



**Department of  
Chemistry and Biochemistry**



# Departmental Strategic Plan

May 2013

*As a department we pledge to:*

*Embrace our similarities and differences.*

*Model civility and professionalism in every interaction.*

*Actively and enthusiastically participate in departmental activities.*

*Encourage and practice open, respectful and timely communication.*

*Problem solve together to build upon the department's reputation, integrity, and strength.*

**UMD**

UNIVERSITY OF MINNESOTA DULUTH

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**SWENSON COLLEGE  
OF SCIENCE & ENGINEERING**



# Department of Chemistry and Biochemistry



## Departmental Mission Statement

The Department of Chemistry and Biochemistry is committed to providing scientific solutions that address societal needs in an increasingly complex, diverse, and dynamic world. This commitment is demonstrated in our support of the professional and personal development of our undergraduate and graduate students through rigorous courses that promote critical thinking, problem-solving strategies, and active learning in addition to opportunities to participate in research and scholarly activities. The department is similarly committed to the professional development and success of each faculty and staff member as we collectively strive to advance our strategic goals. We reaffirm our role in educating non-majors, engaging in creative community partnerships, and serving within the university and professional organizations.

## Departmental Vision Statement

The UMD Department of Chemistry and Biochemistry will continuously enhance the departmental reputation and visibility (both nationally and internationally) to ensure the highest recognition of and opportunities for our graduates, faculty, and staff. The five-year departmental goals are to

1. Prepare our majors to develop, synthesize, and apply their knowledge base and skills to help solve local, national, and global problems.
2. Establish a center of excellence in graduate education that provides knowledge and skills that enable our students to be competitive for challenging careers.
3. Promote excellence in research, discovery, and training of our students.
4. Align and strengthen human and physical resources to support the departmental mission.
5. Promote a departmental culture that supports open communication, mutual respect, collaboration, ethical thinking, diversity, and civic engagement as foundations for excellence.

*(Approved May 16, 2013)*



# Department of Chemistry and Biochemistry



## Goal 1: Undergraduate Education

Prepare our Chemistry, Biochemistry/Molecular Biology, and Biochemistry majors to develop and apply their technical knowledge base and skills; their problem solving, critical thinking, active learning, and communication skills so that they can help solve local, national, and global problems. We aspire to be ranked in the top 10% of public comprehensive universities in graduating Chemistry and Biochemistry majors certified by the ACS or ASBMB.

### Objectives and Action Steps

1. *Review and revise our undergraduate curricula in order to emphasize knowledge synthesis, critical thinking, and active learning*
  - a. Develop and articulate a comprehensive plan for
    - i. departmental expectations with respect to learning outcomes and performance-based grades for each course
    - ii. the integration among courses as well as between lecture and lab courses
    - iii. departmental expectations with respect to student learning, knowledge synthesis, and application.
  - b. Increase resource allocation toward our majors (e.g., smaller course sections, smaller student-to-faculty ratio, faculty-led recitations, revamping teaching labs to advance technical and research skills).
    - i. Establish a first-year introductory experience for our majors in order to enhance retention, course integration, communication and teamwork skills, awareness of available departmental and UMD resources, career options, employment opportunities, and student-faculty relationships.
  - c. Integrate writing and communication skills into the curricula.
2. *Develop a robust assessment program to measure the effectiveness of our curricula.*
  - a. Build a database and comprehensive, evolving assessment methods to quantitatively track student performance and learning outcomes.
  - b. Enhance record keeping concerning undergraduate research experiences and post-baccalaureate placement as a means for additional assessment for a vibrant undergraduate program.
  - c. Be proactive in identifying and correcting shortcomings in the preparation of our graduates for each undergraduate program.
  - d. Obtain external evaluation of the quality and skills of our graduates as compared to our competition.



# Department of Chemistry and Biochemistry



## Goal 1: Undergraduate Education (continued)

### 3. *Improve Advisement and Post-Baccalaureate Placement*

- a. Define the content areas that comprise advisement (courses, majors, minors; opportunities outside the curricula; referral to other UMD resources; departmental employment and service options; post-baccalaureate education and employment).
- b. Develop and implement resources (web-based and written materials, training) and programs (group advisement) to further improve the advisement of students.
- c. Develop a program of internships targeted for the terminal BS degree graduates as an alternative to the research experience for those who will go on to attend graduate schools or professional programs.
- d. Develop and integrate career workshops. These will involve return visits of alumni and/or industrial contacts.

### 4. *Optimize opportunities outside the traditional curricula that would contribute to our students' educational and lifelong learning success.*

- a. Establish/define the number of undergraduate research students that we can effectively mentor.
- b. Increase the number of faculty advisors (new hires, affiliated faculty from related departments), laboratory space, instrumentation, etc.
- c. Review and revise the Departmental Honors Program.

*(Approved April 4, 2013)*



# Department of Chemistry and Biochemistry



## Goal 2: Graduate Education

Establish a center of excellence in graduate education that provides a solid foundation of knowledge and skills that enable our students to be competitive for challenging careers in industry, teaching, or research through a comprehensive program and contemporary curriculum.

### Objectives and Action steps

1. *Define our principles and objectives of graduate education to increase its quality and diversity.*
  - a. Clearly define our expectations for and evaluations of entering and exiting students.
  - b. Increase departmental oversight over progress toward degree and opportunities for professional development of graduate students.
  - c. Striver for a balance balance in graduate student demographics (e.g., graduates from UMD vs. other institutions, domestic vs. international students).
  - d. Establish departmental expectations for Plan A thesis, thesis proposal, seminar, and final thesis defense, and Plan B papers and defense.
  - e. Clarify the roles of Graduate Student Thesis Committee.
  - f. Provide regular performance evaluation and feedback to our students.
    - i. Enhance and refine mid-semester teaching evaluations of GTAs. Discuss student evaluations with GTAs and provide advice for improvement and follow up.
    - ii. Develop and implement an annual progress evaluation of Masters students with respect to research and coursework.
    - iii. Expand the criteria used to determine GTA awards to incorporate data such as TA evaluations, instructor, faculty, and staff evaluations.
2. *Increase the quality of our graduate curriculum through meaningful and comprehensive review.*
  - a. Critically evaluate our graduate courses and curriculum.
    - i. Identify learning objectives and assess student learning outcomes.
    - ii. Determine the need and demand for elective courses in disciplinary and interdisciplinary fields.
    - iii. Provide opportunities to strengthen oral and written communication skills in graduate courses.
    - iv. Foster active learning, critical thinking and problem solving skills in the graduate experience of our students.
    - v. Prepare our students for globally-centered scientific endeavors in academia, industry, government, and entrepreneurship.
    - vi. Prepare our students to create solutions to societal needs.
  - b. Provide effective, modern, relevant, and engaging instruction.



# Department of Chemistry and Biochemistry



## Goal 2: Graduate Education (continued)

3. *Establish guidelines for effective mentoring and professional development of our graduate students.*
  - a. Develop a more comprehensive and consistent approach to advising/mentoring.
  - b. Maximize the benefits of the orientation week program (or Graduate Program Orientation) to emphasize the multiple roles of graduate students.
    - i. Highlight ongoing research in our department and affiliated faculty labs as a means to help new students to choose a research advisor. For example, require new graduate students to meet with at least three faculty members, who may be potential advisors, to discuss mutual research interests.
    - ii. Ensure students' awareness of safety policies and practices, ethical and responsible research conduct, and policies governing teaching and learning (e.g., FERPA).
    - iii. Define and communicate our expectations concerning graduate student responsibilities as a GTA and as a research student. Help our graduate students recognize and balance their multiple roles (teaching assistants, research assistants, students, and emerging professionals).
    - iv. Encourage students to become a part of both their research lab and departmental communities.
4. *Explore and evaluate offering new graduate programs and other opportunities.*
  - a. Continue to play a leadership role in the new Chemical Biology IBS graduate track to best serve our students (IBS and Chemistry).
  - b. Promote interdisciplinary and collaborative research.
  - c. PhD program in Chemistry.
  - d. Biochemistry MS degree.
  - e. Critically monitor the recently approved Science Education Master's degree offered in collaboration with CEHSP with the flexibility to incorporate new ideas for further improvement.
5. *Improve the viability and visibility of our graduate program and faculty.*
  - a. Actively seek funding to ensure graduate student summer funding, to offer GRA opportunities, and/or to improve graduate student stipends.
  - b. Increase efforts to recruit students from other institutions with multicultural and diversity goals in mind.
  - c. Encourage, recognize, and support student participation in scientific conferences (local, national and international) and other scholarly activities.

(Approved April 18, 2013)



# Department of Chemistry and Biochemistry



## Goal 3: Research and Scholarly Activities

Promote excellence in research (both basic and applied), discovery, and mentoring and training our students in using the scientific method for problem solving.

### Objectives and Actions Steps

1. *Create a vibrant research culture that addresses cutting edge basic science questions and critical societal needs.*
  - a. Continue to support ongoing individual and collaborative research programs, which provide training opportunities in cutting-edge research for our undergraduate and graduate students.
  - b. Invest in existing and emerging research areas (such as green chemistry, materials science, nanotechnology, energy, computational chemistry, analytical chemistry...).
  - c. Foster collaborative and/or interdisciplinary opportunities for our faculty and graduate students.
  - d. Strengthen our seminar program by incorporating more
    - i. seminars by our own faculty.
    - ii. research breadth as reflected by the expertise of invited speakers.
    - iii. speaker diversity.
    - iv. pedagogy seminars.
    - v. Opportunities for faculty and students to attend seminars in other departments.
  - e. Create a development plan to
    - i. identify endowment targets.
    - ii. support travel for students and faculty to participate in national and international scientific meetings for the purposes of disseminating their research discoveries, networking with other researchers, and staying current on the latest research findings.
    - iii. establish graduate student fellowships (academic year and summer).
  - f. Create greater links to the local community (including industry, EPA lab, WLSSD, MPCA, etc.) in order to identify knowledge and workforce training needs, and employment opportunities for our graduates.
2. *Train and mentor undergraduate and graduate students in research endeavors.*
  - a. Increase the number of faculty with expertise in new research areas (identified above) in order to create new training opportunities for both graduate and undergraduate students. This will reduce the student-to-faculty ratio in research



# Department of Chemistry and Biochemistry



## Goal 3: Research and Scholarly Activities (continued)

labs and provide more research opportunities for undergraduate students through UROPs, SURPs, Chem 3194, and UGRAs in order to strengthen this critical and distinguishing aspect of our departmental mission.

- b. Ensure sufficient and timely technical support to our faculty and their research.
  - c. Bring to the attention of our undergraduate students other summer research opportunities at other institutions and encourage them to apply in order to promote their professional development.
3. *Support faculty efforts to secure external funding and support faculty in their grant management, mentoring activities, and research efforts.*
- a. Identify and provide appropriate technical and administrative staff (See Strategic Planning Goal 4).
  - b. Streamline purchasing and post-award grant management.
  - c. Revisit idea of service contracts.
  - d. Create workshops to educate new faculty about proposal routing here at UMD as well as grant management.
  - e. Establish useful links (perhaps on the departmental website) to research grants and proposal calls and make them accessible to our faculty while encouraging them to compete for these external funds.
  - f. Bring to the attention of our faculty internal grant funding opportunities and encourage them to apply in order to promote their scholarly activities.
4. *Provide adequate and appropriate physical infrastructure for research.*
- a. Assess current space needs and identify future space needs in order to
    - i. develop a renovation plan for existing lab and office spaces.
    - ii. identify new building needs.
    - iii. work with college and campus to identify and secure appropriate funding mechanisms for a new building and renovations.

*(Approved April 18, 2013)*



# Department of Chemistry and Biochemistry



## Goal 4: Human and Physical Resources

Align and strengthen human and infrastructural resources to support the departmental mission.

### Objectives and Action Steps

#### Human Resources Action Plan

##### 1. Faculty

- a. Create a faculty hiring plan to meet departmental teaching, research, and service goals as defined in this Strategic Plan. Review and revise this plan at least annually.
- b. Promote interdisciplinary research and teaching opportunities through new faculty hires, joint appointments, and/or professional development.
- c. Recognize collaborations and clearly communicate how collaborative efforts should be evaluated, especially for Promotion and Tenure evaluation.
- d. Review and update workload protocols and other measures to reflect the values of the department (teaching, mentoring research students, research projects, grant writing, service).
- e. Strengthen and encourage professional development to advance the research and teaching goals of the department.
  - i. Sabbatical leaves, Single Semester Leaves, travel funds to attend professional conferences.
  - ii. Professional development funding.
  - iii. More topical discussions among faculty members and presentation of research and teaching results to a wider department and campus audience (seminar, discussion groups, web-based information).
- f. Review and strengthen a meaningful peer-evaluation for teaching with a well-defined guideline (or form).
- g. Recognize the importance of balance for individuals and for the department: teaching and research efforts, professional and personal lives, new faculty – veteran faculty, advancing individual and collective goals, etc.
- h. Develop a robust mentoring program.

##### 2. Staff

- a. Create a staff hiring plan to meet the teaching, research, and service goals as defined in this Strategic Plan. Review and revise this plan on a regular basis.
  - i. Discuss the need for and secure a position for an advanced-degreed staff member dedicated to providing instrument support and training.
  - ii. Work with SCSE and other departments to hire a collegiate safety officer to emphasize safety issues and related training as well as to facilitate communication with the Department of Environmental Health and Safety.



# Department of Chemistry and Biochemistry



## Goal 4: Human and Physical Resources (continued)

- iii. Discuss the need for a departmental staff member to assist with such things as proposal editing, grant submission, award and budget management, ordering supplies, alumni development, etc.
  - b. Strengthen professional development to support the goals/mission of the department.
    - i. Regents Scholarships, work-related UM/UMD training programs, etc.
    - ii. Encourage staff to seek professional development funding.
3. *Support our graduate students to optimize their success as MS and PhD students and as Graduate Teaching Assistants (GTAs).*
- a. Clearly articulate departmental research and teaching expectations ensuring that graduate students do not hear conflicting messages from their research advisors and course instructors.
  - b. Recognize excellence among graduate students with awards that are highly competitive and merit-based (e.g., excellence in teaching, mentoring UGs, and excellence in research).
  - c. Expand funding sources for summer and academic year fellowships and GRAs.
  - d. Facilitate community building among graduate students as well as with faculty and staff.
  - e. Strengthen our Graduate Program Orientation.
  - f. Assign courses/labs to GTAs as soon as possible i.e. not a few days prior to classes.
  - g. Establish an evaluation policy for GTAs by both students and faculty.

### Physical Resources Action Plan

1. *New construction and renovation*
  - a. Participate in the planning and development of a new Chemistry and Biochemistry Building.
  - b. Renovate existing Chemistry Building as needed until the new building is available.
2. *Review utilization and maintenance of current space.*
  - a. Research and teaching labs, offices, support areas, storage, etc.
  - b. Identify space for informal gatherings to enhance communication and community building (e.g., refrigerator, eating space, coffee, etc.)
3. *Address the need for these research support services in the college.*
  - a. Machine shop services which might include upgrading the UMD Physics machine shop to serve our department, college, and UMD at large.
  - b. Electronic shop to fix existing and build new electronic systems.

(Approved April 25, 2013)



# Department of Chemistry and Biochemistry



## Goal 5: Departmental Culture

Promote a departmental culture that supports open communication, mutual respect, collaboration, ethical conduct, diversity, and civic engagement as foundations for excellence consistent with UM Board of Regents Policies.

### Objectives and Action Steps

- Promote a departmental culture that supports respectful and open communication and facilitates community-building.*
  - Practice respectful interactions and communication between members of the faculty,
  - Identify ways to create a stronger sense of community among our graduate students.
  - Promote leadership among students, staff, and faculty.
  - Identify practices to realize more open, transparent, and accountable communication and more effective departmental governance in order to build a strong, productive, collegial community.
  - Strive for an open and frank annual review process leading to clear guidance as to how to improve professionally.
  - Develop opportunities for more formal and informal interactions among and between faculty, staff, and students, including social events.
- Promote scientific solutions to address societal needs and problems using classrooms and research labs as platforms. Communicate this responsibility to our students.*
- Inculcate in our students the importance of the scientific method in problem solving, life-long learning, and personal excellence.*
- Value and enlarge the breadth and depth of research expertise, teaching interests, and outreach efforts of the faculty.*
- Improve communication and working relationships with alumni, local and regional companies and organizations, and/or K-12 teachers and community college faculty.*
- Promote collaboration in achieving all aspects of the department mission.*
- Promote and support a culture of diversity [as broadly defined by UMD]. Such a culture will prepare our students to live in a complex, diverse, multicultural and dynamic world.*
  - Provide meaningful opportunities for our students to enhance their multicultural awareness and their ability to articulate and understand different points of view (or ideas) by recruiting a diverse student body, staff, and faculty.



# Department of Chemistry and Biochemistry



## Goal 5: Departmental Culture (continued)

8. *Teach and promote integrity of thought and ethical conduct in decision-making.*
  - a. Emphasize the standards of integrity, responsible conduct in research, and ethics in the classroom and research lab in accordance with UM Board of Regents, ACS, and NSF guidelines.
  - b. Hold ourselves and our students to these standards.
  
9. *Recognize and value individual effort (award nominations, etc.) and celebrate faculty, staff, and student achievement.*
  
10. *Recognize the need for both individual and collective commitment to advance the departmental mission.*
  
11. *Promote safety culture in the department's research and teaching laboratories.*
  - a. Continue to provide and update safety training for all students, instructors and teaching assistants in our lab courses. Address course- and lab-specific safety topics at each level.
  - b. Continue to provide up-to-date safety training as well as lab specific standard operating procedures for all researchers working in our laboratories.

*(Approved May 16, 2013, updated February 18, 2015)*



# Department of **Chemistry and Biochemistry**



## Addendum: Department Simple Rules

*As a department we pledge to:*

Embrace our similarities and differences.

Model civility and professionalism in every interaction.

Actively and enthusiastically participate in departmental activities.

Encourage and practice open, respectful and timely communication.

Problem solve together to build upon the department's reputation, integrity, and strength.

*(Approved & Adopted October 13, 2016)*