

## Outreach to Amherst Regional High School

### *Choice of school*

Amherst Regional High School, which is only a mile from the University of Massachusetts (UMass), has had much success in science education, but is also confronted with persistent achievement gaps. The Commonwealth of Massachusetts administers standardized tests in English language arts, math, and science/technology/engineering to all 5<sup>th</sup>, 8<sup>th</sup> and 10<sup>th</sup> graders (Massachusetts Comprehensive Assessment System, MCAS), and students are required to achieve minimum specific scores on the 10<sup>th</sup> grade tests (individual tests in biology, chemistry, physics and technology/engineering) in order to proceed to graduation. Students at Amherst Regional High School (ARHS) score typically double the state MCAS average in all subjects and in all grades. Consequently, there has been little attempt on the part of UMass to develop outreach programs with ARHS, and instead focus has been on school systems in cities in western MA with chronically low MCAS results and a majority of low income and minority students. However, recent data show a very disturbing trend in the MCAS data from ARHS when scores are broken down by ethnicity and income group. As seen in Table 1, the MCAS data from 2012 for science/technology/engineering show that there is a severe achievement gap in the 10<sup>th</sup> grade between white and minority students, and an equally low performance for students from low income families. Further, while approximately 1/3 of 10<sup>th</sup> grade students are low income, it is alarming that almost 50% of 5<sup>th</sup> grade students are low income, and the same achievement gap is even more apparent in these students. These data indicate that this inequality seriously needs to be addressed. In light of these statistics, the proposed outreach program will place special emphasis on including the traditionally underperforming student population as a first step toward closing the achievement gap that exists at ARHS in Science and Technology. This type of outreach from UMass to ARHS is also an important part of the relationship between UMass and surrounding communities.

**Table 1. MCAS scores for 5<sup>th</sup> and 10<sup>th</sup> graders from 2012.** The “low income” category includes students eligible for free or reduced price lunch or for food stamps, and students receiving Transitional Aid to Families benefits.

Student Group	# Students	% Advanced	% Proficient	% Needs Improvement	% Warning
<b><u>Fifth Grade</u></b>					
Afr. American/Black	12	8	25	33	33
Hispanic/Latino	33	6	9	58	27
White	88	25	39	33	3
Low Income	64	8	20	48	23
<b><u>Tenth Grade</u></b>					
Afr. American/Black	17	29	41	29	0
Hispanic/Latino	32	25	44	28	3
White	140	66	30	3	1
Low Income	58	31	36	26	7

### *Outreach to high school students*

With full support of the chair of the Biochemistry & Molecular Biology Department (BMB) (see letter of support), the PI will engage in outreach to students and teachers in ARHS. Three different efforts are proposed to bring students to campus in order to introduce them to the practice of science and to demystify the college experience.

These activities are based on discussions with teachers about what they would like to see available to their students, and on the kinds of opportunities they would like to see for teachers. Importantly, there will be no cost to ARHS for these programs.

- 1) Three to five high school students (juniors and seniors) will be offered the opportunity (as an excused absence) to "shadow" an undergraduate junior or senior biochemistry major through a

day on campus. BMB undergraduate volunteers working in research laboratories (~75 juniors and seniors currently) will be chosen as “guides” and paired with a high school student so that the students can not only attend classes, but also see the research laboratories and how undergraduates can participate in research. Students will also have lunch at UMass dining services, which are rated third in the country for food quality. Students will be asked to report back to their science classroom on the day’s experience.

2) BMB undergraduates (4 to 5), with participation of the PI and an undergraduates advisor, will host an evening informational panel each year for high school students and their parents. BMB undergraduates will each have approximately five minutes to present their background, school interests and activities, and their general experience in college and the transition from high school. Students and parents will then have time to ask questions about preparing for and applying to college. An optional tour of the new Life Science Laboratories, where the P.I.’s laboratory is located, will be conducted after the panel.

3) The PI will provide a research opportunity for 1-2 high school students per year with the option for the student to continue as a volunteer during the summer. The students' lab experience will have the potential to count as Alternative Learning Program Credit through the ARHS registrar's office. The P.I. has already hosted two female ARHS students in her lab.

### *Outreach to Teachers*

The P.I. will also make a two week laboratory experience available to one teacher each summer, with the offer of a small stipend (\$500/wk), as included in the proposal budget for participant costs. ARHS teachers have expressed an interest in short term experiences due to other demands on their time and effort during the summer. The participating teacher will join the lab with the understanding that he or she will agree to incorporate their lab experience into the school curriculum. Ideally the teacher will have the opportunity to work next to a high school student during this experience. The P.I. has mentored two in service teachers through an MS in Biology Teaching, and has hosted another high school teacher through a summer of research (at the University of Arizona). The P.I. will also encourage teachers to consider a full summer of research if support can be obtained through an NSF RET supplement.

### *Administration and Assessment*

To facilitate this program of activities, the P.I. will work with a part time administrative assistant (<name>), who will be hired for a total of 40 hours per year to interface with the school and UMass administration on the paperwork required to select students, obtain parental permissions, and bring students to campus. She will work with school teachers and guidance counselors in identifying students for these experiences through a short application procedure. Teachers interested in the summer experience will apply directly to, and be interviewed by the P.I.

Given the small numbers of individuals in the proposed program, statistical assessment of outcomes is not really feasible. The administrative assistant will maintain a database of students involved and their experiences, and these will be featured on the P.I.’s and BMB Departmental website. The P.I. anticipates that this program will nucleate more extensive activities with ARHS and facilitate the ability of other faculty members and departments to offer similar opportunities.