

**02 INFORMATION ABOUT PRINCIPAL INVESTIGATORS/PROJECT DIRECTORS(PI/PD) and
co-PRINCIPAL INVESTIGATORS/co-PROJECT DIRECTORS**

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PI/PD Name: Louis J Liotta

Gender: Male Female
Ethnicity: (Choose one response) Hispanic or Latino Not Hispanic or Latino

Race:
(Select one or more)
 American Indian or Alaska Native
 Asian
 Black or African American
 Native Hawaiian or Other Pacific Islander
 White

Disability Status:
(Select one or more)
 Hearing Impairment
 Visual Impairment
 Mobility/Orthopedic Impairment
 Other
 None

Citizenship: (Choose one) U.S. Citizen Permanent Resident Other non-U.S. Citizen

Check here if you do not wish to provide any or all of the above information (excluding PI/PD name):

REQUIRED: Check here if you are currently serving (or have previously served) as a PI, co-PI or PD on any federally funded project

Ethnicity Definition:

Hispanic or Latino. A person of Mexican, Puerto Rican, Cuban, South or Central American, or other Spanish culture or origin, regardless of race.

Race Definitions:

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Black or African American. A person having origins in any of the black racial groups of Africa.

Native Hawaiian or Other Pacific Islander. A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

White. A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.

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PI/PD Name: Craig A Almeida

Gender: Male Female
Ethnicity: (Choose one response) Hispanic or Latino Not Hispanic or Latino

Race:
(Select one or more)
 American Indian or Alaska Native
 Asian
 Black or African American
 Native Hawaiian or Other Pacific Islander
 White

Disability Status:
(Select one or more)
 Hearing Impairment
 Visual Impairment
 Mobility/Orthopedic Impairment
 Other
 None

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PI/PD Name: Maria A Curtin

Gender: Male Female
Ethnicity: (Choose one response) Hispanic or Latino Not Hispanic or Latino

Race:
(Select one or more)
 American Indian or Alaska Native
 Asian
 Black or African American
 Native Hawaiian or Other Pacific Islander
 White

Disability Status:
(Select one or more)
 Hearing Impairment
 Visual Impairment
 Mobility/Orthopedic Impairment
 Other
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Citizenship: (Choose one) U.S. Citizen Permanent Resident Other non-U.S. Citizen

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PI/PD Name: Magdalena James-Pederson

Gender: Male Female
Ethnicity: (Choose one response) Hispanic or Latino Not Hispanic or Latino

Race:
(Select one or more)
 American Indian or Alaska Native
 Asian
 Black or African American
 Native Hawaiian or Other Pacific Islander
 White

Disability Status:
(Select one or more)
 Hearing Impairment
 Visual Impairment
 Mobility/Orthopedic Impairment
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Citizenship: (Choose one) U.S. Citizen Permanent Resident Other non-U.S. Citizen

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PI/PD Name: Kendra Twomey

Gender: Male Female
Ethnicity: (Choose one response) Hispanic or Latino Not Hispanic or Latino

Race:
(Select one or more)
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 Asian
 Black or African American
 Native Hawaiian or Other Pacific Islander
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List of Suggested Reviewers or Reviewers Not To Include (optional)

SUGGESTED REVIEWERS:

Wenzel, Thomas J.
Charles A. Dana Professor
Dana Chemistry Hall, Room 322
Lewiston, Maine 04240-6028

Lawrence J. Kaplan
Department of Chemistry
Williams College
Williamstown, MA 01267

Patricia S. Hill
Department of Chemistry
Millersville University
PO Box 1002 (1 South George St)
Millersville, PA 17551

James P. Snyder
Chemistry Building
Department of Chemistry
Emory University
Atlanta, GA 30322

George C. Shields
Winslow Professor of Chemistry
Hamilton College
198 College Hill Road
Clinton, NY 13323

REVIEWERS NOT TO INCLUDE:

COVER SHEET FOR PROPOSAL TO THE NATIONAL SCIENCE FOUNDATION

PROGRAM ANNOUNCEMENT/SOLICITATION NO./CLOSING DATE/if not in response to a program announcement/solicitation enter NSF 04-23					FOR NSF USE ONLY	
NSF 06-502			02/09/06		NSF PROPOSAL NUMBER	
FOR CONSIDERATION BY NSF ORGANIZATION UNIT(S) (Indicate the most specific unit known, i.e. program, division, etc.)					0622540	
DUE - STEP-Type I						
DATE RECEIVED	NUMBER OF COPIES	DIVISION ASSIGNED	FUND CODE	DUNS# (Data Universal Numbering System)	FILE LOCATION	
02/09/2006	2	11040000 DUE	1796	075711440	02/09/2006 4:44pm	
EMPLOYER IDENTIFICATION NUMBER (EIN) OR TAXPAYER IDENTIFICATION NUMBER (TIN)		SHOW PREVIOUS AWARD NO. IF THIS IS <input type="checkbox"/> A RENEWAL <input type="checkbox"/> AN ACCOMPLISHMENT-BASED RENEWAL		IS THIS PROPOSAL BEING SUBMITTED TO ANOTHER FEDERAL AGENCY? YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> IF YES, LIST ACRONYM(S)		
042104229						
NAME OF ORGANIZATION TO WHICH AWARD SHOULD BE MADE			ADDRESS OF AWARDEE ORGANIZATION, INCLUDING 9 DIGIT ZIP CODE			
Stonehill College			Stonehill College 320 Washington Street Easton, MA. 02357			
AWARDEE ORGANIZATION CODE (IF KNOWN)						
0022178000						
NAME OF PERFORMING ORGANIZATION, IF DIFFERENT FROM ABOVE			ADDRESS OF PERFORMING ORGANIZATION, IF DIFFERENT, INCLUDING 9 DIGIT ZIP CODE			
PERFORMING ORGANIZATION CODE (IF KNOWN)						
IS AWARDEE ORGANIZATION (Check All That Apply) (See GPG II.C For Definitions)		<input type="checkbox"/> SMALL BUSINESS <input type="checkbox"/> FOR-PROFIT ORGANIZATION		<input type="checkbox"/> MINORITY BUSINESS <input type="checkbox"/> WOMAN-OWNED BUSINESS		<input type="checkbox"/> IF THIS IS A PRELIMINARY PROPOSAL THEN CHECK HERE
TITLE OF PROPOSED PROJECT A Public - Private Partnership to Increase Enrollment, Retention, and Diversity in Chemistry, Biology and Biochemistry						
REQUESTED AMOUNT	PROPOSED DURATION (1-60 MONTHS)	REQUESTED STARTING DATE	SHOW RELATED PRELIMINARY PROPOSAL NO. IF APPLICABLE			
\$ 813,486	60 months	09/01/06				
CHECK APPROPRIATE BOX(ES) IF THIS PROPOSAL INCLUDES ANY OF THE ITEMS LISTED BELOW						
<input type="checkbox"/> BEGINNING INVESTIGATOR (GPG I.A)			<input type="checkbox"/> HUMAN SUBJECTS (GPG II.D.6)			
<input type="checkbox"/> DISCLOSURE OF LOBBYING ACTIVITIES (GPG II.C)			Exemption Subsection _____ or IRB App. Date _____			
<input type="checkbox"/> PROPRIETARY & PRIVILEGED INFORMATION (GPG I.B, II.C.1.d)			<input type="checkbox"/> INTERNATIONAL COOPERATIVE ACTIVITIES: COUNTRY/COUNTRIES INVOLVED (GPG II.C.2.j)			
<input type="checkbox"/> HISTORIC PLACES (GPG II.C.2.j)						
<input type="checkbox"/> SMALL GRANT FOR EXPLOR. RESEARCH (SGER) (GPG II.D.1)						
<input type="checkbox"/> VERTEBRATE ANIMALS (GPG II.D.5) IACUC App. Date _____			<input type="checkbox"/> HIGH RESOLUTION GRAPHICS/OTHER GRAPHICS WHERE EXACT COLOR REPRESENTATION IS REQUIRED FOR PROPER INTERPRETATION (GPG I.G.1)			
PI/PD DEPARTMENT			PI/PD POSTAL ADDRESS			
Department of Chemistry			320 Washington Street			
PI/PD FAX NUMBER			North Easton, MA 023570100			
508-565-1469			United States			
NAMES (TYPED)	High Degree	Yr of Degree	Telephone Number	Electronic Mail Address		
PI/PD NAME	PhD	1991	508-565-1043	lliotta@stonehill.edu		
CO-PI/PD	PhD	1996	508-565-1069	calmeida@stonehill.edu		
CO-PI/PD	Ph.D.	1984	508-565-1419	curtin@stonehill.edu		
CO-PI/PD	PhD	1993	508-565-1069	mpederson@stonehill.edu		
CO-PI/PD	PhD	2002	617-588-9100	kdombi@massasoit.mass.edu		

CERTIFICATION PAGE

Certification for Authorized Organizational Representative or Individual Applicant:

By signing and submitting this proposal, the individual applicant or the authorized official of the applicant institution is: (1) certifying that statements made herein are true and complete to the best of his/her knowledge; and (2) agreeing to accept the obligation to comply with NSF award terms and conditions if an award is made as a result of this application. Further, the applicant is hereby providing certifications regarding debarment and suspension, drug-free workplace, and lobbying activities (see below), as set forth in Grant Proposal Guide (GPG), NSF 04-23. Willful provision of false information in this application and its supporting documents or in reports required under an ensuing award is a criminal offense (U. S. Code, Title 18, Section 1001).

In addition, if the applicant institution employs more than fifty persons, the authorized official of the applicant institution is certifying that the institution has implemented a written and enforced conflict of interest policy that is consistent with the provisions of Grant Policy Manual Section 510; that to the best of his/her knowledge, all financial disclosures required by that conflict of interest policy have been made; and that all identified conflicts of interest will have been satisfactorily managed, reduced or eliminated prior to the institution's expenditure of any funds under the award, in accordance with the institution's conflict of interest policy. Conflicts which cannot be satisfactorily managed, reduced or eliminated must be disclosed to NSF.

Drug Free Work Place Certification

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative or Individual Applicant is providing the Drug Free Work Place Certification contained in Appendix C of the Grant Proposal Guide.

Debarment and Suspension Certification

(If answer "yes", please provide explanation.)

Is the organization or its principals presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency?

Yes

No

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative or Individual Applicant is providing the Debarment and Suspension Certification contained in Appendix D of the Grant Proposal Guide.

Certification Regarding Lobbying

This certification is required for an award of a Federal contract, grant, or cooperative agreement exceeding \$100,000 and for an award of a Federal loan or a commitment providing for the United States to insure or guarantee a loan exceeding \$150,000.

Certification for Contracts, Grants, Loans and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure of Lobbying Activities," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

AUTHORIZED ORGANIZATIONAL REPRESENTATIVE		SIGNATURE	DATE
NAME			
TELEPHONE NUMBER	ELECTRONIC MAIL ADDRESS	FAX NUMBER	

*SUBMISSION OF SOCIAL SECURITY NUMBERS IS VOLUNTARY AND WILL NOT AFFECT THE ORGANIZATION'S ELIGIBILITY FOR AN AWARD. HOWEVER, THEY ARE AN INTEGRAL PART OF THE INFORMATION SYSTEM AND ASSIST IN PROCESSING THE PROPOSAL. SSN SOLICITED UNDER NSF ACT OF 1950, AS AMENDED.

NATIONAL SCIENCE FOUNDATION
Division of Undergraduate Education

NSF FORM 1295: PROJECT DATA FORM

The instructions and codes to be used in completing this form are provided in Appendix II.

1. **Program-track** to which the Proposal is submitted: **STEP-Type I** _____
2. Name of **Principal Investigator/Project Director** (as shown on the Cover Sheet):
Liotta, Louis _____
3. Name of submitting **Institution** (as shown on Cover Sheet):
Stonehill College _____
4. **Other Institutions** involved in the project's operation:
Massasoit Community College _____

Project Data:

- A. Major Discipline Code: **12** _____
- B. Academic Focus Level of Project: **LO** _____
- C. Highest Degree Code: **B** _____
- D. Category Code: _____
- E. Business/Industry Participation Code: **NA** _____
- F. Audience Code: **MS** _____
- G. Institution Code: **PRIV** _____
- H. Strategic Area Code: _____
- I. Project Features: **2 5 6** _____

Estimated number in each of the following categories to be directly affected by the activities of the project during its operation:

- J. Undergraduate Students: **3500** _____
- K. Pre-college Students: **160** _____
- L. College Faculty: **10** _____
- M. Pre-college Teachers: **5** _____
- N. Graduate Students: **0** _____

A Public Private Partnership to Increase Enrollments, Retention and Diversity in Biology, Chemistry and Biochemistry

Stonehill College, the only private four-year institution in the immediate vicinity of Brockton, MA, an economically disadvantaged urban area south of Boston, is recognized as much for its student-centered, nurturing environment as for its outstanding academic programs. Stonehill seeks to attract a larger and more diverse student population to its thriving and supportive science community. Massasoit Community College in Brockton, which serves a highly diverse student population and has a growing science transfer track, seeks to increase Biology, Chemistry and Biochemistry enrollments and retention through graduation and/or transfer for its science students. Stonehill College will partner with Massasoit Community College to increase enrollments, and subsequently graduation rates, in Chemistry, Biology, and Biochemistry through six coordinated initiatives: developing a **theme-based General Chemistry curriculum**, providing **enhanced research experiences** for faculty and students, launching **mentoring programs**, introducing a **Science Summer Bridge Program for incoming first-year students**, fostering **early exposure to science career paths**, and providing **access to college laboratories for AP Chemistry and Biology courses**.

Intellectual Merit: This project is grounded in best practices identified by NSF in promoting increased participation in the sciences. It proposes activities that while new, build on past experience and areas of strength at both institutions, from curricular reforms that will impact all science majors to focused initiatives targeting underrepresented students and community college transfers. Stonehill has an established commitment to a discovery-based approach to learning science, and to collaborative student-faculty summer research, both of which are central to this STEP project. Massasoit's success serving underrepresented and low-income students, its commitment to hiring research-active Ph.D. scientists, and its efforts to improve science advising form a sound foundation on which to build the STEP initiatives. By sharing their laboratory resources and expertise with local high schools, many of whom cannot comply with rigorous AP lab standards, Stonehill and Massasoit will increase and improve AP science offerings, and expose students to the collegiate science environment, two important gateways to science for promising high school students. The Stonehill – Massasoit STEP Partnership is unique for its focus on capacity building as well as direct impact. With STEP grant support, Stonehill will not only share its curriculum, research and career exploration resources with Massasoit, but also will also help Massasoit to build and strengthen its own mentoring, research and outreach capacities far beyond what is typically possible for underfunded community colleges. This increased capacity will have a strong impact on recruiting and retaining science transfer-track students at Massasoit well beyond the grant period, as it will assist their faculty and students to secure grant funding from a wider range of sources, including NSF.

Broader Impact: The Stonehill – Massasoit Science Partnership can serve as a model to stimulate greater cooperation between private four-year institutions and community colleges toward preparing a larger and more diverse science workforce. The greatest strengths of Stonehill institutions like it are their focus on effective undergraduate education and the caring, supportive environment they provide. A disproportionate number of students who pursue advanced study come from institutions like Stonehill. Stonehill's general retention rates and four-year graduation rates consistently exceed 80%. Private institutions also tend to have greater resources available than publicly funded community colleges do. Given that the majority of both Stonehill and Massasoit graduates stay in Massachusetts or in the Northeastern United States where the scientific and biotechnology sectors are particularly strong, increasing the number of Biology, Chemistry and Biochemistry graduates at the two institutions will make a significant impact on workforce development.

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Results from Prior NSF Support

Stonehill College received a grant of \$108,625 from the NSF Course Curriculum and Laboratory Improvement Program (ID#0126678) on 1/1/02 for 30 months for a project entitled “Integrating Hands-on Access to High Field NMR Across the Undergraduate Chemistry Curriculum.” The goals of this project included strengthening students’ abilities to retain what they learn, draw connections between courses, interpret spectroscopic results, and design experiments. In General Chemistry, students investigated electronegativity as well as the “heavy atom effect” by obtaining ^{13}C -NMR spectra of halogenated methanes. Early in Organic Chemistry I, students used the NMR in an experiment involving the use of IR spectroscopy, mass spectrometry, and ^{13}C and ^1H -NMR spectroscopy, all in order to determine the structure of unknown compounds. Through the remainder of Organic Chemistry I and II the students used the NMR to characterize products, determine the stereochemical course of reactions, and study dihedral angles through the use of coupling constants. In Physical Chemistry students used the NMR to perform both kinetic and thermodynamic studies. Advanced Inorganic Chemistry students made extensive use of the broadband multinuclear probe in the characterization of many inorganic complexes. Biochemistry students followed ^{13}C -labeled glucose through glycolysis by ^{13}C -NMR. All new undergraduate laboratory experiments developed through this project as well as assessment results are available at the project website:

http://quickplace.stonehill.edu/QuickPlace/pp_lliotta/PageLibrary85256F380051038F.nsf/h_Toc/A77AB12F87DCB49285256F4E0060F547/?OpenDocument

Since its installation in July of 2002, the NMR has been used in research by both students and faculty (Dr. Leon Tilley, Dr. Maria Curtin and Dr. Louis Liotta). To date fifteen undergraduates and eight economically disadvantaged high school students (Project SEED participants) have used the NMR on research projects. The instrument performed excellently allowing both Dr. Tilley and Dr. Liotta to answer structural questions that had long eluded them. In addition to routine ^1H - and ^{13}C -NMR experiments, Dr. Liotta and his students used a variety of advanced NMR experiments to solve the structures of a number of different compounds that had been isolated while trying to develop a general synthesis for all the possible stereoisomers of polyhydroxylated pyrrolidines, pyrrolizidines and indolizidines. These NMR experiments included COSY, HETCOR, NOSY, and DEPT. Dr. Tilley and his students used the instrument for characterizing compounds (^1H , ^{13}C -, and ^{19}F -NMR), monitoring reaction progress (^1H -NMR integrations), and determining product distributions. Both ^1H - and ^{13}C -NMR spectra were used to determine the structure and relative amounts of each product formed during the solvolysis reactions being studied. Dr. Curtin used ^{27}Al -NMR to study aluminum hydroxypolymers in solution. Five undergraduate research students whose research required the use of the NMR presented the results of their work at the National Meeting of the American Chemical Society in March of 2004. Three of these students have also presented their work at local meetings.

Stonehill College received a grant of \$102,378 from the NSF Course Curriculum and Laboratory Improvement – Adaptation & Implementation Program (ID#0311309) on 7/15/03 for 12 months for a project entitled “An Inquiry-Based Cell Biology Laboratory in which Student Research Teams Investigate the Heat Shock Response Using a Cell Culture Model.” The goals of this project were (1) to establish a sophomore-level Cell Biology Laboratory with an open-ended discovery-based approach to investigate a scientific question; (2) to have students develop and improve crucial professional skills: hypotheses and protocol development, experimentation using proper controls, collection, analysis, and interpretation of data, and formation of conclusions; (3) to foster an atmosphere of cooperative learning; (4) to develop and improve students’ analytical as well as oral and written communication skills. The focus of the lab is the analysis of the cytosolic heat shock protein 70 (Hsp70) in Chinese Hamster Ovary (CHO) cells. Students, working in groups, research, develop, and carry out a discovery-based, semester-long analysis of the effects of various stressors on Hsp70 expression. A lab manual has been written that provides background information, theory, and practical uses of techniques commonly used by a research cell biologist such as pipetting, reagent preparation, cell culture, protein and DNA isolation and quantification, SDS-PAGE and agarose gel electrophoresis, Western blot, ELISA, PCR, and DNA sequencing. The lab manual also includes references

to classic papers for certain techniques as well as review and critical thinking questions. In December, 2004 at the 44th Annual Meeting of the American Society of Cell Biology in Washington, DC Dr. Craig Almeida and Jane De Luca presented a poster entitled “Inquiry-Based Cell Biology Lab Investigating the Heat Shock Response and Osmotic Stress in CHO Cells” at the Pre-College and College Science Education Session as well as gave a presentation entitled “Lessons Learned in Designing a Thematic and Inquiry-Based Sophomore Cell Biology Lab with the Aid of an CCLI-A & I Grant” at the meeting’s Education Initiative Forum. Equipment purchased using the CCLI-A & I grant funds have been used in course labs other than the Cell Biology Lab (e.g., Genetics, Molecular Biology, Immunology, Endocrinology) as well as for faculty-mentored student research projects, some of which have culminated in senior theses.

The Need to Promote STEM Recruitment and Retention in Chemistry and Biology

The critical shortage of scientists in the United States has been emphasized in recent years by a wide range of academic and industry groups¹, as well as the President himself in his recent State of the Union Address. This need is felt nowhere more acutely than in Massachusetts, a national center for the biotech industry and for life sciences research. The lines between Biology and Chemistry are becoming increasingly blurred; this intersection between the disciplines is of major importance to many scientific employers, and Stonehill’s growing enrollments in Chemistry and Biochemistry reflect this trend². Given the high concentration of private colleges in Massachusetts and the state’s 49th place ranking among states in public higher education spending, private colleges have an important role to play in helping to increase the number of qualified science graduates, both on their own and through partnerships with public institutions.

On average, 8% of Stonehill students earn degrees in science, a figure the College has committed to increasing to 11% by 2010.³ Compared to its excellent campus-wide first-year to sophomore retention rate of nearly 90%, Stonehill’s Biology, Chemistry and Biochemistry programs averaged only 53% retention of their majors between 1999 and 2003. Sixty-four percent of the attrition in science programs occurs during the first year, and more than 90% occurs within the first two. While low, this compares favorably to the overall national average retention rate for the first two years of 30% and the average of 40% for colleges enrolling less than 2500 students. In Fall 2004, 182 students majored in Biology, Biochemistry and Chemistry, out of a total full-time student body of 2240 students. Students of color choose science majors in parallel with or slightly higher than their representation on campus, 10%, which the College has steadily increased since 1993 and is ever striving to improve. The average SAT scores of science students at Stonehill are within ten points of the general student population, indicating that there is no significant aptitude gap to overcome. Compared to non-science majors, science students who persist to graduation report the highest satisfaction with their educational experience at Stonehill in the annual graduating senior exit survey.

Given the timing of the drop off, feedback from student course evaluations, and the fact that all Biology, Chemistry and Biochemistry majors are required to take General Chemistry, we conclude that the Introductory Chemistry experience is one of the primary reasons students change majors. The GPA of students who leave the sciences is lower than those who stay (2.78 vs. 3.0) but there is no significant difference in SAT scores or high school preparation, indicating that while students have the aptitude to handle the work, those who leave either lose interest or motivation.

Community colleges play an important role in making higher education accessible to underrepresented groups. Massasoit Community College in the neighboring city of Brockton, MA serves a student population that is 24% of color. While nationally only about one fourth to one half of community college students eventually transfer to four-year institutions,⁴ the transfer rate for Massasoit students in the formal science transfer track approaches 70%. Also significant is the fact that students of color are better represented in the science transfer track than in the overall student body, at 37.4%.

Massasoit's science transfer program is its fastest growing transfer track, growing from 94 students in 2001 to 148 today. Yet when one considers that this semester more than 1200 students enrolled in 45 sections of Bioprinciples, the introductory Biology course with lab component (a common prerequisite for allied health degrees and certificates and a popular way to fulfill the science requirement) there is significant room for growth in the number of science transfer students. Compared to the extremely high enrollments in Bioprinciples, only 122 students enroll in General Chemistry at Massasoit each year, and enrollment drops to less than half that number beyond the first semester. Encouraging more students to take Chemistry at the community college level will allow them to accelerate their progress toward the bachelors degree, and enhance their preparation for upper level course work, whether or not their transfer institution requires Chemistry. At a recent PKAL/Keck Consultancy at Stonehill College, a panel of distinguished alumni in the sciences consistently remarked that one of the strongest aspects of Stonehill's science curriculum is cross-disciplinary requirements: Biology majors must take Chemistry, Chemistry majors must take physics, and both must take calculus. These senior professionals, all of whom work in or oversee laboratories, emphasized that for today's science workforce, graduates with strong chemical backgrounds are much better prepared to succeed in the workplace than those without.⁵

Stonehill College, a selective private four-year institution with 2317 FTE students, and Massasoit Community College, a mid-sized public institution with 4083 FTE students, recognize their significant untapped potential to increase enrollment, transfer, and graduation rates in the sciences, and are well positioned to realize these increases with STEP support.

Qualifications of the Stonehill-Massasoit Partnership

Rated the number one comprehensive college in the Northeast by *US News and World Report* for the 5th consecutive year, Stonehill has the outstanding faculty, strong learning outcomes and supportive environment to manage an effective STEP initiative. The eleven science faculty hired during the past decade bring their rich experience at large research universities, including Harvard, Tufts, Cornell and Caltech, as well as a deep commitment to teaching and learning. The Chemistry department's two newest tenure track hires, both women, have received Cottrell College Science Awards from the Research Corporation. The Chemistry Faculty is also 43% Hispanic, which is particularly significant in a field that counts fewer Hispanics than any other minority group. Sixty percent of all summer student-faculty research at Stonehill takes place in the sciences. Forty percent of Stonehill graduates in Biology, Biochemistry and Chemistry immediately go on to graduate study or professional school. In the past three years, two Stonehill College science students have been awarded prestigious national Barry Goldwater Scholarships, and one student received a Department of Homeland Security Scholarship last year.

Massasoit Community College is located just miles from Stonehill College and serves the city of Brockton, an ethnically diverse and economically challenged community, often seen as a "gateway" city for new immigrants. The Brockton public transportation system makes regular bus stops at both Stonehill College and Massasoit, facilitating contact between the two campuses. More than 1400 students are currently enrolled in lab science courses at Massasoit, and 148 are pursuing a formal transfer track in the sciences (an A.A. in liberal arts with a general science focus). The fact that so many students get exposure to lab sciences and that a formal science transfer track exists mean that there is vast potential for growth. Stonehill enrolls several Massasoit transfer students each year, and consistently finds these students to be well prepared for Stonehill's rigorous curriculum. The average Stonehill GPA for Massasoit transfer students is above 3.0.

Yet in addition to the significant socio-economic disadvantages that many Massasoit science students face, they also miss out on the opportunities common in private institutions that are known to increase retention rates in the sciences: research experiences, faculty mentoring, and career exploration. Very few community college transfers will have the advantages that a small, independent college like

Stonehill can provide; only ten percent of science transfers from the class of 2003 matriculated at a private college. The vast majority of these students transfer to public research universities, where overall retention rates (28% over the first two years) are significantly below those of Stonehill.

Past Efforts to Recruit and Retain STEM students

Stonehill has initiated a number of programs both on- and off-campus to promote success in the sciences. Most significant was the lead role of the science departments in creating the Stonehill Undergraduate Research Experience (SURE) program in 1996. What began as a small project involving several professors and students has developed into a full-scale summer research community that engages 15 student-faculty research teams per year, 60% of which are in the sciences. In an effort to recruit students into the sciences, the Office of Admissions collaborates with the science faculty to host a science open house for accepted students each spring. Students have the opportunity to meet faculty, senior administrators and each other in an intimate setting, and learn more about program offerings. In order to improve both student learning and retention in the sciences, Peer-led Team Learning (PLTL) has become an important feature of first- and second- year science courses at the College. PLTL encourages students to support and learn from each other as they tackle challenging assignments and learn difficult concepts. Stonehill launched its Center for Academic Achievement in 2001 to provide customized peer tutoring in all subject areas, with math and Chemistry being two areas of highest demand.

Since 2002, the Stonehill Chemistry Department has participated in the American Chemical Society's Project SEED, which brings three to five disadvantaged high school students to Stonehill for a summer of paid collaborative research with faculty and undergraduate mentors. Stonehill's SEED alumni have gone on to attend Harvard, MIT, Northeastern and the University of the Pacific, among others. Last year, Stonehill received its first Camille and Louis Dreyfus Foundation Special Grant in the Chemical Sciences, which brought three high school science teachers into Stonehill's labs for a full-time research-based enrichment program that culminated in innovative classroom projects to make Chemistry more exciting for students. For several years, Stonehill faculty have also served as resources for Brockton High School students and teachers as they prepare for their annual science fair.

Massasoit established a formal science transfer track in 1999, and since 2001 the program has grown more than 63%. Massasoit has hired 2 science faculty with Ph.Ds (1 in Chemistry and 1 in Biology) during the past 2 years, and is committed to seeking Ph.D. holders for two additional tenure track positions in the coming two years. In response to the need for improved advising in the sciences, Massasoit created a Science Advising Task Force in 2004 and now insures that all science transfer track students are assigned a science faculty member as their academic advisor. As part of the Massachusetts state education system, Massasoit offers the Joint Admissions and Tuition Assistance Programs, which guarantee admission in state colleges and universities to Massasoit graduates, and tuition reductions for those who maintain a 3.0 GPA.

The Stonehill – Massasoit Partnership's Vision for STEM

The report *A Description of Best Practice Findings of Programs Promoting Participation of Underrepresented Undergraduate Students in Science, Mathematics, Engineering, and Technology Fields* prepared under contract for the National Science Foundation reports six "keys" to success in programs designed to increase minority participation in STEM fields.⁶ These keys included summer bridge programs, research experiences, drop-in centers, mentoring, caring staff, and alliance structures. The science departments at Stonehill College and Massasoit Community College believe that these "keys" that are successful at bringing underrepresented students into the sciences will also help to attract and retain students of all backgrounds. Stonehill has also identified an additional, critically important feature of an effective effort to increase the number of students pursuing careers in the sciences; the material in the introductory Chemistry course must be presented in a way that the students can connect to

it and see the relevance of it to their future and to society. These seven keys are the basic tenets underlining this proposal.

A science partnership with Massasoit Community College is mutually beneficial because it connects Stonehill's teaching, research and career exploration resources with Massasoit's larger, more diverse community, to permanently raise the quality and effectiveness of both institutions' science programs and have a greater impact on science enrollments than either institution could have alone. Most previous NSF-STEP grant recipients have been large research universities. Not only do private colleges and universities educate 3.1 million students, 20% of all college students, but also they grant 30% of all degrees, indicating their proven success in retaining students through graduation⁷. They also provide a disproportionately large number of science students who later earn graduate degrees.⁸ Several of the keys to success mentioned above, are cornerstones of a Stonehill education, including research opportunities for all students, close faculty mentoring of all students, a tutoring center, and above all, a truly caring staff. Stonehill College is prepared to devote available resources to other high-impact initiatives, including summer bridge programs, peer mentoring programs, and improving introductory course delivery to increase enrollment and retention in Biology, Chemistry and Biochemistry.

During the past decade, Stonehill College has invested significant resources in improving instrumentation, attracting high-caliber tenure-track faculty, and expanding its student-faculty research program. In order to increase the number of science graduates and to ensure that all students achieve scientific literacy, the Board of Trustees has authorized a comprehensive campaign featuring a new science facility, to be built within four years.⁹ This new facility will be the largest building on campus, designed not only to meet the present and future teaching and research needs of growing science programs, but also to serve the wider campus and off-campus communities. Now is the ideal time for Stonehill to launch a STEP initiative, as Stonehill will soon more than double its available science space, just as the STEP efforts begin to yield their most significant enrollment increases.

Project Objectives

Stonehill and Massasoit seek to achieve the following objectives through its STEP program:

1. Attract 37 more students per year, by year five, to Stonehill's Chemistry, Biochemistry and Biology majors.
2. Reduce average Stonehill attrition rates in the sciences from 47% to 23%.
3. Increase science transfer track enrollments at Massasoit by 35 students.
4. Increase the number of traditionally underrepresented students in STEM degree programs at Stonehill by 24.

Proposed Activities

To achieve these objectives, Stonehill, working closely with Massasoit Community College, will undertake six initiatives:

- 1. Theme-Based Chemistry:** Recognizing that General Chemistry at Stonehill College appears to be the "gatekeeper" course for students entering the fields of Chemistry, Biology, and Biochemistry, we will revise this introductory course to a multi-section theme-based format. Students will enroll in a section that focuses on an area of particular interest to them, such as Forensics, Food and Nutrition, Environment, Drugs, or Art while all of the students will learn the same skills and concepts. Course curricula will then be shared with Massasoit Community College for adaptation by their faculty. The first theme-based course sections to be developed and offered will be Forensics and Nutrition, based on strong interest at Massasoit for these particular topics. We believe that this change will not only help to retain declared science majors at both institutions, but will also attract new science majors, as these courses will be more attractive ways for all students to fulfill science core requirements.

- 2. Early Research Experiences:** Stonehill students do not typically have the opportunity to conduct summer research until after the sophomore year, when much of the attrition has already occurred, and Massasoit students have no access at all to summer research. Through STEP, Stonehill will reserve four summer research positions per year for incoming first-years or rising sophomores, and will open its summer research program to a peak of eight students from Massasoit Community College. By year five of the grant, Massasoit will have launched its own summer research program, and will continue to have access to Stonehill equipment as needed.
- 3. Enhanced Mentoring, Tutoring and Advising:** Stonehill will establish a peer mentoring program for science majors, pairing trained upperclassmen with small groups of first year students. Stonehill students will also serve as Chemistry tutors at Massasoit, where there is a lack of qualified tutoring support. Massasoit will appoint and train two faculty mentors who will provide intensive advising and ongoing support to students in the science transfer track, and a 2 + 2 transfer option to Stonehill will be actively promoted to Massasoit first-year students.
- 4. Summer Bridge Program:** Based on the success of an existing general summer bridge program at Stonehill, we will develop a science summer bridge program for incoming freshmen from underrepresented backgrounds and students accepted to the College who are interested in the sciences but have some gaps in their preparation. This program will be designed to give these students the jumpstart they need to succeed in bachelors degree science programs.
- 5. Career Exploration:** Stonehill will open up its guest lectures, seminars and career nights to Massasoit science students, and will help Massasoit to develop its own activities in this area, offering a mix of daytime and evening activities to reach both pools of students.
- 6. AP Chemistry and Biology Lab Enhancement:** Stonehill and Massasoit will partner with area schools to offer Advanced Placement Biology and Chemistry labs on both campuses to help underresourced districts meet the rigorous lab requirements and better prepare students for success on AP examinations. By doing these labs at Stonehill and Massasoit, high school students will get firsthand exposure to college faculty and lab environments at a time when they are actively making decisions about which academic fields to pursue in college.

First Initiative: Revising the General Chemistry Course

The General Chemistry requirement for all science majors has been identified as a primary factor in science attrition at Stonehill. According to student evaluations, many students find General Chemistry uninteresting and disconnected and as a result often lose interest in the field early in their college careers. This attitude is not observed in Organic Chemistry. Although students find Organic Chemistry very challenging, they still find it interesting because they see how the topics all connect to each other and how they are built upon one another. In addition, with the current course arrangement, students who do not come into the college as declared science students do not have a chance to become science students. Since they do not take Chemistry their first year they do not have the prerequisites needed for other science courses. Last year, in order to begin addressing part of these student concerns, the Department of Chemistry rearranged the order of the introductory courses. The department now teaches a one semester General Chemistry course for first year science students which is followed by the first semester of Organic Chemistry during spring of the first year. The students take the second semester of Organic Chemistry during the fall of their second year. A second semester of General Chemistry is then offered spring of the second year for those students who are required to take it. A curriculum of one semester of General Chemistry followed by two semesters of Organic Chemistry matches both “Potential Curriculum A” and “Potential Curriculum B” presented in the National Research Council document *BIO 2010 Transforming Undergraduate Education for Future Research Biologists*.¹⁰

The Department plans to make the first-semester General Chemistry course more cohesive and engaging by offering course sections based on different themes. The faculty members will cover the

same chemical concepts in these newly designed courses as is currently covered in the first semester general Chemistry course but will connect it to the particular theme. Each Stonehill Chemistry faculty member has committed to developing a course in one or more of the following themes: Art, Energy, Environment, Drugs, Food and Nutrition, and Forensics. Based on strong interest from Massasoit, Stonehill will roll out theme-based courses with forensics and nutrition first and share the content with Massasoit Chemistry faculty, who will adapt it to meet their objectives and satisfy Massasoit course approval standards. The theme-based approach should result in more student engagement in the courses since the material will be more interesting to them and will seem more cohesive. These first-semester General Chemistry courses will also serve as general education science courses for students not majoring in science. As reported by Dr. Lawrence J. Kaplan regarding his NSF funded project (#9752526) *Project Sherlock: An Interactive Multimedia Program in Forensic Science to Enhance Introductory Chemistry (Science) Courses*, “a number of students who were self-described as nonscience majors have changed their area of specialization and are now practicing forensic scientists.”¹¹ The General Chemistry theme-based courses should result in a number of undeclared students becoming interested in and pursuing STEM fields such as forensics, art conservation and restoration, nutritional and food sciences, etc. If science does not capture their interest, they will still have learned “science’s way of knowing,” and thus they will be better able to function as productive members of 21st century society.

The theme-based model will also be a way for Massasoit, which does not require Chemistry, to attract more students to Chemistry courses. Since Chemistry is required in most bachelors degree science programs, students will be able to transfer more efficiently. Furthermore, their job prospects will be better, as Chemistry is becoming increasingly important to the biotech sector.¹²

The proposed approach to teaching first semester Chemistry is based in a large part on the information in the National Research Council publication *How People Learn: Brain, Mind, Experience, and School* (Expanded Ed.).¹³ A number of findings in this text have guided our design.

- There are new ways to introduce traditional subjects (such as Chemistry) and these new approaches make it possible for a majority of individuals to develop a deep understanding of important subject matter.
- Students often have limited opportunities to understand or make sense of topics because many curricula emphasize memory rather than understanding and present too many disconnected facts in too short a time.
- Experts’ knowledge is connected and organized around important concepts; it is “conditionalized” to specify the contexts in which it is applicable; it supports understanding and transfer (to other contexts) rather than only the ability to remember.
- Students come to the classroom with preconceptions about how the world works. If their initial understanding is not engaged, they may fail to grasp the new concepts and information that are taught, or may learn for purposes of a test but revert to their preconceptions outside the classroom.
- To develop competence in an area of inquiry (such as Chemistry), students must: (a) have a deep foundation of factual knowledge, (b) understand facts and ideas in the context of a conceptual framework, and (c) organize knowledge in ways that facilitate retrieval and application.
- There is no universal best teaching practice. The many possibilities are a rich set of opportunities from which a teacher constructs an instructional program rather than chaos of competing alternatives.

- Students need to learn both “the basics” and thinking and problem solving skills. Students’ ability to acquire organized sets of facts and skills are actually enhanced when they are connected to meaningful problem-solving activities, and when students are helped to understand why, when, and how those facts and skills are relevant. And attempts to teach thinking skills without a strong base of factual knowledge do not promote problem-solving ability or support transfer to new situations.
- While students’ interest and engagement in a task is clearly important it does not guarantee that they will acquire the kinds of knowledge that will support new learning; there are important differences between tasks and projects that encourage hands-on doing and those that encourage doing with understanding.

The conceptual framework that all the themed Chemistry courses will be based upon is that of a traditional general Chemistry course. The courses will still use a General Chemistry text and students will need to learn the factual knowledge related to the concepts being covered. These topics to be covered are those recommended by the National Research Council in the document *BIO 2010 Transforming Undergraduate Education for Future Research Biologist*.¹⁰ All of the sections will cover the same chemical topics, but will include examples and experiments around the contextual theme. When registering for the course students will be able to specify the themes in which they are interested. Thus the students will already be inclined to have an interest in the course; the course will engage the students’ initial understanding, which will assist them to grasp the new concepts. Each section will meet twice a week for three hours each time in a room that will allow for lecture presentations, student group work, and experimentation. The faculty member teaching the course will decide what works best with regard to student learning for a specific topic as it relates to a specific theme (*e.g.* lecture, inquiry based problem solving, student designed experiments, prewritten experiments, or case studies). The sections will continue to use the *Calibrated Peer Review (CPR)*¹⁴ system to facilitate student learning by writing and evaluating essays on specific chemical topics. To assist students in developing the ability to transfer what they learned in one theme or context to other contexts (the ability to transfer knowledge from one context to another is an absolute indicator of true learning) the *Peer Led Team Learning (PLTL)* session will be chiefly devoted to problems that were originally produced for sections with themes other than the theme of the section in which the students are currently enrolled. That is for the section of the course dealing with the environmental theme the *PLTL* meetings will solve problems dealing with drugs, food/nutrition, art, etc.

A good model for the type of themed based General Chemistry sections we are planning is a very successful General Chemistry course with a theme of Environmental Chemistry offered by Dr. Thomas Wenzel at Bates College.^{15,16} In addition to the work of Dr. Wenzel, there are a number of the *ChemConnections* modules developed under the direction of the ChemLinks Coalition and the ModularChem Consortium, both of which were funded by the National Science Foundation, that will provide very useful material for the environmental themed sections.^{17,18,19,20} A starting point for the forensics themed sections will be the work of Dr. Lawrence J. Kaplan at Williams College^{11,21} and Dr. Salim M. Diab at the University of Saint Francis.²² The Kaplan and Diab material will be supplemented with the text *Criminalistics: An Introduction to Forensic Science* and the accompanying laboratory manual.^{23,24} The course sections with the themes of Art, Energy, Drugs and Food/Nutrition will require more development but will follow the model of the Environmental and Forensics sections. A review of *Journal of Chemical Education* provides a plethora of good starting points for these different themed sections. General Chemistry concepts relating to these themes that are covered in these articles include aqueous solutions²⁵⁻²⁹, oxidation/reductions,³⁰ reaction kinetics,^{27,31-33} temperature dependence of kinetics,²⁷ phase changes,²⁷ acid/base Chemistry,^{27,29,34} enthalpy,^{35,36} intermolecular forces,³⁷ units and measures,³⁸ stoichiometry^{28,39,40} molecular properties,^{25,29,41} equilibria,⁴² ionic compounds in aqueous solutions, electron configurations,^{31,43} atomic structure,^{43,44} periodic trends,^{44,45} and bonding.⁴⁴ There is also a *ChemConnections* module on fats that covers many of the first-semester General Chemistry concepts listed above.⁴⁶ This module would be well suited for the food and nutrition themed section. In

addition, before developing the section with a theme of art, Dr. Curtin will attend the Chemistry in Art Workshop offered by Dr. Patricia Hill at Millersville University.

Second Initiative: Early Research Experiences

Stonehill's Undergraduate Research Experience (SURE) program has been engaging students and faculty in collaborative summer research for ten years. Student and faculty evaluations consistently report that this research exposure increases students' commitment to studying sciences and helps them to understand and retain important concepts introduced in science courses. Yet Stonehill students do not typically have access to the SURE program until after the sophomore year, when many students have already left the sciences, and Massasoit students have no access to summer research at all. Through the STEP grant, four SURE slots per year will be set aside for incoming first-year students or rising sophomores. Incoming students will be selected as part of their offer of admission, and rising sophomores will be invited by faculty members to apply. A STEP grant will enable Dr. Kendra Twomey of the Massoit Chemistry Department and Dr. William Hanna, a Massasoit Biology faculty member, to engage four Massasoit students in the SURE program as well. During the third year of the STEP grant, two new Massasoit faculty hires will also be offered the opportunity to do research at Stonehill along with an additional four Massasoit students. This opportunity to do summary research should allow Massasoit to hire much stronger Ph.D. level faculty members than a community college would typically be able to attract. Like their Stonehill peers, Massasoit students will receive compensation for participating, join in with weekly SURE lunches, presentations and field trips, and participate in the annual poster session. Since this research will take place at Stonehill College, Massasoit students will be introduced to Stonehill's faculty, students and facilities. They will get access to a research experience that is currently not available at Massasoit, which will not only help motivate them to continue on in the sciences, but will also be helpful in the admissions process as they apply to Stonehill or to other four year institutions. Stonehill and Massasoit students targeted for these opportunities will be chosen not primarily for their academic performance, but for their strong interest, work ethic, and underrepresented status in the sciences. During the third year of conducting research at Stonehill, Massasoit faculty will use grant funds to purchase equipment needed to establish their own research programs at Massasoit. At this point, the Massasoit faculty will leverage the start-up funds from the STEP grant and preliminary results they obtain while at Stonehill to apply for external funding for their research, which will position them to engage students in research experiences well beyond the grant period.

Third Initiative: Enhanced Mentoring, Tutoring, and Advising

Science education is uniquely challenging and requires substantial commitment and determination. Additional support and guidance along the way will help to build confidence among early stage science majors that will help them to persist through the challenges. Stonehill and Massasoit will establish first year mentoring programs that meet the needs of their very different populations while also facilitating peer-to-peer contact between the institutions. Stonehill will train upper division science students to mentor small groups of first-year students. They will provide an additional layer of support during the first year by keeping in close contact with their mentees, listening to their concerns, connecting them with support services, sharing their own experiences, and hosting social events such as dinners and study breaks. The program will begin with mentoring for traditionally underrepresented students or students with identified academic weaknesses and will expand to include all first-year science majors by year five. A peer mentoring model will also help Stonehill to achieve its long-range strategic objective to increase leadership opportunities for students.³³

Massasoit students often juggle competing work, family and academic demands, vary dramatically in their enrollment patterns, and tend to have much less contact with faculty outside of class, making a faculty mentoring model more appropriate for their needs. Through the STEP grant, Massasoit will appoint two faculty mentors who will work closely with students in the science transfer track beginning

in their first semester. They will counsel underrepresented students and other interested students one-on-one, and utilize Massasoit's three weekly activity periods to offer advising and information sessions about science courses like General Chemistry, summer research opportunities such as those at Stonehill, internship opportunities and transfer programs. Evidence from a STEP-supported study at Texas A&M University and San Antonio College showed that the longer students spend in the community college system, the less likely they are to complete a BS STEM degree.⁴⁷ Early advising will help students to choose their courses carefully and take full advantage of unique co-curricular opportunities that may strengthen their interest in sciences and better prepare them for transfer. In addition to working with declared science transfer track students, the mentors will coordinate outreach activities to two key recruitment pools for science: the 45 sections of Bioprinciples and the more than 640 unsuccessful applicants to Massasoit's extremely competitive (60 slots) nursing program, who would be ideal candidates for science careers.

To effectively prepare peer and faculty mentors for their role, Stonehill and Massasoit will utilize the expertise of Stonehill's Teaching and Learning Center, Academic Support Services at both institutions and the training resources of the Massachusetts Mentoring Partnership. Grant coordinators will first attend the Partnership's "Mentoring from A-Z" workshops. Stonehill will host a customized "Mentoring 101" workshop for the first group of mentors, and will later utilize the "Train the Trainer" workshop module to build institutional capacity to train future peer and faculty mentors.

Due to a shortage of qualified Chemistry tutors, Massasoit students often have only their peers currently taking the course for support. Given that Stonehill has an established student tutoring and TA program and a healthy supply of qualified upper division Chemistry students, Stonehill will use STEP grant funds to recruit, train and compensate two students to provide Chemistry tutoring and review sessions for Massasoit students on their Brockton campus. These positions will be attractive both as alternatives to more traditional administrative student jobs and as opportunities for students interested in teaching at the secondary or college level to gain practical experience.

Transfer students from Massasoit have been extremely well prepared for the rigor of Stonehill's curriculum and have excelled. Both Stonehill and Massasoit have transfer specialists who assist transfers in selecting courses and making a smooth transition to the four-year college. Since 2001, there have been six transfer students in Stonehill's Biology, Chemistry and Biochemistry programs, but until now there has been no targeted effort to attract more of these students. Conversely, publicly funded community colleges are judged by their own associates degree completion rates, which can be at odds with promoting increased transfer to private four-year institutions like Stonehill, whose core requirements do not easily match those of the associates degree. Stonehill has developed a 2 + 2 transfer program for Massasoit science majors that would allow them to enter Stonehill's Chemistry or Biology degree programs at the junior year, efficiently meet Stonehill's unique general education requirements and transfer credits back to the community college after transfer that would allow them to fulfill their Associates requirements. Dr. Twomey, the Massasoit coordinator for this grant, is both a Chemistry faculty member and a Stonehill alumna, making her well suited to promote the program and coordinate between Stonehill and Massasoit. Based on the experience of past STEP grantees, an intensive mix of print media, e-mail, phone calls and face-to-face contacts will all be used to build awareness of the Stonehill option among first-year students, including visits to Massasoit by Stonehill science faculty and current transfer students.⁴⁸ Massasoit science mentors will promote the program further in their interactions with students, and Stonehill will work with the Dean of Science and Mathematics, Admissions and Academic Support Offices at Massasoit to identify underrepresented students who could benefit from the program.

Fourth Initiative: Launching a Science Summer Bridge Program

Many studies have found that summer bridge programs have helped to significantly increase student retention in science.⁸ Barriers that summer bridge programs help students to overcome include lack of self-confidence difficulty in transitioning from high school to college, ineffective learning environments, failure to recognize the relationship between introductory science courses and importance of science to society, general misinformation about science curricula, lack of preparation for the academic challenges associated with a degree in the sciences, and not developing a mentoring relationship with a faculty member early in the first year of courses.

For the past four years, Stonehill has offered the Path, a one-week academic support and orientation program for accepted students in any major with identified gaps in their academic preparation. Path emphasizes self-awareness, study skills, and learning strategies in “real life” learning situations, all while introducing students to key faculty, staff and services on campus that can help them succeed. Academic Services follows these students closely throughout the first year, and brings them together at crunch times such as midterms and finals to provide extra support. The current retention rate of Path students is an impressive 85%.

However, this program was not designed to address the specific needs of STEM students. Under the STEP program, Stonehill will launch a three-week Summer Bridge Program building from 15 to 25 students over the grant period to help them transition with success into a bachelors level science program. The target populations will be science “candidates” (between 5 and 16 enrolled students who seek admission to the sciences each year have significant gaps in their preparation), traditionally underrepresented science majors, and students from underrepresented backgrounds with undeclared majors who might not have previously considered a science major. Stonehill recognizes that many students need to work during the summer to contribute toward the costs of their education. To make participation in the Summer Bridge Program easier on these students, the financial aid office will waive any summer earnings expectation that may have been part of these students’ financial aid packages.

Faculty from the Mathematics, Chemistry, Biology Departments and the Writing Program will serve as instructors, with contributions from a range of student services, peer mentors, and alumni. Students will participate in Peer-Led Team Learning sessions, form study groups, and familiarize themselves with best practices in working on lab reports and problem sets. They will get to know Stonehill’s close knit and supportive science faculty, learn about the many support services available on campus, and spend time with upper level student mentors. They will also adjust to the laboratory environment, receive coaching on writing for science, and interact with a range of Stonehill alumni who work in scientific fields and can introduce them to a broad range of science-related career paths.

Transfer students may not have the same needs as incoming first-year students, given that they have successfully completed all introductory courses, but they will need help in transitioning to the new academic and social cultures. In the past, faculty have not been alerted to the presence of transfer students in the classes, often not realizing this until several weeks into the semester. The STEP Coordinator will work with the transfer counselor to add a science-specific component to transfer orientations in January and August, so that transfer students can meet science faculty members, be paired with a mentor, learn about science department policies, and familiarize themselves with the facility before classes start.

All Summer Bridge Program students will be paired with a peer mentor. The summer bridge program coordinator will work with academic advisors to track the students’ progress throughout the first year, and will reunite the group periodically to provide an additional layer of academic and emotional support.

Fifth Initiative: Early Career Exploration

Stonehill has built a sound foundation of on-campus outreach events featuring science alumni, including Biology and Chemistry career nights, graduate and professional school information sessions, and guest speakers and summer research poster sessions. Selected classes currently visit Pfizer, and groups of 10 or fewer students have been invited to visit Genzyme. Through the STEP program, Stonehill College will host at least one event per semester that is specifically for first-year students at both Stonehill and Massasoit, and will increase opportunities for lower division students to visit scientific workplaces through class fieldtrips and spring break externships. We are fortunate to have several hundred science alumni working in a wide range of scientific fields within driving distance of campus. Stonehill has a highly successful spring break externship program for business majors that will be adapted for the sciences; students will be able to sign up for half or full day shadowing visits to scientific workplaces, where they will be hosted by Stonehill alumni. A spring break program eliminates academic schedule conflicts. Since the vast majority of Stonehill students live in New England and particularly in Massachusetts, we believe this model will work well. The externship program will be repeated at Massasoit, whose spring break falls one week after Stonehill's. Stonehill will also advertise its science career events to Massasoit students and faculty, and work with the Massasoit faculty mentors to launch similar events at Massasoit during the weekly activity periods when most students are on campus and able to attend.

Sixth Initiative: AP Chemistry and Biology Lab Enhancement

Budget cuts have forced many high schools in the region to cut back their Advanced Placement course offerings, and chronic lack of resources have prevented others from launching such programs in the first place. Massasoit and Stonehill science faculty have learned that even those schools that do offer AP Chemistry and Biology are unable to comply with the rigorous course lab requirements, leaving their students at a disadvantage on the national AP exams. The STEP Grant will enable Stonehill and Massasoit to support local high school AP science programs, based on proximity and need, by offering the lab components one Saturday per month in the Stonehill Chemistry and Massasoit Biology laboratories, with bus transportation provided. Brockton, Randolph, Avon, Holbrook and Coyle Cassidy (in Taunton) High Schools have expressed interest, and note that this arrangement will give teachers more time to adequately cover the course material during the regular school day and will provide students with a greatly enhanced laboratory experience at no cost to them. This program will be offered first to Brockton and Randolph, the districts with the greatest diversity and socio-economic need. The lab components will be taught by experienced AP teachers and developed in close coordination with participating schools so that the lecture and laboratory components fit together. Students will gain early exposure to the collegiate science environment and will interact with college students and faculty who will be on hand to assist and monitor equipment use. This targeted outreach is important because it is a unique opportunity to keep students interested in science at the precise time when they are considering plans for college, and also helps both Stonehill and Massasoit to meet their shared commitment to serve as a resource for the wider communities they serve.

Project Coordination

Lead Investigator Dr. Louis Liotta, Chair of the Chemistry Department at Stonehill College, will oversee the implementation of the grant, approve budget expenditures, and coordinate evaluation and reporting. He will keep in close contact with project coordinators at both campuses and will respond to recommendations from the Advisory Committee. He will directly manage the roll out of theme-based Chemistry at Stonehill and assist Massasoit as needed with adapting the courses for their use. He will coordinate the early research experience initiative for both the Stonehill College and Massasoit personnel.

Assistant Professor of Chemistry Dr. Magda James-Pederson will serve as the STEP grant coordinator, responsible for the mentoring, tutoring and advising initiative, the summer bridge program,

and the career exploration initiative. Currently a part-time faculty member, she will become full-time to assume implementation responsibility for the six initiatives. In addition, she will also teach in the Department of Chemistry at Stonehill, thus allowing other faculty members the release time necessary to develop other theme-based chemistry courses. She will serve as the lead faculty member for the summer Bridge program, and serve as a key mentor for underrepresented students. She will also develop a first-year Chemistry course related to food and nutrition. Once the theme-based model is fully implemented, the greater number of smaller sections will necessitate that she continue in a full time role. Stonehill College is committed to maintaining this level of staffing in the Chemistry departments. The College will cover the costs of any adjuncts that might be needed to allow Dr. Pederson to complete her STEP project responsibilities and will gradually assume the position's salary starting in Year Four.

Dr. Pederson will work closely with Dr. Kendra Twomey, Assistant Professor of Chemistry at Massasoit Community College, who will serve as Massasoit coordinator for the STEP initiative. As a team, they will insure regular contact with Stonehill and Massasoit science faculty, student and faculty mentors, participating high schools and transfer counselors to maximize the effectiveness of recruiting, retention and transfer initiatives under the grant. Professor Twomey will also conduct full-time summer research with Massasoit students at Stonehill for the first three years of the grant period, and will build the Chemistry summer research component at Massasoit for the last two years of the grant period.

Dr. Craig Almeida, because of his relationship (oversees all science secondary education students at Stonehill) and experience (was a high school teacher before attending graduate school) with area high schools, will work with the schools to develop and implement the AP laboratory initiative. Maria Curtin, with her extensive experience both teaching General Chemistry and actively working with SENCER, will provide oversight into the development and implementation of theme-based General Chemistry courses.

An Advisory Committee, led by Stonehill Vice President for Academic Affairs Dr. Katie Conboy, will meet once per semester to review grant activities and make suggestions to improve outcomes. The committee will also include Dr. Pederson; Dr. Twomey; Bonnie Troupe, Director of Academic Development, whose office will be instrumental in coordinating summer research activities and managing the grant budget; Dr. Craig Almeida, Associate Professor of Biology and Director of the Biochemistry Program, who is himself a community college graduate; Dick Grant, Director of Academic Services; Dr. Maria Curtin, Professor of Chemistry; Jean Hamler, Director of Intercultural Affairs; and David Campbell, Dean of Science and Math at Massasoit Community College.

Project Outcome Measures

The following benchmarks will be used to measure annual progress of the STEP Program:

To be Measured	Year 1	Year 2	Year 3	Year 4	Year 5
Increase in total Stonehill science students	0	13	41	86	118
First year students	0	8	20	37	37
Sophomores	0	3	11	24	42
Juniors (from Massasoit transfers)	0	2(1)	7(2)	17(3)	31(4)
Seniors (from Massasoit transfers)	0	0	3(1)	8(2)	18(3)
Annual increase in underrepresented students in sciences at Stonehill	0	3	8	16	24
Annual increase in science transfers to Stonehill	2	3	5	7	9
Annual increase in Massasoit science transfer track students	0	10	20	30	35

1 st - 2 nd year Stonehill science attrition rate	38%	34%	30%	25%	20%
Summer Bridge Program participation	15	17	20	22	25
Students participating in AP lab courses	0	50	50	50	50

Project Evaluation Methods

Dr. Edward Brush, Associate Professor of Chemistry at Bridgewater State College, has agreed to serve as outside evaluator for this project. Dr. Brush is a four-time NSF Principal Investigator (awards 0421081, 9981064, 9300283, 9200235) and coordinator of the “Chemistry OutReach” Program at Bridgewater State College. He will work with the PI and Co-PIs throughout the grant period to advise on outcome measures, survey and focus group design, and to analyze annual progress. Ultimately, all project successes will be measured by comparing actual increases in STEM students with the proposed targets for the STEP program, but a deeper qualitative understanding of our progress will be actively pursued as well. We have found logic models to be an effective tool for mapping and measuring inputs, activities, outputs and outcomes for both formative and summative progress. The Office of Academic Development has developed and refined midpoint and final surveys for the SURE and SEED research programs that will be modified slightly for student and faculty researchers participating as part of the STEP program. Chemistry faculty members involved in the introductory course redesign will share old and new syllabi which can be reviewed for substantive changes, student performance in the new courses vs. the old general Chemistry will be reviewed, and student evaluations of the old and new courses will be compared. Exit interviews will be conducted with students leaving science majors to determine what factors most influenced their decision. All summer program participants and faculty will complete extensive evaluations so that improvements can be made to the program from one year to the next, and participants will be tracked to determine whether they persist in the sciences. Survey instruments and focus groups for Massasoit transfer students, both those who attend Stonehill and those who transfer to other institutions, will be developed to understand and address the factors that most impact transfer track student outcomes. Student performance on the AP Chemistry and Biology exams will be tracked, and a concerted effort will be made to determine whether AP lab participants major in a STEM field in college.

Project Dissemination

Stonehill and Massasoit will work to increase awareness of the STEP initiatives both on and off campus. A STEP project website will be created and maintained with links to departmental and admissions sites at Stonehill and at Massasoit. SURE program weekly lunches will provide another opportunity to share program developments with faculty, undergraduates, SEED students and high school teachers participating in the summer research community. Stonehill’s Office of Media Relations will develop press releases at appropriate milestones in the program and will pitch STEP-related stories to area media outlets, including the Patriot Ledger, the Enterprise, the Boston Globe and the Providence Journal.

Stonehill and Massasoit are part of SACHEM, a regional higher education network that includes Wheaton College, Bridgewater State College, Dean College, UMASS Dartmouth, Cape Cod Community College and Bristol Community College. SACHEM offers a forum for sharing the results of this STEP project and for developing replication projects that draw on the strengths and needs of member institutions. Stonehill will present its findings and obtain feedback on its STEP activities at meetings of the national and regional organizations to which Stonehill belongs, including the American Chemical Society, NEASC, American Association of Colleges and Universities, the Council of Independent Colleges (Stonehill’s President is on its Board), and the Council on Undergraduate Research. Stonehill is also an active participant in the Project Kaleidoscope (Chemistry faculty member Marilena Hall is a Faculty for the 21st Century member), and SENCER (in which faculty member Maria Curtin is an active participant and presenter). When appropriate, STEP faculty will submit articles to journals such as the *Journal of Chemical Education* and the *Council on Undergraduate Research Quarterly*. In addition to

SACHEM, Massasoit is also a member of the American Association of Community Colleges (AACC), and will seek to present the STEP Program at the AACC Annual Convention.

Project Sustainability

Increasing science enrollments and attracting and retaining students of diverse racial, ethnic and socioeconomic backgrounds are two of Stonehill's most important strategic objectives in its current long-range plan.³ All six of the proposed initiatives grow directly from the existing foundations Stonehill and Massasoit have laid for promoting student retention, fostering research experiences for students, insuring quality advising and pursuing science outreach activities. A STEP grant will enable us to deepen and broaden the impact of reforms that will reap long-term benefits beyond the life of the grant. Stonehill is currently in the leadership phase of a \$55 million comprehensive campaign that will raise \$20 million for facilities including an 85,000 square foot science building, \$20 million for scholarships, \$8 million for academic initiatives such as student-faculty research, and \$7 million for annual operating funds.⁵ This campaign is slated to conclude a year before STEP grant, positioning the College well to carry on STEP initiatives.

Stonehill will assume the salary of the STEP coordinator so that she will continue to teach in the Chemistry department, oversee the peer mentoring program, and coordinate the summer bridge program. The Stonehill Undergraduate Research Experience (SURE) Program will be in a position to absorb the additional summer research positions created for first year students as it grows with the influx of campaign funds; several student research positions have already been endowed. Stonehill anticipates continuing the summer bridge program on a sliding scale model, where the program would become open to all interested first-year students for a fee, which would subsidize students for whom it would be a financial hardship. Priority would continue to be given to underrepresented students, science candidates, and interested transfer students. Workstudy positions will be allocated for science tutors and for student mentoring coordinators. Once a culture of mentoring is firmly in place, we are confident that students will choose to mentor as a form of community service and leadership, just as they do in dozens of existing outreach programs at Stonehill, including the required first-year "Cultural Encounters" seminar.

At Massasoit, participation in research at Stonehill and the equipping of basic research labs will position Massasoit faculty to apply for NSF, ACS-PRF, Research Corporation, NIH, and other grant funding, for themselves and for their students. Massasoit will endeavor to sustain science faculty mentoring by providing course release time to faculty members, and will seek to make mentoring and/or collaborative research important qualifications for two upcoming tenure track faculty hires in the sciences, and will use the grant period to strengthen the mentoring skills of all science advisors.

Stonehill's Offices of Academic Development and Corporate and Foundation Relations will continue to collaborate with Massasoit's Office of Grants to seek additional grant funding sources, and the Massasoit Science Department will work closely with the Massasoit's Office of Development and Alumni Relations to identify individual donors with strong interest in the sciences.

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LOUIS J. LIOTTA

Stonehill College
Department of Chemistry
320 Washington Street
Easton, MA 02357-0100
lliotta@stonehill.edu

Work: (508) 565-1043
Fax: (508) 565-1469
Home: (401) 333-6833

- PROFESSIONAL PREPARATION:
- | | |
|--|-----------|
| Penn State University
B.S., Honors, Chemistry | 1985 |
| Cornell University
M.S., Organic Chemistry | 1987 |
| Ph.D., Bioorganic Chemistry | 1990 |
| Penn State University
Bioorganic Chemistry
National Institutes of Health Postdoctoral Fellow | 1990-1993 |
- APPOINTMENTS:
- | | |
|---|--------------|
| Professor of Chemistry, Stonehill College | 2005-present |
| Chair Department of Chemistry, Stonehill College | 2000-present |
| Associate Professor of Chemistry, Stonehill College | 1999-present |
| Assistant Professor of Chemistry, Stonehill College | 1993-1999 |
- RELEVANT PUBLICATIONS:
- Almeida, C. A.; Liotta, L. J. "Organic Chemistry of the Cell: A Sophomore Learning Community that Focuses on the Reading and Analyzing of Primary Literature," *J. Chem. Educ.* **2005**, *82*, 1794-1799.
- Liotta, L. J. "Hydroboration/Oxidation of 1-Hexene to Make 1-Hexanol," *Modular Laboratory Program in Chemistry*; Chemical Education Resources, Inc.: Palmyra, Pennsylvania, **2000**.
- Liotta, L. J. "Acid Catalyzed Hydration of 1-Hexene to Make 2-Hexanol," *Modular Laboratory Program in Chemistry*; Chemical Education Resources, Inc.: Palmyra, Pennsylvania, **2000**.
- Nash, J. G.; Liotta, L. J.; Bravaco, R. J. "Knowledge Change in the Context of a College Course in Organic Chemistry," *J. Chem. Educ.* **2000**, *77*, 333-337.
- Sletten, E. M.*; Liotta, L. J. "A Flexible Stereospecific Synthesis of Polyhydroxylated Pyrrolizidines from Commercially Available Pyranosides," *J. Org. Chem.* publication pending, anticipated April 2006. (ASAP Web Release Date: 17-Jan-2006)
- (* indicates undergraduate coauthor)
- OTHER PUBLICATIONS:
- Liotta, L. J.; Capotosto, R. D.*; Garbitt, R. A.*; Horan, B. M.*; Kelly, P. J.*; Koleros, A. P.*; Brouillette, L. M.*; Kuhn, A. M.*; Targontsidis, S.* "Synthesis of Methyl β -D-Glucopyranosyl-(1,4)- β -D-Galactopyranoside and Methyl β -D-Xylo-Hex-4-Ulopyranosyl-(1,4)- β -D-Galactopyranoside," *Carbohydr. Res.*, **2001**, *331*, 247-253
- Liotta, L. J.; Dombi, K. L.*; Kelley, S. A.*; Targontsidis, S.*; Morin, A. M.* "Substituted Benzylethers as Radical Stable Protecting Groups," *Tetrahedron Lett.*, **1997**, *38*, 7833-34.

Liotta, L. J.; Ganem, B. , "A Discrimination Protecting Group Strategy for Alcohols and Amines," *Israel J. Chem.* **1991**, *31*, 215-222.

Liotta, L. J.; Lee, J.*; Ganem, B., "Effect of 1-Epoxyalkyl-1-Deoxy-nojirimycins on Exoglucosidases," *Tetrahedron* **1991**, *47*, 2433-2447.

Liotta, L. J.; Ganem, B., "A Short Homochiral Synthesis of Substituted Pyrrolidines," *Synlett* **1990**, 503-504.

SYNERGISTIC ACTIVITIES:

Mentored **Successful** Undergraduate Summer Research Fellowship and Presentation Travel Grants Proposals Writers: James Hummel (2006 *NESACS* Undergraduate Travel Award); Jessica Falco (2006 *NESACS* Undergraduate Travel Award); Ellen Sletten (2005 *NESACS* Undergraduate Travel Award; 2004 Pfizer Inc., Summer Undergraduate Research Fellowship, *SURF*; 2004 Chemistry Division of the CUR Travel Award); Andrew Campbell (2004 ACS Division of Organic Chemistry Undergraduate Travel Award); Renato Bauer (2004 *NESACS* Undergraduate Travel Award); Andrae Vandross, (2002 *NESACS* Undergraduate Travel Award; 2001 Pfizer Inc.; *SURF*); Nicholas Greco (2001 *NESACS* Undergraduate Travel Award); Janelle Comita (2000 Pfizer Inc., *SURF*; 2000 ACS Division of Organic Chemistry Undergraduate Travel Award; 2000 CUR Undergraduate Summer Research Fellowships in Science, Mathematics and Engineering; 2000 *NESACS* Undergraduate Travel Award)

Mentored Undergraduate Research ACS National Meeting Presenters: James Hummel 2006, Jessica Falco 2006, Leighanne Brammer 2005, Ellen Sletten 2005 and 2004, Renato Bauer 2004, Andrew Campbell 2004, Megan Fitzgerald 2004, Andrae Vandross 2002, Erin Leone 2002, Nicholas Greco 2002 and 2001, Janelle Comita 2001 and 2000

Developed in-house Organic Chemistry Laboratory manuals for both first and second semester Organic Chemistry in which the experiments are based on modern organic chemical research techniques. Experiments written for these manuals are being developed into *J. Chem. Educ.* articles in collaboration with Dr. Magda Pederson.

Hosted two economically disadvantaged high school students for eight weeks each of the last four summers as participant in summer research projects as part of the Stonehill College Department of Chemistry hosted Project SEED program.

Led the initiative at Stonehill College to strengthen the natural science by serving as Department of Chemistry Chair since 2000, by serving as principal investigator on an NSF Research Infrastructure grant that led to the remodeling and air conditioning of the science facility, by serving as the chair of the committee that founded the Stonehill Undergraduate Research Experience (SURE) program, by co-designing and initiating a Biochemistry major at Stonehill, by serving as the principal investigator on the Department of Chemistry NSF-CCLI grant to obtain a high field NMR, and by co-chairing the new science facility design committee.

COLLABORATORS & AFFILIATIONS:

Sheila M. Adamus, Providence College
Postdoctoral Advisor: Stephen J. Benkovic, Penn State University
Graduate Advisor: Bruce Ganem, Cornell University

David D. Campbell

Massasoit Community College
Department of Biology
1 Massasoit Boulevard
Brockton, MA 02302
dcampbell@massasoit.mass.edu

Work: (508) 588-9100 x1608
Fax: (508) 427-1231
Home: (781) 447-4888

PROFESSIONAL PREPARATION:	Bridgewater State College Bridgewater, MA B.S., Biology	1961
	Indiana University Bloomington, IN	1964
	Worcester Polytechnic Institute Worcester, MA M.S., Natural Science	1966
APPOINTMENTS:	Teacher of Biology Whitman-Hanson Regional School District Whitman, MA	1961-1965
	Teacher of Biology, Chemistry, Physics Abington Public Schools Abington, MA	1965-2005
	Director of Science Abington Public Schools Abington, MA	1980-2005
	Adjunct Instructor of Biology Massasoit Community College Brockton, MA	1978-present
	Dean of Science and Mathematics Division Massasoit Community College Brockton, MA	2005-present
PROFESSIONAL AFFILIATIONS:	National Science Education Leadership Association Massachusetts Science Education Leadership Association Association of Science Department Heads of Eastern Massachusetts Human Anatomy & Physiology Association National Science Teachers Association	

MARIA AGUDELO CURTIN

Stonehill College

Department of Chemistry Work: (508) 565-1419

320 Washington Street Fax: (508) 565 1469

North Easton, MA 02357 Home: (508) 238 2261

mcurtin@stonehill.edu

PROFESSIONAL PREPARATION:

Merrimack College (North Andover, MA) B.S. Chemistry 1977

Fordham University (Bronx, NY) M.S. Inorganic Chemistry 1979

Brandeis University (Waltham, MA) Ph.D. Inorganic Chemistry 1984

Boston College (Boston, MA) Postdoctoral Fellow 1984-1985

APPOINTMENTS

Associate Professor Stonehill College 1998- present

Chairperson of the Department of Chemistry, Stonehill College 1997-2000

Assistant Professor, Department of Chemistry, Stonehill College 1993-1998

Project Chemist, Toiletries Technology Laboratories, Gillette Company 1985-1991

RELEVANT PUBLICATIONS

Curtin, M.A., Taub, I. A., Kustin, K., Sao, N., Duvall, J. R., Davies, K. I., Doona, C. J., Ross, E. W. "Ascorbate-induced oxidation of formate by peroxodisulfate: product yields, kinetics and mechanism." Res. Chem. Intermed. 2004, 30 (6): 647-661.

Taub, I. A., Doona, C., Curtin, M. A., Kustin, K. "Mechanistic Modeling of Oxidation-Reduction Reactions for Chemical Heating of Rations." Proceedings of the 20th Army Science Conference. Norfolk, Virginia, 1996.

Garipey, K. C.; Curtin, M. A; Clarke, M. J. "Autooxidation of Pentaammineruthenium(III) Nucleoside Complexes: Xanthine Oxidase Activity in a simple compound without Oxo Atom Transfer." J. A. C. S. 1989, 111:4947-4952.

OTHER PUBLICATIONS

Kustin, K., Curtin, M. A.; Doona, C., Taub, I., Kandikar, S., Ross, E., Portable Chemical Sterilizer. US patent application Serial No. 11-105,211, filed April 2005

Kustin, K., Curtin, M. A.; Doona, C., Taub, I., Chemical Combination for Generation of Disinfectant and Heat. U.S. patent application Serial No. 10/988,442, filed November 9, 2004

M. A. Curtin and A. M. Phipps. U S Patent No. 5,356,612 (1994).

M. A. Curtin and A. M. Phipps. U S Patent No.5,330,751 (1994).

M. A. Curtin and A. M. Phipps. European Patent No. 0 337 464 A2 (1989).

Curtin, M. A.; Kustin, K. ; Robinson, W. E. "Iron accumulation in tunicate blood cells. II. Whole body and blood cell iron uptake by *Styela clava*". Biological Bulletin. 1985. 169:152-163.

SYNERGISTIC ACTIVITIES

Contract with Summit Research Labs, Huguenot Division, Huguenot NY. 2004 to present. Stonehill Undergraduate Laura Ingalls '05 worked on this project summer 2004 and Andrew Campbell '05 in the summer of 2005.

Curtin, M.A.; Phipps, A. M.; Kustin, K. Ingalls, L. "Speciation and Chemical Relaxation Studies of Aqueous Basic Aluminum Chloride" Journal of Colloid and Interface Science, to be submitted for publication.

Contracts with the U.S. Army Natick Research, Development and Engineering Center, Natick, MA. December, 1996 - to the present including Stonehill undergraduates

Christina Gendreau 95, John Biello 97, Amy Kuhn 97, Jason Reis 99, Kendra Dombi '98, Matthew Barth '00, Cara Cesario '01, Narith Sao '02, Patricia Bevans '02, J. R. Duvall '02, Shannon Ingraham '03, , Eric Swanson '04.

"Science Education at Stonehill: Changing the culture" Curtin, M. A. August 8, 2005, SENCER summer institute, San Jose, CA

"Scientific Innovations and their Economic Impact: A learning Community" Curtin, M. A.; Kazemi, H.; March 13, 2005. 229th National American Chemical Society Meeting, San Diego, CA.

"Ascorbate induced oxidation of formate by persulfate: Carbon Dioxide and oxalate yields" April 4, 2001. American Chemical Society Meeting, San Diego, CA

"The Voltage Game" demonstrated at the project Kaleidoscope Conference " What Works: Alternatives to Lecture-Based Learning in Math and Science." Wheaton College, MA, June 4, 1998.

Panelist for the National Defense Science and Engineering Fellowship Program, 1997, 1998, 1999 and the NSF Graduate Research Fellowship Program, 1994, 1995, 1996, 2001, 2002, 2003. Chair of one of the chemistry Panels, 2004.

COLLABORATORS & OTHER AFFILIATIONS:

Marilena Hall, Stonehill College

Louis Liotta, Stonehill College

Cheryl Schnitzer, Stonehill College

Leon Tilley, Stonehill College

Micahel J. Clarke, Boston College (Postdoctoral Advisor)

Ken Kustin, Professor Emeritus, Brandeis University (Graduate Advisor)

Alan, M. Phipps, Research Scientist, Gillette Company, Boston, MA (retired)

Christopher Doona, Soldier Systems Command Center, U.S. Army, Natick, MA

Magdalena James-Pederson

EDUCATION

- Ph.D. Department of Biochemistry and Molecular Biology
The Pennsylvania State University, State College, Pennsylvania. 1993
- B.A. Department of Biochemistry
Princeton University, Princeton, New Jersey. 1983

TEACHING APPOINTMENTS

Chemistry Instructor, 2003 – currently
Stonehill College, North Easton, MA
General Chemistry, Organic Chemistry Laboratory, Biochemistry, Genetics

Special Lecturer, 2002 - 2003; Summer 2004
Providence College, Providence, RI
Biochemistry, Chemistry for Non-Majors, Organic Chemistry Laboratory

Visiting Assistant Professor, 1994 - 2001
East Carolina University, Greenville, North Carolina
General Chemistry, Organic Chemistry and Biochemistry
Member of Steering Committee on the Establishment of a Center for Genomics and
Bioinformatics at ECU

RESEARCH EXPERIENCE / THESIS ADVISORS

Graduate Assistant with Dr. Ross C. Hardison.
“The extended promoter of the rabbit α -globin gene”
The Pennsylvania State University. 1983-1989 and 1993

Undergraduate Research Thesis with Dr. John C. Wooley.
“Localization of specific chromosomal proteins in polytene chromosomes of *Drosophila*
Melanogaster by immunofluorescent staining”
Princeton University. 1982-1983

HONORS

Travel Award from The Pennsylvania State University, 1989
NSF Travel Award for Minorities, 1988
Honorable mention: Ford Foundation Doctoral Fellowship for Minorities, 1987

PUBLICATIONS

M. James-Pederson, S.E. Yost, T. Zeigler, R. Miller and R.C. Hardison (1995).
“Flanking and intragenic sequences regulating the expression of the rabbit α -globin gene”
Journal of Biological Chemistry **270**, 3965-3973

D.J. Vandenberg, M. James-Pederson, and R.C. Hardison (1991)
“An apparent pause site in the transcription unit of the rabbit α -globin gene”
Journal of Molecular Biology **220**, 255-270

M.L. Rohrbaugh, J.E. Johnson III, M.D. James, and R.C. Hardison (1985)
“Transcription unit of the rabbit beta1 globin gene”
Molecular and Cellular Biology **5**, 147-160.

Kendra L. Twomey, Ph.D.

Massasoit Community College
1 Massasoit Blvd.
Brockton, MA 02302
kdombi@massasoit.mass.edu

Phone: (508) 588-9100 ext. 1655
Home: (617)-501-8392

Professional Preparation:	Stonehill College	
	B.S., honors, Chemistry	1998
	Tufts University	
	M.S., Chemistry	2000
	Ph.D., Organic Chemistry	2002
	Massachusetts Institute of Technology	
	Postdoctoral, Biochemistry	2002 – 2003

Appointments	Massasoit Community College, Instructor	2004 - present
	Quincy College, Instructor, adjunct	Fall, Summer, and Spring 2004

Other Publications

Dombi, K.L., Steiner, U.E.; Richert, C., Rapidly Measuring Reactivities of Carboxylic Acids to Generate Equireactive Building Block Mixtures: A Spectrometric Assay. *J. Combin. Chem.* **2003**, *5*, 45-60.

Dombi, K.L., Griesang, N., Richert, C., Oligonucleotide Arrays on Aldehyde-Bearing Glass with Coated Background, *Synthesis*, **2002**, 816-824.

Dombi, K.L., Richert, C. Relative Reactivities of Activated Carboxylic Acids in Amide-Forming Reactions Employed For the Synthesis of Tetraphenylporphyrin Libraries. *Molecules*, **2000**, *5*, 1265-1280.

Liotta, L.; Dombi, K.L.; Kelley, S.; Targontsidis, S.; Morin, A. Substituted Benzyl Ethers as Radical Stable Protecting Group. *Tetrahedron Letters*, **1997**, *38*, 45, 7833-7834.

Synergistic
Activities

Developed a laboratory manual for Massasoit Community College students taking General Chemistry I.

Collaborators

& Other Affiliations

Graduate advisor: Clemens Richert, The University of Karlsruhe

Postdoc advisor: JoAnne Stubbe, MIT

David D. Campbell

Massasoit Community College
Department of Biology
1 Massasoit Boulevard
Brockton, MA 02302
dcampbell@massasoit.mass.edu

Work: (508) 588-9100 x1608
Fax: (508) 427-1231
Home: (781) 447-4888

PROFESSIONAL PREPARATION:	Bridgewater State College Bridgewater, MA B.S., Biology	1961
	Indiana University Bloomington, IN	1964
	Worcester Polytechnic Institute Worcester, MA M.S., Natural Science	1966
APPOINTMENTS:	Teacher of Biology Whitman-Hanson Regional School District Whitman, MA	1961-1965
	Teacher of Biology, Chemistry, Physics Abington Public Schools Abington, MA	1965-2005
	Director of Science Abington Public Schools Abington, MA	1980-2005
	Adjunct Instructor of Biology Massasoit Community College Brockton, MA	1978-present
	Dean of Science and Mathematics Division Massasoit Community College Brockton, MA	2005-present
PROFESSIONAL AFFILIATIONS:	National Science Education Leadership Association Massachusetts Science Education Leadership Association Association of Science Department Heads of Eastern Massachusetts Human Anatomy & Physiology Association National Science Teachers Association	

MARILENA FITZSIMONS HALL

Stonehill College
Department of Chemistry
320 Washington Street
Easton, MA 02357-0100
mhall@stonehill.edu

Work: (508) 565-1182
Fax: (508) 565-1469
Home: (617) 713-2944

PROFESSIONAL PREPARATION:

McGill University 1992
B.S., Honors Chemistry

California Institute of Technology 1998
Ph.D., Bioinorganic Chemistry

New England Biolabs, Inc. 1998-2000
Postdoctoral Research in Molecular Biology

APPOINTMENTS:

Assistant Professor of Chemistry 2000-present
Stonehill College

Adjunct Professor of Chemistry 1999-2000
Massasoit Community College

RELEVANT PUBLICATIONS:

Kristin Felice, Jill Harper and Marilena F. Hall. "Modeling the Zn²⁺ Coordination Site of Zinc Metalloenzymes Using Peptide Phage Display" *The Nucleus (a monthly publication of NESACS, the Northeastern Section of the American Chemical Society)* **2004**, Summer Issue.

M. Fitzsimons Hall, C.J. Noren, F.B. Perler and I. Schildkraut. "Creation of an Artificial Bifunctional Intein by Grafting a Homing Endonuclease into a Mini-intein." *Journal of Molecular Biology*, **2002**, 323, 173-179.

K.D. Copeland, M.P. Fitzsimons, R.P. Houser, and J.K. Barton. "DNA Hydrolysis and Oxidative Cleavage by Metal-Binding Peptides Tethered to Rhodium Intercalators." *Biochemistry* **2002**, 41, 343-356.

R.P. Houser, M.P. Fitzsimons and J.K. Barton. "Metal-Dependent Intramolecular Chiral Induction: The Zn²⁺ Complex of an Ethidium-Peptide Conjugate." *Inorg. Chem.* **1999**, 38, 1368-1370.

M.P. Fitzsimons and J.K. Barton. "The Design of a Synthetic Nuclease: DNA Hydrolysis by a Zinc-binding Peptide Tethered to a Rhodium Intercalator." *J. Am. Chem. Soc.* **1997**, 119, 3379-80.

OTHER

PUBLICATIONS:

Kristin Felice and Marilena F. Hall, "Modeling the Zn²⁺ Coordination Site of Zinc Metalloenzymes Using Peptide Phage Display" *Poster presentation by K. Felice at the 227th American Chemical Society National Meeting*, March 2004.

“Rhodium Intercalators with Appended Peptides: Recognition and Reaction” *Oral Presentation at the 212th American Chemical Society National Meeting*, August 1996.

A.E. Grosser, M. Fitzsimons, L. Leonardi and J. Salha. “Model for a Controlled-Release Drug Delivery Safety System with Permeable and Erodible Coatings.” *J. Pharm. Sci.* **1993**, 82, 1061-3.

SYNERGISTIC
ACTIVITIES:

Project Kaleidoscope Faculty for the 21st Century

Mentored **Successful** Undergraduate Summer Research Fellowship and Presentation Travel Grants Proposals Writers: Kristin Felice (2003, James Flack Norris & Theodore William Richards Undergraduate Summer Research Scholarship.

Mentored **Successful** Stonehill Undergraduate Research Experience (SURE) proposal: Benjamin Bolduc (2006, 2005); Kristin Felice (2003); Mark Tuden (2003); Kathryn Stolz (2001).

Mentored Undergraduate Research ACS National Meeting Presenters: Kristin Felice 2004.

Independent Research Students Directed: Benjamin Bolduc (2005), Jessica Kass (2005), Ryan Smith (2004), Erin Beechinor (2004), Andrew Campbell (2004), Kristin Felice (2003), Kate Stefani (2003); Brian Gardell (2003), Jill Harper (2003), Mark Tuden (2003), Katie Stolz (2002).

Hosted two economically disadvantaged high school students for eight weeks, during the summers of 2003 and 2005, as participant in summer research projects as part of the Stonehill College Department of Chemistry hosted Project SEED program.

Developed in-house General Chemistry Laboratory manuals for both first and second semester General Chemistry in which many of the experiments are base on an inquiry approach.

Workshops attended: Supporting Student Laboratory Learning Center for Workshops in Chemical Sciences (CWCS), Chicago July 2005; Use of LabPro Instrument Interface, Vernier Software and Technology, Newton, MA, April 2002; Multi-Initiative Dissemination Workshop, Dartmouth, MA, March 2001.

COLLABORATORS
& AFFILIATIONS:

Christopher J. Noren, New England Biolabs
Postdoctoral Advisor: Ira Schildkraut, New England Biolabs
Graduate Advisor: Jacqueline K. Barton, Caltech

William F. Hanna

Massasoit Community College
Department of Biology
1 Massasoit Boulevard
Brockton, MA 02302
Massasoit.bio@mac.com

Work: (508) 588-9100 x1626
Fax: (508) 427-1231
Home: (508) 558-8104

PROFESSIONAL PREPARATION: Colby College 1995
Waterville, ME
B.A., Biology

John Hopkins University 2002
Bloomberg School of Public Health
Ph.D., Biochemistry and Molecular Biology

APPOINTMENTS: Instructor of Biology 2004-present
Massasoit Community College

RELEVANT PUBLICATIONS:

W. F. Hanna, C. Kerr, J. Shaper and W. Wright (2004). Lewis X-containing Neoglycoproteins mimic the intrinsic ability of zona pellucida glycoprotein ZP3 To induce the acrosome reaction in capacitated mouse sperm. *Biol. Reprod* **71**: 778-89.

C. Kerr, W. F. Hanna, J. Shaper, and W. Wright (2004). Lewis X-containing Glycans are specific and potent competitive inhibitors of the binding of ZP3 to complementary sites on capacitated acrosome-intact mouse sperm. *Biol. Reprod* **71**: 770-7.

C. L. Kerr, W. F. Hanna, J. H. Shaper, and W. W. Wright (2002). Characterization of zona pellucida glycoprotein 3 (ZP3) and ZP2 binding sites on acrosome-intact mouse sperm. *Biol. Reprod* **66**(6): 1585-95.

ABSTRACTS AND PRESENTATIONS:

W. F. Hanna and V. R. Ambros. Identification of genes involved in early heterochronic genetic circuit *via* RNAi-by-feeding. 14th Biennial International *C. elegans* Conference. University of California – Los Angeles. June 2003.

W. F. Hanna, C. L. Kerr, J. H. Shaper and W. W. Wright. Neoglycoproteins Containing Lewis X-glycans mimic ZP3 by inducing the mouse sperm acrosome reaction in a physiologically-relevant manner. Fertilization and Activation of Development Gordon Research Conference. The Holderness School, Plymouth, NH. July 2001

C. L. Kerry, W. F. Hanna, J. H. Shaper and W. W. Wright. Fluorescently-labeled murine ZP3 and ZP2 glycoproteins bind to distinct sites on sperm in a calcium-, capacitation-, and maturation-dependent manner. 34th Annual Meeting of the Society for the Study of Reproduction. University of Ottawa, Ottawa, Ontario. July 2001.

C. L. Kerr, W. F. Hanna, J. H. Shaper and W. W. Wright. Lewis X-containing Neoglycoproteins bind to zona pellucida receptors on murine sperm. 33rd Annual Meeting of the Society for the Study of Reproduction. University of Wisconsin, Madison, WI. July 2000.

W. F. Hanna, C. L. Kerr, J. S. Folmer, J. H. Shaper and W. W. Wright. The oligosaccharide Lewis X plays a functional role in mouse sperm-zona pellucida binding and induction of the sperm acrosome reaction. Northeast Regional Meeting of the Society for Developmental Biology. Marine Biological Laboratory, Woods Hole, MA March 2000.

W. F. Hanna, C. L. Kerr, J. S. Folmer, J. H. Shaper and W. W. Wright. The Carbohydrate structure Lewis X plays a functional role in mouse sperm zona pellucida binding and induction of the sperm acrosome reaction. Fertilization and Activation of Development Gordon Research Conference. The Holderness School. Plymouth, NH. July 1999.

2001 "Lewis X glycans stimulate mouse sperm to undergo the acrosome Reaction in a carbohydrate structure-dependent manner." Fertilization And Activation of Development Gordon Research Conference. The Holderness School, Holderness, NH.

"Lewis X-containing neoglycoproteins induce the mouse sperm acrosome Reaction in a glycans-specific and physiological manner." 14th Annual Mid-Atlantic Reproductive Biology Conference, University of Virginia.

2000 "The role of Lewis X-terminating glycans in the mouse sperm acrosome reaction." 3rd Annual Maryland Reproductive Biology Retreat. Benjamin Banneker Historical Park and Museum. Oella, MD.

1999 "Fucose residues in the context of Lewis X structures are present on mouse ZP3 and when clustered on a polypeptide induce the acrosome reaction." 12th Annual Mid-Atlantic Reproductive Biology Conference. Johns Hopkins University.

"The role of carbohydrates in mammalian fertilization." The Johns Hopkins University Glycobiology Interest Group. School of Medicine, Johns Hopkins University.

1998 "Fucose residues are present on the mouse zona pellucida and participate in the acrosome reaction." 1st Annual Maryland Reproductive Biology Retreat. University of Maryland Donaldson-Brown Conference Center, Port Deposit, MD.

**COLLABORATORS &
AFFILIATIONS:**

Postdoctoral Advisor: Dr. Victor Ambrose, Dartmouth Medical School
Graduate Advisor: Dr. William W. Wright, Johns Hopkins University

Frances McCutcheon
24 Fisher Ave
Brockton, MA 02301
(508) 587-4354

Summary of Qualifications:

- MAT in Biology
- Taught a wide variety of college science courses including: microbiology, general biology, non-majors genetics, anatomy and physiology, survey of chemistry
- Compiled and wrote a series of laboratory exercises for general biology
- Presented workshops on study skills and peer tutoring
- College administration experience

Education:

Bridgewater State College, Bridgewater, MA (1980)
MAT in Biology

Fitchburg State College, Fitchburg, MA (1971)
BS ed. in Biology/Chemistry

Experience:

1992-2002, 2005 – present: Massasoit Community College, Brockton, MA
Professor of Biology
Presently teaching microbiology, but have taught general biology and non-majors genetics. Serve on several college committees including advising task force, strategic planning, and accreditation subcommittee on academic programs.

2002-2005: Massasoit Community College, Brockton, MA
Division Dean for Science and Mathematics
Responsible for hiring and evaluating full time and part-time faculty in the areas of biology, physical science and mathematics, preparing and monitoring the division budget, establishing division course schedule, administrator for MCAS grant, representative at state and local meetings, day to day operation of science and mathematics division

1983-1992: Massasoit Community College, Brockton, MA
Part-Time Instructor in Biology and Chemistry Departments
Taught general biology, microbiology, general chemistry, survey of chemistry, medical science, topics in human physiology. Also ran small group and individual tutoring sessions and workshops on studying in the sciences.

1989-1992: Wheaton College, Norton, MA

Instructor

Taught majors general biology, microbiology, coordinated and taught non-majors biology labs. Responsible for curriculum, ordering supplies, preparation, hiring and supervising work study students, setting up multiple lab sections for non-majors general biology laboratory.

1981-1983: Framingham State College, Framingham, MA

Residence Hall Director

Responsible for daily operation of a 350 person coed dormitory including hiring and training dormitory staff, advising dormitory council, and crisis intervention.

1979-1980: Florida A&M University, Tallahassee, FL

Instructor

Taught general science, biology and chemistry at the on campus laboratory high school. Responsibilities included supervision of student teachers, curriculum revision, and advisor to junior class.

1971-1979: Gardner Public School System, Gardner, MA

Department Chairperson/Teacher

Taught junior high general science. Other responsibilities included preparation of yearly budget, classroom evaluation of colleagues and curriculum development.

Professional Memberships:

NEA/MTA/MFA: National Education Association/Massachusetts Teachers Association/Massasoit Faculty Association

ASM: American Society for Microbiologists

NABT: National Association of Biology Teachers

CHERYL S. SCHNITZER

Stonehill College
Department of Chemistry
320 Washington Street
Easton, MA 02357-0100
cschnitzer@stonehill.edu

Work: (508) 565-1298
Fax: (508) 565-1469
Home: (781) 793-0343

PROFESSIONAL PREPARATION:	Skidmore College B.A., Chemistry	1994
	Tufts University Ph.D., Physical Chemistry	1999
APPOINTMENTS:	Assistant Professor of Chemistry, Stonehill College	2000-present
	Instructor of Chemistry, Suffolk University	1999-2000
	Laboratory Manager, Suffolk University	1999-2000

OTHER

PUBLICATIONS:	Shultz, M. J.; Schnitzer, C.; Simonelli, D.; Baldelli, S. "SFG Spectroscopy of the Aqueous Interface: Ionic and Soluble Molecular Solutions" <i>Int. Rev. Phys. Chem.</i> 2000 , 19, 123-153.
	Schnitzer, C.; Baldelli, S.; Shultz, M. J. "Sum Frequency Generation of Water on NaCl, NaNO ₃ , KHSO ₄ , HCl, HNO ₃ , and H ₂ SO ₄ Aqueous Solutions" <i>J. Phys. Chem. B</i> 2000 , 104, 585-590.
	Schnitzer, C.; Baldelli, S.; Shultz, M. J. "Sum Frequency Generation by Water on Supercooled H ₂ SO ₄ /H ₂ O Liquid Solutions at Stratospheric Temperature" <i>Chem. Phys. Lett.</i> 1999 , 313, 416-420.
	Schnitzer, C.; Baldelli, S.; Campbell, D. J.; Shultz, M. J. "Sum Frequency Generation O-H Vibrations on the Surface of H ₂ O/HNO ₃ Solutions and Liquid HNO ₃ " <i>J. Phys. Chem. A</i> 1999 , 103, 6383-6386.
	Baldelli, S.; Schnitzer, C.; Shultz, M. J. "Structure of Water at the Surface of HCl Solutions: An SFG Investigation" <i>Chem. Phys. Lett.</i> 1999 , 302, 157-163.

SYNERGISTIC

ACTIVITIES:	Mentored students in writing successful Stonehill Undergraduate
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Research Experience (SURE) proposals: Annie Liu (2006), Laura Ingalls (2002), Patrick Furcolo (2001).

Mentored undergraduate research presenter for ACS National Meeting and several regional meetings, Patrick Furcolo (2002).

Implemented changes in General Chemistry curriculum including the introduction of new laboratory experiments, the assembly of an in-house lab manual, institution of a practical laboratory exam, and the creation of an inter-section general chemistry trivia competition (in collaboration with Marilena Hall, 2000-2001).

Founded Stonehill program and hosted economically disadvantaged high school students for eight weeks as part of the Project SEED program (2002, 2005).

Served as administrator and host for high school teacher for eight weeks as part of Project SUCCESS in Chemistry Department at Stonehill College (2005).

Organized chemistry scavenger hunt for children at the Boston Museum of Science as part of a celebration of National Chemistry Week (in collaboration with Marilena Hall, October 2000).

Appointed member of the National ACS Younger Chemists Committee, 1998-2004.

Founder and Co-Chair of the Northeast Student Chemistry Research Conference, MIT, 1999.

Founder and Chair of the New England Graduate Student Physical Chemistry Conference, 1997.

Editorial Assistant: Shultz, Mary Jane. Materials Chemistry, An Immersion Approach to Core Chemistry and Concepts, Benjamin Cummings: San Francisco, *in progress*, 1994-1997.

COLLABORATORS &

AFFILIATIONS: Steve Baldelli, Department of Chemistry, University of Houston
Paul House, Department of Chemistry, Hartwick College
Mary Jane Shultz, Department of Chemistry, Tufts University

LEON J. TILLEY

Stonehill College
Department of Chemistry
320 Washington St.
Easton, MA 02357-0100
ltalley@stonehill.edu

Work: (508)-565-1145
Fax: (508)-565-1469
Home: (508)-763-0584

PROFESSIONAL PREPARATION: Grinnell College, Grinnell IA
B.A., Honors Chemistry 1990
B.A., Honors Russian 1990

Indiana University, Bloomington, IN
Ph.D., Organic Chemistry 1996

APPOINTMENTS: Associate Professor of Chemistry, Stonehill College 2002-present
Assistant Professor of Chemistry, Stonehill College 1996-2002
Visiting Professor, Woods Hole Oceanographic Institute Summer 2001
Adjunct Professor, Northeastern University Summer 2000

RELEVANT PUBLICATIONS

Tilley, L. J.; Prevoir*, S. J.; Forsyth, D. A. "Fun with Computational Chemistry: Solving Spectral Problems using Computed ^{13}C NMR Chemical Shifts. A Comparison of Empirical and Quantum Mechanical Methods," *J. Chem. Educ.* **2002**, 79(5), 593-600.

Anzivino, B.; Cesario*, C.; Comita*, J.; Tilley, L., "From the Mine to A Mirror: Limiting Reagents and the Construction of a Copper Mirror from Malachite," *Chemical Education Resources*, pending.

Smith*, R. M.; Tilley, L. J., *Isotope effects in solvolysis of alpha-trifluoromethylgamma-silyl systems*. Presented at Undergraduate Poster Session, 229th ACS National Meeting, San Diego, CA, 2005

Arsenault*, S.; Byrne*, S.; Tilley, L. J., *Synthesis and Solvolysis of α -Trifluoromethyl γ -Silyl Substituted 3° Systems* Presented at Undergraduate Poster Session, 227th ACS National Meeting, Anaheim, CA, 2004.

Duvall*, J. R.; Prevoir*, S. J.; Tilley, L. J., *Kinetic Studies of Novel Trifluoromethyl-Substituted gamma-Silyl Carbocations and Their Carbon Analogs* Presented at Undergraduate Poster Session, 221st ACS National Meeting, San Diego, CA, 2001.

(*denoted undergraduate co-authors)

OTHER PUBLICATIONS:

Tilley, L. J.; Shiner, V. J., Jr., "Gamma-silyl Stabilized Tertiary Ions? Solvolysis of 4-(trimethylsilyl)-2-chloro-2-methylbutane," *J. Phys. Org. Chem.* **1999**, 12, 564-576.

Pinnick, H. R.; Shiner, V.J.; Stoelting, D. T.; Tilley, L. J., "KNPROG: First-Order Rate Constant Calculation" (QCMP 169) *QCPE Bulletin* **1996**, 16(3), 32.

Montgomery, L. K.; Burgin, T.; Husting, C.; Tilley, L.; Huffman, J. C., "Synthesis and Characterization of Radical Cation Salts Derived from Tetraselenafulvalene and Bis(ethylenedithio)tetraselenafulvalene," *Mol. Cryst. Liq. Cryst.* **1992**, *211*, 283-288.

**SYNERGISTIC
ACTIVITIES:**

Mentored **Successful** Undergraduate Presentation Travel Grant Proposal Writers: Ryan Smith (2005 *NESACS* Undergraduate Travel Award); Shaina Byrne (2004 *NESACS* Undergraduate Travel Award)

Mentored **Successful** Stonehill Undergraduate Research Experience (SURE) proposal: Maura Cassell (2005); Ryan Smith (2004); Bryanna Glod (2004); Shaina Byrne (2003); Ryan Hirschfeld (2002); Shawn Prevoir (1999); Jeremy Duvall (1999); Adam Hall (1998).

Mentored Undergraduate Research ACS National Meeting Presenters: Ryan Smith (2005); Sean Arsenault (2004); Shaina Byrne (2004); Jeramy Duvall (2001); Shawn Prevoir (2001).

Independent Research Students Directed: Maura Cassell (2005); Ashley Bartelson (2004); Bryanna Glod (2004); Ryan Smith (2004); Sean Arsenault (2003); Shaina Byrne (2003); Ryan Hirschfeld (2002); Shannon Courtney (2001); Shawn Prevoir (2001, 2000); Christian Martin (1999); Jeremy Duvall (1999); Dean Wagner (1998); Adam Hall (1998, 1997); Steve Oliveria (1997).

Hosted economically disadvantaged high school students for eight weeks, during the summers of 2002, 2003 and 2005, as participant in summer research projects as part of the Stonehill College Department of Chemistry hosted Project SEED program.

Developed in-house Advanced Inorganic Chemistry Laboratory manual designed to take a research approach to inorganic chemistry involving many experiments requiring high field NMR.

Workshops attended: POGIL (Process Oriented Guided Inquiry Learning), Maine, September 2003; NSF-CHAUTAUQUA Short Course #77: *Advanced Forensic Science*, Memphis, May 2001; NSF-CHAUTAUQUA Short Course #76: *Using Science to Solve Crimes*, Memphis, May 2001; NSF-CHAUTAUQUA Short Course #53: *Studio General Chemistry: Merging Laboratory, Team Problem Solving and Discussion*, Troy, NY, May 2000.

**COLLABORATORS
& AFFILIATIONS:**

David A. Forsyth, Northeastern University
Christopher M. Reddy, Woods Hole Oceanographic Institute
Graduate Advisor: Vernon J. Shiner, Jr., Indiana University, Bloomington, IN

SUMMARY PROPOSAL BUDGET YEAR 1

ORGANIZATION Stonehill College				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Louis J Liotta				AWARD NO.	Proposed	Granted	
				A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)			
				CAL	ACAD	SUMR	
1.	Louis J Liotta - PI			0.00	0.50	2.50	\$ 0
2.	William Hanna - Massasoit co-PI			0.00	0.50	2.50	5,000
3.	Magdalena James-Pederson - Stonehill co-PI/coordinator			0.00	9.00	3.00	48,000
4.	Kendra Twomey - Massasoit co-PI			0.00	2.00	2.50	7,000
5.							
6.	(0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)			0.00	0.00	0.00	0
7.	(4) TOTAL SENIOR PERSONNEL (1 - 6)			0.00	12.00	10.50	60,000
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1.	(0) POST DOCTORAL ASSOCIATES			0.00	0.00	0.00	0
2.	(0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)			0.00	0.00	0.00	0
3.	(0) GRADUATE STUDENTS						0
4.	(10) UNDERGRADUATE STUDENTS						8,680
5.	(0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						0
6.	(5) OTHER						13,000
TOTAL SALARIES AND WAGES (A + B)							81,680
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							16,672
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							98,352
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)							0
2. FOREIGN							0
F. PARTICIPANT SUPPORT COSTS							
1.	STIPENDS \$	28,000					
2.	TRAVEL	0					
3.	SUBSISTENCE	4,725					
4.	OTHER	2,700					
TOTAL NUMBER OF PARTICIPANTS (43)							
TOTAL PARTICIPANT COSTS							35,425
G. OTHER DIRECT COSTS							
1.	MATERIALS AND SUPPLIES						2,400
2.	PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						0
3.	CONSULTANT SERVICES						3,000
4.	COMPUTER SERVICES						0
5.	SUBAWARDS						0
6.	OTHER						0
TOTAL OTHER DIRECT COSTS							5,400
H. TOTAL DIRECT COSTS (A THROUGH G)							139,177
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) (Rate: , Base:)							
TOTAL INDIRECT COSTS (F&A)							0
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							139,177
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							\$ 139,177 \$
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PI NAME Louis J Liotta				FOR NSF USE ONLY			
ORG. REP. NAME*				INDIRECT COST RATE VERIFICATION			
		Date Checked		Date Of Rate Sheet		Initials - ORG	

SUMMARY PROPOSAL BUDGET

YEAR 2

ORGANIZATION Stonehill College				FOR NSF USE ONLY		
				PROPOSAL NO.	DURATION (months)	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Louis J Liotta				AWARD NO.	Proposed	Granted
					NSF Funded Person-months	
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				CAL	ACAD	SUMR
1. Louis J Liotta - PI				0.00	0.50	2.50
2. William Hanna - Massasoit co-PI				0.00	0.00	2.50
3. Magdalena James-Pederson - Stonehill co-PI/coordinator				0.00	9.00	3.00
4. Kendra Twomey - Massasoit co-PI				0.00	2.00	2.50
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00
7. (4) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	11.50	10.50
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (0) POST DOCTORAL ASSOCIATES				0.00	0.00	0.00
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00
3. (0) GRADUATE STUDENTS						0
4. (15) UNDERGRADUATE STUDENTS						10,180
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						0
6. (8) OTHER						26,000
TOTAL SALARIES AND WAGES (A + B)						97,530
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						17,762
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)						115,292
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)						
TOTAL EQUIPMENT						0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)						0
2. FOREIGN						0
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS \$ <u>28,000</u>						
2. TRAVEL <u>2,000</u>						
3. SUBSISTENCE <u>5,355</u>						
4. OTHER <u>3,060</u>						
TOTAL NUMBER OF PARTICIPANTS (115)						TOTAL PARTICIPANT COSTS
						38,415
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES						2,400
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						0
3. CONSULTANT SERVICES						3,500
4. COMPUTER SERVICES						0
5. SUBAWARDS						0
6. OTHER						0
TOTAL OTHER DIRECT COSTS						5,900
H. TOTAL DIRECT COSTS (A THROUGH G)						159,607
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) (Rate: , Base:)						
TOTAL INDIRECT COSTS (F&A)						0
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)						159,607
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)						0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)						\$ 159,607 \$
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$		
PI/PI NAME Louis J Liotta				FOR NSF USE ONLY		
ORG. REP. NAME*				INDIRECT COST RATE VERIFICATION		
				Date Checked	Date Of Rate Sheet	Initials - ORG

SUMMARY PROPOSAL BUDGET YEAR 3

ORGANIZATION Stonehill College				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Louis J Liotta				AWARD NO.	Proposed	Granted	
				A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)			
				CAL	ACAD	SUMR	
1.	Louis J Liotta - PI			0.00	0.50	2.50	\$ 0
2.	William Hanna - Massasoit co-PI			0.00	0.00	2.50	5,000
3.	Magdalena James-Pederson - Stonehill co-PI/coordinator			0.00	9.00	3.00	50,740
4.	Kendra Twomey - Massasoit co-PI			0.00	2.00	2.50	7,000
5.							
6.	(0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)			0.00	0.00	0.00	0
7.	(4) TOTAL SENIOR PERSONNEL (1 - 6)			0.00	11.50	10.50	62,740
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1.	(0) POST DOCTORAL ASSOCIATES			0.00	0.00	0.00	0
2.	(0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)			0.00	0.00	0.00	0
3.	(0) GRADUATE STUDENTS						0
4.	(19) UNDERGRADUATE STUDENTS						11,330
5.	(0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						0
6.	(10) OTHER						36,000
TOTAL SALARIES AND WAGES (A + B)							110,070
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							19,900
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							129,970
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)							0
2. FOREIGN							0
F. PARTICIPANT SUPPORT COSTS							
1.	STIPENDS \$	42,000					
2.	TRAVEL	2,000					
3.	SUBSISTENCE	6,300					
4.	OTHER	3,600					
TOTAL NUMBER OF PARTICIPANTS (134)							
TOTAL PARTICIPANT COSTS							53,900
G. OTHER DIRECT COSTS							
1.	MATERIALS AND SUPPLIES						33,600
2.	PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						0
3.	CONSULTANT SERVICES						4,000
4.	COMPUTER SERVICES						0
5.	SUBAWARDS						0
6.	OTHER						0
TOTAL OTHER DIRECT COSTS							37,600
H. TOTAL DIRECT COSTS (A THROUGH G)							221,470
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) (Rate: , Base:)							
TOTAL INDIRECT COSTS (F&A)							0
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							221,470
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							\$ 221,470 \$
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PI NAME Louis J Liotta				FOR NSF USE ONLY			
ORG. REP. NAME*				INDIRECT COST RATE VERIFICATION			
		Date Checked		Date Of Rate Sheet		Initials - ORG	

SUMMARY PROPOSAL BUDGET YEAR 4

ORGANIZATION Stonehill College				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Louis J Liotta				AWARD NO.	Proposed	Granted	
				A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)			
	CAL	ACAD	SUMR				
1. Louis J Liotta - PI	0.00	0.50	2.50	\$ 0			
2. Magdalena James-Pederson - Stonehill co-PI/coordinator	0.00	9.00	3.00	33,000			
3. Kendra Twomey - Massasoit co-PI	0.00	2.00	2.50	2,000			
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0			
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	11.50	8.00	35,000			
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL ASSOCIATES	0.00	0.00	0.00	0			
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	0			
3. (0) GRADUATE STUDENTS				0			
4. (22) UNDERGRADUATE STUDENTS				11,280			
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0			
6. (8) OTHER				31,500			
TOTAL SALARIES AND WAGES (A + B)				77,780			
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				20,259			
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				98,039			
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT				0			
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				0			
2. FOREIGN				0			
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$	28,000						
2. TRAVEL	2,000						
3. SUBSISTENCE	6,930						
4. OTHER	3,960						
TOTAL NUMBER OF PARTICIPANTS (144)				TOTAL PARTICIPANT COSTS	40,890		
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES				2,400			
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				0			
3. CONSULTANT SERVICES				2,000			
4. COMPUTER SERVICES				0			
5. SUBAWARDS				0			
6. OTHER				0			
TOTAL OTHER DIRECT COSTS				4,400			
H. TOTAL DIRECT COSTS (A THROUGH G)				143,329			
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) (Rate: , Base:)							
TOTAL INDIRECT COSTS (F&A)				0			
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				143,329			
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)				0			
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$ 143,329	\$		
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Louis J Liotta				FOR NSF USE ONLY			
ORG. REP. NAME*				INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG			

SUMMARY PROPOSAL BUDGET YEAR 5

ORGANIZATION Stonehill College				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Louis J Liotta				AWARD NO.	Proposed	Granted	
				A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)			
				CAL	ACAD	SUMR	
1. Louis J Liotta - PI				0.00	0.50	2.50	\$ 0
2. Magdalena James-Pederson - Stonehill co-PI/coordinator				0.00	9.00	3.00	18,000
3. Kendra Twomey - Massasoit co-PI				0.00	2.00	2.50	2,000
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	11.50	8.00	20,000
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL ASSOCIATES				0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0
3. (0) GRADUATE STUDENTS							0
4. (27) UNDERGRADUATE STUDENTS							10,980
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0
6. (8) OTHER							31,500
TOTAL SALARIES AND WAGES (A + B)							62,480
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							10,648
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							73,128
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)							0
2. FOREIGN							0
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ <u>28,000</u>							
2. TRAVEL <u>2,000</u>							
3. SUBSISTENCE <u>7,875</u>							
4. OTHER <u>4,500</u>							
TOTAL NUMBER OF PARTICIPANTS (163)							TOTAL PARTICIPANT COSTS 42,375
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							32,400
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0
3. CONSULTANT SERVICES							2,000
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							0
TOTAL OTHER DIRECT COSTS							34,400
H. TOTAL DIRECT COSTS (A THROUGH G)							149,903
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) (Rate: , Base:)							
TOTAL INDIRECT COSTS (F&A)							0
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							149,903
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							\$ 149,903 \$
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PI NAME Louis J Liotta				FOR NSF USE ONLY			
ORG. REP. NAME*				INDIRECT COST RATE VERIFICATION			
		Date Checked		Date Of Rate Sheet		Initials - ORG	

SUMMARY PROPOSAL BUDGET Cumulative

ORGANIZATION Stonehill College				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Louis J Liotta				AWARD NO.	Proposed	Granted	
				A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)			
				CAL	ACAD	SUMR	
1. Louis J Liotta - PI				0.00	2.50	12.50	\$ 0
2. William Hanna - Massasoit co-PI				0.00	0.50	7.50	15,000
3. Magdalena James-Pederson - Stonehill co-PI/coordinator				0.00	45.00	15.00	199,090
4. Kendra Twomey - Massasoit co-PI				0.00	10.00	12.50	25,000
5.							
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0
7. (4) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	58.00	47.50	239,090
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL ASSOCIATES				0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0
3. (0) GRADUATE STUDENTS							0
4. (93) UNDERGRADUATE STUDENTS							52,450
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0
6. (39) OTHER							138,000
TOTAL SALARIES AND WAGES (A + B)							429,540
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							85,241
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							514,781
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)							0
2. FOREIGN							0
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ 154,000							
2. TRAVEL 8,000							
3. SUBSISTENCE 31,185							
4. OTHER 17,820							
TOTAL NUMBER OF PARTICIPANTS (599)							
TOTAL PARTICIPANT COSTS							211,005
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							73,200
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0
3. CONSULTANT SERVICES							14,500
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							0
TOTAL OTHER DIRECT COSTS							87,700
H. TOTAL DIRECT COSTS (A THROUGH G)							813,486
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)							
TOTAL INDIRECT COSTS (F&A)							0
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							813,486
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							\$ 813,486 \$
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Louis J Liotta				FOR NSF USE ONLY			
ORG. REP. NAME*				INDIRECT COST RATE VERIFICATION			
				Date Checked	Date Of Rate Sheet	Initials - ORG	

C *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

Stonehill College STEP Budget Justification

Year One:

a. Senior Personnel:

During the academic year, 100% of Dr. Pederson's time will be devoted to STEP grant initiatives and thus 100% of her salary (\$45,000) is being requested. She will serve as the STEP grant coordinator over seeing the implementation of all phases of the project. She will be particularly responsible for developing the food and nutrition themed general chemistry course, for the mentoring, tutoring, and advising initiative, the summer bridge program, and for coordinating Stonehill's activities with those of Massasoit. She will also teach courses in the Department of Chemistry so that other faculty members developing the themed base general chemistry courses can have the release time to do so. That is other Stonehill faculty on the grant will not receive any monetary contributions from the grant but will receive release time. Because she will be serving as a faculty member in the summer bridge program she will receive a \$3000 summer stipend.

Dr. Twomey will receive a \$2000 stipend for serving Massasoit's coordinator of the grant. She will also do research at Stonehill College with two Massasoit's students and will receive a \$5000 summer stipend for this activity. Massasoit faculty often teach summer courses to provide summer income the summer research stipend will allow Dr. Twomey to devote herself to research full time.

Dr. Hanna will receive a \$5000 summer research stipend for doing research at Stonehill College with two Massasoit students. This stipend will free him from having to teach summer courses and will allow him to devote himself to research full time.

b. Other Personnel:

Two Massasoit faculty members will be asked to serve as mentors to the Massasoit science transfer students. Because of a lack of qualified faculty to teach all the necessary courses the college cannot grant these faculty release time. Instead, they will each receive a stipend of \$3500 to cover the extra time they will be required to devote to this activity.

Eight undergraduate students (four from Stonehill College and four from Massasoit) will be involved in the summer research initiative. The rate for ten- week undergraduate summer research stipends at Stonehill College is \$3500. Thus \$28,000 is requested for student summer research stipends.

During the academic year five upper level students will receive \$300 stipends to serve as mentors to first-year students. During the academic year, Stonehill students will also provide chemistry tutoring to Massasoit students the grant will provide for 16 hours a week of tutoring for 28 weeks (14 weeks each semester) at a rate of \$10 per hour. Stonehill science students currently have many demands on their time. Most of them would need to reduce time at other activities in order to have time for either mentoring or tutoring. By providing compensation for these activities students can reduce the hours they put into other work-study jobs with out experiencing financial hardship. Many students need the work-study income to meet their college costs so this remuneration is essential.

In addition to chemistry instruction the summer bridge program will also have instruction in math and writing. One faculty member in each of these areas would be needed. A stipend of \$3000 per faculty member is requested. The summer bridge program will also need three (one Stonehill student for every

five bridge program students) current Stonehill science students to act as mentors, tutors, PLTL leaders, and counselors. These students will receive a stipend of \$300 a week for the three-week program.

c. Fringe:

A fringe rate of 23% is charged on the full-time salary of Dr. Pederson and a rate of 12% on all hourly wages or Stonehill student and faculty stipends.

d. Equipment:

e. Travel:

f. Participant Support Cost:

3. Subsistence:

Room and board for the students (15 students) in the summer bridge program will be \$165 a week per student for the three weeks of the program (\$60 per week for housing, \$105 per week for meals). Many of the students requiring the bridge program come from economically disadvantaged background. Charging them \$495 for room and board in order to participate in the program would make many of them choose not participate.

g. Other Direct Cost

1. Materials and Supplies:

Although much of the material and supply cost of doing summer research will be carried by the Stonehill College, as it is in the SURE program. The grant proposal is requesting \$300 per student to cover supply costs specific to the project. The SURE program currently provides \$300 per student and although it is not substantial amount of money it does provide some freedom for the research students in consultation with the faculty to order the supplies they need to accomplish their work.

3. Consultant Services:

Outside consultant services will be required in two areas, mentor training and ongoing evaluation of the program. The training of the student and faculty mentors will be conducted by Massachusetts Mentoring Partnership. Dr. Edward Brush from Bridgewater State College will be hired as a consultant throughout the grant period to provide an ongoing evaluation of the entire program.

Year Two:

a. Senior Personnel:

Dr. Pederson's responsibilities will be the same as they were in Year One. A 3% cost of living increase was requested in her salary bring her 9 month salary to \$46,350. Her summer stipend would remain the same.

Dr. Twomey and Dr. Hanna stipends and responsibilities are the same as they were in Year One.

b. Other Personnel:

The number of Massasoit faculty mentors, Stonehill students tutoring at Massasoit, the bridge program faculty and student counselors, and undergraduate summer research students as well as their stipends are the same as they were in Year One.

During the academic year the number of student mentors will increase to ten. They will still each receive \$300 stipend, thus a total of \$3000 is requested.

A Massasoit chemistry faculty member will receive a \$1000 stipend for adapting one of the theme-based general chemistry (forensics or food/nutrition) courses developed at Stonehill during Year One to fit into the Massasoit curriculum.

Two teachers each semester will be hired to teach the AP laboratories on Saturdays. These teachers will receive a stipend of \$3000 a semester. This stipend is equivalent to the per course stipend paid to part-time faculty at Stonehill. The total will be \$12,000.

c. Fringe:

A fringe rate of 23% is charged on the full-time salary of Dr. Pederson and a rate of 12% on all hourly wages or Stonehill student and faculty stipends.

d. Equipment:

e. Travel:

f. Participant Support Cost:

2. Travel:

The biggest concern expressed by the area high schools regarding the AP laboratories being taught at Massasoit and Stonehill was the need for transportation to get the students from the neighboring towns to the colleges. On the Saturdays that the AP laboratories are offered a bus will pick up students at each of the participating high schools and transport them to the colleges. Two buses will be secured, one for students going to Massasoit and one for students going to Stonehill. After the program the bus will return the students to the high schools. Students will be responsible for getting themselves to and from the high schools. The cost of the buses is \$200 per day for 10 days over the course of the year.

3. Subsistence:

The room and board cost for bridge program students will be the same as in Year One but the number of participants in the program will increase to 17 students. The total request is increased proportionately.

g. Other Direct Cost

1. Materials and Supplies:

Same as Year One

3. Consultant Services:

The mentor training cost has increased by \$500 over Year One because more mentors will need training. There is no change in the cost for the outside evaluator.

Year Three:

a. Senior Personnel:

Dr. Pederson's responsibilities will be the same as they were in Year One. A 3% cost of living increase over Year Two was requested in her salary to bring her 9-month salary to \$47,740. Her summer stipend would remain the same.

Dr. Twomey's and Dr. Hanna's stipends and responsibilities are the same as they were in Year One.

Two newly hired Massasoit faculty members will start summer research at Stonehill College. Each will receive a \$5000 stipend, equivalent to the stipend given to Dr. Twomey and Dr. Hanna previous summers.

b. Other Personnel:

The number of Massasoit faculty mentors, Stonehill students tutoring at Massasoit, AP laboratory teachers and the bridge program faculty as well as their stipends are the same as they were in Years Two.

Due to projected growth in the bridge program, the number of student counselors needed goes from three to four. Therefore the budget request has increased to \$3600.

The two new Massasoit faculty doing summer research will result in the addition of four more Massasoit summer research students. This means that a total of twelve students will be involved in research during the summer of Year Three. The request for summer student research stipends has been increased to \$42,000 to accommodate the four additional students.

During the academic year the number of student mentors will increase to 13. They will still each receive \$300 stipend but the Department of Chemistry will start assuming part of the cost through their work-study budget. Each student mentor will receive \$250 from the STEP grant and \$50 from the Department of Chemistry budget; therefore a total of \$3250 is requested in the grant.

A Massasoit chemistry faculty member will receive a \$1000 stipend for adapting a second one of the theme-based general chemistry courses (forensics or food/nutrition) developed at Stonehill during first two years to fit into the Massasoit curriculum.

c. Fringe:

A fringe rate of 23% is charged on the full-time salary of Dr. Pederson and a rate of 12% on all hourly wages or Stonehill student and faculty stipends.

d. Equipment:

e. Travel:

f. Participant Support Cost:

2. Travel:

Same as year Two

3. Subsistence:

The room and board cost for bridge program students will be the same as in Year One and Two but the number of participants in the program will increase to 20 students. The total request is increased proportionately.

g. Other Direct Cost

1. Materials and Supplies:

Dr. Twomey and Dr. Hanna will be preparing during the third year to bring the research back to Massasoit. In addition to writing research grants they will also purchase the equipment they need to start up their independent research groups. The budget request \$15,000 for each of them to purchase the small equipment and supplies they need to initially establish their independent groups.

Since there will be 12 summer research students the material and supply request has been increased to \$3600, still \$300 per student

3. Consultant Services:

There is not increase in cost for the outside evaluator over Years One and Two but the training cost will increase an additional \$500 to allow for a new “train the trainer” workshops. As the result of training the trainer course, mentor training will become internal and will not be an expense after Year Three.

Year Four:

a. Senior Personnel:

Dr. Pederson's responsibilities will be the same as they were in Year One. Stonehill will begin to assume her salary, so only \$30,000 is requested. Her summer stipend would remain the same.

Dr. Twomey will continue to receive the \$2000 coordinating stipend, but will assume responsibility for seeking grants to fund her research from this point on. Dr. Hanna will also assume responsibility for seeking grant funds for his research.

Two newly hired Massasoit faculty members will continue their summer research at Stonehill College. Each will receive a \$5000 stipend.

b. Other Personnel:

The number of Massasoit faculty mentors will decrease to one, as more faculty advisors will have been trained and coached in mentoring techniques.

Stonehill students tutoring at Massasoit, summer bridge program student staff, AP laboratory teachers and the bridge program faculty as well as their stipends are the same as they were in Year Three.

As the number of Massoit faculty doing research at Stonehill will decrease to 2, the total number of students doing research at Stonehill will return to 8, as it was in Years One and Two, thus the amount requested decreases to \$28,000.

During the academic year the number of student mentors will increase to 16. They will still each receive \$300 stipend but the Department of Chemistry continue assuming part of the cost through their work-study budget. Each student mentor will receive \$200 from the STEP grant and \$100 from the Department of Chemistry budget; therefore a total of \$3200 is requested in the grant.

c. Fringe:

A fringe rate of 23% is charged on the full-time salary of Dr. Pederson and a rate of 12% on all hourly wages or Stonehill student and faculty stipends.

d. Equipment:

e. Travel:

f. Participant Support Cost:

2. Travel:

Same as year Three

3. Subsistence:

The room and board cost for bridge program students will be the same as in Year Three but the number of participants in the program will increase to 22 students. The total request is increased proportionately.

g. Other Direct Cost

1. Materials and Supplies:

Since there will be 8 summer research students the material and supply request has been decreased back to \$2400, still \$300 per student

3. Consultant Services:

There is no increase in cost for the outside evaluator. As more Stonehill and Massasoit faculty and students will have had mentoring training and experience in Years One through Three, there will be no additional training costs.

Year Five:

a. Senior Personnel:

Dr. Pederson's responsibilities will be the same as they were in Year One. Stonehill will assume more of salary, so only \$15,000 is requested. Her summer stipend would remain the same.

Dr. Twomey will continue to receive the \$2000 coordinating stipend.

Two newly hired Massasoit faculty members will continue their summer research at Stonehill College. Each will receive a \$5000 stipend.

b. Other Personnel:

One faculty mentor will continue at Massasoit, with a focus on training additional advisors.

Stonehill students tutoring at Massasoit, AP laboratory teachers and the bridge program faculty as well as their stipends are the same as they were in Year Four. Summer bridge program student staff will increase to 5 to support 25 summer bridge students, increasing the cost proportionately.

Student research stipends will remain the same as in Year Four.

During the academic year the number of student mentors will increase to 20. They will still each receive \$300 stipend but the Department of Chemistry continue assuming additional costs through their work-study budget. Each student mentor will receive \$100 from the STEP grant and \$200 from the Department of Chemistry budget; therefore a total of \$2000 is requested in the grant.

c. Fringe:

A fringe rate of 23% is charged on the full-time salary of Dr. Pederson and a rate of 12% on all hourly wages or Stonehill student and faculty stipends.

d. Equipment:

e. Travel:

f. Participant Support Cost:

2. Travel:

Same as year Four

3. Subsistence:

The room and board cost for bridge program students will be the same as in Year Four but the number of participants in the program will increase to 25 students. The total request is increased proportionately.

g. Other Direct Cost

1. Materials and Supplies:

The student research supply budget will remain the same as in Year Four, as the number of students remains the same.

The two additional Massasoit research faculty will be preparing during the fifth year to bring the research back to Massasoit. In addition to writing research grants they will also purchase the equipment they need to start up their independent research groups. The budget request \$15,000 for each of them to purchase the small equipment and supplies they need to initially establish their independent groups.

3. Consultant Services:

There is not increase in cost for the outside evaluator. As more Stonehill and Massasoit faculty and students will have had mentoring training and experience in Years One through Three, there will be no additional training costs.

Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: **Magdalena James-Pederson** Other agencies (including NSF) to which this proposal has been/will be submitted.

Support: Current Pending Submission Planned in Near Future *Transfer of Support
 Project/Proposal Title: **A Public - Private Partnership to Increase Enrollment, Retention, and Diversity in Chemistry, Biology and Biochemistry**
 Source of Support: **National Science Foundation-STEP Program**
 Total Award Amount: \$ **813,486** Total Award Period Covered: **09/01/06 - 08/31/11**
 Location of Project: **Stonehill College and Massasoit Community College**
 Person-Months Per Year Committed to the Project. Cal:**0.00** Acad:**9.00** Sumr: **1.00**

Support: Current Pending Submission Planned in Near Future *Transfer of Support
 Project/Proposal Title:
 Source of Support:
 Total Award Amount: \$ Total Award Period Covered:
 Location of Project:
 Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: Current Pending Submission Planned in Near Future *Transfer of Support
 Project/Proposal Title:
 Source of Support:
 Total Award Amount: \$ Total Award Period Covered:
 Location of Project:
 Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: Current Pending Submission Planned in Near Future *Transfer of Support
 Project/Proposal Title:
 Source of Support:
 Total Award Amount: \$ Total Award Period Covered:
 Location of Project:
 Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: Current Pending Submission Planned in Near Future *Transfer of Support
 Project/Proposal Title:
 Source of Support:
 Total Award Amount: \$ Total Award Period Covered:
 Location of Project:
 Person-Months Per Year Committed to the Project. Cal: Acad: Summ:

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

FACILITIES, EQUIPMENT & OTHER RESOURCES

FACILITIES: Identify the facilities to be used at each performance site listed and, as appropriate, indicate their capacities, pertinent capabilities, relative proximity, and extent of availability to the project. Use "Other" to describe the facilities at any other performance sites listed and at sites for field studies. USE additional pages as necessary.

Laboratory: **Stonehill Room 101: Analytical and Biochemistry Laboratory, 1088 sq. ft.; four fume hoods; air, gas, water, and ethernet throughout; 264 sq. ft. bench space; available year round**

Clinical:

Animal:

Computer: **Stonehill Faculty Office Computers:**

2 x G4 Mac Power Book
2 x G4 1 GHz eMac

Office:

Other: **Massasoit room #126 houses the main equipment.**

MAJOR EQUIPMENT: List the most important items available for this project and, as appropriate identifying the location and pertinent capabilities of each.

Stonehill Spectrometers

Hitachi UV-Visible Recording Spectrophotometer Model U-2000
Perkin Elmer Atomic Absorption Spectrophotometer Model 360
Leeman Labs PS1000 Inductively Coupled Plasma (ICP) Atomic Spectrometer
Shimadzu RF-1501 Spectrofluorophotometer
9 x Bausch & Lomb Spectronic 20 (various)

OTHER RESOURCES: Provide any information describing the other resources available for the project. Identify support services such as consultant, secretarial, machine shop, and electronics shop, and the extent to which they will be available for the project. Include an explanation of any consortium/contractual arrangements with other organizations.

Machine shop, plumbing, electrical, communications etc. services are available through Stonehill College Facilities Management and is very responsive to Department of Chemistry research needs.

FACILITIES, EQUIPMENT & OTHER RESOURCES

Continuation Page:

LABORATORY FACILITIES (continued):

Massasoit: Rooms 431 and 433 for chemistry research
Room S 545 for Biology research

Room 101A: Instrument Room, 264 sq. ft.; water, air and ethernet;
available year round

Room 101D: Student/Faculty Research Laboratory, 612 sq. ft.; two fume
hoods; air, gas, nitrogen/argon, water, and ethernet throughout; 162.5 sq.
ft. bench space; available year round

Room 102: Physical Chemistry and Instrumental Analysis Laboratory, 578
sq. ft.; one fume hood, air, gas water, and ethernet throughout; 160 sq.
ft. bench space; available year round (will be used for new theme based
General Chemistry sections as needed)

Room 103: General Chemistry and Organic Chemistry Laboratory, 1972 sq.
ft.; eight fume hoods; air, steam, gas, water and ethernet throughout; 420
sq. ft. bench space; available year round

Room 106: Student/Faculty Research and Advance Inorganic Laboratory, 588
sq. ft.; two fume hoods; air, steam, gas, nitrogen, water and ethernet
throughout; 128 sq. ft. bench space; available year round

Room 108: Chemistry Stock and Preparation Room, 525 sq. ft.; one fume
hood; air, steam, gas, nitrogen, water and ethernet; 30 sq. ft. of bench
space; available year round

COMPUTER FACILITIES (continued):

2 x Pentium IV Gateway computer

General/Organic Chemistry Laboratory

12 x G4 1 GHz eMac

14 x Texas Instruments TI x 83+ Graphing Calculators

14 x Vernier LabPro?s with associated sensors

Advanced and Research Laboratories (not including computers dedicated to
instruments)

3 x Gateway Pentium 4 E Series

1 x G3 500 MHz iMac

6 x G3 400 MHz iMac

1 x Dec pc 420SX

1 x Gateway 2000 P5-166

FACILITIES, EQUIPMENT & OTHER RESOURCES

Continuation Page:

COMPUTER FACILITIES (continued):

1 x Gateway E-3400

3 x Gateway E-4200

Massasoit:

Dell Optiplex GX240

1 x G5 Mac Power Book

Gateway Pentium 4

Gateway 450RGH Laptop

MAJOR EQUIPMENT (continued):

Bruker Avance 300 High Performance Digital NMR Spectrometer

Chromex Wizard 1200 Raman Spectrophotometer

Thermo Nicolet Avatar 370 FT-IR Spectrophotometer

3 x Spectronic Genesis 2 UV-Visible Spectrophotometer

Stonehill Chromatographs

2 x Buck Scientific Gradient HPLC Systems with UV-Visible detectors

Waters Model 410 Refractive Index Detector

Perkin Elmer Model LC 75 Spectrophotometric Detector

Waters Model 440 Absorbance Detector

Hewlett Packard 5880A/5970B Gas Chromatograph/Mass Spectrometer

3 x GOW-MAC Gas Chromatographs Model 360

2 x Biotage Flash 12i + Flash 40i Chromatography Systems

3 x Hewlett Packard 3395 Integrators

NGI Servogor 102 Chart Recorder

Fisher Recordall 5000 Chart Recorder

Waters Lambda-Max Model 480 LC Spectrophotometer Detector

Stonehill Electrochemical

Fisher Accumet Selective Ion Analyzer Model 750

Radiometer Capehagen CMT10 Chloride Titrator

20 x Various Fisher pH Meters

4 x Corning Model 240 pH Meters

Brinkmann 625 KF Coulometer

2 x AR20 Accumet Research PH/Conductivity Meters

Obbligato Objectives Faraday MP Cyclic Voltammeter

Stonehill Balances

AE200 Mettler Analytical

PR1203 Mettler Top-loading

AG204 Mettler Toledo Analytical

2 x Fisher Model S-110 Top-loading

FACILITIES, EQUIPMENT & OTHER RESOURCES

Continuation Page:

MAJOR EQUIPMENT (continued):

PM4000 Mettler Top-loading
PE160 Mettler Top-loading
2255 Sartorius Top-loading
6 x Type H6 Mettler Analytical
5 x 2842 Sartorius Analytical
Fisher Accu 224 Analytical
E20 Mettler Top-loading

Stonehill Biochemistry Equipment

VIRTIS Bench Top 3L Lypholizer
I 2400 New Brunswick Scientific Incubator Shaker
2 x Precision 280 Temperature Controlled Water Bath
Fisher Centrifug Bench Top Centrifuge Model 225
EC Apparatus Corporation EC 250-90 Power Supply
2 x Thermo-EC EC600-90 Power Supply
3 x Scientific Industries Vortex Genie 2
6 x Fisher Microcentrifuges
Rainin Pipetman (13 x P-1000, 12 x P-20, 15 x P-200, 1 x P-2)
8-channel P-200-M8 Rainin Pipetman
2 x Fisher Biotech MiniHorizontal Gel Electrophoresis System
4 x Thermo-EC Classic CSSU1214 Gel Electrophoresis Systems
5 x Fisher Biotech Vertical Electrophoresis System
Spectroline BioVision UV/White Light Transilluminator
Fisher Scientific IsoTemp Incubator
Marathon 16 KM Microcentrifuge
2 x Thermo IEC Micromax RF Refrigerated Microcentrifuge
2 x Barnstead/Thermolyne Lab Quake Tube Shaker
BioRad Model 680 Microplate Reader
Sorvall RC-5C-Plus High Speed Refrigerated Centrifuge
Fisher Semi-Dry Blotting Apparatus for Western Blotting
Fisher Model 100 Sonic Dismembrator
BioRad ElectroPulser Electroporator

Stonehill Miscellaneous

Jasco P-1010 Polarimeter with Monochromator
3 x Engel Polarimeters Model 1
Scanning Electron Microscope, International Science Instruments CL9
2 x Millipore Milli-Q Plus PF Milli-RO 12 Plus Water Purification System
NAPCO Model 5831 Vacuum Oven
Savant RT100 Refrigerated Vacuum Line Condensation Trap
4 x Welch 1400 DuoSeal Vacuum Pumps
FTS Systems Model FC100AO1 Cryo-Cool System
3 x Buchi Models R110 and R114 Rotavapors with Temperature Baths
Brinkmann Model B-169 Vacuum Aspirator
Fisher Isotemp 500 Series Drying Oven
Parr Model 3911 Hydrogenator

FACILITIES, EQUIPMENT & OTHER RESOURCES

Continuation Page:

MAJOR EQUIPMENT (continued):

Aldrich Kugeirohr
Barnant Series 20 Variable Speed Overhead Stirrer
Barnant Model 621-8600 Temperature Controlled Oil Bath
Parr 1425 Semimicro Calorimeter
Hummer VI Sputtering System
NESLAB RTE 100 Constant Temperature Circulating Bath
Lauda K-2/R Constant Temperature Circulating Bath
Yamato DX600 Drying Oven
Fisher Model 20 Surface Teniometer
Thermolyte 21100 Tube Furnace
Fisher Isotemp 2100 Constant Temperature Bath
3 x Fisher Refractometers
Dupont Instruments Differential Scanning Calorimeter
Hewlett-Packard 7475A Plotter
10 x Melt-temp various models
Johnson Matthey Magnetic Susceptibility Balance
2 x Thermo NesLab CC-65 Cryo-Coolers
Four Channel BiPolar Conductance Research System
3 x Thermo NesLab RTE7 Constant Temperature Circulating Baths

Massasoit Chemistry Equipment:

Hitachi R-1200 NMR Spectrometer
2 x Perkin Elmer 1600 Series FT-IR Spectrophotometers
4 x Carle AGC Series 100 Gas Chromatographs
6 x Spectronic Unicam Spectronic 20+
HP ColorPro Plotter 7440A
4 x Bausch & Lomb OmniScribe Series D5000 Recorders
10 x Oakton Instruments pHTestr 2 Double Junction Hand-held meters
Clay-Adams Safety Head Centrifuge
2 x Despatch LEB-1-27 Drying Ovens
Thomas Hoover Capillary melting point apparatus
Fisher-Scientific Melting point apparatus
Balances:
3 x Sartorius Top Loading (2x model 1402 and 1 x BP310S)
AND FX-300
Mettler P1200 Analytical
2 x Sartorius Analytical

Massasoit Biology Equipment:

PCR machine
Microscopes
Microcentrifuges
Eppendorf pipetters
Electrophoresis apparatus
Dissecting microscopes
Refrigerator



The Commonwealth of Massachusetts

MASSASOIT COMMUNITY COLLEGE
ONE MASSASOIT BOULEVARD
BROCKTON, MASSACHUSETTS 02302-3996
(508) 588-9100

OFFICE OF THE PRESIDENT

January 31, 2006

Professor Louis Liotta
Chemistry Department Chair
Stonehill College
320 Washington Street
Easton, MA 02357

Dear Professor Liotta:

I am delighted to lend my support to Stonehill College's application to the National Science Foundation for a Science, Technology, Engineering, and Mathematics Talent Expansion Program grant. Massasoit Community College's collaboration in this proposed project will bring great benefits to our students.

Massasoit Community College's student population reflects the diverse community of which we are a part. Many of our students are low-income, minority, or first-generation college students. Our Liberal Arts Transfer – Science major is only a few years old; graduates in this major are few but growing steadily. We are committed to increasing the numbers of students who pursue this major and continue on to earn bachelor's degrees in the sciences, particularly those students from underserved populations.

This collaboration with Stonehill will provide our students with opportunities for research, a revitalized curriculum, faculty mentoring, and an increased awareness of career options in the sciences. Our faculty members will benefit from Stonehill faculty's research and curriculum expertise and experience, and the two institutions will be able to share their resources with area high schools. This project will all have a great impact on attracting and retaining students to pursue degrees and careers in the sciences.

Massasoit Community Colleges enthusiastically supports this proposed collaboration with Stonehill College and is eager to implement this project.

Sincerely,

A handwritten signature in dark ink, appearing to read "Charles Wall".

Charles Wall
President

Brockton Public Schools



Brockton High School
470 Forest Avenue
Brockton, Massachusetts 02301

William Finn
Department Head Science 9-12
(508) 580-7626 fax: (508) 580-7600

February 7, 2006

Dr. Louis Liotta, Professor and Chair
Department of Chemistry
Stonehill College
320 Washington Street
Easton, MA 02357

Dear Dr. Liotta:

Please be advised that Brockton High School would like to participate in the STEP program submitted by Stonehill College and Massasoit Community College to the National Science Foundation. We are committed to offering the highest caliber of science instruction to our students and are particularly excited about the opportunity to enhance our current Advanced Placement Offerings in Chemistry and Biology.

I currently teach the AP Biology course at Brockton High School. Due to budget constraints, time/scheduling, and lab protocols, completing the required labs during a typical school day is a daunting task. A partnership that teams up my expertise in the classroom with the outstanding lab facilities found in local colleges would be extremely beneficial to our students.

We strongly support the proposal and point out that our proximity to the colleges and the association with other school districts in southeastern Massachusetts will enhance the value of this project. We look forward to its successful implementation.

Sincerely,

A handwritten signature in blue ink, appearing to read 'S. Bagge'.

Susan M. Bagge
AP Biology Teacher

A handwritten signature in black ink, appearing to read 'William Finn'.

William Finn
Science Department Chair

A handwritten signature in black ink, appearing to read 'Susan E. Szachowicz'.

Dr. Susan E. Szachowicz
Principal
Brockton High School



STONEHILL
COLLEGE

February 3, 2006

National Science Foundation
Susan H. Hixson
Lead Program Director
Directorate for Education & Human Resources
Division of Undergraduate Education
4201 Wilson Boulevard
Arlington, Virginia 22230

Dear Ms. Hixson:

I enthusiastically endorse Stonehill's collaboration with Massasoit Community College to launch a National Science Foundation STEM Talent Expansion Program. This grant will have a major impact on hundreds of promising science students, particularly those who are traditionally underrepresented in the sciences.

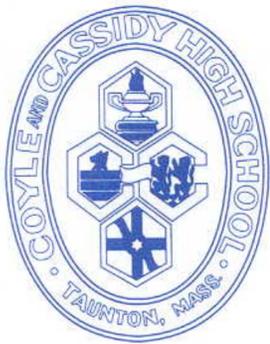
Stonehill is committed to increasing science enrollments, enhancing cultural and socio-economic diversity, expanding the Stonehill Undergraduate Research Experience (SURE) Program, and building an 85,000 square foot multi-disciplinary science facility to support outstanding teaching and learning. The Stonehill - Massasoit Science Partnership reinforces all of these.

Stonehill has a longstanding tradition of serving first-generation, low-to-moderate income students; a proven commitment to discovery-based, research-rich science curriculum; and a supportive, student-centered environment. The proposed combination of curriculum reform, early research experiences, faculty and peer mentoring, summer bridge program, early career exploration, and high school outreach will provide extra layers of support for the most vulnerable first-year science students.

Stonehill fully supports this worthwhile project. I am confident that in the hands of our extremely committed and capable science faculty, the Stonehill-Massasoit Science Partnership will result in greater numbers of highly motivated and well-prepared science graduates.

Sincerely,

(Rev.) Mark T. Cregan, C.S.C.
President



Coyle and Cassidy High School

2 HAMILTON STREET • TAUNTON, MASSACHUSETTS 02780-2483

Recognized as an "Exemplary School" by the United States Department of Education in 1991 and in 1998

February 8, 2006

Dr. Louis Liotta, Professor and Chair
Department of Chemistry
Stonehill College
320 Washington Street
Easton, MA 02357

Dear Dr. Liotta:

Please be advised that Coyle and Cassidy High School would like to participate in the STEP program submitted by Stonehill College and Massasoit Community College to the National Science Foundation. We are committed to offering the highest caliber of science instruction to our students and are particularly excited about the opportunity to enhance our current Advanced Placement Offerings in Chemistry and Biology.

Currently we offer an AP Biology course to sophomore students and an Advanced Chemistry Honors course to senior students. The laboratory component of both of these courses would benefit substantially through the STEP program proposed by Stonehill College and Massasoit Community College.

We strongly support the proposal and point out that our proximity to the colleges and the association with other school districts in southeastern Massachusetts will enhance the value of this project. We look forward to its successful implementation.

Sincerely,

Kathleen St. Laurent
Kathleen St. Laurent
Science Department Chair
Coyle and Cassidy High School

Mary Patricia Tranter, Ph.D.
Mary Pat Tranter, Ph.D.
Principal
Coyle and Cassidy High School

Brother Harold Hathaway, C.S.C.
Brother Harold Hathaway, C.S.C.
President
Coyle and Cassidy High School

BROTHER HAROLD HATHAWAY, C.S.C.
President

MARY PAT TRANTER, Ph.D.
Principal

MARIE ANGELEY
Vice Principal

BRIAN DICKINSON
Guidance Director

BRIAN NICHOLS
Admissions Director

WILLIAM J. TRANTER
Development Director

WILLIAM VENTURA
Athletic Director

TELEPHONE: (508) 823-6164

FAX NUMBER: (508) 823-2530

WEB: www.coylecassidy.com