Grad School; 2003 – U of Arizona grad school</td>
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<td>Schroeder, Bill - BMB</td>
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<td>Superior Electric Co. (Columbus)</td>
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<td>Stewart, Lisa</td>
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<td>U. Cincinnati Med School; 2003 residency, OBGYN, Medical University of South Carolina, Charleston, SC</td>
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<td>Tomcsi, Michael</td>
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<td>UCLA</td>
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<td>Bunn, Kathleen</td>
<td>98</td>
<td>Quality Assurance Chemist, Cargill (Memphis, TN) 2004 - Peace Corps in Tanzania, Africa</td>
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<tr>
<td>Chaksupa, Dan</td>
<td>98</td>
<td>West Virginia U. Medical School</td>
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<tr>
<td>Harms, Erik</td>
<td>98</td>
<td>Brew Chemist, Dragonmead Microbrewery (Warren, MI)</td>
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<tr>
<td>Klett, Jenny</td>
<td>98</td>
<td>Industry - Marketing &amp; Investments (Columbus, OH); MBA – OSU Grad Student – Fisher College of Business - OSU</td>
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<td>Messerly, David</td>
<td>98</td>
<td>OSU Medical School</td>
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<tr>
<td>Miller, Cory</td>
<td>98</td>
<td>2005 ER Physician – Raleigh Emergency Medicine Associates, NC</td>
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<tr>
<td>Miller, Cory</td>
<td>98</td>
<td>Production Chemist, Gfs Chemicals (Columbus, OH)</td>
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<td>Montgomery, Nicole</td>
<td>98</td>
<td>Research Chemist, National Starch &amp; Chemical (Bridgewater, NJ) 1999 – USC Grad School</td>
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<td></td>
<td></td>
<td>2000 – Chemist, National Starch &amp; Chemical (Kansas City, MO)</td>
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<td>Oatman, Alison</td>
<td>98</td>
<td>ISOTEC (Miamisburg, OH) 2005 – Castle Shannon, PA</td>
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<td>Stepsis, Tyler</td>
<td>98</td>
<td>University of Cincinnati Medical School 2005 – ER physician at Clarian West Med Center, Avon, IN</td>
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<tr>
<td>Arnold, Tracey</td>
<td>97</td>
<td>Ohio State (Biochemistry) completed 2003 Asst. Prof. at Capital U.</td>
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<td>Burke, Brian</td>
<td>97</td>
<td>Purdue 2005 – Cardinal Health Pharmaceuticals, Inhalation Scientist</td>
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<tr>
<td>Donnelly, Mike</td>
<td>97</td>
<td>Asst. Football Coach (Wittenberg) &amp; Classes at Wright State 2000 – Chemist-Technologist, Master Chemical Corp. (Perrysburg, OH) 2005 – teaching computer science and coaching at Central Catholic HS in Toledo, OH</td>
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<tr>
<td>Elizarov, Arkadij</td>
<td>97</td>
<td>UCLA 2002 - Scientist, Medicinal Chemistry, Galileo Labs, Santa Clara, CA</td>
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<td>Hansen, Rich</td>
<td>97</td>
<td>OSU Dental School</td>
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<td>Horn, Maike</td>
<td>97</td>
<td>Missionary work &amp; classes. 1998 - Teaching in Germany.; 2001 – Teaching in Malaysia</td>
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<td>Kamenjicki, Marta</td>
<td>97</td>
<td>Univ. of Pittsburgh 2004 – Asst. Professor</td>
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<td>Livingood, Ross</td>
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<td>Weygandt, David</td>
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<td>Travel, Industry (Beaver Creek, CO)</td>
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<td>Burghard, Joe</td>
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<td>Wright State Medical School</td>
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<td>Ebenezer, Suresh</td>
<td>96</td>
<td>Industry - Pharmaceutical Co. (Chicago) 1997 - Masters Program at Miami U 2000 – Chemist at Bath &amp; Body Works (Columbus)</td>
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<td>Marquard, Kristen</td>
<td>96</td>
<td>University of Michigan - College of Pharmacy 2000 – Eli Lilly (Indianapolis)</td>
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<td>Niksic, Rusmir</td>
<td>96</td>
<td>USC Grad. School (Los Angeles) 12/96 - American Embassy in Bosnia</td>
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<td>Sanders, Michael</td>
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<td>Industry - Cargill (Dayton)</td>
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<td>Smith, Alyssa</td>
<td>96</td>
<td>Industry - Kellogg (Battlecreek, MI) 1999 – U. Wisconsin (Pharm. D.)</td>
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<td>Wyly, Carl</td>
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<td>Industry - Eli Lilly (Indianapolis)</td>
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<tr>
<td>Azzara, Lori</td>
<td>95</td>
<td>Teaching High School (Sidney, OH) 1997 - Teaching High School (Camden, OH)</td>
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<tr>
<td>Grant, Brandon</td>
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<td>Industry, Faratech (Dayton)</td>
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<td>Hudson, Brian</td>
<td>95</td>
<td>Industry - Vizcaya Chemical Laboratories - (Miami, Florida) 1997 - Industry (Columbus, OH)</td>
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<tr>
<td>Kim, Richard</td>
<td>95</td>
<td>Case Western Reserve University, (Cleveland)</td>
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<tr>
<td>McNamara, Jennifer</td>
<td>95</td>
<td>Teaching at Catholic Central High, (Springfield, OH); 1998 – Teaching at North High School (Springfield, OH)</td>
</tr>
<tr>
<td>Miller, Paige</td>
<td>95</td>
<td>Medical College of Ohio , Toledo (masters in Occupational Health) 97 - Case Western, Dept. of Occupational &amp; Environmental Safety</td>
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<tr>
<td>Swingle, Jennifer</td>
<td>95</td>
<td>Ohio State, Columbus (Optometry School); 1999 – O.D. degree</td>
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<td>Yelovich, Andrei</td>
<td>95</td>
<td>Univ. of Maryland-Baltimore County (Dept. of Chem &amp; Biochem); 1999 – Teaching High School Chemistry (Baltimore, MD)</td>
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</tbody>
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### Appendix 14

Graduate and Professional Programs for Chemistry Major Graduates, 2001-2005

<table>
<thead>
<tr>
<th>2001-2005</th>
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<tbody>
<tr>
<td><strong>Graduate School</strong></td>
</tr>
<tr>
<td>San Francisco State University</td>
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<tr>
<td>Notre Dame University</td>
</tr>
<tr>
<td>Ohio University</td>
</tr>
<tr>
<td>University of Southern California</td>
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<tr>
<td>Purdue University</td>
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<td>Washington University at St. Louis</td>
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<td>University of Virginia</td>
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<td>Ohio State</td>
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<tr>
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<tr>
<td>University of Cincinnati</td>
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<td>University of California-Riverside</td>
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<td>University of Minnesota</td>
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<tr>
<td>University of Arizona</td>
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<tr>
<td><strong>Professional Schools</strong></td>
</tr>
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<tr>
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<tr>
<td>University of Cincinnati, Pharm D</td>
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<tr>
<td>Ohio State Medical School</td>
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<td>University of Washington (Seattle), Medical School</td>
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