Program Review

Master of Science Program in Chemistry

College of Science

November 2011

MARSHALL UNIVERSITY
Date: October 19, 2011

Program: Master of Science in Chemistry

Date of Last Review: November 1, 2006

**Recommendation**

Marshall University is obligated to recommend continuance or discontinuance of a program and to provide a brief rationale for the recommendation.

**Recommendation**

<table>
<thead>
<tr>
<th>Code (#)</th>
<th>Continuation of the program at the current level of activity; or</th>
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<tbody>
<tr>
<td>1</td>
<td>Continuation of the program at a reduced level of activity or with corrective action: Corrective action will apply to programs that have deficiencies that the program itself can address and correct. <strong>Progress report due by November 1 next academic year</strong>; or</td>
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<td>2</td>
<td>Continuation of the program with identification of the program for resource development: Resource development will apply to already viable programs that require additional resources from the Administration to help achieve their full potential. This designation is considered an investment in a viable program as opposed to addressing issues of a weak program. <strong>Progress report due by November 1 next academic year</strong>; or</td>
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<td>3</td>
<td>Development of a cooperative program with another institution, or sharing of courses, facilities, faculty, and the like; or</td>
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<tr>
<td>4</td>
<td>Discontinuation of the program</td>
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**Rationale for Recommendation**: (Deans, please submit the rationale as a separate document. Beyond the College level, any office that disagrees with the previous recommendation must submit a separate rationale and append it to this document with appropriate signature.)

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**Recommendation**

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<tbody>
<tr>
<td>Dr. John Hubbard</td>
<td>10/24/2011</td>
</tr>
<tr>
<td>Dr. Michael Castellani</td>
<td>10/24/2011</td>
</tr>
<tr>
<td>Dr. Charles Somerville</td>
<td>26 October 2011</td>
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<tr>
<td>Dr. Tracy Christofero</td>
<td>January 27, 2012</td>
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**Recommendation**

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<tr>
<td>Signature of Chair, Academic Planning Committee: (Baccalaureate pgms only)</td>
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**Recommendation**

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<td>Signature of President, Faculty Senate/ Chair, Graduate Council:</td>
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**Recommendation**

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<td>Signature of the Provost and Senior Vice President for Academic Affairs:</td>
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**Recommendation**

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<td>Signature of the President:</td>
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**Recommendation**

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<td>Signature of Chair, Board of Governors:</td>
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College/School Dean’s Recommendation

Recommendation: Continuation of the program with recommendation for resource development (Recommendation Code #3).

Rationale:

Background. The Department of Chemistry offers both a thesis and non-thesis option for achieving the M.S. in Chemistry degree. The thesis option is preferred for most students, and Professor Hubbard notes that the non-thesis option is available primarily for students who are employed full-time. The thesis option requires a minimum of 32 hours of graduate credit, and up to 12 hours can be earned as Research (CHM 682) hours. CHM Graduate Faculty members are talented and research active, and the research equipment available in the department is extensive. Although the graduate program is small, it is a program of high quality as indicated by the success of its graduates. The major challenges of the program include flat budgets and facilities that are long overdue for renovation. The opening of the new School of Pharmacy at Marshall University is expected to cause an increase in the size of the Chemistry Graduate Program, but that increase will come at the expense of program quality unless resource development is made available.

Budgets. Departmental budgets are inadequate, in part because a large percentage of the department’s discretionary budget comes from lab fees. Because lab fees are needed before they are collected, initial lab fee budgets are advanced to the college at the start of the fiscal year, and the advanced funds are repaid over the remainder of the fiscal year. The amount of advanced funds is based on a request from the college office, which in turn is based on an estimate of the lab fees that will be generated during the upcoming year. Because many factors can have an impact on lab fee revenue, we tend to be conservative in our requested budget. This has the intended consequence of reducing the likelihood of a shortfall at the end of the fiscal year, but also has the negative consequence of creating smaller initial allocations to the departments.

Though the college does make several supplemental transfers to departments during the fiscal year, this system creates a budgeting difficulty for departments. Professor Hubbard’s comments regarding budget are essentially correct. The dollar allocations listed in his review should not be viewed as discretionary budgets that the department starts with each year. Instead, it is more informative to think of them as the total amounts spent on operation in a given year. The fact that total spending has remained flat while individual expenses have risen indicates that there is significant pent-up demand for increased funding, as indicated in this review.

In an attempt to make departments more autonomous in their budgeting, and to reduce the need for multiple special requests for funding, the college office now returns a greater percentage of lab fee revenues than was done under the previous dean (60% minimum versus 40%). The college also returns 50% of CoS Indirect Cost Recovery (ICR) funds to the department of a faculty member who has obtained external funding.
Under the previous dean, none of the ICR funds were allocated to department chairs. Although these additional allocations are a positive step, they have only served to keep budgets flat, not to increase available resources.

The small budget in support of graduate assistantships is particularly troubling. I anticipate that the advent of the Pharmacy Program will increase the size of the Chemistry graduate program in much the same way that the Joan C. Edwards School of Medicine drives a measurable increase in the size of the Biological Sciences graduate program. When this growth occurs in Chemistry, graduate students can take on the role of Teaching Assistants in undergraduate chemistry laboratory courses (the demand for which is growing rapidly), but they will require a much larger budget than is currently available. Because the graduate population in Chemistry is now relatively low, the department has very limited stipend and tuition waiver budgets. Significant new university investment in TA stipends and tuition waivers will be needed to meet the demand.

**Facilities.** As noted in Professor Hubbard’s review, the capital equipment in the Department of Chemistry at Marshall University is “better than that at the large majority of primarily undergraduate institutions nationwide”. Maintenance of this equipment is a significant challenge. The college does prioritize the use of indirect cost recovery (ICR) funds for equipment maintenance contracts, but the replacement of outdated equipment is beyond the capacity of those funds. For replacement of research equipment – which greatly benefits the research options available to graduate students – we depend largely upon successful grant applications. Equipment that is used primarily for teaching presents a larger challenge. Teaching equipment is purchased whenever possible from lab fee budgets, but those revenues are insufficient to keep up with both enrollment expansion and the ever-growing costs of replacing and upgrading teaching equipment.

One of our greatest challenges in the College of Science is the state of our facilities, and, because of its position on the fourth floor of the Science building, the Chemistry Department suffers more from this than do other departments in the college. Roof leaks, which have been frequent for many years, have been addressed this year as part of a very large capital investment by the university. That investment is very much appreciated! Unfortunately, the recent investment in infrastructure has not addressed our long-standing problem of climate control in the Science Building. This is not merely an issue of comfort, but a problem that has led to mold infestation, ruined equipment, student dissatisfaction, and faculty disaffection. It is among the highest priorities of my office to improve the very poor climate control in the Science Building, but this cannot be done from limited college budgets. Another round of major capital investment in College of Science facilities is desperately needed.

**Resource Development.** In the Resource Development section of this document, Professor Hubbard presents a table in which he estimates and prioritizes departmental needs. In effect, this is a two-tier request for additional funding for GA stipends and tuition waivers. Priorities 1 and 2 represent requests that would adequately fund the CHM graduate program given the current size of the program and the expected growth in undergraduate offerings. Priorities 3 and 4 would allow the graduate program to grow to the size expected due to the opening of the School of Pharmacy. Increased funding
for Graduate Assistantships and tuition waivers is essential if the quality of the program is to be retained in the face of certain growth at the undergraduate level and anticipated growth in the graduate program.

Charles C. Somerville

15 October 2011

Signature of Dean

Date
Chemistry Master of Science Program Review

Institution: Marshall University
Programs: Master of Science in Chemistry
Date: October 19, 2011

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Marshall University
Program Review

Program: Master of Science in Chemistry
College: Science
Date of Last Review: November 1, 2006

I. Consistency with university mission

Departmental mission statement: To be known as one of the top undergraduate and Masters programs in the nation by integrating teaching and research.

The mission of the Department of Chemistry is consistent with that of the University as a whole. Upon graduation a student in Chemistry should (1) think logically, critically, and creatively and be able to recognize this ability in others; (2) communicate ideas clearly and effectively both in speaking and writing; (3) evaluate the influences that help to shape individuals, institutions, and societies; (4) understand the values, achievements, and aesthetic contributions of past and present cultures; and (5) perceive, investigate, and solve problems by enlisting the most appropriate historical, comparative, quantitative, and qualitative research methods available. The Department is continually developing new and revising outdated courses and programs to meet the needs of the chemical industry and our ever-changing society.

In modern times, integration of disciplines has become increasingly common at universities and in the economy in general. Over time, our collaboration with other departments has also increased. Traditionally, we have interacted with the College of Education in the training of science teachers, with other departments within the College of Science regarding shared curricula, and with basic sciences departments in the School of Medicine in doing research. As equipment has become more expensive and useful to greater numbers of disciplines, we have engaged in the collaborative writing of instrument proposals. The recent impetus to develop a strong presence in biochemistry and biological chemistry has led to the writing and funding of a major NSF EPSCoR grant in conjunction with the Department of Biological Sciences. Several faculty members have engaged in collaborative research (e.g. Biological Sciences, School of Medicine) or collaborative teaching with members of other departments. The Department enjoys friendly relations with local industries. Local companies occasionally consult members of our Department for ideas in solving problems and sometimes use resources such as our instruments, and our faculty members have consulted with them on program development issues.

II. Accreditation Information

II. A. Accreditation Organization

The field of chemistry has no accrediting agency, and the American Chemical Society does not certify degrees and programs at the graduate level.

II. B. Accreditation Verification

II. C. Accreditation Status

II. D. Accreditation Report
II. E. Deficiencies

III. Program Statement

III. A. Adequacy

III. A. 1. Curriculum

Science is an integral part of a liberal education and Chemistry is the central science. The Department of Chemistry offers its students more than a simple collection of facts concerning the nature of chemical interactions. Rather, it endeavors to develop in them an appreciation for the experimental vision and rigor necessary to assemble such knowledge, and expects of them a critical understanding of the logic and theory that integrate these bits of information into a unified whole. In so doing we attempt to provide the opportunity for intellectual and personal growth. Our students are encouraged to appreciate science as a human endeavor and are invited to participate in the work of science as they accumulate the necessary insights and laboratory skills. We seek to stimulate and develop within each individual those qualities that foster an enthusiasm for knowledge, an attitude of critical reasoning, and the attainment of lucid self-expression, all of which transcend the limited context of the chemical sciences.

The Master of Science in Chemistry is a two-year program intended primarily for individuals interested in advanced training in chemistry and related disciplines in preparation for doctoral programs or for careers in industry, government, or post-secondary school education. Students are expected to be well grounded in one or more of the program’s five areas of specialization: Analytical Chemistry, Biochemistry, Inorganic Chemistry, Organic Chemistry, and Physical Chemistry. The Department of Chemistry currently offers both thesis and non-thesis options for the Chemistry M.S. degree. The non-thesis option is a seldom-utilized alternative route available for students currently employed full-time and requires departmental authorization. Basic requirements are the same as the thesis option; however, it requires 36 hours of graduate credit and a problem report followed by a public lecture. This program organization ensures that all students develop research, writing and public speaking skills with any area of concentration.

The preferred route requires a thesis with 32 hours of graduate credit, two public lectures, and an oral thesis defense. The M.S. thesis demonstrates that one is capable of pursuing a program of original and independent research, can formulate and carry out a research project, and can report on the project in a proper scientific manner. The thesis option prepares students for technical careers in industry or for further study toward a more advanced degree. This option requires advanced coursework in chemistry, biochemistry, or environmental chemistry, and research culminating in an M.S. thesis. Shortly after entering the program students select a faculty advisor based on their research interests, with whom they formulate a plan of study and agree on a research problem. Under the guidance of the faculty advisor a student carries out the research program, selects a graduate research committee, and writes and defends the thesis in a final oral examination. The defense of the thesis takes place when the student, the research advisor, and the graduate research committee agree that a defensible copy of the thesis is complete. The thesis examination is graded on a pass/provisional pass/fail basis. To pass the examination, there can be no more than one unsatisfactory grade from the committee members. A student who fails may submit another thesis or a revised version upon approval of the student’s committee. A student may only be reexamined once. A student earning a provisional pass will generally be required to make minor revisions or corrections to the thesis.

Students are required to complete 32 and 36 hours of graduate credit (see Appendix I) for the thesis and non-thesis options, respectively. No more than six hours of Special Topics courses
may be counted in the minimum hours required by either route; any exceptions require specific departmental approval. Students following the thesis option receive up to 12 hours credit for 682 and one hour each for 631 and 632. The remaining 18 hours of graduate credit come from courses in the various areas of chemistry, chosen in consultation with the faculty advisor. It is required that at least three of the five areas be represented in the plan of study, and it is recommended that all courses pertaining to the area of one’s research be included.

In addition to the formal curriculum and program requirements, M.S. students in Chemistry are offered many opportunities to familiarize themselves with the wide-range of state-of-the-art instrumentation, work on cutting-edge, cross-disciplinary projects and participate in professional conferences. Due to the Department’s small size, graduate students are compelled to interact with faculty outside their immediate research area. This provides exciting opportunities for our students to broaden their graduate experience.

Students are encouraged to attend professional conferences around the country and to present papers based on the research they conduct at Marshall. Since the Summer of 2006, 22 papers with Marshall graduate students as authors and co-authors have been presented at regional, national and international conferences and meetings.

III. A. 2. Faculty

There are 10 tenured or tenure-track faculty members in Marshall's chemistry department who have Graduate Faculty status. A two-page vitae is included for each faculty member in Appendix II. A list of faculty, with their doctoral university and area of specialization, follows:

- **Professor Michael P. Castellani** (UC San Diego): *Inorganic Chemistry* - Transition metal organometallic chemistry; paramagnetic complexes; steric control of reactivity.
- **Assistant Professor B. Scott Day** (Virginia Tech): *Nanochemistry and Surface Chemistry* - Emphasizing biomolecule functionalization.
- **Associate Professor Leslie M. Frost** (Virginia): *Biochemistry and Bioanalytical Chemistry* - Identification and sequencing of biologically important peptides and proteins by mass spectrometry.
- **Professor John L. Hubbard** (Purdue): *Organic Chemistry* - Hydride-induced carbonylation of organoboranes; hydride transfer reactions; synthesis and pharmacology of succinimides.
- **Assistant Professor Derrick R.J. Kolling** (Illinois): *Biochemistry* – Investigation of the mechanism of water oxidation by photosystem II.
- **Assistant Professor Laura McCunn** (Chicago): *Physical Chemistry* – Radical intermediates. Matrix isolation FTIR. Molecular photochemistry
- **Associate Professor Robert J. Morgan** (City University of New York): *Organic Chemistry* - Synthesis and characterization of organic fluorochromes.
- **Associate Professor William D. Price** (UC, Berkeley): *Physical, Biophysical and Bioanalytical Chemistry* - Chemical and physical properties of gas phase biomolecules, trace constituent cellular analysis.
- **Assistant Professor Bin Wang** (Queen’s): *Analytical Chemistry* – Microfluidics and lab-on-a-chip. RNA structural determination.
All ten of the Graduate Faculty members in the chemistry program have earned the Ph.D. in chemistry from highly respected and nationally/internationally ranked Chemistry graduate programs. Eight of these have at least one year of postdoctoral research or industrial work experience and it is now required for new appointments to the Department.

The level of research activity in the Department of Chemistry is very high. During the past five years, ten faculty members have authored 44 research papers and have presented 53 papers at national or international conferences. [This total includes papers and presentations by faculty now separated from Marshall, but whose work was done here.] Six faculty have received research grants from outside funding agencies for a total of $3.55 M. In addition, two faculty have obtained over $600K in grant support for university and state activities. Notably, Michael Norton was co-principal investigator on a $930K NSF grant to purchase a state-of-the-art microscope that will be used in Marshall’s Molecular and Biological Imaging Center. The entire faculty attends departmental seminars and the local American Chemical Society Meetings.

Laura McCunn received a Camille and Henry Dreyfus Foundation Faculty Start-up Award in 2008. This award is given to an incoming faculty member at a predominantly undergraduate institution who is deemed to be exceptional. In a typical year, 5 such awards are made nationally, with only one going to a faculty member at a public college or university. The award comes with $30,000 in unrestricted funds.

Bin Wang’s research was selected as a cover article in the Journal of Biological Chemistry in 2010. Drs. Day, Frost, Kolling, and McCunn have held leadership positions in the local American Chemical Society chapter. Mike Castellani was re-elected as councilor to the Chemistry Division of the Council on Undergraduate Research, the nation’s largest organization devoted to the advancement of research with undergraduates. He co-coordinates Posters on the Hill (an outreach event to the US Congress) and WV Undergraduate Research Day at the Capitol.

Chemistry Graduate Faculty members hold a number of leadership positions on campus including: Faculty Senate (Kolling), WAC facilitator & former chair of the Honors Council (Price), President Kopp’s ad hoc Budget Understanding Committee (McCunn), and vice-chair of the Council of Chairs (Castellani).

III. A. 3. Students

III. A. 3 a. Entrance Standards

Applicants must have a baccalaureate degree from an accredited U.S. college or university, or an equivalent degree from a foreign university in chemistry or biochemistry. Students enrolled in the last semester of an undergraduate program may be admitted conditionally subject to completion of the bachelor’s degree program and subject to departmental approval. All required credentials, including official transcripts are necessary for consideration, including an official letter of good standing/proof of pending graduation. The transcript from the institution that awarded the B.S. degree must contain the name of the degree earned and the date the degree was conferred. Transcripts of all previous graduate work must be submitted. International applicants must submit official translations to English of all transcripts and diplomas. The Graduate Admissions Office cannot accept unofficial transcripts, including transcripts that are faxed, hand-delivered or, stamped “issued to the student.” The official transcript must be issued to and mailed directly to Marshall University Graduate Admissions by the registrar of the issuing institution. A 2.50 undergraduate grade point average (on a 4.0
scale) is required. In order for post-baccalaureate credit to be included in the GPA computation, the coursework must be upper division. Post-baccalaureate coursework at community colleges will not be included in the GPA used for admission. Applicants with advanced degrees from accredited institutions are considered to have met GPA requirements. The Graduate Record Examinations (GRE) General Test is required, and the scores must be sent directly to the Graduate Admissions Office by the testing agency. The chemistry subject test is optional. Final admission to the program is subject to favorable review and recommendation by the Department of Chemistry Graduate Affairs Committee. In special cases, students who do not meet all the requirements for full admission may be granted provisional admission. These students must make up any deficiencies before full admission to the program.

It is possible to be admitted conditionally without English proficiency if a student applies for admission to the L.E.A.P. Intensive English Program at the same time he or she applies for admission. Otherwise, proof of proficiency in English may be certified by submitting one of the following (results of tests taken more than two years prior to the date submitted cannot be accepted): a. The Test of English as a Foreign Language (TOEFL). Students taking the paper version of the test must have a minimum score of 525. Computer-based TOEFL ceased in September 2006, therefore scores are no longer acceptable. Internet-based TOEFL requires a minimum score of 70. b. Michigan English Language Assessment Battery (MELAB). The minimum acceptable score is 82% for graduate study. c. A minimum score of 6.5 on the International English Language Testing System (IELTS) for graduate study. d. Advanced ELS. Completion of the advanced level of Marshall University's L.E.A.P. Intensive English Program or the completion of an intensive English program comparable to Level 112 of the English Language School (ELS). e. Diploma or degree from an English-speaking school - A degree or a diploma from an accredited secondary school, college or university in which the primary language of instruction is English.

The Affidavit of Support Form must be completed by applicants needing to obtain an F-1 visa. This is to show that the student or a sponsor has finances to support study and living costs for one academic year (9 months; current estimate is $27,600 US). In some cases, a 50% deposit will be required in order to issue the I-20 form. Proof of financial support may be demonstrated in several ways: a. Affidavit of financial support from a personal sponsor (parent, relative, friend) that has been certified by a US bank or financial institution. b. Scholarship agency (government, corporation, etc.) statement showing the availability of funds and the intention to support educational and living expenses for the entire duration of study at Marshall University. c. Bank statement from a U.S. bank or financial institution or its affiliate documenting personal funds in US dollars (USD); a statement from an employer certifying the granting of study leave and salary support arrangements may also be acceptable.

III. A. 3. b. Entrance Abilities

Students entering the M.S. program in Chemistry have varying backgrounds, experience and levels of preparation. All students entering the program are evaluated to identify any academic weaknesses or deficiencies. As part of this process, members of the Chemistry Graduate Affairs Committee interview all incoming students. Placement exams for the five areas of chemistry are administered when appropriate, and a student is required to take additional courses during the first year to overcome any deficiencies revealed by these exams. In cases where a deficiency has been identified sufficiently early in the application process, a student may be asked to take additional courses in the summer prior to admission. In those cases where an applicant shows promise but is significantly deficient in chemistry background, provisional admission may be granted and specific requirements established to gain full admission.
III. A. 3. c. Exit Abilities

The M.S. in Chemistry program prepares students for employment in laboratories (academic, government, industrial) and in manufacturing facilities, or for further study toward the Ph.D. or professional degrees. It places high priority on, and encourages growth in, these areas:

- independence, because each individual has unique abilities;
- collaboration, because current problems are large and complex;
- flexibility, because employment opportunities are changing rapidly;
- written and oral communication skills, because one must disseminate one's knowledge;
- numeracy, because most modern scientific problems are quantitative;
- computer literacy, because computers moderate many of our efforts;
- inquiry, because learning should be lifelong and self driven;
- currency, because knowledge is evolving rapidly;
- analytical habits of thought, because life requires problem resolution;
- vision, because the empowered student should be ambitious.

While we cannot quantify these goals, we can discuss how we address them. Numerous chemistry courses have significant mathematical components that require a student to compute and think quantitatively, or they cannot pass them. By its very nature, thesis research prepares students to deal with the unexpected and to recognize opportunities. Many research projects involve two or more mentors at some time during the project. Students frequently learn from one another on new instruments and while conducting laboratory procedures. These aspects of research teach the student the necessity of cooperation in a research lab. The thesis and literature presentation address communication. Nearly all Chemistry Graduate Faculty engage in research to create new knowledge and lead by example. They discuss the merits of these endeavors: in classes, with their own research students, and with students in an informal way. The very nature of research requires currency, analytical thinking, and vision, attributes students learn to appreciate while conducting their thesis projects.

III. A. 4. Resources

III. A. 4. a. Financial

Before presenting the budget numbers associated with this Department some comment must be made to put that data into context. In the following table, the amount of money passing through the Department is presented, but this total does not represent our budget. A large proportion are “pass through funds,” that is money placed into our accounts for a specific purpose, but, in some cases having little do with the daily operations of the Department. Three examples follow in the next paragraph for 2006-7.

In 2006, the then dean of the College of Science hired two academic advisors but could not use state employment lines. As a result, our stockroom manager lost his state line and now receives his salary and benefits through lab fees. In 2006-7 that amounted to over $35,300, which appears as a budget increase for this Department. In that same year, Academic Affairs transferred $3,300 to Chemistry for the purpose of hosting Undergraduate Research Day at the Capitol and sending a member of the Department to Posters on the Hill in Washington, DC because he was national program co-chair. Under no conditions would the Department spend its own funds for those purposes, yet this $38,300 is listed as part of our budget and represents over 33% of the total. As a result of these and other, similar insertions, the yearly totals do not correctly reflect our actual discretionary budget.
Another point warrants comment; the totals here are problematic in another way. Money is placed into our accounts at various times during the year. For example, the travel funds for *Posters on the Hill* were placed into a Department account on March 6. There would be no reasonable way to budget this at the beginning of the fiscal year. **Although almost always at the request of the Department, essentially all funds received after early Fall each year are dedicated for a specific purpose. In each case, the funds exist because of a special request to the Dean or Provost and are subject to the availability of funds and their approval. In no way could they realistically be called either budgeted or discretionary.**

<table>
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<th>Year</th>
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<td>$45,397</td>
<td>$800</td>
<td>$111,215</td>
</tr>
</tbody>
</table>

This table suggests the Department had $557,000 over 5 years ($111,400 annually) as its budget, but our stockroom manager’s salary ($186,000), telephone funds ($19,000), and transfers for recruiting new faculty, classroom equipment replacement, etc. ($35,000) and a $13,000 a one-time appropriation from the Dean to upgrade the equipment in one of our labs should be deducted from this total. After doing so, our yearly expenditures averaged $60,800, or about 55% of the apparent amount. Again, the Department does not receive this as a lump sum at the beginning of the fiscal year, but rather through an initial allocation, followed by several supplements that come on the basis of requests.

Notably, **the Departmental allocation has remained flat for the past 5 years, yet we have had a significant increase in costs.** Since the 2001-6 reporting period, inflation for common chemicals has increased by 150-350% and lab supplies and small equipment by 20-140% (for the period 2004-2011). In no single year did final appropriations fully cover the cost of operating the Department. We have drawn down approximately $10,000 in reserves from old stock in each of the 5 years of this report. That value is decreasing, not because less was needed, but rather because stock is being exhausted. Our Dean has increased our allotment of lab fees each of the past 3 years, but a reduction in the number of students taking CHM 217 labs because of departmental retention efforts and flat HERF allocations have negated this. **In short, in each year original allocations were insufficient to cover the normal operating expenses of this Department. Even the replacement of routinely used equipment in our freshman and sophomore labs may require special appropriations from the Dean.**

Another problem is an insufficient budget to hire laboratory teaching assistants. This is a potential liability issue for the University. Each laboratory must have a supervisor present at all times. Because labs frequently run 3 hours, provision must be made for the faculty member to leave the room (to retrieve equipment from the stockroom, etc.). Teaching assistants fulfill that role in addition to assisting in the supervision and grading of as many as 60 students. Historically, we have done this by awarding course credit, but the recent reduction in hours required for graduation, has reduced students from enrolling for TA credit. The recent 5% departmental budget reduction came exclusively from student assistant funds. As a result, in
FY 2011, we are already in deficit, having been forced to use GA stipend funds to cover the cost of teaching assistants for the fall semester alone.

There appears to be significant concern about Departments carrying funds over from one FY to another. Each year this Department retains ca. $5,000 from the previous year’s funds because we engage in year round operations. As we enter the new FY, there is still part of one summer school lab in session and a second yet to start. Furthermore, fall semester supplies must be purchased, some of which have limited shelf lives. Each year the amount we retain stays relatively constant. That is, the retained funds are spent before allocations of new FY funds become available. The inability to retain funds will require us to “borrow” money from the Dean or Academic Affairs in anticipation of our allotment.

During each year of this period, there has been $18,000 available for graduate assistantships. This is enough to provide one full-time graduate student stipend and to provide half-time compensation for one other graduate student. The inadequacy of this allocation will be addressed further elsewhere in this review.

On the positive side, the Dean and Provost have been generous with the Department when making one-time allocations. For example, the Department has received funding for a teaching infrared spectrophotometer ($13 K) and over $51,000 to purchase a rebuilt mass spectrometer that has greatly benefited Leslie Frost’s research program from College indirect cost recovery funds. We have also been able to offer prospective faculty members nationally competitive start-up packages, and this has helped immeasurably with faculty recruitment. As noted earlier, the faculty we have recruited have been very successful at obtaining external grant funding and that is supplementing our infrastructure budget through their equipment budgets.

III. A. 4. b. Facilities

The Department of Chemistry extends throughout the 4th floor of the Science Building and occupies an NMR lab on the ground floor of the building. The Department also has two offices and laboratories in the Byrd Biotechnology Science Center (BBSC). The teaching facilities include two large lecture rooms equipped with multimedia projectors and computers, two large freshman laboratories, two large organic laboratories, and labs for other courses. The Department also contains dual use research/teaching labs. These include the mass spectrometry, NMR, fluorescence and laser spectroscopic equipment. Our instrumentation is described on our website.

The capital equipment at Marshall is better than that at the large majority of primarily undergraduate institutions nationwide thanks in large part to the support offered by the administration in terms of providing matching funds for external grants. Unfortunately, we are beginning to see erosion due to the high maintenance and upgrade costs for many of the high end instruments and their software.

As a result of our previous program review Ms. Verna Gibson made a $25,000 donation to the Department, which was used to renovate our instrument room. The funds allowed us to purchase modern cabinetry and tables for our equipment. Residual funds from that donation and the sale of an instrument also allowed us to renovate a little used room into a small, high tech classroom for upper division and graduate level classes.

The Department maintains a conference room for faculty meetings, research group meetings, and grant proposal preparation meetings. There is also a stockroom with access to everyday chemicals and equipment and an outside chemical warehouse for bulk and hazardous storage.
The Department has a full-time office manager, a full-time laboratory manager, and a full time stockroom clerk. These departmental assistants operate the office, repair and install instruments, order and maintain an inventory of chemicals, and assist in the preparation of teaching laboratories. Our long time laboratory manager Karl Shanholzer is nearing retirement. When that occurs, we wish to replace him with someone who has a background in chemistry, preferably with a bachelor’s degree in field. This will allow us to hire someone who can assist with supervising teaching assistants and laboratory preparations. The base salary for pay grade 16 is approximately $29,000, well below what a B.S. in chemistry generally commands for an entry-level job.

III. A. 5. Assessment Information

III. A. 5. a. Summary Information

Below are discussed the Department’s strategic planning and various elements of assessment.

III. A. 5. b. Other Learning and Service Activities

III. A. 5. b. i. Strategic Planning

The Department has undergone a significant period of new hiring resulting in 6 of 14 tenure-track lines (both Graduate Faculty and non-Graduate Faculty) being occupied by assistant professors. During this period there was considerable discussion about the future direction of the Department. In 2008 we received funding from the WV state Division of Science and Research and the College of Science to match departmental funds to bring in a team of external evaluators (Dr. Silvia Ronco, program officer at Research Corp., a private funding agency and Dr. Bernadette Donovan-Merkert, department chair at UNC-Charlotte). We also sent teams of faculty to two “best-practice” institutions in the area: James Madison University and UNC-Charlotte to learn about their departments.

One of the principal recommendations of the external review team was that the Department develop a strategic plan. In 2009, the Department hired Dr. Kevin DiGregorio (president, WV Chemical Alliance Zone) to facilitate a two-day retreat. There we developed the mission statement presented on page 8 and a strategic plan (Appendix X – 1 page diagram synopsis). Since then we meet roughly once a semester to discuss implementation of the plan. A few of the goals are complete with significant progress made on several others.

III. A. 5. b. ii. Elements of Assessment

The objective of the M.S. degree program is:

1. To maintain a commitment to excellence in teaching and research in the advanced study of chemistry.

2. To provide degree candidates with opportunities to acquire appropriate preparation for future success in careers in chemistry and allied fields that require competence in the chemical sciences, or for continuing study in programs leading to a professional degree or a Ph.D.

3. To provide candidates with competence and skills in researching, processing, evaluating, and defending new knowledge in chemistry.
This program’s mission conforms to the broad mission of Marshall University of making a “major commitment to … enhancement of graduate education.” Compliance to the University mission of commitment “to expanding the body of human knowledge and achievement through research” and “to assuring the integrity of the curriculum through the maintenance of rigorous standards and high expectations for student learning and performance” is also demonstrated.

Program Goal:
To provide Marshall graduates with a degree that prepares them for career advancement in industries and/or for further professional or graduate work.

Five Comprehensive and Measurable Program Objectives in Support of Marshall’s Educational Goals Spanning Multiple Learning Domains:
1. Graduates should be able to synthesize and integrate chemical knowledge.
2. Graduates should have developed critical thinking skills.
3. Graduates should be resourceful in locating relevant chemical information through library search, CAS On-line services, interlibrary service, and online search.
4. Graduates should be able to effectively communicate chemical principles and chemical information in both written and oral formats.
5. Graduates should have the basic skills necessary for placement in appropriate positions.

Assessment Measures:
Objective 1: synthesize and integrate chemical knowledge

a. M.S. candidates in chemistry are required to successfully complete a distribution of courses that reflect 3 of the 5 sub-disciplines of chemistry as well as in their selected concentration. Highly experienced and trained chemistry faculty execute the assessment in these courses using problem sets, exams and final exams. Students must maintain a 3.0 GPA to remain in the program.

Materials from each course are reviewed for level of difficulty, content breadth and depth, problem solving, and quantitative reasoning, on a rotating basis for the subdisciplines (Inorganic, Organic, Analytical, Biochemistry, and Physical Chemistry) by an evaluation committee primarily of faculty from that discipline.

b. Students are expected to present a seminar critiquing a published paper from an area of chemistry. The topic is selected in consultation with the candidate’s faculty committee using the Literature Topic Approval Form (see Appendix XII). The student must synthesize the information in the paper and the background information into an oral presentation to the entire department. Attending faculty evaluate how well the student integrates the information from the multiple sources (primary paper, background information) into the presentation using the Chemistry Graduate Student Seminar Evaluation Form (see Appendix XIII).
Objective 2: Critical Thinking Skills
M.S. students are required to present two seminars before the entire department. One is a critique of a paper in the literature (described above in Outcome #1), and the other is a presentation of the candidate’s thesis research. Faculty rate each seminar on the critical thinking skills exhibited by the student using the system previously described. In addition, the graduating student must defend their thesis before the aforementioned faculty committee.

Objective 3: Literature search
The requirement of seminar/outside topic seminar presentation for credit ensures that the student undertakes the task of extensive literature search prior to writing a thesis. The Chemistry faculty members attending the student’s oral presentations evaluate both outside topic and research seminar abstracts for inclusion of pertinent references and information using the Chemistry Graduate Student Seminar Evaluation Form.

Objective 4: Written and oral communication
a. Oral communication is assessed using the outside-topic seminar, research seminar, and the thesis defense. In order to better evaluate the oral communication and give students better feedback, the evaluation process utilizes the Chemistry Graduate Student Seminar Evaluation Form.

b. Oral communication is further assessed by an annual evaluation of Graduate Teaching Assistants.

c. The thesis defense committee assesses the written communication component.

Objective 5: Student Placement
Exit interviews and surveys and follow-up alumni surveys.

III. A. 5. c. Plans for Program Improvement
The Department now requires that applicants submit GRE scores as a prerequisite for admission. While there is no minimum score requirement, this enables identification of those whose verbal and quantitative abilities are not predictors of success and who may require remedial work.

In the past, an undergraduate degree in chemistry or a related field was not required for admission. Thus, applications were received from persons with degrees such as B. Pharm. or B. Veterinary Science. Experience revealed that most such students lacked the necessary background in chemistry to be successful in our program. Thus, since the last program review the requirement of a degree in chemistry was instituted.

There is continued effort to take advantage of the undergraduate capstone requirement by encouraging the better participants to enter the 4 + 1 program as juniors. This allows one to continue an undergraduate research project and earn the M.S. with just one additional year of study. This route has a good track record of favorably positioning students in the job market, thus becoming an increasingly attractive alternative to graduate study elsewhere and potentially increasing the number of M.S. candidates while maintaining high academic standards.
III. A. 5. d. Graduate and Employer Satisfaction

The department is currently conducting formal studies of program satisfaction from recent graduate students and their employers. Exit interviews indicate that the students are pleased with the balance between theory and practice in the Department. The opportunity to work with state-of-the-art instrumentation is also cited as a plus. Graduates are also pleased with the ease with which they have found employment or other relevant opportunities. Of the eleven graduates from the program in the previous five years, two continued on to Ph.D. programs (U. of North Texas Health Science Center, Ft. Worth; U. of Pretoria, South Africa), one is a forensic analyst with the WV State Police, four have industrial positions (Pfizer, St. Louis; Patheon, Cincinnati; Ohio Valley Electric Co., Cheshire, OH; Rustoleum, Chicago), three are laboratory technicians at Marshall or WVU, and one is employed in an academic office at Marshall.

Four students in good standing had employment at the time of admission or accepted employment before graduation. Two of these are with a local company (Marathon Petroleum), one works for a State lab in Charleston, and the other is with a small company in Nitro, WV.

It has been fairly typical over the years to have part-time graduate students who worked full-time, but this has become less common as local industries have declined and/or become less inclined to pay for employee education. While some may see part-time status as detrimental to the program, it is usually a consequence of financial exigency and is an inevitable consequence of the inadequacy of University funding for graduate assistantships.

III. A. 6. Previous Reviews

In our last program review we were designated: continue with designated resource development. As funds become available, the program should receive support for the repair or replacement of instrumentation as identified in the program review document.

III. A. 7. Strengths/Weaknesses

III. A. 7. a. Program Strengths

- A very high quality faculty with exceptional training and a firm commitment to continuing education, professional development, and research.
- A wide range of new, state-of-the-art instrumentation for student research and training.
- Faculty grants (ca. $3.6 M) used to enhance institutional resources for graduate studies.
- Ease of student interactions with the Biomedical Science program and researchers in the Departments of Biological Sciences and Integrated Science and Technology.
- Small class sizes in courses allowing individualized attention.
- Faculty grant funds support additional Graduate Assistantships to supplement those provided by the University.
- Strong program of seminars to keep faculty and students informed about current research topics.
- Generous alumni funding of departmental initiatives. Donations from alumni, coupled to lab manual royalties donated by faculty and state matching funds have created over $200,000 in endowments to support student research projects.
- Graduates are readily placed in quality jobs, Ph.D. programs, or professional schools.
- Participation of graduate students in professional conferences.
- Diversity of faculty research interests has a positive impact on student education.
- An active chapter of the national chemistry fraternity Alpha Chi Sigma promotes camaraderie among students and faculty, as well as providing students contacts in industry and academia.
III. A. 7. b. Program Weaknesses

- **An inadequate financial allocation and an unpredictable system for distributing funds.** The Department has been forced to budget on assumptions, primarily that we would receive the same funding as the previous year for non-capital expenditures. If the actual disbursement fell below that level, then funds may not have be spent to maximal effectiveness. When additional funds are made available, we are typically given hours or days to decide how to spend them, again preventing intelligent decision making.

- **Faculty retention and morale.** The university compensation system encourages salary inversion and compression, which is injurious to faculty morale. Recent and proposed changes will exacerbate this problem. The Department no longer inverts salaries, but cannot avoid severe salary compression. That all salary increases will be 100% merit based will increase the rate of compression as junior faculty get 10% or more bonuses on promotion. As a result the best faculty will use Marshall as a training ground before leaving for other institutions providing better compensation. It should be noted that it is not the lower salary that is the problem, per se. In the last reporting period we lost 2 faculty for this reason. Faculty coming to West Virginia realize that compensation rates will be lower. Rather it is the unfairness of the distribution system that causes problems.

- **Upkeep of infrastructure.** Essential repairs, even simple ones, may require weeks or months to resolve. The heating and cooling system has been a problem in the original building since it was renovated (1992). Certain offices will drop to 55º in winter and others reach 85º in summer without dehumidification. We have mold removed from offices and labs on a regular basis.

- **Science Annex Laboratories need refurbishing.** The Annex is 25 years old and was poorly constructed. Laboratories are in a constant state of disrepair that goes beyond routine maintenance. Leaks in the hallway are so commonplace that we keep a trash barrel there at all times to collect water.

- **Teaching assistants.** The number of Chemistry graduate students (Teaching and Research Assistants) supported by the University has been consistently reduced over the last 40 years. In 1970 the Department had over 20 graduate students supported with regionally competitive stipends and tuition waivers. At the beginning of the previous review period Marshall University supported 3.5 Chemistry graduate students with $12 K annual stipends (Chemistry graduate students are expected to be in the lab conducting research 12 months a year); by the end of that period Marshall was supporting only 1.5 graduate students at the $12 K level (the current situation). Recruiting new graduate students is thus very difficult; if the number and level of stipends is advertised candidly, potential applicants will view getting such an award as highly unlikely. Further, the dollar amount of stipends is not competitive with that offered by Ph.D. programs, from which qualified applicants are likely to get offers, and which they will almost surely accept. The number of enrollments in the program in each of the past five years (6, 7, 6, 3, 2) reflects a continuing downward trend. Currently there is only one graduate student available for service as a teaching assistant, and the Department is thus forced to use undergraduate teaching assistants for its laboratory courses: little money exists to hire them and so most are offered Independent Study credit; freshman labs could not be staffed without depending on sophomore assistants; gifted young faculty members attempting to establish productive research programs must depend almost entirely on undergraduates. To maintain the type of departmental research effort aspired to in the Strategic Plan, having at least one graduate student per research-active faculty member is essential.

- **The Department lacks an equipment technician.** A technician represents the most cost effective method of maintaining equipment worth about $3 M.
• The Department lacks regularly budgeted funds for the upkeep and replacement of major equipment. The department owns a large amount of expensive and sophisticated equipment. Most years at least one piece requires repair. An existing budget item would allow more rapid repairs than are now possible.

• Access to chemical literature is limited. Subscriptions to printed journals have been cut drastically. Electronic access compensates for this to a certain extent, but expanding this would be beneficial, as would increasing the number of comprehensive reference works (print and/or electronic form). These steps would facilitate research productivity, scholarly activity, and graduate student progress.

III. B. Viability

III. B. 1. Articulation Agreements  NONE

III. B. 2. Off Campus Classes  NONE

III. B. 3. Online courses  NONE

III. B. 4. Service courses  NONE

III. B. 5. Program Course Enrollment

See Appendix VI; note that most 500 level courses are double numbered with advanced undergraduate courses, so that enrollments are often higher than the graduate numbers alone would suggest.

III. B. 6. Program Enrollment

Over four of the past five years enrollment remained relatively constant (12, 11, 15, 12, 5). However, the number of admissions (6, 6, 6, 3, 2) has begun to decline, which will inevitably lower enrollments if the trend continues.

III. B. 7. Enrollment Projections

Enrollments in the M.S. program are hard to project. Historically, enrollments were helped by having part-time students who were full-time employees in local industry, which has declined markedly. Other sources of students are highly unpredictable under current circumstances. What must happen to assure a predictable and stable enrollment of suitably qualified students is to be able to recruit these persons. Recruitment is possible only if competitive stipends and tuition waivers can be offered and advertised. Ideally, each research-active faculty member should have a least one graduate student, which means recruiting approximately half-a-dozen each year. Over time, it would be desirable for faculty to provide research support from grants after the first year, but a foundation must be laid for that through University allocation of funds.

III. C. Necessity

III. C. 1. Advisory Committee

We do not have a formal advisory committee. However, members of the Department regularly consult with members of local industry. Each semester the local section of the American Chemical Society meets two to three times. Employees of companies such as Marathon Petroleum and Flint Pigments regularly attend these meetings and provide advice and suggestions to members of our Department in attendance.

III. C. 2. Graduates
Over the past five years, approximately two students have graduated annually. This compares to about three each year during the previous five year period.

III. C. 3. Job Placement

See section III.A.5.d.
IV. RESOURCE DEVELOPMENT

<table>
<thead>
<tr>
<th>Priority</th>
<th>Request</th>
<th>Rationale</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$40,000-50,000 annually</td>
<td>This Department currently has funds and tuition waivers for 1.5 graduate assistants. It also provides instruction to 13 sections of 300-400/500/600 teaching laboratories. Of these, 6 are typically taken by undergraduates in their senior year. The remaining sections are sophomore and junior level classes, including organic chemistry lab. In addition, freshman and sophomore laboratories require preparatory teaching assistants with significant skill and experience. Existing funds allow coverage of roughly 4 sections per semester, when we can find a person willing to accept the half time appointment. Because of the large size of organic sections coupled to inherent liability risks, GAs are typically assigned to those labs and to preparing our organic and freshman labs. This typically leaves senior and, frequently junior laboratories without any assistants. This represents a significant liability risk for the university because, in principle, the instructor may not leave the room for periods of up to 3 hours. Having just 1 GA in each upper division laboratory and preparing laboratories, would require an additional 2 GA positions ($12,000 stipend plus tuition waiver).</td>
<td>FY 2012</td>
</tr>
<tr>
<td>2</td>
<td>$2,000 annually</td>
<td>Each GA will have a thesis research project that will require supplies and equipment. These funds would provide those materials.</td>
<td>FY 2012</td>
</tr>
<tr>
<td>3</td>
<td>$40,000-50,000 annually</td>
<td>The priority 1 request provides the Department with no margin of error. Should a graduate student not accept an offer or drop out, there would be no ability to cover the loss. In addition, with the addition of the graduate pharmacy program, we expect enrollment in chemistry classes to be very unpredictable in the coming years. The ability of the Department to add sections of laboratories, particularly on short notice, will require the availability of GAs because adding undergraduate teaching assistants, even for freshman laboratories is quite difficult on short notice.</td>
<td>FY 2013</td>
</tr>
<tr>
<td>4</td>
<td>$2,000 annually</td>
<td>Each GA will have a thesis research project that will require supplies and equipment. These funds would provide those materials.</td>
<td>FY 2013</td>
</tr>
</tbody>
</table>
Appendix I

Required/Elective Course Work in the Program
## Appendix I

Degree Program: **M.S. in Chemistry**

Person responsible for the report: **John L. Hubbard**

<table>
<thead>
<tr>
<th>Courses Required in Major (By Course Number and Title)</th>
<th>Total Required Hours</th>
<th>Elective Credit Required by the Major (By Course Number and Title)</th>
<th>Elective Hours</th>
<th>Related Fields Courses Required</th>
<th>Total Related Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHM 631 – Seminar (Literature)</td>
<td>1</td>
<td>Courses must be from at least three of the five areas of chemistry and must be sufficient to complete 32 hours (Thesis Option) or 36 hours (Non-Thesis Option)</td>
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<tr>
<td>CHM 632 – Seminar (Thesis Defense)</td>
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<tr>
<td>CHM 682 – Research (Thesis Option)</td>
<td>1-12</td>
<td>CHM 511 – Modern Instrumental Methods in Chemistry and Biochemistry</td>
<td>4</td>
<td></td>
<td></td>
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<tr>
<td>or CHM 679 – Problem Report (Non-Thesis Option)</td>
<td>3</td>
<td>CHM 520 – Fundamentals of Chemistry</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CHM 522 – Spectrophotometric Methods of Analysis</td>
<td>3</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>CHM 523 – Environmental Analytical Chemistry</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CHM 526 – Chromatographic Methods of Analysis</td>
<td>3</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>CHM 540 – Thermodynamics</td>
<td>3</td>
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<tr>
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<td></td>
<td>CHM 542 – Quantum Mechanics</td>
<td>3</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CHM 548 – Advanced Inorganic Chemistry I</td>
<td>4</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>CHM 549 – Advanced Inorganic Chemistry II</td>
<td>3</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>CHM 553 – Magnetic Resonance in Chemistry</td>
<td>3</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>CHM 565 – Advanced Organic Chemistry I</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CHM 566 – Advanced Organic Chemistry II</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CHM 567 – Intermediate Biochemistry</td>
<td>3</td>
<td></td>
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<td></td>
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<td>CHM 580-583 – Special Topics</td>
<td>1-4</td>
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<td>CHM 585-588 – Independent Study</td>
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<td>CHM 628 – Special Topics (Inorganic)</td>
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<td>CHM 629 – Special Topics (Organic)</td>
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<td>CHM 630 – Special Topics (Physical)</td>
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<td></td>
<td>CHM 678 – Applied Microscopy in Research</td>
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<td></td>
<td></td>
<td>CHM 685-688 – Independent Study</td>
<td>1-4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Professional society that may have influenced the program offering and/or requirements: **American Chemical Society**
Appendix II

Chemistry Faculty Vitae

Undergraduate student authors are highlighted in bold blue.
Graduate student student authors are bold green.
Presenters are double underlined.
Appendix II
Faculty Data Sheet
(for the period of this review)

Name: Michael Castellani

Rank: Professor

Status: Full-time ✓ Part-time ___ Adjunct ___ Current MU Faculty: Yes ✓ No ___

Highest Degree Earned: Ph.D. Date Degree Received: December 1986

Conferred by: University of California at San Diego

Area of Specialization: Inorganic Chemistry

Professional Registration/Licensure: None Agency: ____________________________

Years non-teaching experience: 2

Years of employment other than Marshall: 2

Years of employment at Marshall: 23

Years of employment in higher education: 23

Years in service at Marshall during this period of review: 5

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught (summer through spring), course number, course title and enrollment. (Expand the table as necessary)

<table>
<thead>
<tr>
<th>Year/Semester</th>
<th>Alpha Des. &amp; No.</th>
<th>Title</th>
<th>Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2009</td>
<td>CHM 211</td>
<td>Principles of Chemistry I</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>CHM 305</td>
<td>Chemical Information Retrieval and Scientific Ethics</td>
<td>1</td>
</tr>
<tr>
<td>Spring 2010</td>
<td>CHM 218H</td>
<td>Principles of Chemistry II Honors Laboratory</td>
<td>21</td>
</tr>
<tr>
<td>Fall 2010</td>
<td>CHM 211</td>
<td>Principles of Chemistry I</td>
<td>56</td>
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<tr>
<td></td>
<td>CHM 305</td>
<td>Chemical Information Retrieval and Scientific Ethics</td>
<td>2</td>
</tr>
<tr>
<td>Spring 2011</td>
<td>CHM 218H</td>
<td>Principles of Chemistry II Honors Laboratory</td>
<td>23</td>
</tr>
</tbody>
</table>

1) If your degree is not in your area of current assignment, please explain. N/A

2) Activities that have enhanced your teaching and or research.
   a) Introduced personal response devices (“clickers”) to my class in 2010.
   b) Wrote a laboratory for our CHM 218 laboratory manual.
   c) Occasional reviewer for NSF, the Petroleum Research Fund, and various journals.
   e) Developed (with John Larson) and implemented a new Principles of Chemistry II Honors Laboratory that is designed to teach students to use modern instrumentation in a research-like setting.
3) Discipline-related books/papers published (provide a full citation).

4) Papers presented at state, regional, national, or international conferences.
   c) “Relationship between college chemistry pass rates/grades and high school grades” Castellani, M.P.; Sottile, J.M.. 241st National Meeting of the American Chemical Society, Anaheim, CA, 2011. (Oral)

5) Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.
   a) Membership in American Chemical Society (ACS) and Council on Undergraduate Research (CUR)
   d) Co-chair of the program and off-site organizing committee for the 11th national conference of CUR at DePauw University (2006)
   g) Chair CUR’s Outreach Committee.
   i) Facilitator at the NSF-CCLI Midwest Regional Workshop on Institutionalizing Undergraduate Research at Hope College: 2008
   j) CUR Institutionalizing Undergraduate Research site visitor to the University of Maine – Orono (2010)

6) Externally funded research grants and contracts you received.

7) Awards/honors (including invitations to speak in your area of expertise) or special recognition.
   a) Invited research seminars at University of Richmond (2007), Central Michigan University (2008), Otterbein College (2009), and West Virginia University (2011).
   b) Presented the keynote address at Glenville State College’s first Pioneer Creative Arts and Student Research Forum in Glenville, WV on April 5. The talk was entitled “Undergraduate Research and Student Learning.”
   c) Reelected to CUR’s national legislative body in 2007 and 2010 (3rd and 4th terms) as a Councilor.

8) Community service as defined in the Greenbook.
   a) Science fair judge for WV State Science Fair (2006-2007)
Appendix II
Faculty Data Sheet
(Information for the period of this review)

Name:  B. Scott Day  Rank:  Assistant Professor
Status:  Full-time  Yes  Part-time  No  Adjunct  No  Current MU Faculty:  Yes  No

Highest Degree Earned:  Ph.D.  Date Degree Received:  December 2005
Conferred by:  Virginia Polytechnic Institute and State University
Area of Specialization:  Analytical Chemistry

Professional Registration/Licensure:  None  Agency:  

Years non-teaching experience  3
Years of employment other than Marshall  3
Years of employment at Marshall  3
Years of employment in higher education  3
Years in service at Marshall during this period of review  3

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught (summer through spring), course number, course title and enrollment. *(Expand the table as necessary)*

<table>
<thead>
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<td>CHM 432</td>
<td>Chemistry Seminar</td>
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<td>CHM 490</td>
<td>Internship</td>
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<td></td>
<td>CHM 631</td>
<td>Seminar</td>
<td>4</td>
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<td>CHM 632</td>
<td>Seminar</td>
<td>3</td>
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<td></td>
<td>CHM 345</td>
<td>Introduction to Analytical Chemistry (Team taught, 50%)</td>
<td>18</td>
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<td>CHM 432</td>
<td>Chemistry Seminar</td>
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<td>Fall 2010</td>
<td>CHM 211</td>
<td>Principles of Chemistry I</td>
<td>29</td>
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1) If your degree is not in your area of current assignment, please explain.

2) Activities that have enhanced your teaching and or research.
   a) I participated in a POGIL workshop March 15, 2008 in which I used a modified version of these inquiry based activities in a new course: Nanochemistry.
   b) Participated in two-day departmental retreat for establishing a strategic plan (2009)
   c) Visited the Department of Chemistry of James Madison University as a model “best practices” institution as part of Departmental Strategic Planning, April 2010.

3) Discipline-related books/papers published (provide a full citation).

4) Papers presented at state, regional, national, or international conferences.
   No papers presented.

5) Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.
   a) I was elected as the chair-elect for the Central Ohio Valley Section of the American Chemical Society for 2009, served as the chair in 2010, and am serving as past chair in 2011.
   b) I lead a group of ACS members in submitting a grant proposal to the ACS Project SEED Program through our local ACS section. The grant was funded and will support three high school students in the summer of 2011.
   c) I presented a 15 minute presentation on my proposed research program at a local ACS meeting March 31, 2009.

6) Externally funded research grants and contracts you received.

7) Awards/honors (including invitations to speak in your area of expertise) or special recognition.

8) Community service as defined in the Greenbook.
   a) Science fair judge South Point High School 1/16/2009 and Fairland High School 1/29/2010
   b) Participated in Boy Scouts Merit Badge College 2/20/2010 and 2/19/2011
Appendix II
Faculty Data Sheet
(for the period of this review)

Name: Leslie R. Frost

Rank: Associate Professor

Status: Full-time ✓  Part-time ___ Adjunct ___ Current MU Faculty: Yes ✓  No ___

Highest Degree Earned: Ph.D. Date Degree Received: January 1997

Conferred by: University of Virginia

Area of Specialization: Chemistry

Professional Registration/Licensure: None

Agency: 

| Years non-teaching experience | 0 |
| Years of employment other than Marshall | 0 |
| Years of employment at Marshall | 14 |
| Years of employment in higher education | 14 |
| Years in service at Marshall during this period of review | 5 |

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught, course number, course title and enrollment. (Expand the table as necessary)

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<thead>
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<th>Year/Semester</th>
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<th>Title</th>
<th>Enrollment</th>
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<td>CHM 491</td>
<td>Capstone Research</td>
<td>2</td>
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<tr>
<td></td>
<td>CHM 467/567</td>
<td>Intermediate Biochemistry</td>
<td>23</td>
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<td>Principles of Chemistry 1</td>
<td>67</td>
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<td>58</td>
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<td>CHM 217</td>
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<td>53</td>
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<td></td>
<td>CHM 491</td>
<td>Capstone Research</td>
<td>1</td>
</tr>
<tr>
<td>2010/Spring</td>
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<td>Intro Biochemistry Lab</td>
<td>20</td>
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<tr>
<td></td>
<td>CHM 411/511</td>
<td>Instrumental Analysis</td>
<td>8</td>
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<td>CHM 491</td>
<td>Capstone Research</td>
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<tr>
<td>2009/Fall</td>
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<td>Principles of Chemistry 1</td>
<td>62</td>
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<td>CHM 483/583</td>
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<td>2011/Spring</td>
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<tr>
<td></td>
<td>CHM 467/567</td>
<td>Intermediate Biochemistry</td>
<td>23</td>
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</table>
1) If your degree is not in your area of current assignment, please explain.

2) Activities that have enhanced your teaching and or research.
   a) Directed the capstone research of 17 undergraduate students and 4 graduate students.
   b) Redesigned the mass spectrometry course as a biological mass spectrometry course. Created all new notes and labs to go with this course that were geared toward biological and forensic applications.
   c) Designed and taught a new advanced biochemistry course, CHM 467.
   d) Contributed three labs to the departmental 218 lab manual and one lab to the 217 departmental lab manual.
   e) Continuously designing and writing new labs for all of my upper level courses (Biochemistry lab, Instrumental Analysis lab, and Biological Mass Spectrometry lab).
   f) All lecture notes, lab handouts, problem sets, and old exams for all of the courses that I each teach are revised yearly and made available to the students on Blackboard.

3) Discipline-related books/papers published (provide a full citation).

4) Papers presented at state, regional, national, or international conferences.
   a) “Identification of Insulin Receptor Phosphorylation Sites using a novel PhosphoTip” 54th annual international meeting of the American Society of Mass Spectrometry, Seattle, WA, 2006. (Poster)
   b) “In vitro galactation of human serum albumin: analysis of the protein’s galactation sites by mass spectrometry” Pittcon, Atlanta GA, 2011. (Poster)

5) Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.
   a) Member of the American Society of Mass Spectrometry.
   b) Treasurer of the local section of the American Chemical Society.

6) Externally funded research grants and contracts you received.

7) Awards/honors (including invitations to speak in your area of expertise) or special recognition.

8) Community service as defined in the Greenbook.
   a) Coordinator of local ACS chemistry Olympiad
**Appendix II**

**Faculty Data Sheet**

(Information for the period of this review)

Name: John L. Hubbard  
Rank: Professor

Status: Full-time ✓  Part-time ___  Adjunct ___  Current MU Faculty: Yes ✓  No ___

Highest Degree Earned: Ph.D.  
Date Degree Received: December 1976

Conferred by: Purdue University

Area of Specialization: Organic Chemistry

Professional Registration/Licensure: None  
Agency: 

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<td>Years of employment in higher education</td>
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<td>Years in service at Marshall during this period of review</td>
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</tbody>
</table>

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught (summer through spring), course number, course title and enrollment. (*Expand the table as necessary*)

<table>
<thead>
<tr>
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<td>Principles of Chemistry Laboratory II Organic Chemistry I</td>
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1) If your degree is not in your area of current assignment, please explain. N/As

2) Activities that have enhanced your teaching and or research.
   a) Incorporated WebAssign into CHM 355
   b) Reviewed nine manuscripts for professional journals

3) Discipline-related books/papers published (provide a full citation).

4) Papers presented at state, regional, national, or international conferences.

5) Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.
a) Member, American Chemical Society (member, Organic Division); Alternate Councilor, Central Ohio Valley Section, American Chemical Society
b) Member, Sigma Xi, The Research Society

6) Externally funded research grants and contracts you received.

7) Awards/honors (including invitations to speak in your area of expertise) or special recognition.

8) Community service as defined in the Greenbook.
Appendix II
Faculty Data Sheet
(Information for the period of this review)

Name: Derrick Kolling
Rank: Assistant Professor

Status: Full-time ✓ Part-time ___ Adjunct ___
Current MU Faculty: Yes ✓ No ___

Highest Degree Earned: Ph.D. Date Degree Received: 2005

Conferred by: University of Illinois at Urbana–Champaign

Area of Specialization: Biophysics and Computational Biology

Professional Registration/Licensure None Agency: ____________________________

Years non-teaching experience 4.5
Years of employment other than Marshall 4.5
Years of employment at Marshall 2
Years of employment in higher education 6.5
Years in service at Marshall during this period of review 2

List courses you taught during the final two years of this review. If you participated in a
team-taught course, indicate each of them and what percentage of the course you
taught. For each course include the year and semester taught (summer through
spring), course number, course title and enrollment. (Expand the table as necessary)

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<td>CHM401</td>
<td>Research for Undergraduates</td>
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1) If your degree is not in your area of current assignment, please explain. N/A
2) Activities that have enhanced your teaching and or research.
   a) Research Boot Camp (spring 2010)
   b) Participated in MURC-sponsored Grants Workshop, 2009
   c) Participated in New Faculty Orientation, 2009
   d) Recruitment seminar for local ACS chapter (Central Ohio Valley, 2009)
   e) Initiated and contributed to the development of the Department of Chemistry summer research program (begun summer 2010)
   f) Participated in two-day departmental retreat for establishing a strategic plan (2009)
   g) Visited the Department of Chemistry of James Madison University as a model “best practices” institution as part of Departmental Strategic Planning, April 2010.

3) Discipline-related books/papers published (provide a full citation).

4) Papers presented at state, regional, national, or international conferences.

5) Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.
   a) NSF Metabolic Biochemistry Advisory Panel Meeting (spring 2010)
   b) Member: American Chemical Society (2009–current)
   c) Member: The International EPR (ESR) Society (2009–current)
   d) Central Ohio Valley ACS: Secretary (2009-2010) and President-Elect (2010-2011)
   e) ACS Leadership Initiative Workshop (Fort Worth, Dallas, fall 2010)
   f) Reviewed manuscripts for Bioresource Technology and Horticultural Science

6) Externally funded research grants and contracts you received.
   a) 2010 Research Corporation SI-CCSA Research Proposal funded: Using Extremophilic Phototrophs to Study Photoassembly of the Oxygen-Evolving Complex. $35,000
   b) WVHEP CDSR 2009 Research Proposal Preparation Mini-Grant funded: Trapping and characterization of intermediates of photosynthetic water oxidation; Grant application for NSF RUI. $4,500
   c) WVHEP CDSR 2010 Research Proposal Preparation Mini-Grant funded: Using Extremophilic Phototrophs to Study Photoassembly of the Oxygen-Evolving Complex; Grant application for Research Corp SI-CCSA. $5,000

7) Awards/honors (including invitations to speak in your area of expertise) or special recognition.

8) Community service as defined in the Greenbook.
   a) Central Ohio Valley ACS Awards Night emcee (spring 2010)
   b) LGBT safe space faculty ally (2010–current)
   c) 30 letters of recommendation for students
Appendix II
Faculty Data Sheet
(Information for the period of this review)

Name: Laura R. McCunn

Rank: Assistant Professor

Status: Full-time ✓ Part-time ___ Adjunct ___

Current MU Faculty: Yes ✓ No ___

Highest Degree Earned: Ph.D. Date Degree Received: December 2005

Conferred by: University of Chicago

Area of Specialization: Physical Chemistry

Professional Registration/Licensure: None Agency: 

Years non-teaching experience: 2

Years of employment other than Marshall: 2

Years of employment at Marshall: 3

Years of employment in higher education: 3

Years in service at Marshall during this period of review: 3

List courses you taught during the final two years of this review.

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<th>Year/Semester</th>
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<th>Enrollment</th>
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<td>2011/Spring</td>
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<td>Introductory Physical Chemistry</td>
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<td>CHM 480/580</td>
<td>Special Topics: Atmospheric Chemistry</td>
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<td>Principles of Chemistry I</td>
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<td>2009/Fall</td>
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<td>Capstone Experience</td>
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</table>

1) If your degree is not in your area of current assignment, please explain. N/A

2) Activities that have enhanced your teaching and or research.
   a) Attended a Proposal Writing Workshop sponsored by the Petroleum Research Fund, 2008
   b) Attended the campus workshop, “Designing Effective Writing Activities to Enhance Learning, Thinking, and Communicating in Any Discipline” held during the 2009 Fall Teaching Conference.
   c) Participated in the “Da Vinci Roundtable” discussion series on campus during Spring 2009.

3) Discipline-related books/papers published (provide a full citation).
   b) “Probing isomer interconversion in anionic water clusters using an Ar-mediated pump-probe approach: Combining vibrational predissociation and velocity-map photoelectron imaging


4) Papers presented at state, regional, national, or international conferences.


  b) “Exploring the Photochemistry of Radical Precursors” at Undergraduate Research Day at the Capitol (2011) *Combs, A.*, *Lilly, S.*; McCunn, L.R. (Poster)


  e) “Probing Binding Motifs: Velocity-Map Imaging of Anionic Water Clusters” Physical Chemistry Student Lecture Series, Ohio State University (2007, Oral)

  f) “An H/D isotopic substitution study of H$_2$O$_2^+$-Ar: Exploring Fermi resonances in the bridging proton fundamentals” Fall ACS Meeting in Boston, MA (2007, Oral)

  g) “An H/D isotopic substitution study of H$_2$O$_2^+$-Ar: Exploring Fermi resonances in the bridging proton fundamentals” Dynamics of Molecular Collisions Meeting in Santa Fe, NM (2007), *McCunn, L.R.*; Roscioli, J.R.; Johnson, M.A.; McCoy, A.B. (Poster)

5) Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.

  a) American Chemical Society, member 2001-present

  b) Central Ohio Valley Section of the American Chemical Society; secretary (2009), chair-elect (2010), chair (2011)

  c) Attended the Ohio State International Symposium on Molecular Spectroscopy in June 2009.


  e) Reviewed a grant proposal for the National Science Foundation (2011)

6) Externally funded research grants and contracts you received.

  a) $43,954. Research Corporation for Science Advancement Cottrell College Science Award, “Characterization of Radical Intermediates in the C2H3 + O2 Reaction” (2010-2011)


7) Awards/honors (including invitations to speak in your area of expertise) or special recognition.

  a) Camille and Henry Dreyfus Foundation Faculty Start-up Award, 2008-2013, $30,000

8) Community service as defined in the Greenbook.

  a) Science fair judge at South Point High School (2009) and Fairlady High School (2010)
Appendix II
Faculty Data Sheet
(Information for the period of this review)

Name: __Robert Morgan_________________________ Rank: __Associate Professor_________________________

Status: Full-time ☒  Part-time ___  Adjunct ___  Current MU Faculty: Yes ☒  No ___

Highest Degree Earned: __Ph.D._________ Date Degree Received: __May 1992_________

Conferred by: __City University of New York_________________________________________

Area of Specialization: __Organic Chemistry__________________________________________

Professional Registration/Licensure  __None__  Agency: ________________________________

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<th>Years non-teaching experience</th>
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<td>Years of employment at Marshall</td>
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<td>Years of employment in higher education</td>
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<tr>
<td>Years in service at Marshall during this period of review</td>
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</table>

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught (summer through spring), course number, course title and enrollment.  *(Expand the table as necessary)*

<table>
<thead>
<tr>
<th>Year/Semester</th>
<th>Alpha Des. &amp; No.</th>
<th>Title</th>
<th>Enrollment</th>
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<tr>
<td></td>
<td>CHM 327</td>
<td>Intro Organic Chemistry</td>
<td>19</td>
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<td>CHM 356 (201)</td>
<td>Organic Chemistry II</td>
<td>35</td>
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<td></td>
<td>CHM 356 (202)</td>
<td>Organic Chemistry II</td>
<td>16</td>
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<td>Summer 2010</td>
<td>CHM E254</td>
<td>Basic Concepts Org Chem</td>
<td>1</td>
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<td>Fall 2010</td>
<td>CHM E254 (101)</td>
<td>Basic Concepts Org Chem</td>
<td>4</td>
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<tr>
<td></td>
<td>CHM E254 (102)</td>
<td>Basic Concepts Org Chem</td>
<td>1</td>
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<tr>
<td></td>
<td>CHM 217 (107)</td>
<td>Principles of Chem Lab I</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>CHM 217 (108)</td>
<td>Principles of Chem Lab I</td>
<td>25</td>
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<td></td>
<td>CHM 327</td>
<td>Intro Organic Chemistry</td>
<td>20</td>
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<tr>
<td></td>
<td>CHM 356</td>
<td>Organic Chemistry II</td>
<td>54</td>
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<tr>
<td>Spring 2011</td>
<td>CHM E254 (101)</td>
<td>Basic Concepts Org Chem</td>
<td>4</td>
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<td>CHM 361</td>
<td>Intro Organic Chm Lab (shared 40%)</td>
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<td>CHM 356 (201)</td>
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<td>CHM 356 (202)</td>
<td>Organic Chemistry II</td>
<td>8</td>
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<td>CHM 491</td>
<td>Capstone Experience</td>
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</table>
1) If your degree is not in your area of current assignment, please explain.

2) Activities that have enhanced your teaching and or research.
   a) Developed CHM 361H to include 6 weeks of student research projects (2011).
   b) Developed and taught an E course, E254 (basic concepts organic chem).
   c) The Synthesis of a charges Bicyclic System, Matthew Seitz, Robert Morgan, 21st Annual Sigma Xi Research day April, 29, 2011
   d) Mentor to NASA Student Fellowship winner Matt Seitz (2011)
   e) The Synthesis of a New Fluorescent Imidazolium Dye, Jeremey Wilson and Robert J. Morgan 19th Annual Sigma Xi Research day April 30, 2009
   f) Departmental NMR liason. Professional relationships with Flint group (Huntington WV) and American polystyrenics (Ironton OH)

3) Discipline-related books/papers published (provide a full citation).

4) Papers presented at state, regional, national, or international conferences.

5) Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.
   a) Membership in Sigma Xi

6) Externally funded research grants and contracts you received.

7) Awards/honors (including invitations to speak in your area of expertise) or special recognition.

8) Community service as defined in the Greenbook.
Appendix II
Faculty Data Sheet
(Information for the period of this review)

Name: Michael Norton
Rank: Professor

Status: Full-time ✓ Part-time ___ Adjunct ___ Current MU Faculty: Yes ✓ No ___

Highest Degree Earned: Ph.D. Date Degree Received: 1982

Conferred by: Arizona State University

Area of Specialization: Inorganic Chemistry

Professional Registration/Licensure: None Agency: 

Years non-teaching experience
Years of employment other than Marshall
Years of employment at Marshall
Years of employment in higher education
Years in service at Marshall during this period of review

List courses you taught during the final two years of this review

<table>
<thead>
<tr>
<th>Year/Semester</th>
<th>Alpha Des. &amp; No.</th>
<th>Title</th>
<th>Enrollment</th>
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<td>2010 Spring</td>
<td>CHM 583-201</td>
<td>SpTp: Applied Microscopy</td>
<td>3</td>
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<td></td>
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<td>SpTp: Applied Microscopy</td>
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<td>CHM 448</td>
<td>Advanced Inorganic Chemistry I</td>
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<td>CHM 548</td>
<td>Advanced Inorganic Chemistry I</td>
<td>2</td>
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<td>2011 Spring</td>
<td>CHM 678-201</td>
<td>Applied Microscopy in Research</td>
<td>1</td>
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</table>

1) If your degree is not in your area of current assignment, please explain. N/A

2) Activities that have enhanced your teaching and or research.
   a) Mentoring numerous graduate and undergraduate research students.
   b) Developed labs for Advanced Inorganic Chemistry I (CHM 448) and Applied Microscopy in Research (CHM 478) that employ the primary research literature to prepare graduates for real-life experiences.

3) Discipline-related books/papers published (provide a full citation).


Total publications = 14 (6 others not listed)

4) Papers presented at state, regional, national, or international conferences.


Total presentations = 23 (19 others not listed)

5) Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.

a) Member of American Chemical Society
b) American Crystallographic Association
c) Electrochemical Society
d) New York Academy of Science
e) American Academy for the Advancement of Science
f) The International Society for Optics and Photonics Professionals (SPIE)
g) Institute of Electrical and Electronics Engineers (IEEE)

6) Externally funded research grants and contracts you received.


Total grants = 11 (7 others not listed, total amount = $3,005,578)

7) Awards/honors (including invitations to speak in your area of expertise) or special recognition.

8) Community service as defined in the Greenbook.

a) Regular judge for local science fairs.
Appendix II
Faculty Data Sheet
(Information for the period of this review)

Name: William D. Price

Rank: Associate Professor

Status: Full-time ☑ Part-time ___ Adjunct ___ Current MU Faculty: Yes ☑ No ___

Highest Degree Earned: Ph.D. Date Degree Received: December 1997

Conferred by: University of California, Berkeley

Area of Specialization: Physical Chemistry

Professional Registration/Licensure: None

Agency: _____________________________

Years non-teaching experience: 0

Years of employment other than Marshall: 0

Years of employment at Marshall: 14

Years of employment in higher education: 14

Years in service at Marshall during this period of review: 5

List courses you taught during the final two years of this review. If you participated in a
team-taught course, indicate each of them and what percentage of the course you
taught. For each course include the year and semester taught (summer through
spring), course number, course title and enrollment. (Expand the table as necessary)

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<thead>
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<th>Title</th>
<th>Enrollment</th>
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<td>2009/Intercession</td>
<td>ISC 220</td>
<td>Drugs and Disease</td>
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<tr>
<td>2009/Summer III</td>
<td>CHM 212</td>
<td>Principles of Chem II</td>
<td>28</td>
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<tr>
<td>2009/Summer III</td>
<td>CHM 218</td>
<td>Principles of Chem Lab II</td>
<td>19</td>
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<tr>
<td>2009/Fall</td>
<td>CHM 203</td>
<td>General Chemistry I</td>
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<td>2009/Fall</td>
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<td>Principles of Chem Lab I</td>
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<tr>
<td>2009/Fall</td>
<td>CHM 217</td>
<td>Principles of Chem Lab I</td>
<td>21</td>
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<td>2009/Fall</td>
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<td>Capstone Experience</td>
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<tr>
<td>2009/Fall</td>
<td>HON 101</td>
<td>Introduction to Honors</td>
<td>15</td>
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<td>2009/Fall</td>
<td>YGS 271 (Team 33%)</td>
<td>Sem Thry Sciences &amp; Stats</td>
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<td>2010/Spring</td>
<td>CHM 212</td>
<td>Principles Chemistry II</td>
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<td>Intro Physical Chemistry</td>
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<td>2010/Spring</td>
<td>CHM 491</td>
<td>Capstone Experience</td>
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<td>2010/Summer III</td>
<td>CHM 212</td>
<td>Principles of Chem II</td>
<td>37</td>
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<td>2010/Summer III</td>
<td>CHM 218</td>
<td>Principles of Chem Lab II</td>
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<td>2010/Fall</td>
<td>CHM 203</td>
<td>General Chemistry I</td>
<td>47</td>
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<td>Principles of Chem II</td>
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<td>Principles of Chem Lab I</td>
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<td>Sem Thry Sciences &amp; Stats</td>
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<td>Principles Chemistry II</td>
<td>56</td>
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<td>2011/Spring</td>
<td>CHM 358</td>
<td>Physical Chemistry II</td>
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1) If your degree is not in your area of current assignment, please explain. N/A
2) Activities that have enhanced your teaching and or research.
   a) Facilitate Writing Across the Curriculum Workshop (2002 – current)
   b) Freshman Year Seminar Institute (Spring 2011)

3) Discipline-related books/papers published (provide a full citation).

4) Papers presented at state, regional, national, or international conferences.

5) Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.
   a) American Society for Mass Spectrometry
   b) International Mass Spectrometry Society
   c) American Chemical Society

6) Externally funded research grants and contracts you received.
   f) $1000. NASA Travel Award 2009.

7) Awards/honors (including invitations to speak in your area of expertise) or special recognition.

8) Community service as defined in the Greenbook.
   a) Presentation to Booth Scholars (exceptional high school students in Wayne County) about preparing to study the sciences in college. (summer 2008 & 2009)
Appendix II
Faculty Data Sheet
(for the period of this review)

Name: Bin Wang  Rank: Assistant Professor

Status (Check one): Full-time  Part-time  Adjunct

Current MU Faculty: Yes  No

Status: Full-time  Part-time  Adjunct  Current MU Faculty: Yes  No

Conferred by: Queen’s University at Kingston, Canada

Area of Specialization: Analytical Chemistry

Professional Registration/Licensure  None  Agency: ________________________________

Years non-teaching experience  8
Years of employment other than Marshall  8
Years of employment at Marshall  4
Years of employment in higher education  4
Years in service at Marshall during this period of review  4

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught (summer through spring), course number, course title and enrollment. (Expand the table as necessary)

<table>
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<th>Title</th>
<th>Enrollment</th>
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<td>Fall 2009</td>
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<td>Spring 2011</td>
<td>CHM 345 (50%)</td>
<td>Introduction to Analytical Chemistry</td>
<td>26</td>
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</table>

1) If your degree is not in your area of current assignment, please explain. N/A

2) Activities that have enhanced your teaching and or research.
   a) Mentored research projects of 16 undergraduates and 4 graduate students.
   b) Developed an eight-experiment lab manual for CHM 345.
   c) Visited the Department of Chemistry of the University of North Carolina-Charlotte as a model “best practices” institution as part of Departmental Strategic Planning, April 11-12, 2010.
   d) Attended the 5th Annual On Course National Conference in Raleigh, NC, on April 9-10, 2010.
   f) Attended NIH Regional Seminar on Program Funding and Grants Administration in Atlanta, GA, April 16-17, 2009.
3) Discipline-related books/papers published (provide a full citation).

4) Papers presented at state, regional, national, or international conferences.
   b) Dana Lycans, Bin Wang, Structural determination of the 5’ untranslated region of BACE1 mRNA by SHAPE chemistry, The 239\textsuperscript{th} American Chemical Society National Meeting, San Francisco, CA, March 2010. (Oral)
   c) Bin Wang, RNA structural determination-SHAPE chemistry on a chip, WVNano Initiative Research Symposium, West Virginia University, Morgantown, WV, May 2009. (Oral)
   d) Dana Lycans, Bin Wang, The structural determination of the 5’-untranslated region of BACE1 messenger RNA by SHAPE chemistry, The West Virginia Science, Technology and Research (STaR) Symposium, Charleston, WV, April 2009. (Poster)
   e) Bin Wang, Wallace Kunin, Development of an integrated microfluidic device for RNA structural analysis, The 237\textsuperscript{th} American Chemical Society National Meeting, Salt Lake City, UT, March 2009. (Oral)

5) Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.
   a) Member of the American Chemical Society
   b) Member of Sigma Xi, the Scientific Research Society, Marshall Chapter
   c) Member of the RNA Society
   d) Member of the International Society for Nanoscale Science, Computation, and Engineering

6) Externally funded research grants and contracts you received.
   a) $5,000 was awarded by the WV Research Proposal Mini-Grants Program to support my proposal writing during the summer of 2011.
   b) $3,585 of field service fees for my ABI310 sequencer were paid for by QR Pharma, Inc., a pharmaceutical company that I am collaborating with. (2011)
   c) $20,000,000 was awarded to Dr. Paul Hill by the NSF EPSCoR RII Program. I was one of the participants (senior personnel). (2010-2015)
   d) $10,000 was awarded by TriLink Biotechnologies Research Rewards Program for purchasing research supplies. (2008)

7) Awards/honors (including invitations to speak in your area of expertise) or special recognition.

8) Community service as defined in the Greenbook.
# Appendix IIA
## Teaching Assistant Data Sheet

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<tr>
<th>GTA Name</th>
<th>Course No.</th>
<th>Course Name</th>
<th>Year 1 2006-2007</th>
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<th>Year 3 2008-2009</th>
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<td>Su</td>
<td>Fa</td>
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<td>X</td>
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<td>Pack, Kristen</td>
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Appendix III
Students’ Entrance Abilities (M.S. Program)

<table>
<thead>
<tr>
<th>Year</th>
<th>N*</th>
<th>Mean Undergraduate GPA</th>
<th>Mean GRE Verbal</th>
<th>Mean GRE Quantitative</th>
<th>Mean GRE Analytical Writing</th>
<th>GMAT Mean**</th>
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<td>2006-2007</td>
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<td>3.17</td>
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<td>705</td>
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<td>AVG.</td>
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<td>3.30</td>
<td>445</td>
<td>675</td>
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</table>

*A/B = Total/number with GRE
** Value not provided
Appendix IV
Students’ Exit Abilities (M.S. Program)

<table>
<thead>
<tr>
<th>Year</th>
<th>N</th>
<th>Mean GPA</th>
<th>Licensure Exam Results</th>
<th>Certification Test Results</th>
<th>Other Standardized Exam Results</th>
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<td>2006-2007</td>
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<td>3.36</td>
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# Appendix V

**Assessment Summary**

Marshall University

**Assessment of the Program’s Student Learning Outcomes**

5 year summary

**Component Area/Program/Discipline:** Chemistry

<table>
<thead>
<tr>
<th>Program’s Student Learning Outcomes</th>
<th>Assessment Measures (Tools)</th>
<th>Standards/Benchmark</th>
<th>Results/Analysis</th>
<th>Action Taken to improve the program</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a: synthesize and integrate chemical knowledge</td>
<td>Exams, Projects, Papers, Presentations</td>
<td>Minimum GPA of 3.00 must be maintained; any grade lower than C may result in dismissal.</td>
<td>23 new students entered the program. Six remain in good standing, nine transferred to other programs or left for other reasons, eight completed the degree.</td>
<td>These are typical results. All students met the entrance requirements. No action is needed at this time.</td>
</tr>
<tr>
<td>1b. synthesize and integrate chemical knowledge</td>
<td>Chemistry Graduate Student Seminar Evaluation Form</td>
<td>75% of the attending faculty must rate the seminar as competent or highly competent.</td>
<td>All student seminars were rated competent or above.</td>
<td>New seminar guidelines are being considered to improve student competence.</td>
</tr>
<tr>
<td>2a. Critical Thinking Skills</td>
<td>Chemistry Graduate Student Seminar Evaluation Form</td>
<td>75% of the attending faculty must rate the seminar as competent or highly competent.</td>
<td>All student seminars were rated competent or above.</td>
<td>New seminar guidelines are being considered to improve student competence.</td>
</tr>
<tr>
<td>2a. Critical Thinking Skills</td>
<td>Thesis Committee</td>
<td>Pass/No Pass</td>
<td>All students defending their theses passed.</td>
<td>An evaluation form for future use is under consideration.</td>
</tr>
<tr>
<td>3a. Literature search</td>
<td>Exams, Projects, Papers, Presentations</td>
<td>Minimum grade of B</td>
<td>Not implemented yet</td>
<td>None</td>
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<tr>
<td>3b. Literature search</td>
<td>Chemistry Graduate Student Seminar Evaluation Form</td>
<td>75% of the attending faculty must rate the seminar as competent or highly competent.</td>
<td>All student seminars were rated competent or above.</td>
<td>New seminar guidelines are being considered to improve student competence.</td>
</tr>
<tr>
<td>4a. Written and oral communication</td>
<td>Chemistry Graduate Student Seminar Evaluation Form</td>
<td>75% of the attending faculty must rate the seminar as competent or highly competent.</td>
<td>All student seminars were rated competent or above.</td>
<td>New seminar guidelines are being considered to improve student competence.</td>
</tr>
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<td>----------------------------------</td>
<td>-----------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>------------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
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<tr>
<td>4b. Written and oral communication</td>
<td>Thesis Committee</td>
<td>Pass/No Pass</td>
<td>All students defending their theses passed.</td>
<td>An evaluation form for future use is under consideration.</td>
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<tr>
<td>5. Student Placement</td>
<td>Graduate Student Exit &amp; Alumni Survey &amp; Interview</td>
<td>Appropriate Placement</td>
<td>All graduates readily found employment in their fields or continued for Ph.D.</td>
<td>Survey recent alumni about the program.</td>
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# Appendix VI
## Program Course Enrollment

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Name</th>
<th>Required/Elective/Service</th>
<th>Delivery Method</th>
<th>Location</th>
<th>Year 1 2006-2007</th>
<th>Year 2 2007-2008</th>
<th>Year 3 2008-2009</th>
<th>Year 4 2009-2010</th>
<th>Year 5 2010-2011</th>
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<td>Td</td>
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<td>S</td>
<td>Td</td>
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<td>E</td>
<td>Td</td>
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<td>CHM 548</td>
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<td>Td</td>
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<tr>
<td>CHM 553</td>
<td>Magnetic Resonance in Chemistry I</td>
<td>E</td>
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<td>CHM 682</td>
<td>Research</td>
<td>R</td>
<td>Td</td>
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<td>4</td>
<td>7</td>
<td>6</td>
<td>3</td>
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<td>CHM 723</td>
<td>Chemistry and Physics</td>
<td>S</td>
<td>Td</td>
<td>South Charleston</td>
<td>25</td>
<td>3</td>
<td>26</td>
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</table>
Indicate all program and service courses. Please include all special topics courses offered as well as independent studies. When listing Independent studies, please list the number of independent study students enrolled, but DO NOT include individual names or the titles of the independent studies. Please use the following codes:

Required/Elective: Required = R; Elective = E; Service = S (Please indicate all that apply; e.g. E + S, if the course is both an elective and a service course.
Delivery Method: Traditional = Td, Online = O, Hybrid = H
Location: Huntington, South Charleston, Point Pleasant, etc.

Expand table as needed.
Appendix VII

Program Enrollment

<table>
<thead>
<tr>
<th>Students</th>
<th>Year 1 2006-2007</th>
<th>Year 2 2007-2008</th>
<th>Year 3 2008-2009</th>
<th>Year 4 2009-2010</th>
<th>Year 5 2010-2011</th>
</tr>
</thead>
<tbody>
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<td>New Students Admitted</td>
<td>6</td>
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<td>6</td>
<td>3</td>
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<td>Grand Total Of Students Enrolled in the Program</td>
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<td>9</td>
<td>14</td>
<td>11</td>
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<td>Graduates of the program</td>
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<td>2</td>
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Figure 1. Trend Line for Total Enrollment and Program Graduates
## Appendix VIII
Job and Ph.D. Program Placement Rates

<table>
<thead>
<tr>
<th>Year</th>
<th># of graduates employed in major field</th>
<th># of graduates employed in related fields</th>
<th># of graduates employed outside field</th>
<th># of graduates accepted to Ph.D Programs</th>
<th># of graduates not accounted for</th>
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<td>2006-2007</td>
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<td>2010-2011</td>
<td>2</td>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Five –Year Total</td>
<td>8 (73%)</td>
<td>0 (0%)</td>
<td>1 (9%)</td>
<td>2 (18%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>
Appendix IX

Strategic Plan

(Items in blue are priority goals)
MU CHEMISTRY STRATEGIC PLAN

Our Vision: To be known as one of the top undergraduate and MS programs in the nation by integrating teaching with research experience

Recruitment & Outreach (Ken O'Connor)
- 1. Increase number of incoming chemistry majors with 26 math ACT by at least 5% per year by Spring 2012 (Ken)
- 2. Increase graduating chemistry majors by 5 starting in 2012-2013 (Leslie)
- 3. At least double private donations by Spring 2014 (Mike C)
- 4. Increase number and breadth of external partnerships to at least 10 defined partnerships in at least 3 different industry sectors by 2012 (Mike C)
- 5. Implement plan to increase visibility to all key stakeholders by 2012 (Rudolf)

MS Program (Mike Norton)
- 1. Increase number of incoming MS students by 1 per year by fall 2013 (Mike N)
- 2. Implement new MS curriculum plan by fall 2011 (John)
- 3. Implement MS diagnostic exams by fall 2010 (Larry)
- 4. Graduate at least 5 MS students on average per year by 2014 (Bin)

Infrastructure (Leslie Frost)
- 1. Implement a plan to maximize the functionality and appearance in the chemistry department (Mike C)
- 2. Implement a common and shared space usage plan by May 15, 2010 (Derrick)
- 3. Implement an equipment maintenance and replacement plan by Dec 31, 2010 (Leslie)
- 4. Publish a departmental policies and procedures manual by December 15, 2010 (Bob)

Teaching & Research Integration (Mike Castellani)
- 1. Make all incoming students aware of research opportunities and their value by fall 2010 (Bin)
- 2. Double time in research per student within 5 years (Derrick)
- 3. Take 10 or more students to at least 1 major meeting each year by 2011 (Laura)
- 4. Freshmen will do at least 20% inquiry-based labs increasing to at least 50% for seniors by Spring 2012 (Scott)
- 5. Incorporate communication skills into curriculum: including WAC-certified chemistry courses, public speaking and peer evaluation required of all students by fall 2011 (Laura)
- 6. Create a summer research program that will have 25 students each year by 2014 (Derrick)

Culture (Laura McCunn)
- 1. Publish departmental promotion and tenure policies and guidelines by May 1, 2010 (Larry)
- 2. Hold at least 2 social events per month for faculty starting October 1, 2009 (Scott)
- 3. Implement 2 events per year for undergraduates (Freshman/Sophomore mixer with Junior/Senior) starting fall 2009 (Rudolf)
- 4. Implement faculty workload policy by May 1, 2010 (Mike C)
- 5. Review and, if needed, revise departmental committee structures and develop committee responsibilities by January 15, 2010 (John)
Appendix X

2011 Alumni Newsletter
SURF Endows and a Lot More!

Late last summer, we received the donation that pushed us over the $100,000 needed to endow the summer undergraduate research fellowship (SURF). Almost 80 alumni have contributed to the fellowship fundraising drive and that makes our contribution rate almost double the norm for fundraising appeals. We are deeply appreciative of the generosity of our alumni. While we were fundraising, the lab manuals and William Dudley supported a total of 8 students who are now pursuing a range of activities ranging from a chemistry doctorate, medical school (4), an M.D./Ph.D., employment with an environmental testing company, and a senior biochemistry major. In January, we learned that matching money from WV’s Research Trust Fund will raise our total to almost $180,000 by the end of March 2011. The RTF will dollar-for-dollar match every donation to SURF from March 16, 2008 (about $55,000 so far) until March 15, 2013. As a result we are very close to being able to ensure that each summer two students will be guaranteed the opportunity to work in a Marshall chemistry professor's lab. SURF students will participate in our new, vibrant summer research program that is described in the next article.

Inaugural Summer Research Program Launches

The Department organized a new summer research program in 2010. In previous years, students worked in faculty labs that rarely interacted, but this year we designed a program with group activities to better engage students and foster a sense of community. Our goal for the Summer Research Program for Undergraduate Chemistry is to build a culture of research among our students. We believe that students should view this as an opportunity and a privilege rather than a necessity or degree requirement. The aims of the program are to develop student camaraderie, to increase student-faculty interactions, to elevate the profile of research within the Department, and to improve students' oral communication skills. To kick off the program, each of the sixteen undergraduate, two masters, and one high school research student presented a short, two-minute research proposal to acquaint everyone participating in the program with each others' research goals for the summer. Students worked full time for ten weeks but it wasn't all just hard work. For example, the photo above was taken while some of the students and faculty enjoyed watching a minor-league baseball game in Charleston. An ice cream social was held with a rotating trophy awarded to a research group for the following academic year for their achievement in a group competition. This summer, the trophy went to Scott Day's group for the highest average score in a Wii Bowling tournament. Students and faculty also traveled to Charleston and toured the State Police Crime Lab, which served to introduce students to several aspects of the daily life of a forensic chemist. Alumna Farrah Boggess-Machado provided a tour of the facility. To wrap up the summer, a finale symposium in which students presented their summer research in a formal setting was held at the Huntington House. We will continue to develop our research program with a goal of operating each summer with 25-30 students and all research-active faculty. Each summer, we'll incorporate fun, social activities along with educational, career-building exercises.

Student and Faculty Accomplishments

Rebecca Ragland (BS 2010) became the Department’s first recipient of a Graduate Research Fellowship from the NASA West Virginia Space Grant Consortium. She started her project during the summer on the development of an integrated microfluidic device for transporting nanocargo in Scott Day’s lab. Samantha Cotsmire (biochemistry major) received an Undergraduate Research Fellowship from the NASA West Virginia Space Grant Consortium for a projects in Mike Norton’s laboratory. In addition, chemistry majors Allison Combs and Benjamin Crowder and biochemistry majors Paul Brooks, Cameron Buchman, Rebekah Jamieson, and Evan Riley received NASA Fellowship awards. Two students co-authored
research publications with faculty. Tiffany Bell with Leslie Frost working on a study addressing the disease galactosemia, and Rebecca Klug (BS 2007) with Rudolf Burck on a study of the internal energetics of small molecules. Rebecca is currently a student at Marshall’s medical school while Tiffany will graduate next year. Bin Wang (3), Scott Day (2), and Mike Norton (2) also published papers this year, with Bin mentoring undergraduate students from math and integrated science and technology. Five different faculty members coauthoring 9 publications from Marshall is easily our best year ever! Mike Castellani presented faculty development talks on mentoring undergraduate research students and advice for prospective department chair at the Council on Undergraduate Research national conference.

Dawn Nicholas (MS 2010) presented her research with Mike Norton at the fall 2010 ACS national meeting in Boston. On January 25, 2011, two research groups from the Department of Chemistry shared their work with state politicians and fellow scientists at the Eighth Annual Undergraduate Research Day at the Capitol. Courtney Nichols, Rebecca Mead, Ben Blodgett, Shaheed Elhamdani, and Cameron Buchman presented three posters on work that they had accomplished in Derrick Kolling’s lab. Sara Lilly and Allison Combs presented a poster on work that they had accomplished in Laura McCunn’s lab. Last January, three students: Austi Sergent Roush (BS 2010), Michael Adams (BS 2010), and Sara Lilly, who worked in Laura McCunn’s lab presented at the 7th Annual Undergraduate Research Day. In December 2009, Michael Norton teamed with faculty in biology and the School of Medicine to obtain nearly a million dollars for a multi-photon confocal microscope. This technique allows fluorescent imaging of multilayered samples.

chosen as recipient of the Marshall University Distinguished Alumni Award. He is currently Clinical Associate Professor of Pediatrics at the University of South Florida. Marisa Rubio (BS 2008) received a prestigious National Science Foundation doctoral fellowship and is a Ph.D. student in the Department of Molecular Biophysics and Biochemistry at Yale University. We also learned that Dr. Halimatun Hamdan (MS 1981), Prof. of Chemistry at the Universiti Teknologi Malaysia won the 2009 Merdeka Award in Health, Science and Technology.

Scott Day Receives Funding From Research Corp.

Scott Day recently received a two-year, $35,000 grant from the Research Corporation for Science Advancement. These awards are given to researchers at primarily undergraduate institutions in their first three years of appointment for their project's potential to further fundamental scientific knowledge and for its potential to develop into a long term viable research program. Scott's award will be used to study some fundamentals of self-assembly needed to understand how DNA aptamers attached to gold substrates can best be used in capturing various targets. DNA aptamers are particular sequences of DNA that recognize specific target molecules. The grant provides summer stipends for undergraduate students to work on the project and will help them gain experience in chemical synthesis, in using common separation techniques, and in using methods for characterizing the structure and function of the DNA monolayers.

Transitions

Joyce Maynard, our long time secretary, retired at the end of October and Rudolf Burck will be leaving to enter Marshall’s medical school to seek a medical degree. Both will be missed and we wish them well in the next phases of their lives. We welcome Melinda Combs who will join us as our new secretary on March 1.
Appendix XI

Literature Topic Approval Form
Literature Topic Approval Form

Student’s Name: ___________________________ Date: ________________

Provide the reference for 3 topics (ranked in priority of preference) chosen for the literature topic and a brief synopsis of your master’s research. The three articles should be given to your committee members one week prior to the meeting.

1. 

2. 

3. 

Thesis research synopsis:

The committee has approved topic number ______ as the focus of the literature presentation.

<table>
<thead>
<tr>
<th>Committee Member</th>
<th>Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
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<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
</tbody>
</table>

This form should be completed and turned in to the main office prior to scheduling for CHM 631 or during the first week of course enrollment.
Appendix XII

Chemistry Graduate Student Seminar Evaluation Form
Chemistry Department Graduate Seminar Evaluation

Student’s Name:

Date:

Topic:

Faculty Present:

Comments:
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Description</th>
<th>Needs Developing (2)</th>
<th>Developing (3)</th>
<th>Competent (3.5)</th>
<th>Highly Competent (4)</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
<td>Is content appropriate for topic.</td>
<td>Content and main topics are confusing. More information is needed.</td>
<td>Main topics are scattered and need more development.</td>
<td>Main topics are developed and based on accurate information.</td>
<td>Main ideas are well-developed and supported with accurate information.</td>
<td></td>
</tr>
<tr>
<td>Weight = 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization</td>
<td>Overall flow, order and transitions.</td>
<td>Hard to follow: details and examples show confusing organization.</td>
<td>Details and examples show inappropriate organization.</td>
<td>Information is presented in a logical manner.</td>
<td>Information is presented in an effective order. Presentation flows nicely with well timed transitions.</td>
<td></td>
</tr>
<tr>
<td>Weight = 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction</td>
<td>Focuses the audience and introduces concepts essential to the talk.</td>
<td>Introduction is not apparent.</td>
<td>Introduction is vague.</td>
<td>Introduction contains a focus and essential concepts.</td>
<td>Introduction has a sharp and distinct focus and well ordered essential concepts.</td>
<td></td>
</tr>
<tr>
<td>Weight = 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral Presentation-Delivery</td>
<td>Eye contact is made. Knowledge of subject is shown by use of few or no notes. Comfortable in delivery through practice.</td>
<td>Has little eye contact; reads extensively from notes and/or reports. Extensive memorization. Stiff and/or rote delivery. Displays excessive nervousness.</td>
<td>Some eye contact; some understanding of the topic; considerable reference to notes of evidence of memorization.</td>
<td>Adequate; Maintains eye contact between audience and notes; shows sufficient understanding of the topic with some reference to notes or evidence of memorization.</td>
<td>Engaging; has excellent eye contact demonstrates considerable understanding of the topic by speaking to audience with infrequent references to notes. Calm and relaxed delivery.</td>
<td></td>
</tr>
<tr>
<td>Weight = 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Understanding of the topic</td>
<td>How well does the presentation and the question &amp; answer period demonstrate that the student understands</td>
<td>It is quite apparent that the student does not understand the selected topic. Answers to questions posed are not thorough and</td>
<td>The presentation and answers to posed questions demonstrate that the student has only a minimal understanding</td>
<td>The presentation and answers to posed questions demonstrate that the student has thoroughly mastered the topic material.</td>
<td>The presentation and answers to posed questions demonstrate that the student has thoroughly mastered the topic material.</td>
<td></td>
</tr>
<tr>
<td>Weight = 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criteria</td>
<td>Description</td>
<td>Needs</td>
<td>Developing (2)</td>
<td>Developing (3)</td>
<td>Competent (3.5)</td>
<td>Highly Competent (4)</td>
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<tr>
<td>their chosen topic?</td>
<td>detailed.</td>
<td>of the selected topic.</td>
<td></td>
<td></td>
<td>and material related to the topic.</td>
<td></td>
</tr>
<tr>
<td><strong>Depth and Accuracy of Scientific Analysis</strong></td>
<td>How well did the presentation show the student’s ability to critically evaluate scientific literature?</td>
<td>Student shows inability to analyze other’s work.</td>
<td>Student highly dependent on authors’ data interpretation. Shows limited knowledge of scientific impact. Shows inadequate understanding of method limitations.</td>
<td>Demonstrates some ability to independently interpret data. Recognizes impact on scientific community. Shows adequate understanding of experimental/theoretical limitations.</td>
<td>Demonstrates ability to independently interpret data. Recognizes impact on scientific community. Clearly understands experimental/theoretical limitations. Suggests methods of improvement.</td>
<td><strong>Weight = 4</strong></td>
</tr>
<tr>
<td><strong>Slide Show Layout and Presentation</strong></td>
<td>Organization and integration of spoken and visual presentation.</td>
<td>Poorly organized. Not appealing to the eye. Too many extras (e.g. transitions) Message not the most important characteristic.</td>
<td>Spoken and visual presentation not integrated in parts. Too many ‘added extras’ which detract from the message. Some organization shown.</td>
<td>Integrated spoken and visual presentation. Organization apparent and appealing.</td>
<td>Effectively integrates spoken and visual presentation. A high degree of originality, organization and eye appeal.</td>
<td><strong>Weight = 2</strong></td>
</tr>
<tr>
<td><strong>Professionalism</strong></td>
<td>How well did this presentation show the student’s desire to be a professional scientist?</td>
<td>Joked during the presentation. Used inappropriate sound and slide effects to make the presentation appear flashy. Dressed poorly for a formal presentation. Did not</td>
<td>Occasionally joked during the presentation. Used inappropriate sound and slide effects to make the presentation appear flashy. Dressed casually. Did not take the</td>
<td>Used humor rarely and appropriately. Used sound and slide effects rarely and appropriately. Dressed as a professional would dress. Took the assignment seriously.</td>
<td>Used humor rarely and appropriately. Used sound and slide effects rarely and appropriately. Dressed as a professional would dress. It was obvious that this student took the seminar</td>
<td><strong>Weight = 2</strong></td>
</tr>
<tr>
<td>Criteria</td>
<td>Description</td>
<td>Needs Developing (2)</td>
<td>Developing (3)</td>
<td>Competent (3.5)</td>
<td>Highly Competent (4)</td>
<td>Score</td>
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</tr>
<tr>
<td></td>
<td>appear to take the assignment seriously.</td>
<td>assignment very seriously.</td>
<td></td>
<td>presentation as an extremely important step in their professional career.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall Score: \[ \quad / 100. \]

Scale: 90-100 A, 80-89 B, 70-79 C, 60-69 D, < 60 F

Grade: A B C D F

This form will be completed by the seminar coordinator and returned to the student in no less than 48 hours following the oral presentation.
Appendix XIII

Letters from the Office of Assessment
Office of Assessment & Program Review

June 8, 2011

Dr. Mike Castellani, Chair
Chemistry
COS

Dear Mike:

The Graduate Council and I have completed our evaluation of the MS in Chemistry’s assessment of student learning. This letter will provide general comments and suggestions for improvement. Although the scoring rubric we used to evaluate assessment reports was sent to you in April, I will not include numerical ratings in this letter. The reason for this is that the rubric is still relatively new and is continuing to be revised. At this time, I ask that you use it for formative purposes to help improve your assessment plan. We also would appreciate your comments concerning this rubric.

Your learning outcomes are well articulated and assess higher orders of thinking and the assessment measures described are appropriate. You also allude to rubrics, but don’t include those in the report. Unless I’m missing something, I did not see any results given (other than the number of degrees awarded). Please refer to the rubric sent in April for more detail concerning reviewers’ comments.

During the academic year 2011 – 2012, I plan to meet with all programs to assist with further development of assessment plans and look forward to meeting with you. I will be in touch at the end of the summer about scheduling. If you have questions or concerns, please let me know.

Sincerely,

Mary E. Reynolds

Mary E. Reynolds
Director of Academic Assessment

C: Dr. Charles Somerville, Dean, COS
Dr. John Hubbard, Graduate Coordinator
Dr. Mike Castellani, Chair  
Chemistry  
COS

Dear Mike:

I have completed my evaluation of the MS in Chemistry's assessment of student learning. This letter will provide my general comments and suggestions for improvement. Although the scoring rubric we used to evaluate assessment reports is attached, I will not include numerical ratings in this letter. The reason for this is that we used the attached rubric is still relatively new and, as you will see, it raises the bar for what is considered excellent assessment. However, I ask that you use it for formative purposes to help improve your assessment plan. We also would appreciate your comments concerning this rubric.

You learning objectives (outcomes) are measurable and assessment measures appropriate. However, there are no results reported from these measures, nor were assessment rubrics included in the report. I recommend that you establish a timeline for assessing outcomes and would like to meet with you after Assessment Day to discuss how this might be done.

Please see the attached rubric. If you have questions or concerns, please let me know.

Sincerely,

Mary E. Reynolds

Mary E. Reynolds  
Director of Academic Assessment

C: Dr. Charles Somerville, Dean, COS
Dr. Michael Castellani, Chair  
Chemistry  
COS

Dear Mike:

The Graduate Council and I have completed our evaluation of the MS in Chemistry's assessment of student learning. This letter will provide my general comments and suggestions for improvement. Although the scoring rubric we used to evaluate assessment reports is attached, I will not include numerical ratings in this letter. The reason for this is that we used the attached rubric for the first time this year, and, as you will see, it has changed considerably from the ones used in previous years. It raises the bar for what is considered excellent assessment considerably and, since it was not shared with programs before this assessment cycle, I'm not comfortable using it to give programs a formal rating this year. However, I ask that you use it for formative purposes to help improve your assessment plan. We also would appreciate your comments concerning this new rubric.

Your student learning outcomes are well articulated and assess higher levels of learning. You also indicate that you use appropriate complementary direct measures, some of which employ rubrics, to evaluate these outcomes. However, no actual data or planned actions based on assessment of student learning are presented.

Reviewers also commented that your primary tool for assessment is the Chemistry Graduate Student Seminar Rubric. The rubric is not included in the report and there is no indication of what minimum rating students would need to earn to be considered competent or how these data would be used for program improvement.

Overall, you have a nice assessment plan. To strengthen your assessment program, we recommend that you establish benchmarks against rubrics and report results against these benchmarks. To be most useful, results should be reported for each area of the assessment rubric, not just a holistic score.

Please see the attached rubric and letter to Deans, Chairs, and Faculty detailing general suggestions for an effective assessment program. If you have questions or concerns, please let me know.
Sincerely,

Mary E. Reynolds

Mary E. Reynolds
Director of Academic Assessment

C: Dr. Wayne Elmore, Interim Dean, COS
Office of Assessment & Program Review

April 1, 2008

Dr. Michael Castellani, Chair
Chemistry
COS

Dear Mike,

The Graduate Council and I have completed our evaluation of the annual program assessment report for the MS in Chemistry. This letter will provide feedback in the following manner. First, I will comment generally on each section of your report. Second, I will rate the following areas of the report on a four point scale (0 – 3, with 3 being the highest rating): student learning outcomes, assessment measures, and the feedback loop. Although I considered feedback from committee members, I made the final decision on ratings for all reports submitted. Third, I will offer suggestions for your consideration as you plan your assessment for the 2008-2009 academic year. Fourth, I will include my evaluation using the Primary Traits Analysis rubric and will include reviewers' comments for your information.

General Comments

Your program goal and student learning outcomes are appropriate for a graduate program, although I think outcome 5 (demonstrate skills necessary for employment) may be redundant. In other words, if students successfully accomplish the first four outcomes, I would argue they also have accomplished outcome 5.

The assessment measures used to evaluate the student learning outcomes; problem sets, exams, seminar and thesis presentations, and evaluations of teaching also are appropriate direct assessment measures. It is an excellent idea to use rubrics, as you indicate you do. The timing of the seminar presentation is not explicit in the report, but I assume it occurs before the end of the student's program, whereas the thesis presentation obviously comes at the end. Although assessment of student learning should primarily use direct measures, I would suggest that these be supplemented with indirect data such as graduate and employer satisfaction survey data.

Since you are using rubrics I'm sure you do this, but your report does not specify benchmarks indicating acceptable performance. I recommend specifying the level on each component of your evaluation rubrics that you deem to represent acceptable outcomes as benchmarks. For example, if seminar presentations are evaluated on a scale of 4 – 1, with 4 meaning "outstanding," 3 meaning "good," and 2 meaning "satisfactory," you might expect a mean score of 2.5 on each component of the rubric.
MS in Chemistry

(or individual scores of at least 2). Then, results will be actual mean performance (across students). I realize you don’t have many students enrolled in the program at any time, so individual outcomes might even be reported. Comparison of these means (on each area of the rubric) should allow you to identify specific strengths and weaknesses across students. Finally, your planned actions will be what you plan to do based on the results, i.e. how you plan to address weaknesses in student performance.

Ratings for Student Learning Outcomes, Assessment Measures, and the Feedback Loop

Student Learning Outcomes = 3. This rating was given because your student learning outcomes are comprehensive, measurable, support Marshall’s educational goals, and span multiple learning domains.

Assessment Measures = 3. This rating was given because the assessment measures you’ve identified assess higher order learning and allow learning to be gauged over time. I would recommend supplementing direct measures with some indirect measures, which I see you are planning to do during the upcoming year.

Feedback Loop = 0. This rating was given because your report did not set benchmarks, give results, or specify how results were used to improve student learning.

Suggestions to Consider as you plan your assessment strategies for the 2008-2009 academic year

I would recommend that you use scoring rubrics to analyze student learning in more depth. Remember, too, that it is not necessary to assess all outcomes every year. So, you may choose to do an in-depth assessment of one/third of your outcomes during year 1. If this is done using several assessment measures with detailed rubrics, you will be able to collect detailed data regarding the outcomes. These data should allow you to identify specific strengths and weaknesses regarding student learning (and hence, your program). Changes to strengthen these areas of learning can be implemented the following year, while you assess two more outcomes. This will allow you to assess all outcomes on a three-four year rotation and will give you sufficient time to allow curricular modifications to have an effect before the next assessment.

I appreciate the work you are doing to make your assessment stronger. If I can be of additional help, please do not hesitate to contact me at 62987 or at reynolddm@marshall.edu.

Sincerely,

Mary Beth

Mary E. Reynolds
Interim Director of Assessment

C: Dr. Andrew Rogerson, Dean, COS