

Exploration of Recruitment and
Retention in the
College of Natural Science
at
Michigan State University

Report Submitted to
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by the
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August 2012

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Preface

Michigan State University (MSU) College of Natural Science's Council on Diversity and Community focused throughout the 2011-2012 academic year on improving recruitment and retention of underrepresented minority students to graduate studies within the College of Natural Science (CNS). This document contains the findings and recommendations for action stemming from this work. Of particular importance are the findings on the current state of student retention within CNS and identification of the factors which most increase the likelihood of success for programs endeavoring to make a positive change in this area. This report concludes by presenting three key recommendations along with secondary suggestions and a list of resources and data supporting the conclusions.

A. Current State of Recruitment and Retention at MSU

Undergraduate Student Enrollment and Attrition

A growing trend nationwide to base future state funding for higher education on graduation rates and using comparisons across peer institutions is resulting in an intense focus by MSU on what can be done to improve its undergraduate student retention and graduation. Special attention is being paid to various at-risk populations, including underrepresented minority (URM) students. A recent publication (Lynch & Engle, 2010) listed MSU as one of the top 25 public universities with the largest White/Black student graduation rate gaps, with a White graduation rate of 78.4% and a Black graduation rate of 55.8% (22.6% gap). At MSU, student organizations such as the Black Student Alliance are calling for the administration to take action to reduce this gap (Black Student Alliance, 2011; Miller, 2012).

As one of the core colleges at MSU, CNS is taking a close look at its own retention and graduation rates. Of particular interest for this document on increasing graduate student diversity is the CNS retention and graduation of its URM students. Ultimately, this affects the “pipeline” of diverse students who are prepared to enter our graduate programs. Some of the recent findings for CNS freshmen are:

- The 6 year graduation rate with a CNS degree for Whites is 40% and Blacks is 21% – this is a 19% gap (See Appendix A).

- The 6 year graduation rate with a CNS degree for non-URM (White & Asian/PI) is 41% and URM (Black, Hispanic, American Indian, Multiple Ethnicities) is 23% - this is an 18% gap (See Appendix A).
- 55% of URM have low math placement and only 2.6% of URM low math placers graduate within 6 years (See Appendix B).
- Retention to the Junior year in a CNS major for Whites is 47% and Blacks is 37% (See Appendix C).
- Retention to the Junior year in a CNS major for non-URM is 48% and URM is 38% (See Appendix C).

These data underscore the importance of increasing the retention and graduation rates of all CNS students, in particular decreasing the graduation gap between our non-URM and URM students.

Graduate Student Enrollment and Attrition

CNS collects information on gender, citizenship and race/ethnicity for graduate school enrollment. Every year, department or individual programs report data on the first time enrollment and median time until degree enrollment for each degree and demographic category. Additionally, each department or program reports the number of students entering, leaving, and completing programs with data for the number of years spent completing the degree. Table 1 lists the departments and programs that provided reports on graduate student enrollment and attrition.

Table 1. Graduate Programs in CNS

| Biological Sciences | Physical Sciences |
|--|--|
| <ul style="list-style-type: none"> • Biomedical Laboratory Diagnostics (BLD) (Master's Only) • Biochemistry and Molecular Biology (BMB) • Microbiology and Molecular Genetics (MMG) • Plant Biology (PLB) • Physiology (PSL) • Zoology (ZOL) | <ul style="list-style-type: none"> • Chemistry (CEM) • Geological Sciences (GLG) • Mathematics (MTH) • Physics (PHY) • Statistics and Probability (STT) |

An analysis of gender, ethnicity and degree completion was conducted using departmental reports generated in 2011 that contained historical data dating back to 2006. The format of the reports do not allow for tracking of individual graduate students through the program. Therefore, to evaluate attrition for Master's and Doctoral programs, we compared the total count of entering students and leaving students for the biological and physical sciences, separately. Based on this information, a brief analysis of diversity and attrition is presented below.

Gender

Enrollment counts for females and males between 2006 and 2009 were totaled and compared. More females enrolled in biological science graduate programs than males. For Master's programs, 48 males and 85 females entered programs during the time period. During the same time period, 18 males and 14 females left programs without a degree. More than twice as many males left biological science Master's programs than females (37.5% versus 16.5%, respectively). For Doctoral programs, 92 males and 148 females entered programs while 12 males and 13 females left without a degree. More males were found to have left Doctoral programs than females (13% versus 8.8%, respectively).

The same analysis was performed on the physical science programs between 2006 and 2009. More males are enrolled in physical sciences graduate degree programs than females. Across the physical sciences, 234 males and 155 females started Master's programs, while 24 males and 13 females left programs without degrees. There was not a significant difference between rates of attrition for males and females enrolled in physical science Master's programs (10.3% versus 8.4%, respectively). Nearly twice as many males as females enrolled in physical science Doctoral programs ($n_{\text{male}}=294$, $n_{\text{female}}=151$), while 91 males and 39 females left these programs without degrees. The attrition rates were comparable, with 30.1% of males and 25.8% of females leaving without degrees.

In summary, there are substantial gender differences in enrollment numbers for the biological sciences and physical sciences in CNS. More female students enroll in biological sciences while more male students enroll in physical sciences. The male attrition rates for the biological sciences Master's programs are substantially larger than female attrition rates. Attrition rates are not substantially different for males and females in biological sciences Doctoral programs. Interestingly, the attrition rates of females in the physical sciences are slightly lower than male attrition rates for both Master's and Doctoral programs.

Ethnicity

Enrollment counts and degrees awarded for the biological and physical science programs are reported from 2006 to 2010 for Caucasian, Black, Hispanic, American Indian/Alaska Native, Asian/Pacific Islander, Native Hawaiian/Pacific Islander, Asian, Multi-ethnic and Unknown categories (Tables 2 and 3). Overall, students enrolled in the graduate programs in CNS are

predominantly Caucasian. Enrollment numbers for ethnic and racial minorities are too low to allow for generalization about attrition rates.

Table 2. Total number of graduate students enrolled in Biological Science programs by ethnicity/race

| Ethnicity | New Enrollments | | Degrees Awarded | |
|----------------------------------|-----------------|----------------|-----------------|----------------|
| | MS Programs | Ph.D. Programs | MS Programs | Ph.D. Programs |
| Caucasian | 114 | 113 | 75 | 81 |
| Black | 4 | 3 | 0 | 1 |
| Hispanic | 6 | 4 | 7 | 2 |
| American Indian/Alaska Native | 0 | 0 | 0 | 0 |
| Asian/Pacific Islander | 3 | 0 | 2 | 0 |
| Native Hawaiian/Pacific Islander | 0 | 0 | 0 | 0 |
| Asian | 2 | 8 | 0 | 0 |
| Multi-ethnic | 1 | 4 | 1 | 1 |
| Other | 5 | 6 | 1 | 9 |

Table 3. Total number of graduate students enrolled in Physical Science programs by ethnicity/race

| Ethnicity | New Enrollments | | Degrees Awarded | |
|----------------------------------|-----------------|----------------|-----------------|----------------|
| | MS Programs | Ph.D. Programs | MS Programs | Ph.D. Programs |
| Caucasian | 144 | 208 | 143 | 99 |
| Black | 4 | 4 | 1 | 1 |
| Hispanic | 6 | 9 | 7 | 4 |
| American Indian/Alaska Native | 2 | 0 | 0 | 1 |
| Asian/Pacific Islander | 3 | 4 | 8 | 5 |
| Native Hawaiian/Pacific Islander | 0 | 0 | 0 | 0 |
| Asian | 1 | 7 | 2 | 1 |
| Multi-ethnic | 3 | 1 | 2 | 0 |
| Other | 15 | 30 | 11 | 11 |

Challenges

Funding Sources

An important factor in successfully recruiting qualified graduate students is the promise of continued financial support that is competitive with other institutions. Offering a competitive fellowship would not only add prestige to a prospective student's CV but also may make MSU more attractive than other institutions. However, such an action would require a greater financial commitment from the university. The Graduate School at MSU does offer a few fellowships to minority students, but not on the scale required to transform the demographic makeup of the CNS graduate student body. Nevertheless, financial support can come from more conventional sources, such as teaching assistant (TA) and research assistant (RA) positions. Providing guaranteed TA positions for incoming graduate students would provide financial support through their coursework years. Once a research lab has been chosen, the graduate students would then transition to a RA position within their research lab. Each of these funding sources requires departmental commitment to these students' success. It is vitally important that prospective students know they will be financially supported by MSU for the duration of their graduate careers.

Faculty and Department Support

Many faculty and staff at MSU do not take action to improve diversity of graduate programs. There may be a variety of reasons for lack of action. One of the major factors involved in leading a successful recruitment program is the presence of a group of faculty members who are committed to expanding diversity and willing to help recruit and mentor minority students within their department. On an administrative level, these faculty members would serve as resources for adding URM status as key criteria for consideration in the graduate admissions process for his/her specific department. URM students would be reviewed using these criteria to see how they could uniquely contribute to the graduate program. It may be necessary to seed this program by recruiting a faculty member with these qualities to CNS if current faculty members are not intrinsically motivated to take on these initiatives. Our hope is that given incentives and more resources, faculty and departments will be more proactive at following through on recruiting efforts and mentoring of minority students.

Geographical

Geography is one of the obstacles facing MSU in recruiting a diverse graduate student body. A large proportion of qualified undergraduates come from southern regions and as a result, they

may be hesitant to pursue graduate study in East Lansing due to its harsh winters. Furthermore, these students would be traveling away from their familial support systems. Thus, we recommend that recruitment efforts focus on minority populations found locally and within the Midwest region. Nevertheless, we do not believe that the geographic constraint is solely responsible for the low numbers of minorities in the current graduate student population.

Concluding Remarks

We have highlighted the importance of increasing the retention and graduation rates of all CNS students, starting at the undergraduate level and continuing throughout the graduate level. Funding, faculty/department support and geography are cited as challenges specific to MSU.

B. Undergraduate Programs for Recruitment and Retention at MSU

At MSU, there are several programs that aid in the recruitment and retention of undergraduate students, with particular focus on URM groups, low-income, and first generation college students. The purpose of these programs ranges from serving as immersion programs, which help students gain exposure to college and research experiences, to providing academic and social support to undergraduates who are interested in pursuing graduate level study or professional careers. In Table 4, we provide brief details on undergraduate programs that may serve as recruitment pools to funnel students into graduate programs at MSU. Utilizing these undergraduate programs as recruitment resources is discussed in the Key Recommendations section of this document.

Table 4. Current Undergraduate Enrichment Programs at MSU

| Program Name | Target Population | Type of Experience | Time of Year |
|---|--|-------------------------------------|--------------|
| SpartaNature | Incoming freshmen in CNS (all backgrounds) | Freshman Experience | Summer |
| Summer Research Opportunity Program (SROP)/BEACON SROP | Undergraduates (all backgrounds) | Research & Professional Development | Summer |
| McNair Scholars Program | Undergraduates (URM, low-income or first generation) | Research & Professional Development | Year-round |
| Charles Drew Scholars Science Program | Undergraduates (all backgrounds) | Academic Support Program | Year-round |
| Research Education Program to Increase Diversity in Health Researchers (REPID-HR) | Undergraduates (URM) | Research | Summer |

| | | | |
|---|---|-----------------------------|---|
| Increasing Diversity and Education Access to Sciences (IDEAS) | 1 st and 2 nd Year Undergraduates (URM, low-income or first generation) | Research | Fall (opportunities available for additional semesters) |
| Engineering and Science Summer Academy (ESSA) | Incoming Freshman (URM) | Academic Support | Summer |
| Michigan Louis Stokes Alliance for Minority Participation –Summer Research Academy (SURA) | Undergraduates (URM) | Research & Academic Support | Summer through Fall |

See Appendix E for program descriptions and contact information.

C. Increasing Graduate Student Diversity

Programs at MSU and elsewhere have identified critical components for increasing graduate student diversity. Below is a summary of the proven models for recruitment and retention of diverse graduate students and the common components that make them successful.

Table 5. Graduate Research Programs that Increase Graduate Student Diversity.
All these programs target URM students beginning at the undergraduate level.

| Program Name | Administration Locations | Mentors | Overhead Organization | Student Funding Sources |
|--|---|------------------------------|-----------------------------|--|
| Sloan Scholars Program | Electrical & Computer Engineering (ECE) and Computer Science & Engineering (CSE) at MSU | MSU | Sloan Foundation | TA/RA, Fellowships |
| Fisk-Vanderbilt Masters- Ph.D. Bridge Program | Fisk University (Master’s) Vanderbilt University (Ph.D.) | Fisk and Vanderbilt | Extramural grants | RA, Fellowships, Extramural grants |
| Jackson State University Bridge to the Doctorate Program | Jackson State University (JSU) | JSU and internship locations | National Science Foundation | Louis Stokes Alliance for Minority Participation (LSAMP) |

Common Components that Contribute to Success

Funding

Undoubtedly, funding appears to be the ultimate source of success because it ensures program longevity and encourages student interest. The National Science Foundation and the National

Institutes of Health are two examples of groups that have provided funding for the running costs of a select number of Bridge programs throughout the United States. Funding is usually allocated into the following categories: tuition waiver, health insurance, housing assistance, a stipend for professional development or discretionary use and travel reimbursement.

Mentoring

Mentoring is a central component of a successful Bridge program and it can come in many forms. Individual mentors who develop a personal relationship with the URM graduate students may be the most important component of a successful program. A faculty mentor should be committed to the program, be familiar with program requirements and actively advocate for each student's success. Furthermore, the faculty mentor should keep in touch with the mentees regularly to monitor their progress through the program and intercede when appropriate.

Peer mentors can also impact success. A peer who has successfully completed at least one year more than the mentee may be more in touch with problems and concerns of the younger students. Furthermore, any minority student should be aware of the resources on campus such as American Indian Science and Engineering Society (AISES) and Alliance for Graduate Education and the Professoriate (AGEP), which are groups that may help create a student community.

Other campus resources that are already available could be used to further educate Bridge participating students on how to be successful in their program. Workshops sponsored by the Graduate School can help fill holes in the students' graduate education by providing help on writing and time management. However, other programs may be needed to help prospective students prepare applications for graduate school. GRE prep for Master's candidates might also help more undergraduates be eligible for admission into a Master's program.

Finally, increasing the number of minority speakers who talk on campus at scientific colloquiums and seminars may also help students be successful. This strategy can supply a positive example of people from URM backgrounds that have navigated a career path successfully after a Ph.D., which can help fill in the gaps in departments that may not have any minority faculty members. This format of meeting minority and women speakers has been used successfully by the Physics and Astronomy Department's student group Women and Minorities in the Physical Sciences in a "Meet-the-Speaker" series (see resources).

Faculty Engagement

Faculty engagement is imperative in any recruiting effort. Prospective students want to hear about MSU and know what it has to offer. All successful programs advertise directly to minority populations and include a personalized response to prospective students. Faculty need to be invested in students before they arrive by contacting competitive minority applicants personally at least a couple of times a semester through their final year of undergraduate studies to see if they have any questions regarding MSU programs or the application process. Faculty responsibility does not end with an acceptance. It is the department's responsibility to ensure that every minority student has access to mentoring and proper professional development once they arrive.

Graduate programs that have high numbers of URM students have a climate where promoting diversity is supported and prioritized. The Fisk-Vanderbilt program, for example, was spearheaded by a group of young faculty members committed to making a Bridge program work. The physics departments at both Fisk and Vanderbilt then worked together to align curricula, admission criteria, and logistical policies. At MSU, the Sloan program was piloted by an individual faculty member, Dr. Percy Pierre, who helped motivate other faculty involvement. Simply put, if the faculty do not feel any responsibility for URM students, then nothing of note will change in the current graduate student population.

Research Experience

While not a component of all Bridge programs, courses or workshops in fundamental laboratory techniques are often offered to students prior to their research or internship experience. This experience provides students with an understanding of the basic methods, techniques and concepts that they will encounter in a typical laboratory setting. Experience with upper level courses gives students insight to the demands and time commitment required of graduate level study. For Master's degree-granting Bridge programs, coursework is a required component of the program. Additional courses to consider include: 1) Journal club (for reading, analyzing and interpreting scientific articles), 2) Writing course or workshop (to prepare students for writing grants, scientific papers, research proposals, theses and dissertations), and 3) Capstone or Colloquium (to serve as a culmination of what the student has learned throughout the program).

Professional Development

Professional development of minority students is an important component of creating a program with successful students. An ideal orientation program would include a section on resources offered by the university that are open to all students. University offices like the Family Resource Center may help students in unique circumstances. Organizations like AGEP and AISES may serve as a peer support system and add support in ways a traditional academic program lacks. Another way to make URM more visible on campus is to encourage departments to invite one minority speaker per semester to give a scientific seminar or colloquium. During their visit on campus, minority speakers could be made available to students for questions and thus, allow for a “one-shot” mentoring experience for minority students. Finally, all graduate education should include serving as a teaching assistant and presenting research at conferences.

D. Key Recommendations

Through researching the multitude of programs at MSU and other institutions, three clear recommendations emerged. Amongst the data, it was evident that two of the most important items in successfully recruiting and maintaining a diverse graduate student population were building a pool of diverse potential applicants and establishing firm faculty participation. The recommendations that reflect programs of highest success as evidenced at similar institutions to MSU, involve developing a pool of our own undergraduates and nurturing their success through supportive courses, faculty mentoring, and early exposure to research. This is the first step in making not only a group to draw upon, but also in fostering an open environment that is both welcoming and inviting to diverse populations. From there it is essential to involve the faculty in the recruitment process for MSU undergraduates and for external candidates. There are many established programs at MSU that the departments and faculty could utilize and participate with in order to gain the kind of contact and networking that will effectively show potential graduate students the inclusive and supportive environment in CNS.

Recommendation #1: Undergraduate Initiatives

Main Ideas:

- Many underrepresented students in the STEM disciplines at 4 year institutions are underprepared for college, particularly in science and math. Data demonstrates that this is the case at MSU for CNS students.
- There is a need for 4 year institutions to provide assistance to underprepared students, and the vast majority of public institutions do so.

- Research literature demonstrates that transition courses that have well defined goals and contain specific components are effective in increasing the success of underprepared students.
- It is important to assist CNS underprepared students with the development of stronger math and science foundation skills and learning skills through transition courses in math, chemistry, and biology. This sets the stage for improved retention and graduation, particularly for underrepresented students.
- The structure and format of transition courses can vary from course to course and institution to institution. CNS should have discussions at departmental, college, and university levels to carefully examine the best structure and methods of delivering the math, chemistry, and biology transition courses.
- Introducing underrepresented students to STEM careers and research experiences early in their undergraduate studies is an important component of mentoring them through the pipeline to graduate school.
- A sophomore year research seminar experience for underrepresented CNS students who have built strong foundation skills in math and science would be valuable in introducing research skills and graduate school preparation to continue them in the pipeline to graduate school in CNS.

Transition Course Background

Providing academic assistance to underprepared college students is becoming an increasing need in higher education, with the majority of those students being underrepresented minorities, and particularly within the STEM disciplines. During the 2006-2007 academic year, 90.4% of public institutions of higher education provided some type of academic assistance to students who were underprepared in various college level courses (Maize, Fuller, Hritcko, Matsumoto, Soltis, Taheri, & Duncan, 2010). These programs attempt to develop confident and motivated learners who can manage their time, set goals, synthesize information from multiple sources, problem solve, develop strategies for studying and test taking, and perform self-assessments of their learning.

Effective assistance programs for underprepared students have two objectives: (1) correcting learning skills deficits to make more effective learners and (2) teaching content-specific skills and strategies. Educational literature supports utilizing transition courses (historically known as developmental or remedial courses) that contain these objectives, as well as specific components such as supplemental education and peer facilitated learning, to improve student performance and increase student persistence (Bowles, McCoy & Bates, 2008; Boylan, 1999; Congos, Schopes, & Does, 1993; Merisotis & Phipps, 2000; Preszler, 2009; Ramirez, 1997; Russell, 2008; Span, 2000; Tenney & Houck, 2003).

There is not a standard recommendation throughout the literature on the structure and format of effective transition courses. They range from separate remedial courses to summer bridge courses to enriched sections of non-remedial courses to paired courses or other formats (Angel & LaLonde, 1998; Lucas & McCormick, 2007; Maize, et al., 2010; Shields, Spees, Handlin, Noelken, Riley, & Frey, 2010; Tenney & Houck, 2003). The goals of the courses, course content, and resources dictate the format and structure. However, in a review of 30 years of research on what works in college student remediation (Boylan & Saxon, 2002), the following specific components of successful remediation courses were found:

1. Clearly specified goals and objectives are established.
2. Adult learning theory is applied in the design and delivery of these courses.
3. A high degree of structure is provided.
4. There is a centralized program for the courses or highly coordinated effort and communication among departments/units offering the courses.
5. Mastery learning is included as an instruction component.
6. Supplement instruction, tutoring, and group learning components are included.
7. Attention is paid to the social and emotional development of the students.
8. Regular course/program evaluations are conducted and findings disseminated widely.
9. Graduation or certificate credit is awarded for the courses.
10. The students and the programs receive adequate financial support.
11. Instructors that are eager to teach these courses are recruited and hired.
12. Staff training and professional development are provided.

Transition Courses for CNS Gateway Courses

As is the case with college freshmen in general who have not been prepared for key introductory college courses, CNS freshmen that enter MSU underprepared in math and science are at risk of not being successful in the CNS gateway courses in math (MTH 1825 & 103), chemistry (CEM 141), and biology (BS 161). Courses that are specifically designed to transition these students to the gateway courses could impact their success with a CNS major and keep them in the pipeline to graduate programs in CNS. It is recommended that transition courses be developed by CNS that include components from the existing literature on effective content and pedagogy. The course goals, structure, and format would need to be determined through discussions and collaborations between CNS departments, the College, and the University, who all have a stake in these courses.

Transition Courses in Math

Data indicates that CNS students who place into the MTH 1825 and 103 transition courses for higher math have low retention and graduation in CNS and that a majority of these students are from underrepresented populations. Providing transition course components and formats in these

courses can be crucial for the future math and science success of these students. The goal is to help students have a positive experience with math, practice effective learning and problem solving strategies, understand the connections between math and “the real world”, and include supplemental instruction, peer facilitated learning, and other effective components identified in educational literature. They should contain in-person instruction and academic support in addition to online instruction and problem sets. Several of these components have also been identified in the recent list of demands to the MSU administration by the Black Student Alliance (BSA, 2011).

Transition Courses in Chemistry and Biology

Students who are underprepared in math are typically also underprepared in chemistry and biology. CNS does not currently have transition courses for the gateway CEM 141 and BS 161 courses. Due to the math prerequisites for chemistry and chemistry prerequisites for biology, students who enter MSU in MTH 1825 are not eligible to enroll in the gateway courses in chemistry and biology until their sophomore year. They become disconnected from CNS and/or their preprofessional curriculum, and their graduation in a CNS major is often delayed.

It is recommended that transition courses in chemistry and biology be developed that are designed for CNS underprepared students to take during their freshman or early sophomore year concurrently with math transition courses. Inclusion of demonstrations, laboratory introduction, effective problem solving and study strategies, supplemental instruction, peer facilitated learning, and other effective components identified in educational literature are important.

Sophomore Year Research Seminar

This seminar would be designed to give research exposure to URM undergraduate students at an early point in their academic careers. It could also have the potential to lead students toward extended research opportunities and encourage a pipeline towards graduate school by exposing students to alternative post-baccalaureate paths.

The program would be piloted for 10 students with the anticipation to grow to a cohort of 20 students, given available funding. Students would be required to have completed MTH 103 and CEM 141 at a 2.0 grade or higher and have a minimum cumulative GPA of a 2.75 prior to the Fall semester of their sophomore year. Students would be selected due to their matching the criteria and invited to apply. The program commitment would be for the entire sophomore year.

Each student would be placed in a lab according to their area of interest and lab space availability, and required to work five to seven hours per week paid at the campus minimum wage or in exchange for research credits. A group seminar involving the exploration of the process of research and preparation towards graduate study would be held once a month with the cohort and a lead coordinator. The program would need one coordinator to run the seminar sessions and to arrange student lab placements. A mentoring component with either a faculty member or graduate student would help the undergraduate deconstruct what they are learning and experiencing in the lab and how this program could assist them in their pathway.

Additionally, career workshops presented to upper level undergraduate students could serve to promote career paths that require graduate degrees. Faculty could be in attendance at the career workshop to network with students about their graduate programs. The main goal would be to make all aspects of graduate education and professional careers known to promising undergraduate students. These students could also be cultivated towards the BS/MS program to encourage longevity of vision and possibly transition to the Ph.D..

The financial commitment would involve the salary and benefits for a part time coordinator and a \$500 stipend for each lab that takes on a student. This stipend would not cover the costs of hiring the student but would offset lab costs by approximately 50%. Alternatively, the program could be offered as a course and the students would be paying for and earning credits, rather than getting paid for their time in the lab.

Recommendation #2: Faculty Involvement in Recruitment

Main Ideas:

- CNS should emphasize the importance of diversity initiatives with the current department chairs and graduate directors
- CNS should promote existing CNS diversity activities and MSU student recruitment programs through new faculty orientation sessions.
- CNS faculty should receive information regarding diversity initiatives through presentations made by existing MSU diversity programs (such as AGEPE) and a document outlining the best practices for recruitment and retention of URM students.
- CNS departmental recruitment strategies for URM students should include maintaining good communication with students throughout the recruitment phase and ensuring timely delivery of funding information to compete with other graduate programs.
- CNS incentives for successful recruitment and retention of URM students would encourage faculty participation; this is particularly important for untenured faculty.
- CNS should develop a team of CNS faculty members interested in recruiting URM students, rather than relying on one single faculty member.

Without faculty involvement, there will be very little change in the diversity of CNS graduate programs. Similarly, if very few people make initial efforts and steps toward improving diversity will be unsustainable. Any diversity initiative should begin by stressing the importance of diversity in graduate student and postdoc populations with CNS department chairs and graduate directors, since change often comes from the top. These individuals in particular should be familiar with URM recruitment and retention best practices, as it ultimately falls to them to see those practices implemented.

Many best practices are enumerated in this document, but putting together a separate document may be beneficial. Recruitment is a year round process. Faculty should be aware of and participate in URM recruitment efforts on and off campus. One of the simplest and oft neglected aspects of recruitment is maintaining constant contact with promising students as they are away from MSU. While the Graduate School does maintain a certain level of contact with URM recruits, it is far more effective if the relevant department takes an active interest in promising individuals as soon as the URM states an interest in attending MSU. We recommend that faculty email or call recruits a couple of times a semester during the recruit's final year of undergraduate program to see if the recruit has any questions regarding the program or application process.

Faculty should all be aware of the importance funding plays in graduate students attending a particular school. An acceptance with funding lets the recruit know that MSU is committed to their success. We recommend all acceptance letters to graduate programs should include some statement in regards to funding. This statement should be as explicit as possible, but if it must be vague then it should give a detailed time frame and the recruit should be told to contact the recruitment director if they desire more clarification. We want to avoid having promising minority students accepting schools other than MSU because they thought that MSU was not going to support them financially through graduate school. While these suggestions may seem too simple or mostly already done, they are crucial in getting minority students to MSU. Since URM's in the numbers of ones and twos make a difference in a graduate program's diversity, each recruitment effort is important. Faculty must also be engaged with students once they arrive on campus. Quality mentoring is also a year round responsibility. In short, more efforts toward recruiting URM's need to take place to show CNS's commitment to student success.

It is crucial that diversity efforts not be seen solely as the department chairs' and graduate directors' individual responsibilities. To that end, we recommend that CNS provide incentives for

faculty and departments whose efforts in recruiting more minority graduate students are successful. As recruitment and mentoring make consistent demands on a faculty member's time, we suggest that quality efforts count toward a faculty service requirement. If any junior faculty member takes on expanding the diversity of their graduate program on as a project, we recommend that such efforts be looked upon and rewarded by tenure review committees. Therefore, we recommend including a line in the Reappointment Promotion and Tenure document regarding efforts toward promoting diversity. By providing incentives for improving diversity, we hope that any faculty member who wishes to promote diversity within their departments will have the time to do so.

In the spirit of making diversity a priority of all faculty members, we recommend that new faculty orientation allocate time devoted to stressing CNS's commitment to diversity. In addition to explaining why diversity helps a research community, orientation should include time devoted to explaining the resources available at MSU to aid recruitment efforts. Any individuals or programs that are particularly good at recruiting a diverse graduate student population should be highlighted, so that new faculty can see how efforts toward diversity are valued. Many young members of academe value diversity themselves and may prove instrumental in any real change in culture in CNS departments, so we recommend highlighting CNS commitment to diversity early in these new faculty members' careers.

Recommendation #3: Utilizing MSU Resources

Main Ideas:

- Graduate recruitment efforts should target student populations that presently exist at MSU such as McNair Scholars, Veterans, BEACON SROP, etc.
- CNS faculty involvement should be a strong component in recruitment efforts, including on-going faculty follow-up with prospective students and active participation in Graduate School recruiting (e.g. the AGEF Alliance Fall Conference held at MSU).
- CNS faculty should maintain constant communication with the Graduate School staff, particularly those that attend recruiting conferences, to identify prospective students for follow-up efforts.
- CNS departments should collaborate with AGEF staff to enhance recruitment and retention strategies during orientations & on-campus recruitment days, and provide faculty training in challenges facing underrepresented students.
- Encourage graduate directors across all departments to communicate with AGEF and the Graduate School staff regarding effective recruiting materials and to inform incoming graduate students at orientation about key workshops from the Graduate School.

McNair Scholars Program Connections

Leveraging existing local programs that serve underrepresented minority students at the undergraduate level can act as a good "feeder" into graduate studies at MSU. There are six McNair Scholars Programs in the state of Michigan in addition to the McNair/SROP program at MSU. Students in the McNair Scholars Program have already proven themselves to be individuals of significant potential and capability and are an excellent pool from which to draw diverse and highly qualified graduate students to MSU. We recommend that these programs be specifically targeted during recruiting initiatives. Some McNair Scholars Programs already visit MSU's campus as a group to allow their students to experience what MSU has to offer for graduate school opportunities.

Since all the programs listed in Appendix G are within the state of Michigan, students may be more likely to come to MSU for graduate studies than if they came from another region of the country. Furthermore, for those instances where a student may be supported on a fellowship, a significant proportion of the students recruited in this manner qualify for in-state tuition, reducing the cost to departments of their graduate education. Based on communication with a selection of McNair Scholars Program representatives from Michigan institutions, staying within the state seems to be the strongest draw towards attending MSU, since students feel it is "closer to home." Students from some of the smaller universities seem to be hesitant to come to a large research university like MSU, which is where formation of strong support communities could prove helpful.

Veterans

Student veterans form an excellent pool from which to draw a diversity of graduate students. All of these students have learned discipline and responsibility. Because of their time spent in service to their country, most student veterans are older than their counterparts who followed the traditional path of high school, college, then graduate school. This adds to a much-needed diversity in age and life experience from which perspective their fellow students can benefit greatly. Veterans are a valuable group to include, and the task in this case is making graduate school in the natural sciences an appealing option. To this end, it can be valuable to interact with student veteran organizations and with local programs for people leaving the military to increase the viability of pursuing graduate studies in the natural sciences for their advisees. Since many

veterans will have been out of school for some time, a variant on the bridge program experience could help to improve their transition into graduate school.

BEACON SROP

Dr. Judi Brown-Clarke, Diversity Director at BEACON (MSU), coordinates the student recruitment efforts for BEACON SROP. Students come from various institutions including BEACON partner institutions (North Carolina A&T, University of Idaho, University of Texas, and University of Washington-Seattle), Historically Black Colleges (HBCs) and institutions in Puerto Rico. Many of these students have undergraduate majors that match well-established graduate programs at MSU, which increases the likelihood of interest in graduate study at MSU.

We recommend that any diversity initiative include recruiting from SROP students. BEACON SROP provides an opportunity to meet with students that are physically at MSU and may be involved in research with CNS faculty. The SROP program is designed to integrate minority students into the MSU community by hosting activities such as networking dinners and research forums. Furthermore, Dr. Brown-Clarke is willing to help organize one-on-one lunches between recruitment chairs and promising SROP students in their last year of college.

Alliance for Graduate Education and the Professoriate

The Alliance for Graduate Education and the Professoriate (AGEP) is a National Science Foundation (NSF) program with the goal of substantially increasing the number of underrepresented populations pursuing academic careers in science, technology, engineering, and mathematics (STEM) and social, behavioral and economic (SBE) disciplines. MSU is part of the Michigan AGEP Alliance (MAA) for STEM disciplines, which also includes University of Michigan, Wayne State University and Western Michigan University. The funding from the AGEP grant is used for activities to recruit and retain graduate students. Recruitment strategies engaged by this program include financial support for faculty travel to recruit graduate students and faculty-to-faculty collaborations that create a pipeline between institutions and encourage the flow of students into graduate programs. Retention strategies include supporting graduate students through community meetings to build peer relationships and provide training, as well as small research and professional development grants. The MSU AGEP also supports the annual MAA Spring and Fall conferences where upper-level undergraduate and graduate students at all levels engage in training for their PhD and share their research.

The MSU AGEP is a resource that should be leveraged for recruitment and retention of underrepresented students in CNS. Faculty from CNS may engage with the AGEP recruitment activities to find competitive and interested students from diverse backgrounds. The CNS departments and programs would benefit from in-reach to this program. Current graduate students should be given information regarding the opportunities provided by MSU AGEP at departmental orientation sessions. The CNS faculty could benefit from brief training sessions provided by AGEP staff during faculty meetings regarding typical challenges facing underrepresented students as well as strategies for supporting their graduate students. AGEP is a model program for recruitment and retention that should be leveraged by CNS in support of recruitment and retention of underrepresented graduate students.

Utilizing Faculty in Recruitment Efforts

CNS faculty members should be active participants in all recruitment efforts. They should be encouraged to attend and network at recruitment functions such as the AGEP Alliance Fall Conference held at MSU, and should maintain constant communication with the Graduate School staff to identify prospective students for their graduate programs. Of utmost importance, CNS faculty should maintain ongoing communications with any promising undergraduate students. These communications are critical to ensure that the students feel connected to MSU throughout their fall and spring semesters at their home institution. Lastly, CNS departments should collaborate with AGEP and the Graduate School to expand their recruitment and retention strategies and participate in faculty training in challenges facing underrepresented students.

E. Secondary Recommendations

In addition to the key recommendations, several smaller concepts developed from the review of current programs and resources. While not seen to be the most critical areas of improvement, these items should be considered in future efforts.

Main Ideas:

- Communicate opportunities to undergraduate students that will help them stay in the pipeline toward graduate school. Disseminate information about research experiences, mentoring programs, student organizations, and other such community-building and professional development opportunities.
- Provide a centralized list on the CNS website of links to programs and resources for minority students, particularly those programs actively involved on campus.
- Host an annual meeting of on-campus units involved in recruiting efforts and minority outreach. This will provide an opportunity for cross-pollination of ideas and help decrease unnecessary duplication of efforts towards these goals.
- Encourage departments to bring minority faculty to campus as seminar speakers to present their research and to interact with graduate and undergraduate students, and disseminate information about these talks and meetings outside the departments themselves. It is particularly important to provide visiting role models from underrepresented populations while those populations also remain underrepresented among MSU faculty.
- Encourage recruitment of professorial candidates with a demonstrated focus on minority issues because they may be more inclined to be actively involved in mentoring students, writing grants for this purpose, and running recruitment and retention programs.

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Appendix A: Graduation of FS00-FS05 CNS Preprofessional and Non Preprofessional Freshmen Cohorts - By Ethnicity

Appendix A

Graduation of FS00-FS05 CNS Preprofessional and Non Preprofessional Freshmen Cohorts - By Ethnicity

(Based on Number Entering CNS 1st Year)

Non URM = White, Blank, Not Requested

Asian/PI= Asian, Asian/PI, Hawaii/PI

URM = Black, Amer Ind, Hispanic, Multiple

| Ethnicity | Ethnicity Code | Total 1st Year Fr CNS | % Grad CNS 1st Yr | % Grad Non CNS 1st Yr | Total Grad 1st Yr | % Grad CNS 2nd Yr | % Grad Non CNS 2nd Yr | Total Grad 2nd Yr | % Grad CNS 3rd Yr | % Grad Non CNS 3rd Yr | Total Grad 3rd Yr | % Grad CNS 4th Yr | % Grad Non CNS 4th Yr | Total Grad 4th Yr | % Grad CNS 5th Yr | % Grad Non CNS 5th Yr | Total Grad 5th Yr | % Grad CNS 6th Yr | % Grad Non CNS 6th Yr | Total Grad 6th Yr |
|---------------------------|----------------|-----------------------|-------------------|-----------------------|-------------------|-------------------|-----------------------|-------------------|-------------------|-----------------------|-------------------|-------------------|-----------------------|-------------------|-------------------|-----------------------|-------------------|-------------------|-----------------------|-------------------|
| FS00-FS05 Cohorts: | | | | | | | | | | | | | | | | | | | | |
| White | 1 | 5847 | | | | | | | | | | | | | | | | | | 40% |
| Black | 2 | 725 | | | | | | | | | | | | | | | | | | 21% |
| Amer Ind | 5 | | | | | | | | | | | | | | | | | | | |
| Blank | 8 | | | | | | | | | | | | | | | | | | | |
| Not Rqstd | 9 | | | | | | | | | | | | | | | | | | | |
| Hispanic | H | 190 | | | | | | | | | | | | | | | | | | 28% |
| Multiple | M | | | | | | | | | | | | | | | | | | | |
| Non URM | 1, 8, 9 | 5960 | 0% | 0% | 0% | 0% | 0% | 0% | 1% | 0% | 2% | 29% | 21% | 51% | 39% | 31% | 69% | 40% | 38% | 79% |
| URM | 2, 5, H, M | 1002 | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 10% | 11% | 21% | 20% | 29% | 49% | 23% | 36% | 59% |
| Asian/PI | 6, 11 | 640 | 0% | 0% | 0% | 0% | 0% | 0% | 4% | 1% | 5% | 33% | 16% | 49% | 45% | 27% | 72% | 47% | 30% | 77% |
| Total | | 7602 | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | |
|---------------------------------|--|--|---|---|---|---|---|---|----|----|-----|------|------|------|------|------|------|------|------|------|
| Cumulative Award Totals: | | | | | | | | | | | | | | | | | | | | |
| White | | | | | | | | | | | | | | | | | | | | 2355 |
| Black | | | | | | | | | | | | | | | | | | | | 149 |
| Hispanic | | | | | | | | | | | | | | | | | | | | 54 |
| Non URM Awards | | | 0 | 0 | 0 | 3 | 0 | 3 | 77 | 26 | 103 | 1755 | 1273 | 3028 | 2313 | 1820 | 4133 | 2399 | 2283 | 4682 |
| URM Awards | | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 4 | 99 | 111 | 210 | 204 | 288 | 492 | 231 | 357 | 588 |
| Asian/PI Awards | | | 0 | 0 | 0 | 0 | 0 | 0 | 27 | 6 | 33 | 213 | 102 | 315 | 289 | 173 | 462 | 301 | 193 | 494 |

**Appendix B: Math Placement – Incoming Freshmen with CNS Major
Declared AY 2006-2010**

Appendix B

**MATH PLACEMENT - INCOMING FRESHMEN WITH CNS MAJOR DECLARED
AY 2006-2010**

Data based upon typical math placement determination - does not reflect actual enrollments into Math courses.

Includes:

-All new incoming Freshman during the Academic Year. Does not include transfer students.

-Primary majors in CNS departments (including pre dental, premedical and preoptometry). Excludes Lymna Briggs majors.

| | | CNS FRESHMEN ENTERING ACADEMIC YEAR (US, FS, SS) | | | | | | % of Total CNS Incoming Fr Math Placers |
|--------------------------------|--|--|-------------|-------------|------------|-------------|-------------|---|
| Math Placement | Determined Based Upon | 06/07 | 07/08 | 08/09 | 09/10 | 10/11 | 5 Yr TOTAL | |
| MTH 1825 | MSUM Score | 113 | 162 | 152 | 151 | 166 | 744 | |
| | 1825 Default (no MSUM score) | 2 | 3 | 4 | | 2 | 11 | |
| | TOTAL | 115 | 165 | 156 | 151 | 168 | 755 | 14% |
| MTH 103 | MSUM Score | 96 | 124 | 102 | 104 | 118 | 544 | 10% |
| MTH 116 | Transfer Credit (h.s. dual enrollment) | 4 | 2 | 7 | 11 | 4 | 28 | |
| | MSUM Score | 157 | 221 | 181 | 181 | 205 | 945 | |
| | TOTAL | 161 | 223 | 188 | 192 | 209 | 973 | 18% |
| MTH 124 | MSUM Score | 146 | 157 | 170 | 156 | 169 | 798 | 15% |
| MTH 132 | Transfer Credit (h.s. dual enrollment) | 7 | 6 | 7 | 1 | 6 | 27 | |
| | MSUM Score | 227 | 223 | 243 | 214 | 254 | 1161 | |
| | ACT/SAT Math Score | 55 | 66 | 78 | 45 | 70 | 314 | |
| | TOTAL | 289 | 295 | 328 | 260 | 330 | 1502 | 28% |
| > MTH 132 | AP Credit | 143 | 118 | 114 | 115 | 118 | 608 | |
| | Transfer Credit (h.s. dual enrollment) | 18 | 17 | 23 | 19 | 16 | 93 | |
| | TOTAL | 161 | 135 | 137 | 134 | 134 | 701 | 13% |
| TOTAL INCOMING FRESHMAN | | 968 | 1099 | 1081 | 997 | 1128 | 5273 | 100% |

**MATH PLACEMENT - INCOMING FRESHMEN WITH CNS MAJOR DECLARED
DISTRIBUTION BY ETHNIC CODE
AY 2006-2010**

Underrepresented Minorities (URM) include: Black, Chicano, Hiapanic, American Indian/Alaskan Native

| MATH Placement | Ethnic Category | CNS FRESHMEN ENTERING ACADEMIC YEAR (US, FS, SS) | | | | | TOTAL | % of Total In Place Level | % Of Total In Ethnic Code |
|---------------------|---------------------------------------|--|-------------|-------------|------------|-------------|-------------|---------------------------|---------------------------|
| | | 06/07 | 07/08 | 08/09 | 09/10 | 10/11 | | | |
| MTH 1825 | TOTAL | 115 | 165 | 156 | 151 | 168 | 755 | | |
| | 1 - White | 63 | 89 | 70 | 79 | 91 | 392 | 52% | 10.2% |
| | 2 - Asian/Hawaiian/Pacific Islander | 3 | 3 | 9 | 9 | 4 | 28 | 4% | 6.1% |
| | 3 - Other/Not Requested/Not Reported | 3 | 4 | 9 | 6 | 2 | 24 | 3% | 9.5% |
| | 4 - URM | 46 | 69 | 68 | 57 | 71 | 311 | 41% | 42.2% |
| MTH 103 | TOTAL | 96 | 124 | 102 | 104 | 118 | 544 | | |
| | 1 - White | 73 | 93 | 77 | 81 | 83 | 407 | 75% | 10.6% |
| | 2 - Asian/Hawaiian/Pacific Islander | 4 | 5 | 9 | 3 | 5 | 26 | 5% | 5.7% |
| | 3 - Other/Not Requested/Not Reported | 2 | 1 | 4 | 3 | 4 | 14 | 3% | 5.6% |
| | 4 - URM | 17 | 25 | 12 | 17 | 26 | 97 | 18% | 13.2% |
| MTH 116 | TOTAL | 161 | 223 | 188 | 192 | 209 | 973 | | |
| | 1 - White | 116 | 185 | 148 | 138 | 165 | 752 | 77% | 19.6% |
| | 2 - Asian/Hawaiian/Pacific Islander | 15 | 9 | 11 | 19 | 18 | 72 | 7% | 15.8% |
| | 3 - Other/Not Requested/Not Reported | 1 | 6 | 2 | 7 | 8 | 24 | 2% | 9.5% |
| | 4 - URM | 29 | 23 | 27 | 28 | 18 | 125 | 13% | 17.0% |
| MTH 124 | TOTAL | 146 | 157 | 170 | 156 | 169 | 798 | | |
| | 1 - White | 119 | 122 | 141 | 125 | 129 | 636 | 80% | 16.6% |
| | 2 - Asian/Hawaiian/Pacific Islander | 10 | 11 | 11 | 18 | 15 | 65 | 8% | 14.3% |
| | 3 - Other/Not Requested/Not Reported | 1 | 7 | 3 | 3 | 6 | 20 | 3% | 7.9% |
| | 4 - URM | 16 | 17 | 15 | 10 | 19 | 77 | 10% | 10.4% |
| MTH 132 | TOTAL | 289 | 295 | 328 | 260 | 330 | 1502 | | |
| | 1 - White | 222 | 214 | 231 | 183 | 236 | 1086 | 72% | 28.4% |
| | 2 - Asian/Hawaiian/Pacific Islander | 36 | 34 | 40 | 27 | 45 | 182 | 12% | 39.9% |
| | 3 - Other/Not Requested/Not Reported | 12 | 27 | 39 | 37 | 23 | 138 | 9% | 54.8% |
| | 4 - URM | 19 | 20 | 18 | 13 | 26 | 96 | 6% | 13.0% |
| > MTH 132 | TOTAL | 161 | 135 | 137 | 134 | 134 | 701 | | |
| | 1 - White | 121 | 109 | 116 | 104 | 105 | 555 | 79% | 14.5% |
| | 2 - Asian/Hawaiian/Pacific Islander | 28 | 12 | 11 | 18 | 14 | 83 | 12% | 18.2% |
| | 3 - Other/Not Requested/Not Reported | 4 | 6 | 6 | 8 | 8 | 32 | 5% | 12.7% |
| | 4 - URM | 8 | 8 | 4 | 4 | 7 | 31 | 4% | 4.2% |
| | TOTAL INCOMING FR MATH PLACERS | 968 | 1099 | 1081 | 997 | 1128 | 5273 | | |
| | 1 - White | 714 | 812 | 783 | 710 | 809 | 3828 | | 73% |
| | 2 - Asian/Hawaiian/Pacific Islander | 96 | 74 | 91 | 94 | 101 | 456 | | 9% |
| | 3 - Other/Not Requested/Not Reported | 23 | 51 | 63 | 64 | 51 | 252 | | 5% |
| | 4 - URM | 135 | 162 | 144 | 129 | 167 | 737 | | 14% |

**CNS DEGREES CONFERRED AY 2006-2010
DISTRIBUTION BY ETHNIC CODE
AY 2006-2010**

Underrepresented Minorities (URM) include: Black, Chicano, Hispanic, American Indian/Alaskan Native

| MATH Placement | Ethnic Category | Time to Completion: Up to 4 Years | % of Total Conf 4 Yrs | Time to Completion: 5-6 Yrs | % of Total Conf 5-6 Yrs |
|-----------------|--------------------------------------|--------------------------------------|-----------------------|--------------------------------|-------------------------|
| MTH 1825 | TOTAL | 41 | 3% | 150 | 11% |
| | 1 - White | 33 | 2.1% | 97 | 6.8% |
| | 2 - Asian/Hawaiian/Pacific Islander | 1 | 0.1% | 9 | 0.6% |
| | 3 - Other/Not Requested/Not Reported | 3 | 0.2% | 3 | 0.2% |
| | 4 - URM | 4 | 0.3% | 41 | 2.9% |

| Total Time to Completion: Up to 6 Yrs | % of Total Conf Up to 6 Yrs |
|--|-----------------------------|
| 191 | 6% |
| 130 | 4.4% |
| 10 | 0.3% |
| 6 | 0.2% |
| 45 | 1.5% |

| MTH 103 | Ethnic Category | Time to Completion: Up to 4 Years | % of Total Conf 4 Yrs | Time to Completion: 5-6 Yrs | % of Total Conf 5-6 Yrs |
|----------------|--------------------------------------|--------------------------------------|-----------------------|--------------------------------|-------------------------|
| MTH 103 | TOTAL | 73 | 5% | 133 | 9% |
| | 1 - White | 66 | 4.2% | 98 | 6.9% |
| | 2 - Asian/Hawaiian/Pacific Islander | 2 | 0.1% | 4 | 0.3% |
| | 3 - Other/Not Requested/Not Reported | 1 | 0.1% | 2 | 0.1% |
| | 4 - URM | 4 | 0.3% | 29 | 2.0% |

| Total Time to Completion: Up to 6 Yrs | % of Total Conf Up to 6 Yrs |
|--|-----------------------------|
| 206 | 7% |
| 164 | 5.5% |
| 6 | 0.2% |
| 3 | 0.1% |
| 33 | 1.1% |

| MTH 116 | Ethnic Category | Time to Completion: Up to 4 Years | % of Total Conf 4 Yrs | Time to Completion: 5-6 Yrs | % of Total Conf 5-6 Yrs |
|----------------|--------------------------------------|--------------------------------------|-----------------------|--------------------------------|-------------------------|
| MTH 116 | TOTAL | 172 | 11% | 221 | 16% |
| | 1 - White | 155 | 9.9% | 180 | 12.7% |
| | 2 - Asian/Hawaiian/Pacific Islander | 7 | 0.4% | 14 | 1.0% |
| | 3 - Other/Not Requested/Not Reported | 2 | 0.1% | 0 | 0.0% |
| | 4 - URM | 8 | 0.5% | 27 | 1.9% |

| Total Time to Completion: Up to 6 Yrs | % of Total Conf Up to 6 Yrs |
|--|-----------------------------|
| 393 | 13% |
| 335 | 11.2% |
| 21 | 0.7% |
| 2 | 0.1% |
| 35 | 1.2% |

| MTH 124 | Ethnic Category | Time to Completion: Up to 4 Years | % of Total Conf 4 Yrs | Time to Completion: 5-6 Yrs | % of Total Conf 5-6 Yrs |
|----------------|--------------------------------------|--------------------------------------|-----------------------|--------------------------------|-------------------------|
| MTH 124 | TOTAL | 207 | 13% | 221 | 16% |
| | 1 - White | 181 | 11.6% | 179 | 12.6% |
| | 2 - Asian/Hawaiian/Pacific Islander | 11 | 0.7% | 14 | 1.0% |
| | 3 - Other/Not Requested/Not Reported | 1 | 0.1% | 6 | 0.4% |
| | 4 - URM | 14 | 0.9% | 22 | 1.5% |

| Total Time to Completion: Up to 6 Yrs | % of Total Conf Up to 6 Yrs |
|--|-----------------------------|
| 428 | 14% |
| 360 | 12.1% |
| 25 | 0.8% |
| 7 | 0.2% |
| 36 | 1.2% |

| MTH 132 | Ethnic Category | Time to Completion: Up to 4 Years | % of Total Conf 4 Yrs | Time to Completion: 5-6 Yrs | % of Total Conf 5-6 Yrs |
|----------------|--------------------------------------|--------------------------------------|-----------------------|--------------------------------|-------------------------|
| MTH 132 | TOTAL | 614 | 39% | 472 | 33% |
| | 1 - White | 503 | 32.1% | 374 | 26.3% |
| | 2 - Asian/Hawaiian/Pacific Islander | 64 | 4.1% | 53 | 3.7% |
| | 3 - Other/Not Requested/Not Reported | 23 | 1.5% | 22 | 1.5% |
| | 4 - URM | 24 | 1.5% | 23 | 1.6% |

| Total Time to Completion: Up to 6 Yrs | % of Total Conf Up to 6 Yrs |
|--|-----------------------------|
| 1086 | 36% |
| 877 | 29.4% |
| 117 | 3.9% |
| 45 | 1.5% |
| 47 | 1.6% |

| > MTH 132 | Ethnic Category | Time to Completion: Up to 4 Years | % of Total Conf 4 Yrs | Time to Completion: 5-6 Yrs | % of Total Conf 5-6 Yrs |
|---------------------|--------------------------------------|--------------------------------------|-----------------------|--------------------------------|-------------------------|
| > MTH 132 | TOTAL | 460 | 29% | 223 | 16% |
| | 1 - White | 381 | 24.3% | 175 | 12.3% |
| | 2 - Asian/Hawaiian/Pacific Islander | 56 | 3.6% | 31 | 2.2% |
| | 3 - Other/Not Requested/Not Reported | 7 | 0.4% | 3 | 0.2% |
| | 4 - URM | 16 | 1.0% | 14 | 1.0% |

| Total Time to Completion: Up to 6 Yrs | % of Total Conf Up to 6 Yrs |
|--|-----------------------------|
| 683 | 23% |
| 556 | 19% |
| 87 | 3% |
| 10 | 0% |
| 30 | 1% |

| | | 4 Yr Completion | | 5-6 Yr Completion | |
|--|--------------------------------------|-----------------|--------------|-------------------|--------------|
| | Totals | 1567 | | 1420 | |
| | 1 - White | 1319 | 84.2% | 1103 | 77.7% |
| | 2 - Asian/Hawaiian/Pacific Islander | 141 | 9.0% | 125 | 8.8% |
| | 3 - Other/Not Requested/Not Reported | 37 | 2.4% | 36 | 2.5% |
| | 4 - URM | 70 | 4.5% | 156 | 11.0% |

| Up to 6 Yr Completion | | Total 06-10 Degrees Conf |
|-----------------------|------------|--------------------------|
| 2987 | | *3184 |
| 2422 | 81% | 80% |
| 266 | 9% | 9% |
| 73 | 2% | 3% |
| 226 | 8% | 8% |

*Includes 197 degrees completed in more than 6 years

**Appendix C: Retention in CNS of FS00-FS10 CNS Freshmen Cohorts
(Includes Preprofessional Codes) – By Ethnicity**

Appendix C

Retention in CNS* of FS00-FS10 CNS Freshmen Cohorts (Includes Preprofessional Codes) - By Ethnicity

**If Retained at MSU*

Non URM = White, Blank, Not Requested

Asian/PI = Asian, Asian/PI, Hawaii/PI

URM = Black, Amer Ind, Hispanic, Multiple

| Ethnicity Description | Ethnicity Code | Total 1st Year Fr CNS | Ret to 2nd Yr FS00-10 Cohorts | % | Ret to 3rd Yr FS00-09 Cohorts | % | Ret to 4th Yr FS00-08 Cohorts | % | Ret to 5th Yr FS00-07 Cohorts | % | Ret to 6th Yr FS00-06 Cohorts | % | Ret to 7th Yr FS00-05 Cohorts | % |
|---------------------------|----------------|-----------------------|-------------------------------|---|-------------------------------|---|-------------------------------|---|-------------------------------|---|-------------------------------|----|-------------------------------|----|
| FS00-FS05 Cohorts: | | | | | | | | | | | | | | |
| White | 1 | 5847 | | | | | | | | | | | 63 | 1% |
| Black | 2 | 725 | | | | | | | | | | | 20 | 3% |
| Amer Ind | 5 | 43 | | | | | | | | | | | 1 | 2% |
| Blank | 8 | 52 | | | | | | | | | | | 1 | 2% |
| Not Rqstd | 9 | 61 | | | | | | | | | | | 1 | 1% |
| Hispanic | H | 190 | | | | | | | | | | | 1 | 1% |
| Multiple | M | 44 | | | | | | | | | | | 0 | 0% |
| Asian/PI | 6, 11 | 640 | | | | | | | | | | | 9 | 1% |
| Non URM | 1, 8, 9 | 5960 | | | | | | | | | | | 65 | 1% |
| URM | 2, 5, H, M | 1002 | | | | | | | | | | | 22 | 2% |
| FS00-FS06 Cohorts: | | | | | | | | | | | | | | |
| White | 1 | 7054 | | | | | | | | | 200 | 3% | | |
| Black | 2 | 846 | | | | | | | | | 33 | 4% | | |
| Amer Ind | 5 | 56 | | | | | | | | | 1 | 2% | | |
| Blank | 8 | 68 | | | | | | | | | 2 | 3% | | |
| Not Rqstd | 9 | 79 | | | | | | | | | 4 | 5% | | |
| Hispanic | H | 229 | | | | | | | | | 10 | 4% | | |
| Multiple | M | 66 | | | | | | | | | 3 | 5% | | |
| Asian/PI | 6, 11 | 783 | | | | | | | | | 27 | 3% | | |
| Non URM | 1, 8, 9 | 7201 | | | | | | | | | 206 | 3% | | |
| URM | 2, 5, H, M | 1197 | | | | | | | | | 47 | 4% | | |

Appendix D: Graphs Depicting Attrition by Gender

Graduate student enrollment and graduation counts for the departments and programs within CNS were compared for 2006 through 2009 to gain insight regarding attrition by gender within the biological science and physical science programs.

Figure 1. Comparison of number of female and male students enrolling in bioscience masters programs between 2006 and 2009.

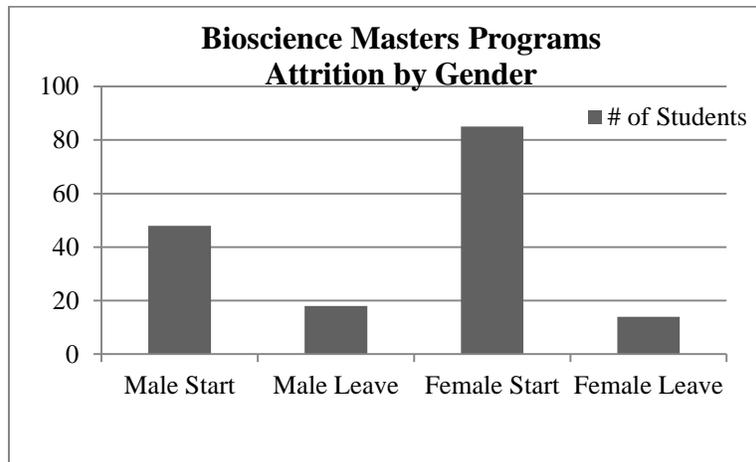


Figure 2. Comparison of number of female and male students enrolling in bioscience doctoral programs between 2006 and 2009.

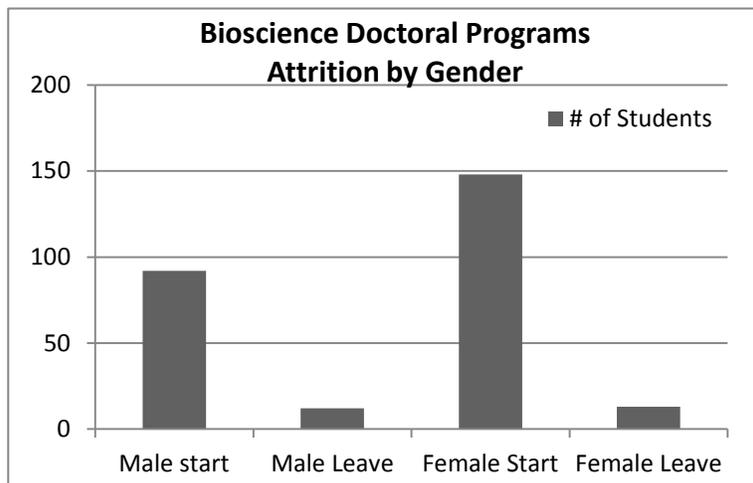


Figure 3. Comparison of number of female and male students enrolling in physical sciences masters programs between 2006 and 2009.

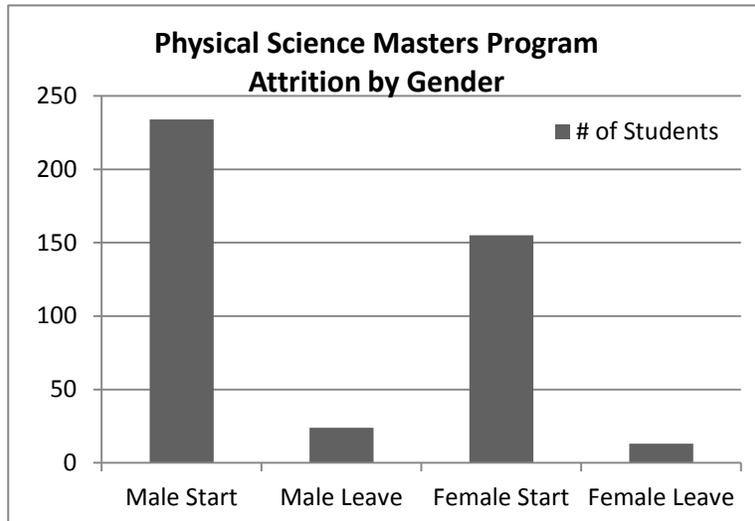
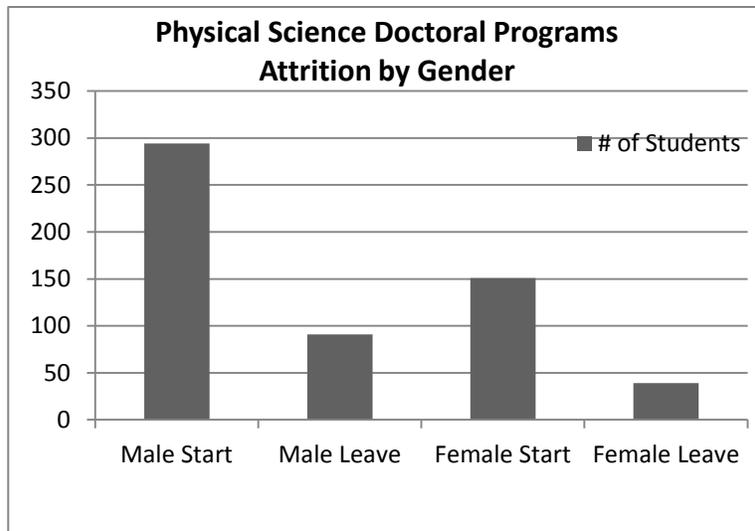


Figure 4. Comparison of number of female and male students enrolling in physical science doctoral programs between 2006 and 2009.



Appendix E: Details for Undergraduate Programs for Recruitment and Retention at MSU

SpartaNature

SpartaNature is a 2-credit program offered to incoming freshmen during the summer before their freshman year. Admission to the program is extended to students who have interests in the biological sciences and/or have selected a major within CNS. Admitted students experience living in dormitories for four days, are trained in laboratory and field techniques, learn about study strategies, and build a social network before the start of the fall term. During the fall term, students participate in a Freshman Experience course that focuses on college transition issues and encourages student attendance at on-campus activities.

- <http://spartanature.cns.msu.edu/>

Summer Research Opportunity Program (SROP)

SROP is an intensive summer research initiative to help encourage students to pursue graduate education at MSU. The program runs from May through June and is associated with SROP at other Committee on Institutional Cooperation (CIC) institutions. Along with the opportunity to pursue research, students gain professional development experience, participate in mentoring activities, attend and present at research seminars. At MSU, all McNair Scholars participate in SROP but not all SROP participants are McNair Scholars.

- Steven P. Thomas, AGEP/SROP advisor in the Graduate School. Email: deshawn@msu.edu
- MSU SROP website: <http://grad.msu.edu/srop/>

BEACON SROP

BEACON, a NSF Center for the Study of Evolution in Action, has created a SROP that recruits undergraduates from institutions across the U.S. and Puerto Rico to participate in a 10-week research program at MSU. The central idea of this initiative is to bring students to MSU's campus at an early stage in their undergraduate careers so they can acquire not only research experience but also a familiarity for MSU and its faculty. These factors are considered to be highly valuable for effective recruitment of BEACON SROP students to graduate programs at MSU.

- Dr. Judi Brown-Clarke, BEACON Diversity Director. Email: jbc@msu.edu
- BEACON website: <http://beacon-center.org/education-outreach/undergraduate-education/>

McNair Scholars Program

The Ronald E. McNair Post-Baccalaureate Achievement Program was established in order to encourage URM, low-income, and first-generation college students to pursue graduate studies. This program provides students with extensive research experience, faculty mentors, a generous stipend and the opportunity to attend conferences in their field.

- MSU Office of Supportive Services website: <http://oss.msu.edu/ronald-e-mcnair-scholars-program>

Charles Drew Scholars Science Program

The Charles Drew Program is as an academic support program that explores pathways to student success via academic achievement, career exploration and community service. This program is targeted for high achieving undergraduate students from all racial and ethnic backgrounds interested in pursuing science and math degrees, as well as professional careers such as medicine, veterinary medicine, dentistry, research, optometry, and physical therapy.

- <http://drewlab.msu.edu/>

Research Education Program to Increase Diversity in Health Researchers (REPID-HR)

This program is unique to the MSU College of Human Medicine and allows students who are interested in pursuing medicine or medical research to gain experience in scientific research. The program takes place during the summer and is targeted towards URM students. Target students for this program would be currently enrolled at MSU at any level.

- <http://www.repid.msu.edu/repid-hr-scholars>

Increasing Diversity and Education Access to Sciences (IDEAS)

Directed by Dr. Richard Losick, the IDEAS Howard Hughes Undergraduate Research Program (formerly FEEDS) at Harvard University is being utilized by the MSU Biochemistry department to recruit and cultivate diverse undergraduates to the field of Biochemistry. Applications are welcomed from individuals from any underserved group, such as URM groups in science, economically disadvantaged undergraduate students and first generation college students. The program can support three freshmen or two freshmen and one sophomore each Fall semester. Students work in the laboratory 10-20 hours per week for pay, and have the opportunity to continue with the program throughout their tenure at MSU.

- <http://www.bmb.msu.edu/~ugrad/research/MSUBMBIdeas.html>

Engineering and Science Summer Academy (ESSA)

In collaboration with the Michigan Louis Stokes Alliance for Minority Participation (MI-LSAMP), ESSA is a six-week, residential, academic intensive program designed to acclimate incoming freshmen with both the academic and environmental aspects of post-secondary education. Participants attend daily classes in Math, English/Writing, Chemistry and an Engineering Seminar course to expose students to post graduation and professional opportunities.

- <http://www.egr.msu.edu/event/2011/06/25/engineering-and-science-summer-academy-essa>

Michigan Louis Stokes Alliance for Minority Participation –Summer Research Academy (SURA)

The MI-LSAMP Summer Undergraduate Research Academy (SURA) is hosted in collaboration with MSU SROP and is designed to provide undergraduate students with a comprehensive research training and enrichment experience. MI-LSAMP SURA helps prepare undergraduate students for graduate study through intensive research experiences with faculty mentors as well as academic enrichment activities. Students gain a competitive advantage as a graduate applicant by: 1) Intense research activities that broaden technical and presentation skills, 2) Professional and academic development activities, 3) Seminars that introduce students to a range of research fields across disciplines, and 4) Informal gathering for student and faculty exchange.

- <http://www.egr.msu.edu/dpo/programs/summer-residential-programs/sura-overview/>

Appendix F: Programs Aimed at Increasing Graduate Student Diversity

Sloan Scholars Program at MSU

Dr. Percy Pierre, a faculty member in MSU’s Electrical and Computer Engineering (ECE) department, received a grant in 1998 from the Alfred P. Sloan Foundation to recruit and fund minority graduate students in his department. Since then, the department has graduated approximately 45 minority Ph.D.s and has also extended into the Computer Science department. Minority students are recruited primarily from HBCs and Puerto Rico but occasionally, students apply from other institutions. Students from the Sloan program account for 15% of the ECE graduate student population and 40% of the domestic student population.

Notable factors that have made this program successful are funding, mentoring and support from the Admissions Committee. Since the Sloan program is funded through various grants and the Graduate School, Dr. Pierre can make offers independently of the student having a faculty member sponsor. Front-end support is crucial in helping to place students in labs throughout the department. Dr. Pierre then takes an active mentoring role once the students arrive to ensure they pass the qualifier and other program requirements. Sloan students participate in lunchtime social events every other week as a way of developing a rapport with each other. The camaraderie is not only beneficial for current students, but helps in recruiting new students to the program.

The Sloan program highlights the need for a “department champion”; someone who advocates for the students with a recruitment committee, maintains contact with them during the application process, and invests in their success during their time at MSU. Dr. Pierre is an excellent resource and potential mentor to interested faculty of CNS initiatives. Existing support structures, such as AGEF, are already in place at MSU and help to ensure student success throughout graduate school. In addition, the Sloan program has tapped internal sources for funding, like BEACON, which are also relevant for departments in CNS.

Resources:

- Dr. Percy Pierre, Sloan Program Director. Email: pierre@msu.edu

Bridge Programs

Graduate Bridge programs are transition programs that offer participating students the opportunity to engage in a true graduate student experience. Bridge programs are generally

structured into one of three types: research programs, certificate programs and Master's degree granting programs. Research Bridge programs are solely research programs, wherein students participate in an intensive research experience. Certificate Bridge programs are also research programs but require that students generate a research proposal on their research project. These programs have the added value of offering students a certificate of completion from their institution. For Master's degree granting Bridge programs, students are required to complete and submit a Master's thesis, along with taking the final oral comprehensive exam.

Model Program #1: Fisk-Vanderbilt Masters- Ph.D. Bridge Program

To date, one of the most successful Bridge programs in the United States is the Fisk-Vanderbilt program in Tennessee, which began in the Department of Physics and Astronomy and has since expanded to include Biology and Chemistry. Since its inception in 2004, the program has successfully graduated 45 underrepresented minorities (55% of these students being women). Of those who entered the program, 94% stayed until graduation.

The Fisk-Vanderbilt program was started by a cohort of faculty in the Physics department at Vanderbilt, in collaboration with Fisk University, a university with a large population of African American students. Students admitted to the Fisk-Vanderbilt program earn their Master's degrees at Fisk and transition to Vanderbilt for their Ph.D. Students are assigned a faculty mentor at both Vanderbilt and Fisk to ensure they make adequate progress. The faculty who began this program credit a large part of its success to the consistent mentoring each student receives.

There are many other aspects of the program's structure that contribute to successful students. A committee consisting of eight faculty members from both Fisk and Vanderbilt (and one from each discipline) do most of the recruiting and mentoring of the students. Due to the program's growth, the Fisk/Vanderbilt program has hired a full time Executive Director to monitor the students more actively and make tutoring assignments available to the students. Additionally, two full-time program coordinators (one at Fisk and one at Vanderbilt) handle administrative aspects such as registration, financial aid and other reimbursements, scheduling and advertising.

Another important aspect of this program is that students are funded throughout their tenure in the program. The program provides a full stipend, tuition, and insurance for the first three years, which supports students for their entire Master's program at Fisk and the first year of their Doctoral program at Vanderbilt. After that time, students are guaranteed three additional years of

funding in TA and RA-ships. The stipends included in the Fisk Master's program and Vanderbilt Ph.D. program are approximately \$21K and \$26K per year, respectively. Tuition at Fisk is \$15K per year and the Vanderbilt tuition is \$30K per year. Insurance is approximately \$2500 per year.

Resources:

- Dr. Kievan Stassun, Vanderbilt University. Email: keivan.stassun@vanderbilt.edu
- Fisk-Vanderbilt Bridge Program website: <http://www.vanderbilt.edu/gradschool/Bridge/>

Model Program #2: Jackson State University Bridge to the Doctorate Program

The National Science Foundation established the Louis Stokes Alliance for Minority Participation (LSAMP) Program to provide support to initiatives that assist in increasing the number of students who earn Doctoral degrees in STEM fields, with particular interest in URM students. Under LSAMP, the Bridge-to-the-Doctorate Program (BDP) was created to provide former LSAMP students with a fellowship to pursue graduate studies. This program offers stipends of \$30,000 annually for two years, tuition and fee coverage, mentoring, academic enrichment, academic year and summer research experiences, travel to conferences, workshops, seminars, and speaker series. To date, there are 14 BDP institutions nationwide.

BDP at Jackson State University (JSU) in Jackson, Mississippi offers research experiences at JSU or with a partnering institution including, but not limited to, the Armed Forces Institute of Pathology, the Lawrence Berkeley National Lab, the National Institutes of Health, the Office of Naval Research, the University of California at Berkeley, Santa Barbara and Southern California, and the University of Hawaii. In addition to the BDP benefits package, the JSU-BDP Program also offers a weekly journal club and organizes group visits to labs, universities and private sector companies. JSU-BDP is starting its 9th cohort this year. Since its inception, a total of 94 students have entered the program, 72 have been admitted to Doctoral programs, 11 earned their Ph.D., and 40 are currently completing their dissertation or coursework. Nine students from Cohort 7 have been admitted to Doctoral programs and 3 are awaiting response.

Resources:

- Dr. Abdul K. Mohamed, Director for JSU-BDP. Email: abdul.k.mohamed@jsums.edu
- Ms. Joan Blanton, Program Manager for JSU-BDP. Email: joan.blanton@jsums.edu
- Jackson State University BDP website: <http://www.jsums.edu/cset/BD.htm>

Appendix G: McNair Scholars Programs

In the following list, contact information is as given on the universities' McNair Scholars Programs websites, except where denoted by an asterisk, in which case the information was confirmed or supplemented by personal contact with a representative from that program.

* Northern Michigan University
Megan DelBello, Coordinator
mdelbell@nmu.edu
mcnair@nmu.edu
(906) 227-2560
2809 West Science
Marquette, MI 49855
<http://www.nmu.edu/mcnairscholars/>

* Central Michigan University
Lynn Curry, Director
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(989) 774-1138
Foust 148
Mount Pleasant, MI 48859
<http://www.mcnair.cmich.edu/>

Eastern Michigan University
Heather Neff, Director
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(734) 487-8240
Wise Hall, 1st Floor
Ypsilanti, MI 48197
<http://www.emich.edu/mcnair/>

Grand Valley State University
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(616) 331-3441
1 Campus Drive 230 STU
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Wayne State University
Joseph Baynesan, Program Director
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(313) 577-9484
5700 Cass Avenue
1330 A/AB
Detroit, MI 48202
<http://federaltrio.wayne.edu/mcnair/index.php>

Siena Heights University
Patricia Wallace, Program Director
(517) 264-7157
mcnair@sienaheights.edu
301 Sacred Heart Hall
1247 E. Siena Heights Dr.
Adrian, MI 49221
<http://www.sienaheights.edu/StudentLife/McNairScholarsProgram.aspx>

Resources:

- MSU Student Veterans of America
Shannon Burton, Adviser to MSU-VA and
Assistant Ombudsperson
sburton@msu.edu, (517) 353-8830
Office of the Ombudsperson
MSU
North Kedzie Hall
354 Farm Lane, Rm. 129
- Women and Minorities in the Physical
Sciences, Meet-the-Speaker Series
Megan Romanowich, Past President
knappmeg@msu.edu

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