

Success of First-Year Calculus & Physics Students Using Online Tutoring

Programmatic, Multidisciplinary, and/or Multicampus Teaching Improvement

Principal Investigator: Sheila Riley-Callahan, Executive Director of Academic Services & Special Programs, Centers for Learning & Academic Support Services, UMass Lowell

Sheila_Rileycallahan@uml.edu (978) 934-2946

James Egan, Professor, Chair of Physics Department, UMass Lowell

James_Egan@uml.edu (978) 934-3780

Stephen Pennell, Professor, Chair of Mathematics Department, UMass Lowell

Stephen_Pennell@uml.edu (978) 934-2710

Suzanne Gamache, Coordinator of Tutoring Services,
Centers for Learning & Academic Support Services, UMass Lowell

Suzanne_Gamache@uml.edu (978) 934-2947

David Driscoll, Associate Director of Educational Computing,
Centers for Learning & Academic Support Services, UMass Lowell

David_Driscoll@uml.edu (978) 934-2942

**University of Massachusetts Lowell
1 University Avenue
Lowell, MA 01854**

Funding requested: \$24,872

Abstract: This project will provide online tutoring to first-year students in randomly selected sections of Calculus I and Physics I during Fall 08. Students will be required by department faculty to utilize online tutoring twice per week. Course instructors will provide ongoing support to peer tutors, and faculty will receive feedback from peer tutors. It is expected that students involved in the project will have higher grades and improved mastery of the course content.

Dr. Donald Pierson
Interim Provost

Dr. Robert Tamarin
Dean: College of Arts & Sciences, Sciences Division

January 31, 2008

Mark Schlesinger, Associate Vice President for Academic Technology
Academic Technology Grant Proposals
University of Massachusetts 225 Franklin Street, 12th Floor
Boston, MA 02110

Dear Dr. Schlesinger,

I am pleased to submit this proposal to the Subcommittee on Academic Technology. The request for a grant of \$24,872 to support the online tutoring program at UMass Lowell's Center for Learning & Academic Support Services (CLASS) will provide additional funding for tutoring and technical staff and equipment that will be used to improve student performance in first-year Calculus and Physics courses. The design and implementation of this project align closely with the strategic initiatives of the President's Office to "improve the student learning experience at the University of Massachusetts through more effective use of technology" by supplementing classroom instruction with accessible online peer tutoring.

The Centers for Learning has a long history of providing undergraduates at UML with exceptional academic support services including peer tutoring and is looking forward to expanding that support by offering interactive online tutoring using tablet PCs. This collaborative effort with faculty who are already using the electronic environment to deliver instruction is one that we feel matches the Subcommittee's desire to promote "exploration, experimentation, and innovation in teaching and learning" using technology.

If you require additional information about our tutoring program or have questions about this proposal, please contact me at (978) 934-2946 or Suzanne Gamache, Coordinator of Tutoring Services, at (978) 934-2947. Thank you for your consideration of this proposal.

Sincerely,

Sheila Riley-Callahan, M.Ed.
Executive Director of Academic Services & Special Programs
University of Massachusetts Lowell

Dr. Mark Schlesinger
Associate Vice President for Academic Technology
Academic Technology Grant Proposals
University of Massachusetts
225 Franklin Street, 12th Floor
Boston, MA 02110

Dr. Schlesinger,

Please accept this letter of intent to the University of Massachusetts Subcommittee on Academic Technology for the proposal titled **Success of First-Year Calculus & Physics Students Using Online Tutoring**. I believe after reading this proposal the subcommittee will see how our plan fits perfectly into the Programmatic, Multidisciplinary, and/or Multi-campus Teaching Improvement category.

As you know, there are many students today who have responsibilities outside of the classroom. These responsibilities often include working many hours to pay for their educations, family responsibilities, and the usual transition issues from high school to college. The Centers for Learning and Academic Support Services (www.uml.edu/class) provides a safety net for our students who utilize our services and also supports faculty teaching in the classroom. In addition to our face-to-face tutoring support, we implemented online tutoring in the Fall 06 semester for students who are not able to utilize our face-to-face support. The online tutoring program has been successful and we see the need to offer online support to other courses.

As principal investigator I will take responsibility for overseeing this project from the beginning to completion and provide data on its success. I am confident this initiative will contribute to the retention of our students and assist them as they work toward completing their degrees at the University of Massachusetts Lowell.

I thank you for your consideration and look forward to hearing from you.

Sheila Riley-Callahan, M.Ed.
Executive Director of Academic Services & Special Programs
University of Massachusetts Lowell



Olney Hall - Room 136C
1 University Avenue
Lowell, Massachusetts 01854-5043
tel: 978.934.3780
fax: 978.934.3068
e-mail: James_Egan@uml.edu

James J. Egan, Ph.D.
Professor of Physics; Department Chair

DEPARTMENT OF PHYSICS & APPLIED
PHYSICS

February 1, 2008

Mark Schlesinger, Associate Vice President for Academic Technology
Academic Technology Grant Proposals
University of Massachusetts
225 Franklin Street, 12th Floor
Boston, MA 02110

Dear Dr. Schlesinger,

The Department of Physics at UMass Lowell is pleased to submit this grant proposal along with the Centers for Learning. The project *Success of First-Year Calculus & Physics Students Using Online Tutoring* will provide essential academic support to students enrolled in Physics I and we expect it will result in improvements in both student retention and learning outcomes.

Sincerely,

A handwritten signature in blue ink that reads 'James J. Egan'.

James J. Egan, Chair
Physics Department
UMass Lowell

February 1, 2008

Ms. Suzanne Gamache
Coordinator of Tutoring Services
Centers for Learning and Academic Support Services
University of Massachusetts Lowell
Lowell, MA 01854

Dear Suzanne,

The Department of Mathematical Sciences is happy to support your grant application **Success of First-Year Calculus & Physics Students Using Online Tutoring** to study the effectiveness of online tutoring. The Calculus I instructor, Professor Ron Brent, and I look forward to working with you on this project. We expect it to lead to improvements in student learning outcomes in Calculus.

Sincerely,

Steve Pennell, Chair
978-934-2710
Stephen_Pennell@uml.edu

January 31, 2008

Mark Schlesinger, Associate Vice President for Academic Technology
Academic Technology Grant Proposals
University of Massachusetts
225 Franklin Street, 12th Floor
Boston, MA 02110

Dear Dr. Schlesinger,

As the Coordinator of Tutoring Services at the Centers for Learning & Academic Support Services at UMass Lowell, I am pleased to provide this letter of intent to the University of Massachusetts Subcommittee on Academic Technology for the proposal titled *Success of First-Year Calculus & Physics Students Using Online Tutoring* in the Programmatic, Multidisciplinary, and/or Multicampus Teaching Improvement category.

I have met with all investigators for this proposed project and we are eager to implement this program which will positively impact the academic outcome for first-year students.

Improving the retention rate of undergraduates enrolled in high-risk courses such as Calculus I and Physics I is certainly an objective that is worthy of our attention, and we have worked carefully to design a project that will have that desired outcome. As a collaborative effort among professional staff and faculty, this project embodies the spirit of innovation and creativity in using technology to enhance classroom instruction.

My responsibility in this project is to train peer tutors who will be the primary support providers as they interact with students in the online environment. I will ensure that all necessary resources are available to them, and serve as a liaison between tutor and instructor. I will provide information to all campus outreach news sources to publicize the availability of online tutoring to all students enrolled in Calculus and Physics courses.

Thank you for your time and consideration.

Sincerely,

Suzanne A. Gamache, M.Ed.
Coordinator of Tutoring Services

January 31, 2008

Mark Schlesinger, Associate Vice President for Academic Technology
Academic Technology Grant Proposals
University of Massachusetts
225 Franklin Street, 12th Floor
Boston, MA 02110

Dear Dr. Schlesinger,

As the Associate Director of Educational Computing at the Centers for Learning & Academic Support Services at UMass Lowell, I am pleased to provide this letter of intent to the University of Massachusetts Subcommittee on Academic Technology for the proposal titled *Success of First-Year Calculus & Physics Students Using Online Tutoring* in the Programmatic, Multidisciplinary, and/or Multicampus Teaching Improvement category.

My role in this project is to train computer technicians and peer tutors in the use of the Horizon Wimba software. In addition, I will be delivering supplemental guidance to the computer technicians on technical support for not only the tutors and their computers, but for any tutee needing assistance to connect to Horizon Wimba. I will ensure that all necessary technology resources (both hardware/software) are available to both the tutors and technicians. I will be the primary support for all technological needs for online tutoring and assessment for this project.

Thank you for your consideration of this proposal.

Sincerely,

David Driscoll
Associate Director of Educational Computing

UMass Lowell Centers for Learning & Academic Support Services

Success of First-Year Calculus & Physics Students Using Online Tutoring

Background

The Centers for Learning & Academic Support Services (CLASS) at UMass Lowell has developed and implemented a successful academic support program including advising services, a peer tutoring program, and state of the art drop-in and teaching computer labs for its students and faculty for over twenty years. The program has grown from a first-year academic support service to its present status as a comprehensive CRLA (College Reading & Learning Association) master-level certified peer tutoring program offering assistance in courses at all levels in each of the University's five colleges: Engineering, Health & Environment, Humanities, Fine Arts & Social Sciences, Management, and Sciences. All Centers for Learning peer tutors are students at UML who have completed the course(s) they tutor with a grade of B+ or better and have been recommended by faculty to the Coordinator of Tutoring Services.

During the past decade, technology has evolved to a point that the Centers for Learning can extend its outreach to students through online tutoring. The Centers for Learning seeks to expand its outreach in order to improve retention rates, particularly among the commuter student population.

Current Status of Online Tutoring

Centers for Learning staff worked with faculty to address the needs of tutoring for the commuter student population. In Fall 2006, online tutoring was added to the existing face-to-face academic support resources providing tutoring support in two high-risk freshman level courses: Physics I (95.141) and Calculus I (92.122). At that time, Centra, an online collaboration tool that was supported by the UMass President's Office, was used. Trained peer tutors provided online tutoring four nights per week. The technical support staff members were trained to assist end users with the process of logging in and other usage issues.

Posters were distributed in residence halls and placed in commuter lounges and announcements were made on campus to promote usage of online tutoring, and links were added to the CLASS website with schedules and instructions on how to log-in to online tutoring. Faculty

who teach Calculus and Physics were notified of the availability of online tutoring and spoke to their students about it.

In 2007 the UMass President's office shifted to a software package called Horizon Wimba. At that time additional training of tutors and technicians was offered and the transition to using the new software took place.

Since then online tutoring has been offered each semester, with tutoring in Calculus I and Physics I in the fall semester, expanding to Calculus I and II and Physics I and II in the spring semester. In addition to a tutor for each subject, a technical assistant has been available each evening to provide support for students who require assistance logging in or downloading the software.

Usage has grown steadily since 2006. Our records indicate that an average of twelve students per week log in for sessions with the tutors in both Calculus and Physics. Most of the tutees are logging-in from off-campus locations which implies that this service is especially important for commuter students. The scheduling of online tutoring during the late evening hours (7:00 pm to midnight) has been valuable for students who work after classes and do their homework when they return home.

The existing level of online and face-to-face tutoring in Physics and Calculus will continue for all students in all sections of those courses; if this project is funded, the changes will result in additional tutoring and online supplemental instruction for selected sections of students in the first semester of those courses.

Expansion of Current Program and Targeting of Students

In Fall 07, the DF/W (withdrawal) rate for first-year students enrolled in Calculus I was 60%. In Physics I the failure rate was 40%. By providing online tutoring based on the 'supplemental instruction' model in which tutors are actively involved in both face-to-face lectures and interactive dialog online, we hope to help reduce failure rates and improve student performance.

The focus of this proposal is to provide online tutoring to students in randomly selected sections of both Calculus I and Physics I during Fall 08. The students in these sections will be required to utilize online tutoring twice per week for a Supplemental Instruction session with the online tutor. They will have a password that will differentiate them from other tutees so their progress and outcomes will be compared to a section that was not required to use online tutoring.

Methodology and Assessment of Goals

The obvious goal of this project is to improve student performance in Calculus I and Physics I by providing supplemental instruction via online tutoring. The support will be provided by trained CRLA certified peer tutors who have introduced themselves to the participating section of students and informed them of their participation in the pilot program. Students will be required to utilize online tutoring at least twice per week; records of their usage will be maintained by using their student ID numbers and special passwords that differentiate them from students in control sections of the courses.

The online tutors will be familiar with course material and assignments and will prepare tutoring sessions that deal with concepts that are being presented by faculty. By using the tablet PC as an electronic whiteboard, peer tutors will be able to respond to tutees' questions and engage students in interactive problem solving and clarify content that has been demonstrated in class.

Prior to exams in Calculus I and Physics I, tutors will offer special review sessions and be available as students prepare for tests. Each tutor will act as a liaison between students and faculty, and inform the instructor of obvious problems in understanding of course material that the students may present. All online tutoring sessions will be archived so that faculty will be able to review sessions and assess the quality of tutoring.

Students in all sections of Calculus I and Physics I will be encouraged to utilize existing online tutoring; only students in the selected sections will be required to utilize online supplemental instruction sessions.

This project is a collaborative effort among faculty, professional staff, and student staff. The Centers for Learning values and benefits from the strong relationship it has built with faculty and that partnership allows this type of project to be feasible. There will be ongoing support provided to peer tutors by instructors of the courses, and continuous feedback from tutors to faculty. Chairs of the Math and Physics Departments have indicated that using electronic resources as a medium for instruction will have a strong appeal to students and that this type of support using the online environment should have a positive impact on student performance.

Project Deliverable

This project will serve as a model which will be used to provide online support to students in other first-year courses, such as Chemistry and Biology. Data which is gathered from the project will be presented to faculty in the Mathematics and Physics Departments, as well as to the Deans of the College of Engineering and College of Arts and Sciences.

Several of the investigators involved in this project will report their findings to national tutoring and academic advising associations at regional conferences in 2009.

The Council on Teaching, Learning, and Research as Scholarship at UMass Lowell is a faculty driven council which relies on information provided by these types of projects for data on student retention and performance. All investigators involved in this project are active members of the Council and a presentation of the findings based on this project will be the subject of a panel discussion.

Resources and Project Budget

The current online tutoring program was custom-designed to make the most effective use of resources that are available at UMass Lowell. By collaborating with the IT department, many existing resources for support (hardware, software, and networking) have been utilized, and the resulting product has allowed for high quality interaction among tutors and tutees.

The following chart illustrates the budget breakdown that is needed to implement this proposal. Included in this budget are both equipment costs and staffing expenditures.

Item	Unit cost	Quantity	Total
Microphone headsets	\$18.00	4	72
Tablet PC	\$1,700	4	6,800
Peer Tutors	\$12/hr x 20hrs x 15 weeks	4	14,400
Technical Assistant	\$12/hr x 20hrs x 15 weeks	1	3,600
Total Funding Requested			\$24,872

Project Timetable

Spring 08	Identify participating sections of Calculus I and Physics I
Summer 08	Meet with instructors of participating sections Train peer tutors and technical assistants Design Supplemental Instruction program
September 08	Peer tutors meet with participating students Students begin online interaction
October 08	Mid-term exam review session Meeting of all investigators, instructors, peer tutors to assess progress to date
November 08	Special tutoring sessions prior to withdrawal date
December 08	Final exam review session Collection of all data
January 09	Analysis of data