COLLEGE OF NATURAL SCIENCES
STRATEGIC PLAN PHASE 3 PART 1

STRATEGIC PLANNING PROCESS

1. Overall Approach

The College of Natural Sciences (CNS) currently consists of 13 departments and two schools (the School of Computer Science and the Stockbridge School of Agriculture). There are 21 four-year undergraduate majors and six two-year undergraduate majors. All departments have departmental graduate programs except Biology and Biochemistry and Molecular Biology, and there are four interdepartmental graduate programs in the life sciences: Molecular and Cellular Biology, Neuroscience and Behavior, Plant Biology, and Organismic and Evolutionary Biology. There are approximately 7,145 undergraduate students with primary and secondary majors and 1,175 graduate students within the college.

The strategic planning process in CNS began in the summer of 2014 with the establishment of four committees focused on teaching and learning, research, facilities, and strategic planning principles. This initial activity involved more than 40 faculty members. In the fall the departments and schools were charged with developing departmental scans (a.k.a. “the look in the mirror”). These reports have been produced and are posted on-line:

https://www.cns.umass.edu/cns-faculty/cns-strategic-plans

Departments are encouraged to examine each others’ reports and are free to modify their own reports at any time. It is anticipated that this will help to encourage cross-fertilization across the college. Access to these documents has been shared with all staff and faculty within the college in order to solicit additional feedback.

A reinvigorated curriculum committee was charged with exploring approaches to improve the undergraduate experience. It solicited suggestions from all of the departments and schools. These suggestions were then thoroughly discussed by the curriculum committee and individual members took the results of the deliberation back to departments for further discussion. The resulting recommendations were shared with all staff and faculty prior to an all-college meeting held specifically to discuss the undergraduate experience. The meeting was attended by 108 staff and faculty and the dedication within CNS to improving the undergraduate experience was quite evident. The draft will be further refined, based on the results of that activity.

As we develop our strategic plans we want to be sure to ask ourselves, “How will this benefit students and how might this hurt students?” We challenge each staff and faculty member to ask themselves, “What do I do to go the extra mile to improve the undergraduate experience?”
The strategic planning process has reaffirmed the college’s commitment to provide a high quality and affordable undergraduate education with an emphasis on authentic research experiences. It has also demonstrated the importance of a diverse student body and faculty. The process has also shown that the college community has an openness to diverse ideas and viewpoints about the quality of the undergraduate experience.

2. Major Preliminary Recommendations

Several themes have already begun to emerge from the strategic planning process:

- The need for effective enrollment management at the level of majors. In some disciplines we simply cannot meet our expectations for the quality of the student experience because of the imbalance of student numbers and capacity.
- The need to improve the physical quality of the teaching laboratories. It is unrealistic to aspire to be a destination of choice for students when more than half of our teaching laboratory inventory is of lower quality than the teaching laboratories that our students are exposed to in high school.
- The need to increase our expectations for student performance and to help students develop a culture of professionalism throughout their college careers.
- The need for a college-wide implementation of a plan to increase the number and quality of student internships.
- The need to rebuild faculty numbers to ensure that we are nationally competitive. Several disciplines are still greatly impacted by faculty losses from more than a decade ago. This constrains course availability, disciplinary coverage, and advising.

Several structural changes within the college are also beginning to emerge. These are at various states of exploration:

- Creation of an autonomous College of Computer Science
- Creation of a School of Earth, Sustainability, and the Environment within the college
- Creation of a unified first-year curriculum across the life sciences

We also envision developing a set of crosscutting strategic plans that span academic units within the college. This fall we convened a broad group of faculty to discuss all aspects of neuroscience on the campus. This conversation included undergraduate education, graduate education, and research directions; a draft plan has also been posted to the webpage listed above. We anticipate that other crosscutting plans will be developed as academic units explore the overlap of their respective individual plans. For instance, Plant Biology might well be a good candidate to undergo such a broad strategic review.

UNDERGRADUATE EDUCATION

Since 2005, total student majors in the college have increased by nearly 3,000 students, a 72 percent increase in just under 10 years. The increase over this time period in primary
majors is just slightly less at 67 percent. This has resulted in an increase of 28 percent in full-time equivalent (FTE) instructed students.

There has been a 33 percent increase in student majors and a 15 percent increase in FTEs in just the five years since 2009. Over this same period the number of tenure system faculty has increased by 1.8 percent (from 348 to 354) and the number of lecturers has increased by 75 percent (from 44 to 77). Lecturers as a percentage of the total teaching faculty has increased from 11 percent in 2009 to 18 percent today. Of the tenure system faculty, 20 percent are assistant professors, 24 percent are associate professors, and 56 percent are full professors. The number of undergraduate majors per available tenure system faculty was 17.3 in 2010. By 2014 this already unacceptably high ratio had increased to 21.5 undergraduate majors per available tenure system faculty.
Over the last five years the total student credit hours taught has increased by 21 percent. Since 2009 there has been a 14 percent increase in organized class sections taught in the college and a 13 percent increase in organized class sections taught by tenure track faculty.

While there is a strong and steady trend within the college for increasing numbers of majors, increasing student credit hours taught, and increasing organized class sections taught, these trends are not consistent across all CNS departments.
UNDERGRADUATE STUDENT SUCCESS

1. Destination of Choice

CNS is a destination of choice for more than 6,400 undergraduates who are primary majors in one of the 21 undergraduate offerings in the college. In addition, the college provides the core curriculum in mathematics, chemistry, physics, and biology for undergraduates in the College of Engineering and the School of Public Health as well as students of any major preparing for post-graduate degrees in the health sciences. CNS also services all undergraduates by offering general education courses in mathematics and life and physical sciences.

CNS has experienced tremendous growth at the undergraduate level, reflecting the growth of STEM disciplines nationally. There is particular urgency in ensuring the continued success of students majoring in STEM disciplines, given the global increase in demand for STEM graduates. In response, it is our goal to increase the retention and completion rates and overall success of STEM majors, with particular emphasis on the advancement of women and underrepresented minority (URM) students.

CNS Majors by Race/Ethnicity
2009-2015
The graph above shows the number of undergraduate majors by race/ethnicity in CNS from fall 2009 to spring 2015. The patterns of movement in and out of our college for students from underrepresented backgrounds fluctuate by less than one standard deviation in any direction during this period.

Effective practices and conditions that improve STEM student success, particularly for underrepresented populations, have been identified and validated. To persist and achieve success in a STEM major, students should develop a relationship with a faculty member, be a member of a peer group, receive holistic and comprehensive advising, and engage in an authentic research experience. Research suggests that instructional practices that promote active engagement in the classroom, such as peer learning, inquiry-based learning, and team-based learning are associated with a range of positive student outcomes that include motivation, course satisfaction, test performance, content retention, and mastery of problem solving skills. Furthermore, the incorporation of inquiry-based laboratories into introductory STEM courses has been demonstrated to increase student learning, persistence in a major, and graduation rates among student majoring in STEM disciplines.

The CNS departments recently completed their look-in-the-mirror component of the strategic planning process. In assessing both their strengths and their challenges, departments identified areas and issues that, if addressed, will improve STEM student success and student satisfaction. The CNS curriculum committee reviewed these recommendations; those deemed to be of high priority and impact are presented below. The recommendations address issues identified by the Chancellor and the Joint Task Force on Strategic Oversight in the areas of Curricular Coherence, Engaged Learning, A Rich Choice of Opportunities, the Research Advantage, and Career Development and Preparation.

The college is committed to increasing STEM student satisfaction and success and achieving the goals described below. Several of the high impact recommendations can be achieved only with the investment of significant resources to increase student access to courses, reduce class size, improve advising, and provide students with training and opportunities for authentic research in and out of the classroom. We believe that investment in and implementation of these recommendations will result in realization of the university goals of improving STEM student success and satisfaction.

2. Undergraduate Student Trends

The College of Natural Sciences (CNS) is a “Destination of Choice” for students who want to pursue studies in the life, physical, and environmental sciences. The college has seen substantial growth in recent years: current undergraduate enrollment for fall 2014 including both primary and secondary majors is 7,145 students (see appendix for enrollment trends in majors). Notable growth has occurred in Biochemistry and Molecular Biology; Biology; Computer Science; and Mathematics and Statistics. Psychological and Brain Sciences has been the largest major on campus since 2009. This growth at the undergraduate level reflects the importance of STEM disciplines nationally. There is particular urgency in ensuring the continued success of students majoring in STEM.
disciplines given the global increase in demand for STEM graduates. In response, it is our goal to increase the retention and completion rates and overall success of STEM majors, with particular emphasis on the advancement of women and underrepresented minority (URM) students.

<table>
<thead>
<tr>
<th>Undergraduate Enrollment - College of Natural Sciences</th>
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<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>2009 2010 2011 2012 2013 2014</td>
</tr>
<tr>
<td>College of Natural Sciences</td>
</tr>
<tr>
<td>Primary Majors</td>
</tr>
<tr>
<td>5,039 5,314 5,732 6,150 6,286 6,510</td>
</tr>
<tr>
<td>Secondary Majors</td>
</tr>
<tr>
<td>316 372 383 446 577 635</td>
</tr>
<tr>
<td>Subtotal</td>
</tr>
<tr>
<td>5,355 5,686 6,115 6,596 6,863 7,145</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>2009 2010 2011 2012 2013 2014</td>
</tr>
<tr>
<td>Associates (Stockbridge School)</td>
</tr>
<tr>
<td>155 148 131 138 112 92</td>
</tr>
</tbody>
</table>

In terms of admissions, the quality of CNS students as measured by GPAs and SAT scores has risen. This has also resulted in an increase of CNS students being accepted into the Commonwealth Honors College. Although this is a great experience for students, it is a very big challenge to meet the needs of students, especially regarding capstone classes that often require a laboratory experience.

<table>
<thead>
<tr>
<th>CNS Entering Freshmen Academic Profile</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td>2009 2010 2011 2012 2013 2014</td>
</tr>
<tr>
<td>Cohort Year</td>
</tr>
<tr>
<td>Mean HS GPA</td>
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<tr>
<td>Mean Combined SAT</td>
</tr>
<tr>
<td>2009</td>
</tr>
<tr>
<td>3.68</td>
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<tr>
<td>1186</td>
</tr>
<tr>
<td>2010</td>
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<tr>
<td>3.69</td>
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<tr>
<td>1180</td>
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<tr>
<td>2011</td>
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<tr>
<td>3.71</td>
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<tr>
<td>1200</td>
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<tr>
<td>2012</td>
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<tr>
<td>3.73</td>
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<tr>
<td>1216</td>
</tr>
<tr>
<td>2013</td>
</tr>
<tr>
<td>3.81</td>
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<tr>
<td>1222</td>
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<tr>
<td>2014</td>
</tr>
<tr>
<td>3.87</td>
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<tr>
<td>1236</td>
</tr>
</tbody>
</table>

The four-year graduation rate for CNS students entering in 2009 was 64.6 percent, which is close to the university rate. The six-year graduation rate is 69.3 percent, which is slightly below the university rate of 73 percent. A delay in graduation rate is often due to students changing majors, transfer students needing to take foundation courses, students pursuing double majors or degrees, and academic difficulty.
Undergraduate Graduation Rates

<table>
<thead>
<tr>
<th>Cohort Year</th>
<th>Campus 4 year</th>
<th>Campus 6 year</th>
<th>CNS 4 year</th>
<th>CNS 6 year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>58.7%</td>
<td>73%</td>
<td>55.9%</td>
<td>69.3%</td>
</tr>
<tr>
<td>2008</td>
<td>62.8%</td>
<td></td>
<td>61.6%</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>65.7%</td>
<td></td>
<td>64.6%</td>
<td></td>
</tr>
</tbody>
</table>

3. Advising for Undergraduate Student Success

CNS is committed to providing outstanding advising to students, but admittedly this is a challenge, especially for our large departments. Our aim is to provide needed information and guidance to help students achieve their goals, to assist them in making the most of their undergraduate experience by taking advantage of all opportunities in the college and at the university, and to help them make good choices regarding their academic work. The 2014 graduating senior survey reveals that 95 percent of students indicated being very/somewhat satisfied with their overall experience at UMass Amherst. In terms of the college, 90 percent of students indicated they were very/somewhat satisfied with accessibility of faculty and 92 percent were very/somewhat satisfied with the quality of teaching, but only 74 percent were very/somewhat satisfied with advising. There is quite a variation in departmental satisfaction rates and we are working with all advisors to better meet the needs of students.

Advising more than 6,500 undergraduate students is a challenge. Not only do we have students in 21 different majors, but we are also responsible for advising pre-med/pre-health students. At this time we have more than 1,100 registered for the pre-med/pre-health track. We are very pleased that Professor Wilmore Webley has just been named the new director of Pre-med/Pre-health Advising, and that a new pre-med advisor was hired in September. CNS recognizes the importance of providing students with an advising program that enhances their college experience. Advising is more than just meeting requirements and checking off boxes. Students today need guidance in selecting the major that they will succeed in and have a passion for studying. Students need to be aware of the many co-curricular opportunities that supplement their academic work and will aid them when applying to graduate school or pursuing a career. Many students today are grappling with serious issues and advisors must be knowledgeable about resources on campus and be ready to assist students in distress.

Advising is handled two ways in the college. The CNS Advising Office located in the Morrill Science Center provides general academic advising such as information about change of majors, referral information, co-curricular opportunities, and academic discipline. In order to get students off to a good start, all first year and transfer students must attend a mandatory meeting at the beginning of their first semester so that academic policies and
procedures can be reviewed. A newsletter is emailed every other week to all students in the college informing them of important deadlines and events. The college maintains contact with advisors to be sure that they are aware of services on campus. To accomplish that, we have monthly meetings with chief undergraduate advisors and we have initiated a monthly newsletter that will be sent to all 182 advisors. We have also organized opportunities for advisors to meet with representatives from offices across campus. Every semester a series of workshops are organized for students. This semester the following workshops will be offered: a student internship panel, study skills and time management, essential interview techniques, health careers and beyond, financial aid, and “The Real World is Coming.”

Individual departments handle advising regarding major requirements but the quality of advising can vary. According to the latest three-year aggregate senior survey, some departments are rated highly for advising (Food Science, Stockbridge School of Agriculture, Geosciences), while others (Math and Statistics, Psychological and Brain Sciences, Biology) have room for improvement. The obvious relationship between department size and advising satisfaction is striking. According to the 2014 senior survey, 41.3 percent of students in CNS indicate they were very satisfied with academic advising, 33.7 percent were somewhat satisfied, 17 percent were somewhat dissatisfied, and 8 percent were very dissatisfied. The college is providing training to faculty and advisors so they have access to and utilize student success data that will aid them in serving students, especially underrepresented minorities, first generation, and international students.

Students (and parents) are concerned about career preparation and opportunities after graduation. This is a challenge for advisors. CNS needs to explore ways to prepare students more effectively for careers after graduation. Currently students can work with a counselor in Campus Career Services but a dedicated CNS Career Center would better serve our students.

4. Undergraduate Student Opportunities

Research Experience and Opportunities are essential for students in order to develop and practice research-centered skills. In order to accomplish this CNS must improve and increase access to modern undergraduate teaching lab space. Curricular redesign is essential to provide authentic research experiences early in students’ training through lab courses or as lab components of courses. It is essential that early research method training occurs for students in order to position them for advanced research and internships. CNS is investigating a lab fee mechanism to support the cost of laboratory courses.

CNS First-Year Research Experience provides students with the invaluable opportunity to have an authentic research experience in their first semester. Students are mentored by members of a faculty research group and learn first-hand how science advances through the generation, dissemination, and in-depth analysis of new knowledge.

ExSEL: Excellence through Student Enhanced Learning is a new program in which CNS is an integral player. Three CNS departments are participating in the program and will offer
peer-led team learning in Biology 152, Chemistry 111, Chemistry 112, and Math 127. Future plans call for Physics to be included in the program. Students will be organized into cohesive study groups consisting of no more than 10 members and will meet weekly to work on problem sets developed by the course instructor. Not only have CNS faculty been willing to participate in the program, but Charlana Simmons, the college’s new director of Student Success and Diversity, has been instrumental in recruiting and identifying peer leaders.

*Internships* are becoming increasingly important for students in order to better prepare themselves for careers after graduation. Maintaining a database of where students engage in internships is a challenge, given that often students do not do an internship for credit. The college has developed a web-based survey for students to complete that has created a database that students can search by major and location. It has been beneficial for the college to identify institutions where students have secured opportunities. Each semester an internship panel is organized where students who have completed an internship opportunity can share their experiences. A dedicated CNS Career Center will definitely help prepare student for careers after graduation. We plan to solicit and utilize insights from alumni and employers in order to increase student access to networking opportunities. In addition we need to create departmental guidelines regarding supervision and evaluation of students’ internship experiences.

*First Year Seminars* will be launched in fall 2015 for all 230 exploratory undeclared students assigned to CNS. The seminars will provide students the opportunity to explore various pathways to aid in selecting a major inside or outside the college. In the future we will also offer seminars to declared students that will have a more discipline-based focus.

*iCons: Integrated Concentration in Science* is an unique program initiated in 2008 that has received national and international attention. The curriculum integrates scientific expertise across departments and gives students the opportunity to work on real-world problems. It is a four-year program—embedded in the student’s major—providing collaborative learning experiences, active scientific investigation, leadership development, and multidisciplinary analytical skills. Students currently select a track in either Renewable Energy or Biomedicine/Biosystems. New concentration areas in Clean Water and Climate Change will be developed in the future.

*Residential Academic Programs (RAPs)* offer unique living and learning opportunities designed to help first-year students transition to college. CNS students can choose from specific RAPs for biology (BioTap), chemistry, computer science, geosciences, health sciences, physics, animal science, and sustainability. The Scientific Connections RAP is affiliated with the iCons program. The number of CNS students participating in RAPs has increased from 347 in fall 2008 to 471 in fall 2014.

*BIOS: Biology Intensive Orientation Session* is a pre-semester, five-day intensive orientation designed to help first-year students enrolled in Biology 151 make a smooth transition to college. The program began in 2010 and last summer 50 students enrolled. Ideally, we would like to add orientation sessions focusing on other majors.
5. Undergraduate Student Success and Diversity

The creation of the director for Student Success and Diversity position in CNS was a first step towards ensuring that students from diverse backgrounds have every opportunity to be successful in STEM. Through this position, we are currently focused on identifying the students we need to support and creating the infrastructure that will make that support seamless. In the sections below, we outline our current activities and future plans relating to the recruitment, retention, and success of first-generation, low-income, transfer, and underrepresented minority students in CNS.

Recruitment
Starting with 2009, overall enrollment in CNS has grown tremendously. Enrollments of women and underrepresented minorities have trended in the same direction but not at the same rate. We are keeping an eye on these trends and are developing efforts that will lead us towards a period of steady growth in enrollment of students from diverse backgrounds.

CNS First-year Enrollment Trends 2009-2014

*ALANA includes the following categories: Asian, Black, Latino, Native American, Native Pacific Islander, Native Hawaiian, Native American, and Multiple Ethnicities.
In efforts to increase the numbers of diverse undergraduates, the college has collaborated with the College of Engineering and the School of Computer Science to participate in a Community College Day Conference on February 11, 2015. Through this event, we will host close to 300 local community college students and their faculty members. Among the community colleges that produce our highest yields, there is a considerable diversity of candidates.

**Community College Yield and Diversity Rates for CNS Academic Year 2013-2014**

<table>
<thead>
<tr>
<th>Community College</th>
<th>Fall Yield</th>
<th>Spring Yield</th>
<th>% CNS Majors</th>
<th>% URM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holyoke Community College</td>
<td>77%</td>
<td>69%</td>
<td>35%</td>
<td>13%</td>
</tr>
<tr>
<td>Springfield Technical Community College</td>
<td>77%</td>
<td>73%</td>
<td>40%</td>
<td>22%</td>
</tr>
<tr>
<td>Mt. Wachusett Community College</td>
<td>71%</td>
<td>100%</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Greenfield Community College</td>
<td>70%</td>
<td>63%</td>
<td>43%</td>
<td>4%</td>
</tr>
</tbody>
</table>

*URM percentage in the total transfer population, not just CNS.
+College level and diversity data for this college not reported.

This table demonstrates that we have a considerable amount of diversity to gain from tapping into our community college partners.

CNS has developed relationships with the STEM Starter Academy programs at Springfield Technical Community College, Holyoke Community College, and Greenfield Community College. The STEM Starter Academy is a state-funded program designed to support the success of entering community college students through a summer bridge program, financial support, and early connections to four-year campuses, including UMass Amherst. We are working to develop a robust summer visit day for the three STEM Starter academies in this partnership that will most benefit students who are new to the STEM Starter Academy. We are also collaborating with Enrollment Management to develop a spring preview weekend for STEM Starter Academy students from our partner institutions who have applied to and plan to attend UMass Amherst.

CNS is also collaborating with Enrollment Management and the Center for Multicultural and Academic Student Success (CMASS) to develop relationships with federally funded college prep programs that focus on STEM, starting with the Upward Bound Math/Science
Programs in Massachusetts, Connecticut, and Maine. The goal of this initiative will be to increase the numbers of highly qualified applicants from diverse backgrounds in the regular admissions pool who have an interest in STEM. With the addition of the Assistant Provost for Diversity position in Enrollment Management, this project has great promise towards the goal of further diversifying the college’s undergraduate population.

**Retention and Student Success**

Among undergraduate primary majors the CNS domestic ethnic diversity rate is 12 percent (790/6,466). It is our goal to retain ethnically diverse, low-income, and first-generation students through a holistic support approach that combines intensive academic advising, student success workshops, mentoring, and better access to high-impact academic practices.

According to the 2013 UMass Senior Survey, our students express high levels of dissatisfaction with three core areas that have been widely reported as having an impact on the retention and success for students who are traditionally underrepresented in higher education: academic advising, faculty concern for academic progress, and career preparation and guidance.

The graph above shows that in several CNS departments student rating of academic advising is below acceptable standards. In response to this data, CNS has developed relationships across campus to garner more holistic support for CNS students from diverse backgrounds.

The college is developing the CNS Scholars program, designed to support students holistically who are traditionally underrepresented in STEM and move them towards success as defined by success in STEM courses, on-time graduation, and the development
and execution of a STEM-related future plan. This program model is based on the nationally recognized model for student success in STEM similar to the University of Maryland, Baltimore County’s Meyerhoff Scholars, the Louis Stokes Alliance for Minority Participation in STEM, and the Ronald E. McNair Post-Baccalaureate Achievement Programs.

CNS UNDERGRADUATE STUDENT EXPERIENCE:
RECOMMENDATIONS FOR ACTION

1. Curricular Cohesion and Continuity

A. Goal: Explore ways to deliver unified and coherent curricula that align with the course objectives and departmental learning goals in order to achieve the following possible outcomes:

- Establish college-wide learning goals including: interdisciplinary thinking, communication skills, critical and creative thinking, information literacy, teamwork and problem solving, ability to test hypotheses, analyze scientific literature, and perform scientific research; ethical judgment and integrity.
- Reinforce and expand CNS learning goals with discipline-specific learning goals for each major.
- Develop measurable learning outcomes for all courses and assessment plans to measure whether the objectives are being met.
- Establish departmental review of syllabi or a guide for effective syllabus design.
- Identify and share successful strategies for teaching and meeting the need for Junior Year Writing and Integrative Experience (IE) courses.

B. Goal: Explore ways that will allow CNS to provide a more coherent framework for undergraduate training in order to achieve the following possible outcomes:

- Explore the pros and cons of forming a School of Earth, Sustainability, and the Environment (ESE) within CNS.
  - Unify and coordinate undergraduate education programs across the ESE departments.
  - Maximize attractiveness, retention, and graduation timeline among our majors.
  - Develop a set of core ESE curricular goals and outcomes.
- Explore the pros and cons of forming a School of Life Sciences within CNS.
  - Form an independent entity (e.g., the Core Life Sciences Program) to teach and advise life science and pre-professional students in the introductory life science core curriculum.
  - Integrate instructors from departments with major requirements that include the introductory life science core curriculum.
  - Design and teach a unified introductory life science core curriculum in collaboration with contributing departments that includes core concepts, learning objectives, examples that demonstrate the relatedness of science disciplines, and assessment methods.
- Examine existing majors to determine if any need to be added or changed.
2. Engaged Learning

Goal: Expand the use of evidence-based teaching methods (teaching methods for which there is scientific evidence of effectiveness) that promote student learning, engagement, and success in order to achieve the following possible outcome:

• Provide opportunities for instructors to share their teaching approaches and successes.
• Support instructors in their efforts to adopt teaching strategies that are demonstrated to increase student learning and engagement.
• Offer a yearly workshop for effective teaching for new CNS faculty.
• Collaborate with the Center for Teaching and Faculty Development (CFTD) to educate and support instructors in the use of evidence-based teaching practices.
• Partner junior faculty members with effective instructors to team-teach a course.
• Formalize robust mentoring relationships for junior faculty around research and teaching.
• Create a CNS-based supportive network for the mentoring and career development of lecturers.
• Improve access to undergraduate computer-based classrooms.
• Emphasize interdisciplinary learning goals to a) help students understand relationships between courses and disciplines, and b) help ensure that their educational experience is integrated.
• Provide more effective and consistent training for teaching assistants.
• Work with CFTD and the CNS Personnel Committee to develop multimodal methods (beyond Student Response to Instruction SRTIs) for evaluating teaching effectiveness.

3. Research Experience and Opportunities

A. Goal: Expand the on-campus opportunities for students to develop and practice research-centered skills, professional practice, and habits of mind individually and in teams in order to achieve the following possible outcome:

• Improve and increase access to modern undergraduate teaching lab space including teaching facilities on and off campus that are available to all programs.
• Redesign curricula to provide authentic research experiences early in students’ training through lab courses or as lab components of courses.
• Develop a lab-fee style mechanism to support the cost of laboratory courses and ensure that they are sustainable.
• Offer introductory research methods training for students that will position them for advanced research and internships.
• Increase the number of students engaged in independent research.
• Provide some fiscal support for labs to cover the cost of students engaged in independent research.
B. Goal: Expand the off-campus opportunities for students to develop and practice research-centered skills, professional practice, and habits of mind in order to achieve the following possible outcomes:

- Provide guidance for the skills and abilities required to be competitive for an internship.
- Develop guidelines for assessing student performance in a for-credit internship.
- Produce a web-based how-to guide for applying to and securing an internship.
- Develop a clearing house where students can identify and be matched with internship opportunities.
- Establish a CNS alumni network to identify and establish internship opportunities specific for UMass Amherst students.

4. Effective Use of Resources

Goal: Explore ways to standardize the allocation of instructional resources to maximize the delivery of the best curricular experience for all CNS students by increasing student access to classes, reducing class size, and providing more and richer learning opportunities in order to achieve the following possible outcomes:

- Review teaching assistant (TA) workloads and expectations across the college.
- Review the allocation of TAs to courses.
- Review the teaching loads of instructors within and across disciplines.
- Identify courses with common learning objectives and work to increase efficiencies.
- Consider the fiscal cost and benefits gained from the unfunded General Education, Integrative Experience, and Junior Year Writing requirements.

5. Undergraduate Student Community and Cohesion

Goal: Expand the community of scholarship for CNS majors with their peers and CNS faculty in order to achieve the following possible outcomes:

- Bring students together to learn and share effective learning strategies.
- Expand the BIOS-type experience for STEM majors.
- Increase the number of Residential Academic Programs (RAPs) for first-year CNS majors.
- Strengthen the ties between faculty and student-run discipline-based clubs and groups.
- Increase number of college and department events with an undergraduate focus.
- Evaluate and improve as necessary the physical space that CNS majors identify as their departmental home.

6. Diversity and Recognizing the Needs of Special Student Populations

Goal: Explore ways to work with the CNS Director of Student Success and Diversity to meet the needs and increase the participation and success of select groups of STEM students in order to achieve the following possible outcomes:
• Increase the participation and persistence of women and URM in STEM majors.
• Increase the participation of URM students in BIOS-type experiences.
• Identify factors impacting the success of students transferring to the university as STEM majors and improve transfer-student success rates.
• Devise a sustainable approach for meeting the needs (e.g., small enrollment courses, capstone experiences, etc.) of increasing numbers of Commonwealth Honors College (CHC) students without compromising the education and experience of non-CHC students.
• Collaborate with campus partners to support international students and ensure their opportunities for success.

7. Advising

Goal: Explore ways to improve departmental advising in order to increase student success and progression through the major and provide early identification of students in trouble in order to achieve the following possible outcomes:

- Assess advising in the college to identify strengths and areas needed for improvement.
- Provide training for faculty and advisors so that they are aware of, have access to, and utilize student success data that will aid them in servicing students, especially underrepresented minorities, first generation, and international students.
- Provide training regarding SPIRE, UMETRX, the Student Success Collaborative, and the Office of Institutional Research.
- Provide information to advisors regarding resources on campus including Career Services, the Center for Counseling and Psychological Health, CMASS, the dean of students, and Disability Services.
- Provide mechanisms for the routine assessment and tracking of students at the department level.
- Improve department websites to provide a comprehensive consistent message to undergraduates and make them more informative by including FAQ pages, model pathways for advancement, etc.
- Develop and use continuation policies and the Student Success Collaborative for early identification of students unlikely to succeed in the major.
- Mandate the use and accuracy of Academic Requirements Reports by all departments.
- Mandate the use of SPIRE NOTES across all departments.
- Adopt measures to assess the quality of advising throughout the undergraduate experience.

8. Career Preparation

Goal: Explore ways to prepare students more effectively for careers after graduation in order to achieve the following possible outcomes:
• Create a dedicated career counselor to better serve students.
• Solicit and utilize insights from alumni, employers, and stakeholders.
• Strengthen connections with alumni and increase student access to networking.
• Improve and expand departmental web-based resources including how-to pages.
• Offer career seminars either at the department or college level.
• Provide stronger, more in-depth internship opportunities; better track the student experience.
• Create departmental guidelines regarding supervision and evaluation of students involved in internships and off campus experiences.
• Create more enterprise classes that simulate real-world professional experiences and professional practice.

9. Logistics and Administration

Goal: Explore ways to improve communication, clarity, and responsiveness of the administrative groups with departments and students in order to achieve the following possible outcome:

• Address anomalies in the general education system that negatively impact student progression and satisfaction.
• Discontinue the misleading pre-med and pre-dental major designations on the common application and at the university.
• Advocate for a greater degree of collaboration between CNS and the Scheduling and Registrar’s offices with the goal of achieving a seamless registration experience for students and departments.
• Advocate for a greater degree of collaboration between CNS departments and Enrollment Management and CHC to a) set guidelines and targets for enrollment of students most likely to succeed in STEM majors, especially the involuntary undeclared students, and b) ensure timely graduation, specifically with regard to availability of resource-intensive courses (e.g., laboratory courses, research laboratories for CHC thesis work, etc.).

CNS RESEARCH AND GRADUATE EDUCATION

1. Research

A primary mission of CNS is to drive the research engine of the flagship campus of the University of Massachusetts system. CNS’s research mission shapes our ability to offer the most important opportunity we provide to undergraduates: the ability to be actively engaged in research discoveries and learn science by doing science under the tutelage of world-class science faculty and graduate students. To this end, a major thrust of our strategic planning for undergraduate education is focused on broadening and deepening access to research experiences. Our success in securing external funding for research, when combined with careful attention to undergraduate educational needs, is the key to meeting
our goal of being nationally recognized as an R1 state university that specializes in offering direct research experiences to all science majors.

The college’s research discovery and research training mission has led us to hire faculty who are preeminent scientists with strong records of research mentorship of graduate students, post-doctoral fellows, and undergraduates. The college seeks to robustly support the research success of our faculty throughout their careers. This section provides a brief snapshot of the college’s record of research discovery (grant proposals and awards, patents, publications) and research training (graduate programs admissions, selectivity, and outcomes).

**Grants and Patents**

In 2014, CNS submitted 754 new proposals and was awarded 590 new grants. As seen in the chart below, over the past 15 years CNS has been annually responsible for about 60 percent of all new research proposal and awards coming to the UMass Amherst campus. CNS faculty obtained steady increases in research dollars as federal funding levels rose until the 2008 recession. Immediately after the recession, CNS faculty were able to take advantage of several years of stimulus funding, producing a noticeable bump in awards, which have now leveled off.

![15 Year Trends of New Research Award Dollars by College, 2000-2014](https://www.umass.edu/research/reports-0)

Note: Data from UMA VCRE annual reports, [http://www.umass.edu/research/reports-0](http://www.umass.edu/research/reports-0)

Although federal funding after the stimulus was substantially cut, it is encouraging that the recent FY2016 Budget proposed by President Obama includes a 5.2 percent budget increase for NSF (up $7.72 billion), a $1 billion increase for NIH, a 5.2 percent increase at the Department of Energy, and an 11 percent increase in funding for basic research at the Department of Agriculture, with increased monies for land grant universities. Fortunately, many of these increases specifically target new funding for areas that are particular strengths for CNS scientists, such as antibiotic-resistant bacteria, climate change, brain sciences, and food, energy, and water systems. It will be especially important in the future
for the college to aggressively support faculty in pursuing the best matches between CNS’s areas of research strength and federal, foundation, and industry funding priorities.

CNS faculty across 13 of our 18 departments and interdisciplinary graduate programs are more likely to be PIs of active research grants, garner more external research grants, and hold larger grant awards (12 of 18 programs) than their peers in the field (Academic Analytics data). CNS is responsible for three-quarters of UMass invention disclosures, patent filings, and issued patents.

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**Publications and National Awards**

The large majority of CNS faculty garner more national awards (13 of 18 CNS departments and graduate programs), publish more peer reviewed articles (11 of 18), and have more citations (12 of 18) than peers in their respective fields. This level of achievement and recognition is particularly notable when we consider that at least six of our graduate programs are below the median of their fields with respect to the number of faculty in their graduate programs (Academic Analytics data).

**CNS Research Development**

*College Grants Administration.* CNS now operates a central Research Support Services office that provides extensive grant application support to post-tenure faculty in a subset of departments and to all pre-tenure and extension faculty in the college. Faculty consistently applaud this service as a highly valued investment to increase their productivity. Recent reports by the Vice Chancellor for Research and Engagement (VCRE)’s office evaluating effectiveness of grant management staff across the university confirm that the staff in this office are remarkably efficient and effective in supporting faculty pre-award grant management. Nevertheless, we are not able to offer these important services to enough faculty at this time. Our goal is to increase staff in this office over the next two years in order to better meet the increasing needs of our faculty for research support. CNS also provides proposal submission-related travel grants to facilitate pre-tenure faculty visits with program officers at federal, foundation, and industry sites.

*Central Administration Collaborations.* CNS coordinates actively with the VCRE’s office through the participation in the Research Administrative Advisory Board, the Research Business Network, close collaboration with the Office of Research Development (e.g., working with Capital Edge Consultants to increase DOD funding within CNS and working on the I-CORPS initiative to increase industry-research partnerships), and Research Compliance. In the past two years, we have substantially increased our working partnerships with the Technology Transfer Office and with the UMass Innovation Institute. CNS faculty and the Dean’s office are working actively with the Office of International Programs’ initiatives for developing sustained faculty and student research and training exchanges with Indian universities.

*Neuroscience Strategic Planning.* In order to strategically target growth in an area of campus strength and in a priority area for federal, industry, and state funding, CNS oversaw a campus-wide Neuroscience Strategic Planning Task Force this year. Its report includes a plan for a new undergraduate major, strategic discussion of a UMass Neuroscience Institute, and enhanced collaboration of UMass Amherst neuroscientists with UMass Medical School and with the Institute for Applied Life Sciences (IALS).

*CNS Research Centers & Institutes.* CNS has 18 active research centers and institutes and is in various stages of supporting the development of an additional six new research centers and/or institutes in areas that are high priorities for future growth. Many of our existing centers are outstanding disciplinary research hubs, such as the Amherst Center for Fundamental Interactions (physics), but most are distinguished by their strong interdisciplinary mission (e.g., the Institute for Massachusetts Biofuel Research, the Center
for Research on Families, and the Clydesdale Center for Foods for Health and Wellness). New research center planning and/or development includes the Center for Data Science, the UMass Amherst Institute for Cybersecurity, the Center for Computational Social Science, the Center for Evolutionary Materials, the Cognitive Science Institute, and a possible UMass Neuroscience Institute.

*Institute for Applied Life Sciences (IALS).* The large majority of faculty involved in the three research centers within IALS are from CNS. The institute’s director, Peter Reinhart, is also actively involved in CNS’s Neuroscience Strategic Planning Task Force.

**CNS Faculty Development**

*Women in Science Initiative (WISI).* A network of coordinated programing focuses on increasing the success of women scientists at all stages of their academic careers. Although the numbers of women have increased in each CNS department over the years, issues of isolation and underrepresentation remain a challenge. CNS Women in Science programs provide women the chance to exchange ideas, strategies, and make connections with colleagues as well as provide training to CNS leadership (heads and chairs, the Deans’ office, and the personnel and search committees). Programs include: an annual college-wide lecture and day of consultation by a nationally renowned researcher on women in science; faculty peer mentoring networks for tenure track and lecturers that foster professional development; collaboration with the CNS Women’s Caucus, and development and on-going sponsorship of Graduate Women in STEM (GWIS).

*Faculty Equity and Inclusion.* This year CNS hired a director of Faculty Equity and Inclusion, Professor Nilanjana Dasgupta, who has overseen a college-wide climate survey with results to be presented in a workshop with CNS faculty and leadership this spring. CNS regularly provides college-wide search committee training focused on increasing diversity of hiring pools. The college is currently participating in the development of an NSF ADVANCE proposal to be submitted in fall 2015.

*Professional Development.* CNS provides a year-long seminar for all new heads and chairs during the first and second years of their leadership terms. All new faculty (tenure track, lecturers, and extension) participate in a year-long professional development seminar in the Dean’s office during their first year (New Faculty Dean’s Group). CNS collaborates with the Center for Teaching and Faculty Development to offer CNS-specific workshops in the tenure and promotion process, and is collaborating with the School of Social and Behavioral Sciences this year to develop a workshop on the process of moving from associate professor to full.

**Faculty Diversity**

Hiring, retaining, and nurturing the success of diverse faculty is an important goal for CNS. The demographics of CNS faculty should reflect the scientific talent pool in the nation. Having a diverse faculty also affects the next generation of scientists-in-training. Social science research clearly shows that hiring and retaining excellent faculty who are members of underrepresented groups has a significant positive impact on the students they teach and mentor. When students of color see successful scientists from their racial/ethnic group
in the classroom, such exposure enhances their academic motivation, persistence, and pursuit of scientific majors and careers. Thus, **hiring and retaining a diverse faculty** helps to broaden the participation of underrepresented students in science and grow the next generation of scientists, which is vital for American economic competitiveness in this century. Indeed, much of the future job growth in the U.S. is projected to be in science, technology, engineering, and mathematics (STEM).

![Percent women faculty in 2013-2014: UMass campus total and CNS](chart)

Although the relative percent of URM faculty in CNS is just slightly lower the percentage in the university as a whole, there are striking deficits in the racial/ethnic diversity of our science faculty across disciplines.

![Percent minority faculty in 2013-14: UMass campus total and CNS](chart)
As of today, CNS has proportionally fewer female and minority faculty than does the UMA campus as a whole. The relative lack of diversity within CNS is most dramatic with respect to the underrepresentation of women in the physical sciences and Earth Sciences, although underrepresentation of women in the Biological and Behavioral Sciences is serious in all but two of our departments (PBS, Vet & Animal Sciences).

| CNS initiatives to increase the recruitment of women and minorities |

Given the low numbers of women and URM faculty in CNS departments, the college has made enhancing diversity a priority. This is reflected in several initiatives.

1. **Hiring initiatives**: We have hired a Director of Faculty Equity & Inclusion (Dr. Nilanjana Dasgupta, Professor of Psychological and Brain Sciences) who is responsible for developing evidence-based programs to increase recruitment, hiring, retention, and success of a more diverse faculty and also tracking faculty inequities within departments. We have also hired a Director of Student Success and Diversity (Charlana Simmons) whose focus is on undergraduate programming for the recruitment and retention of diverse students in CNS majors.

2. **CNS Women in Science initiative (WISI)**: Begun in 2012, WISI seeks to create opportunities for women faculty, postdocs, and students in the sciences to connect with one another. Our activities include an annual speaker series which brings in a prominent scientist to campus every year who has been involved in institutional initiatives and/or research on gender equity in academic science. The visitor gives a public lecture and spends the day meeting and consulting with CNS leadership,
faculty, graduate students and postdocs, and undergraduates. A second activity involves connecting faculty across CNS departments to peer mentoring groups. These informal mentoring networks foster collegiality, learning, and provide mutual advice on career-related challenges in academic science. These mentoring groups have been active for the past two years.

3. **CNS Faculty survey:** Is a new data-driven initiative to assess faculty job satisfaction, transparency of decision-making in CNS departments, and department culture. Our goal is to use these data to understand the strengths of CNS departments as well as to target and address problems in a proactive way. Data from this survey will be the basis for faculty training workshops for search committees, department personnel committees, and heads and chairs in CNS.

4. **Graduate Women in Science (GWIS).** Since 2012, CNS has been funding a graduate student women’s organization that provides professional development opportunities, mentoring lunches with faculty, and provides peer-to-peer advice on career-related challenges in science.

![Percent White, Asian, and URM faculty by CNS Department: 2014](image)

**Faculty Hiring**

In the past few years, CNS has strategically invested more resources into centrally supporting the development of research and faculty success. Maintaining the strength and building the diversity of CNS faculty and graduate programs is critical for advancing the university’s research mission. One of the largest challenges we face is rising start-up costs for science faculty. Although hiring was slowed during the past two years, start-up costs have dramatically accelerated with recent hires.
2. Graduate and Postdoctoral Training

CNS provides nearly half of all comprehensive training in graduate programs at the university. The college offers 21 PhD programs, 21 masters of science, and seven graduate student training, professional, and/or certificate opportunities.

Below is a simple overview of the size and activity of CNS graduate programs in 2013:

- CNS received 46 percent of UMass Amherst’s doctoral student applications (2,110 of 4,555 total applications to university programs)
- CNS awarded 47 percent of UMass Amherst’s doctoral degrees (134 of 288 total doctoral degrees)
- CNS received 19 percent of UMass Amherst’s master’s degree program student applications (948 of 5,028 total applications to university programs)
- CNS awarded 14 percent of UMass Amherst’s master’s degrees (88 of 631 total degrees)

The look-in-the-mirror department reports provide specific information relative to each discipline and an excellent foundation for our spring strategic planning. CNS department reports highlight such strengths as:

- High quality of students, actively publishing and presenting research;
- Student access to renowned and productive faculty in their fields;
- Selective admissions, which promote quality in graduate programs and strong enrollment yield;
- Courses of study ranked competitively among peer programs;
- Improved efforts to attract and retain a diverse student body across disciplines with excellent results in several departments.
**Effectiveness, Advancement, and Preparation**

CNS students complete their program sooner on average than their UMass Amherst counterparts. For the 2007/2008 doctoral cohort, 45 percent had completed their degrees in less than six years (compared to 35 percent for the campus as a whole). For masters degree students, 61 percent of the 2011/2012 cohort had completed their degrees in less than two years, and 81 percent had completed their degrees in less than four years. This performance is comparable to the campus average.

CNS departments described prioritizing and instituting improvements in areas of advising, mentoring, and overall graduate preparedness:

- High standards for degree requirements;
- Demonstrated student success in obtaining national fellowship and outside funding;
- Departments offer program specific innovations;
  - (e.g., lab rotations, travel funding, mentorship activities, collaborative programming with other disciplines/departments, team advising, increasing professional development seminars, roundtables with alumni)
- Departments have developed creative programming to prepare students for the future of particular fields;
  - (e.g., professional masters programs such as in applied molecular biotechnology, which is specifically designed for preparation for industry; a fifth year master’s degree program offered by Biochemistry and Molecular Biology to enhance the B.S. level student; and a professional master’s program in environmental and other interdisciplinary graduate programs)
- Many opportunities for graduate students to teach, providing training as well as a service;
- Student’s experience of their program is generally positive;
  - (e.g., the 2013 doctoral program student survey students indicated that they would choose UMass Amherst again; other areas indicate a need for improvement, which departments are addressing)
- Collegial atmosphere in programs among students, faculty, and staff;
  - (“Our program has a strong sense of community, both socially and scholarly, such that students cherish their participation in the program and become strong advocates of the program after finishing their degree.”)
- Students completing their studies find highly regarded and successful placements following graduation;
  - (“Our students find good positions in industry, R&D, and at strong academic institutions where there is demand in the field.”)
- Overall student experience ratings reveals strong satisfaction with faculty guidance and overall educational experience in several departments (the Stockbridge School and the departments of Biology, Geosciences, Food Science, and Polymer Science and Engineering) some other areas rank lower (Astronomy, Mathematics and Statistics), and others indicate average experiences (Psychological and Brain Sciences, Computer Science).
CNS recognizes the tremendous financial challenges and escalating costs required to provide the highest possible quality of education for our students. We are committed to working creatively and wisely within those constraints. With the goal of attracting and serving the top students in excellent programs, our central weaknesses include:

- A need for increasing tenure track faculty with specific areas of research in order to improve programs, offer more graduate courses, and attract students;
- Insufficient laboratory facilities;
- Weaker graduate student recruitment compared to stronger schools, with low stipends and lack of fellowships indicated as contributing factors;
- High teaching loads for faculty, which jeopardizes research activity;
- Lack of funding for TA positions to meet teaching demand;
- Need for more faculty in smaller departments struggling with critical mass and breadth of offering.

**Postdoctoral Fellows**
CNS contains the largest number of post-doctoral fellows on campus. In recognition of the need to provide greater institutional support to post-doctoral fellows, CNS has been instrumental in supporting the development of a highly active post-doctoral organization for the life sciences, and works with the Graduate School to develop procedures for the post-doctoral fellows’ Individual Development Plans.

**Diversity in the Graduate Student Body**
CNS faces significant challenges in recruiting a sufficiently diverse graduate student body. The percentages of graduate student enrollment of ALANA students, of students from underrepresented minority groups, and of women students is lower in CNS than in UMass Amherst as a whole. Increasing college-wide supports for improving recruitment strategies for women and URM graduate students is a high priority, as is examining possibilities for increasing graduate stipends.
Graduate Women in STEM (GWIS). In 2012, CNS brought together its women graduate students to discuss whether a graduate organization focused on issues of interest to
graduate women in science would be useful. Based on a subsequent proposal from graduate students, CNS approved funding for the group and reached out to the Graduate School and College of Engineering to match funding. The GWIS blog includes events, activities of interest, and summaries of GWIS’ many initiatives. 
http://blogs.umass.edu/gwis/

NIH Training Grant for URM Biomedical and Behavioral Science Graduate Students. Two CNS faculty are principal investigators on Initiative for Maximizing Student Development, an NIH grant ($2,441,801 from 2012-17) that funds training for underrepresented minority graduate students in the biomedical and behavioral sciences. Through the grant, STEM faculty also receive increased training in mentoring minority students.

CNS Science Outreach & Public Engagement

STEM Education. CNS seeks to contribute to the longer-term solutions to the current lack of diversity in the sciences by building programs that improve scientific education for women and URM students at all stages of the educational pipeline. The college and its faculty support a variety of STEM education programs serving students from URM groups at UMass and in off-campus communities, with a particular emphasis on Springfield and Holyoke. Examples include:

Eureka! Starting in the summer of 2013, CNS partnered with Girls Inc. of Holyoke to bring the Eureka! program to campus. The nationally recognized program is designed to engage girls ages 12 to 18 in exploring the STEM fields. The program provides access to college campuses and academic STEM experts who act as program facilitators and coaches as the girls continue through high school. More than 60 CNS faculty and graduate students volunteered to offer four weeks of STEM classes for Eureka! student scholars from Holyoke that first summer. The program has continued during the current academic year with a variety of events. This is a five-year commitment and we anticipate 60 students will be part of the program in summer 2015. This video provides a strong overview.
http://youtu.be/nOx5Ewl4bWQ?list=PL8D5909B848026D11

Graduate Students for Diversity in Science and Engineering. CNS URM graduate students founded this organization, with support from faculty and the college, to promote diversity in STEM fields, to create a nation-wide support network, and to facilitate a pipeline of talent for careers in academia, industry, and beyond for URM students at UMass Amherst.

Public Engagement in Science Discovery. The Public Engagement Project (PEP) supports faculty who want to use their research to contribute to social change, inform public policy, and enrich public debate. PEP was founded on the principle that public engagement is an important factor to the UMass Amherst land-grant mission, and that learning the skills for public engagement is a vital component of faculty development. From its inception, CNS has provided support from PEP’s inception to help it grow into a campus-wide initiative and an integrated, self-sustaining resource. PEP activities and workshops have been offered to
train faculty members to use their research to inform public policy and enrich public debate. In 2015, PEP launched a pilot Public Engagement Faculty Fellowship program, an initiative made possible by support from CNS and SBS.
APPENDIX: UNDERGRADUATE ENROLLMENT TRENDS BY DEPARTMENT
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