CNS LEADS

A Proposal for Enhancing Student Success and Retention across the College of Natural Sciences

The College of Natural Sciences 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. Undergraduate enrollment for Spring 2016 including both primary and secondary majors is 6,900. Notable growth has recently occurred in Biochemistry and Molecular Biology; Biology; Mathematics and Statistics as well as students with an interest in Pre/Med and Pre/Health. Our two largest departments are Psychological and Brain Science - currently has 1,600 students and Biology - currently has 1,215 students. This growth at the undergraduate level reflects the importance of STEM disciplines nationally. 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 students.

Universities and colleges across the nation are increasingly focused on creating programs to increase student retention and to increase the four and six-year graduation rates (nationally the six-year graduation rate for four-year colleges and universities is 56%). The four-year graduation rate for CNS 2008 entering student cohort was 61.6% and the six-year graduation rate was 75.9% (compared to 56% nationally). While we are above the national average, CNS can and will do better. As the flagship university of the Commonwealth of Massachusetts we are committed to our students and their excellence. The following strategy is the CNS recommendation for supporting and enhancing student success and increasing retention rates.

The following strategy is modeled after the high impact advising strategies from the University Innovation Alliance that is a collaborative between 11 research 1 universities (see attached, resources for link), Federal Title III Strengthening Institutions Grant projects, and the "Finish in 4" strategy in implementation at SUNY Buffalo.

Program Components

Student Success Advisors

Team of Student Success Advisors

The hiring of Student Success Advisors will provide intrusive and proactive academic advising services to students in each of the major academic areas [e.g. the School of Earth and Sustainability, the lower division of the life sciences, and the physical sciences programs (Mathematics, Physics, Geosciences, and Astronomy)]. Their role is to enhance and support student success initiatives.

The program would be centralized in the CNS Advising office and the advisors would be assigned to academic programs. The advisors would receive specialized training on advising strategies based on NACADA's advising philosophy and best practices, utilization of Student Success Collaborative, and the creation and implementation of an early alert process. Implementing mandated advising across the college will ensure that every student is accounted for and no student is left behind.

These advisors would be matched with the Chief Undergraduate Advisors to work within the current departmental advising structure to provide an additional level of support to students who have been identified as at risk as well as provide academic advising services. All students would be required to meet with an academic advisor twice/academic year. Exploratory track students, transfer students, underrepresented minorities, first generation, and Pell-eligible students, and students in academic jeopardy will receive additional attention.

Student Success Advisors will be responsible for working alongside the faculty and professional academic advisors to identify students at risk in specific predictor courses. Faculty advisors would also refer students who they have identified as at-risk (receiving low test scores, not attending classes, change in affect/behavior). Students identified in this process will receive additional support and coaching for success. Recommendation from data and advising best practices shows required academic advising check ins (even just once a year) will increase retention and student satisfaction.

The Student Success Advisors will also provide standardized academic advising services. Student Success Advisors will introduce themselves in all of the Nat-Sci 191 Seminars to begin to build relationships with students. They will handle the probation advising for their assigned academic programs. They will require that all students in academic jeopardy participate in a 'success seminar". They will use the Student Success Collaborative to build campaigns to reach out to the "murky middle" in their programs. They will enhance and facilitate current student success workshops, and create a structured student success program for students on probation, and those identified by their faculty as "at risk". Finally, they will implement a CNS Student Leadership Fellows Program targeting URM's, Pell eligible, first generation, international students.

Career Advising

Center for Career Advising and Professional Development

The College of Natural Sciences has no career or professional development advising for nearly seven thousand students. The creation of Center for Career Advising and Professional Development will bring creative advising services to these students. The Center's advisors will develop a 1-credit career seminar (limited to 19 students) for CNS sophomores. The Center's advisors work with academic departments to enhance their web pages to create a careers page for each academic department to

help students see the bridge from studying a field to working in the field. The Center's advisors will develop and enhance the internship database. The Center's advisors will create and facilitate workshops on how to find the right science major, career planning and assessment (using MassCIS and FOCUS II and other career center tools), resume writing, interviewing skills etc. They will also partner with the Alumni and the CNS Development Office to establish mentoring relationships between our students and alumni. CNS will continue to lead in implementation of the Evisors program.

The Center for Career Advising and Professional Development will be particularly helpful in guiding exploratory track students, freshmen with declared major, and transfer students to learn about the links between majors and potential career pathways. This will have the advantage of helping exploratory track students find their pathway sooner. Students with declared majors can also explore if their major is right for them and beginning to make links with career possibilities sooner. An early project of the center will be to develop the Early Pathway Career Advising Tool described below.

Early Pathway Career Advising Tool

The early pathway career advising tool will be an "interactive flowchart" that presents a series of screens, each with three images to choose from, and a "next" button/arrow at the bottom of the screen. The first screen begins with fairly broad categories and when they click on the image for the particular "flavor" that most appeals to them out of the three images and hit "next", it brings them to another set of three choices, narrowed down slightly, but all within to the broad domain they had picked on the initial screen. As they mouse-over the image, a box shows some further information, and again when they click on the image that's most interesting to them, it takes them to the next screen (and so on), and by the third or fourth screen they're seeing visually a variety of careers related to the set of 'flowchart" choices they've made up to that point. Each career area has a concise descriptions/explanation, and clicking on one these careers (maybe selecting checkboxes for 3 or 4 of them?) then shows the particular UMass undergraduate majors that would best lead them to that career path. This tool will initially developed for the School of Earth and Sustainability and the Lower Division of the Life Sciences. It will then be expanded to our academic areas.

It is anticipated that this tool will allow exploratory track students to more quickly identify and select a major. It should also lead to an increase in first year retention.

Pre-med / Pre-health Advising

Predictive Analytics and Success Coach

In the face of growing student populations and limited advising resources, progressive institutions like UMass have begun to leverage the large data sets already present in our student information systems to inform student decisions about courses and majors. While currently in its nascent stage, predictive advising

resources that leverage historical data to guide the decisions of current students are likely to become more commonplace in the next several years. However, pre-health advisors across the country have not yet leveraged this type of data to create predictive models for student success. Additionally, a significant percentage of UMass Amherst students who get interviews to medical and dental schools do poorly in those interviews, effectively costing them an acceptance into these programs. Working with students specifically to help them develop stronger skills in this area is another crucial, yet unmet need. Attention to this aspect of the application process could significantly improve the acceptance rate for our students.

The Predictive Analytics Advisor will be responsible for the acquisition and analysis of big data from *American Medical College Application Service (AMCAS),* Spire and the Student Success Collaborative (SSC). The goal is to identify areas of weakness and success trends and leverage that information to improve the success of all pre-health students. Essentially the new advisor will systematically identify success markers for pre-health students, which we will use in both group and individual advising sessions to effectively guide students in becoming more competitive applicants. We predict that this type of systematic predictive analysis can improve pre-health advising and student success.

Together, the advising team would then be able to develop a "Pre-Health student success campaign" that focus on targeted interventions to improve retention and graduation rates in at-risk groups of pre-health students. Once at risk students have been identified through data analytics, we would create a process of developing goals for communication strategies to engage students in one-on-one advising, and use of metrics to assess success and achieving set goals. We anticipate that this type of predictive model could then be mapped to other departments on campus. In addition to predictive analytics, the new pre-health advisor will also have the responsibility of developing and administering mock interview workshops for our students who are in the process of applying to health professions schools.

Early Alert System

Implement an Early Alert System

CNS will develop the infrastructure to sustain a college-wide early alert system, with the plan to have one fully implemented within 3 years. First, it is necessary to build the advising infrastructure to sustain an early alert system. Currently there is a need for early alert system but CNS does not have the advisor capacity to support these students once an alert is raised. It should be noted that while the student Success Collaborative is a valuable tool, it does not provide real time data, it provides alerts after the grades are posted. An early alert works as the academic downslide begins to occur in real time during the semester. An early alert system will rely on the student success advisor described above. In year 1, these advisors would be trained and begin building relationships with faculty/departments and the students. A natural early alert will automatically happen through this process as the faculty and advisors create rapport. In year 2, more students will begin to be referred to the

advisors as word gets out that there is an academic advisor assigned to provide direct advising services. In years 3 and 4 it will be necessary to utilize software to help management the traffic and caseloads.

International Students

Meeting the Needs of our International Students:

The university has in recent years increased the enrollment of international students and continues to do so. These students come to UMass as a destination of choice to receive excellent training – particularly in the sciences - and they enrich the UMass culture with their perspectives and range of experience. These are talented and ambitious students, but they face challenges in adjusting to college above and beyond those faced by domestic students. To help these students adjust and excel, we propose offering one-credit, first year seminars developed specifically for international students who have never before studied in the United States. The seminars will focus primarily on helping these students understand and utilize the many resources on and around campus to support their success and to understand and thrive in the US academic culture. Advanced undergraduate TA/mentors will work with small groups of students to help these students connect to the university community and to answer questions of all sorts – from how to use a syllabus and prepare for exams to what is the Superbowl and where is Antonio's Pizza? Research suggests that these seminars are most successful when they include a community engagement component. We will work with Civic Engagement and Service Learning (CESL) to most effectively develop a service-learning component for the seminar. There are many service opportunities that would help international students become a part of the broader UMass community more quickly and effectively.

Peer Advising

College-wide Support for Peer Advising

Contemporary students seek advice about more and more questions and are accustomed to receiving information from many sources, not least their peers. Well-trained peer advisors can enrich the overall advising system. Pockets of peer advisors already exist within CNS (e.g., Psychological & Brain Sciences, and Biochemistry & Molecular Biology), but there is an underutilized opportunity to enrich advising resources by training more students to assist in advising one another. There is no substitute for well-trained professional and faculty advisors, but students can help to handle some of the more straight forward advising tasks such as assisting with registration, reviewing basic requirements, helping students understand and use campus resources, and so on. Reducing this burden on faculty/staff advisors can free up resources for advisors to assist students with more complex and/or sensitive advising needs.

We propose to develop a college-based peer advisor system. CNS peer advisors will be trained through CNS and complete a 1-credit seminar prior to serving as a peer advisor. As part of an overall CNS Student Success Center, these students will provide a quality service to their peers in directing them to appropriate resources. We will work closely with the departments that are already utilizing peer advisors. Departments will also be able to refer departmentally-based peer advisors to the CNS training course for additional

preparation. Peer advisors fill an important niche as a first "layer" of advising and have a unique credibility with their peers.

Community College

Additional Attention

CNS will create an advising support system for community college transfer students with a focus on URM's, first generation and Pell Grant students. We will reach out to community college students, faculty and transfer counselors via Community College Day where faculty and students are invited to campus. We will continue to support the STEM Starter Academy Program. Given that transfer students sometimes have a difficulty transitioning to campus we will mandate advising for all new transfer students utilizing the student success advisors.

Life Science Academic and Career Advising Initiative

Supporting the Needs of Lower Division Life Science Students

The CNS Life Science Academic and Career Advising Initiative will improve the quality and efficacy of academic and career advising for undergraduate life science majors, resulting in increased academic success, seamless progression into majors, and confident initiation of career paths. This advising initiative will integrate with the ongoing effort to improve access to and cohesion of the first and second year life science curriculum.

Target Advising Outcomes

Students will progress through a coherent, coordinated advising infrastructure that will:

- Improve academic success for students in the introductory life science curriculum
- Guide students in identifying interests and facilitate early selection of a suitable major
- Improve and increase student access to and participation in academic and career advising
- Acquaint students with available university resources
- Improve student satisfaction with advising
- Build a sense of community among students, peer mentors, advisors and faculty
- Help students build an academic and experiential portfolio to ensure their career success.
- Connect life science undergraduates with internship and research opportunities

Professional advisors will advise students for degree requirements for graduation and career development. Our goal is to achieve a student to advisor ratio of not more than 350:1. The current advising resources fall short of providing the needed support for meeting with life science students to guide them effectively through the life science curricula, facilitating the identification and transfer of students into appropriate life science majors, and

maintaining their effective progress towards a degree. Importantly, the professional advising staff will serve as the connection between the students and faculty, in which the students are accountable to a professional advisor who works with faculty to ensure that the progress of all students is accounted for. In addition, science advising is undergoing a paradigm shift toward effective career preparation to help place the many students that come into the life sciences with uncertain or unrealistic career goals, such as attending medical school, and then need to develop alternative plans in a timely way. Coordination of academic and career advising staff in concert with restructuring and coordination of the introductory life science curriculum will provide much needed support to students in choosing their academic paths toward careers in life sciences as well as increased graduation rates and job placement of our graduates.

An internship coordinator will be responsible for developing, arranging, and coordinating internship opportunities for life science majors, including helping the students prepare competitive applications and develop career networking skills. These work opportunities will be paid or for credit towards the major and generally will be 1 semester in length in fall and spring or for the summer. The coordinators will contact potential employers to design the experiences and will develop a system to assign students to appropriate experiences. They will also obtain evaluations from the employers for the purpose of assigning credit to the students.

Career and At-Risk Advising in Psychology

Meeting High Volume Demand

A professional advisor's primary focus would be to create a more systematic program for guiding our majors through career exploration during their four years at UMASS. This advisor would develop seminars (at the freshman and junior level), workshops, and individual advising opportunities that would engage majors both: 1) early in their academic careers so that students would take advantage of appropriate career-exploratory opportunities (e.g. internships, research assistantships, course specialization) AND 2) at the mid-end of their academic careers to assist with graduate school and or job planning.

Data-Driven Mentoring of At-Risk Students

The advisor's primary focus would be to use the SSC database to identify at-risk students in the psychology major and provide support for these students (both academically and socially). This advisor would develop programs to aid this process including a Peer-Mentoring program which would match at-risk students with upper-level majors to help them navigate the major and its opportunities; and a Peer Tutoring Program which would provide all majors with tutoring for specific psychology courses by trained upper-class majors who were identified for their academic strengths.

Undergraduate Professional Development in Mathematics and Statistics

Linking Career Advising to Alumni Relations

A professional advisor would support and manage ongoing operations and new initiatives in the areas of Career Advising, Continuing and Professional Education, and Alumni Relations. These areas are interconnected and build on each other. For example, stronger relationships with successful alumni will enable to department to develop internship opportunities and improve career advising for undergraduates. Stronger relationships with industry partners will aid and inform the development of online career-building courses in mathematical sciences offered through Continuing and Professional Education for current teachers, actuaries, analysts and programmers. For example, Mass Mutual has always been a strong supporter of our Actuarial Program.

A professional advisor will work to develop relationships between faculty, alumni, and industry employers that will enable the department to upgrade the quality of its career advising services and improve the undergraduate experience for its majors. The person in this position will develop a departmental alumni relations program, including a web interface and a database of alumni mail and email addresses. The career advisor and alumni relations manager will use the alumni relations program to build relationships for the department with current employers of alumni and prospective employers looking for individuals trained in the mathematical sciences. The career advisor and alumni relations manager will also develop internship opportunities for undergraduates and host career nights where alumni return to inform current undergraduates about their work experiences and offer advice about career choices.

There is a strong market for offering numerous additional Mathematics and Statistics classes on-line. These include 500-level graduate courses among professionals in data science careers who would benefit from online courses in mathematical and statistical software packages such as R and MATLAB. Another strong niche is training at all levels for the actuarial sciences: here there is particularly strong synergy in having a single person coordinate both on-line offerings and alumni relations. We have also had requests over several years for on-line courses for in-service as well as p[re-service K-12 teachers, and a significant opportunity exists for developing hybrid classes of this type in collaboration with the UMass Springfield center. As the Career Advisor and Alumni Relations manager develops a network of alumni and employers, s/he can explore the market for all such courses and coordinate the resources needed to provide administrative support for such online courses, generating significant additional annual CPE resources as well as significantly enhancing our alumni development efforts and student career placements.

Appendix 1: Original Advising Allocation Request

1. Professional Advisors [$520,000]

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 students. In order to do this and to ensure that all CNS students are provided with excellent advising during their college career, we are requesting to hire ten professional advisors. This will reduce the student to advisor ratio from 700 to 1 down to 350 to 1. These professional advisors will be the front line for students – assisting them in understanding major requirements and university polices. Faculty will continue to mentor students and will focus on providing important guidance to the students, including the pursuit of advances degrees and other career opportunities.

2. Departmental Websites [$60,000]

Our department websites are the most visible and significant recruitment tool for attracting top-notch faculty and graduate students. Currently, four CNS departments have Websites created in Drupal 6, a version that stopped being supported by the Drupal community in March 2016. This means that Drupal 6 sites will no longer receive security updates. Additionally, UMass IT will no longer host Drupal 6 sites. Therefore, it's imperative to upgrade the department sites currently in Drupal 6: Biochemistry & Molecular Biology, Biology, Physics, and Veterinary & Animal Sciences.

The upgrade will ensure the following: conversion of the Websites to a supported version of Drupal; reformatted to a mobile friendly design so that they are easily accessible on tablets and smart phones; redesigned to take advantage of new functionality and technological advances.

3. Pre-medical and pre-health advising [$52,000]

The PreMed/PreHealth office currently serves 1100 students. The staff consists of one faculty advisor and one professional advisor. Funds are requested to add one additional professional advisor.

4. Career Advising [$104,000]

CNS must hire two full time career counselors to meet the increased needs of students. Given the undergraduate enrollment in the college it is essential that we have a career center to assist students in career development and experiential learning. Students need help in developing professional skills in order to be prepared to pursue internships, coops, and employment opportunities. The career advising needs of undergraduate students in the sciences are very similar to the needs of students in engineering and business. And yet there is no dedicated career advising or internship placement for the nearly 7000 CNS students. This investment would provide two career advisors.

Appendix 2: Resources / Evidence Based Practices

University Innovation Alliance: http://www.theuia.org/#home

> "The University Innovation Alliance is a coalition of eleven public research universities spanning the geographic, economic and social diversity of our country. We are committed to making quality college degrees accessible to a diverse body of students and consider this commitment a defining element of our public mission.
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> Because UIA member institutions serve large numbers of first generation, low-income students, we are at the forefront of America's efforts to regain its educational edge and increase economic opportunity and mobility. Many of our universities have been recognized for aggressively driving innovations to serve more students with quality programs at sustainable cost. Now, we are going to work together to leverage our strengths and maximize our impact." (University Innovation Alliance, 2016)

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