

**SPECIAL REPORT**  
of the  
**PROGRAM AND BUDGET AND RESEARCH COUNCILS**  
concerning a  
**CENTER FOR BIOLOGICAL PHYSICS (CBP)**

Presented at the  
699<sup>th</sup> Regular Meeting of the Faculty Senate  
November 18, 2010

**COUNCIL MEMBERSHIP**

**PROGRAM AND BUDGET COUNCIL**

**D. Anthony Butterfield, Nancy Cohen, Josh Davidson, Robert Faulkner, Patricia Galvis y Assmus, Joyce Hatch, Julie Hayes, Ellen Knuerr, Michael Leto, Ben Levine, Lisa Liebowitz, Linda Lowry, Sheila Mammen, Andrew Mangels, Gail Matthews, Ernest May, John McCarthy (Chair), Andreas Muschinski, Jay Schafer, Anurag Sharma, Stephen Schreiber, Norman Sims, Richard Simpson, Julian Tyson**

**RESEARCH COUNCIL**

**Jenny Adams, C. Marjorie Aelion, Leslie Button, Lori Clarke, Robert Deconto, David Evans, Andrea Foulkes, Aura Ganz, Brigitte Holt, Abigail Jensen, Jane Kent-Braun, David Lass, Yariv Z. Levy, Mason Lowance, Michael Malone, Michael Maroney (Chair), Ernest May, Sharon Mills-Wisneski, John Mullin, Jennifer Normanly, Stephen Rich, Caren Rotello, Jay Schafer, Linda Shea, Carol Sprague, Martha Taunton, Martin Weinberg, Hilary Woodcock, Zhun Xu**

**PROGRAM AND BUDGET COUNCIL**

Following a review by the Program Subcommittee and based on its recommendation, the Program and Budget Council unanimously approved the Center for Biological Physics by electronic vote on 27 October 2010. The Council was satisfied that projected costs and revenues are realistic and in balance.

**RESEARCH COUNCIL**

At its October 8, 2010 meeting, the Research Council unanimously voted in favor of the interim approval for the Center for Biological Physics (CBP). Among the research benefits of such a Center are:

1. Facilitation of interdisciplinary collaborations to conduct physically sophisticated research in biological systems as well as to bring needed physics to collaborators from other disciplines.
2. Enhancement of interdisciplinary curriculum efforts at the graduate level.
3. The creation of the Gluckstern Scholars Program, which will bring world-class lecturers to campus to teach, confer and collaborate, thereby providing a vehicle to increase the visibility of the University of Massachusetts and the Center as well as create a forum for connecting scholars in this field. This program is currently underway, with the first invited scholars arriving on campus October 2, 2010.
4. The CBP is currently financially self-sufficient. Proposed Center members have already acquired significant federal funds to develop truly novel instrumentation that will be broadly useful to CBP members and collaborators. The CBP plans to pursue major grant funding. Its members represent the sort of interdisciplinary mix and breadth that is very attractive to federal funding programs that support program project grants, graduate training grants and other multi-investigator projects.

The Center is an interdisciplinary effort currently including faculty from Physics and 13 additional departments within the 5-College Consortium and UMass Medical School.

The Council was impressed with the level of activities of key faculty members in the CBP. The CBP enjoys strong support from the Department of Physics and has benefited from the effective leadership of Dr. Adrian Parsegian, Gluckstern Professor of Physics who has committed considerable resources from his named professorship to establish this Center.

The CBP is unique on campus and eagerly awaited by life scientists on campus. The CBP complements other interdisciplinary programs in the life sciences.

The CBP has the potential to develop into a nationally and internationally recognized Center for Biological Physics.

**MOVED:** That the Faculty Senate approve the Center for Biological Physics, as presented in  
18-11 Sen. Doc. No. 11-019.

UNIVERSITY OF MASSACHUSETTS AMHERST  
OFFICE OF THE SECRETARY  
THE FACULTY SENATE

NEW INSTITUTES AND CENTERS APPROVAL FORM  
50 COPIES REQUIRED

**PROPOSED TITLE OF**

**INSTITUTE:**

**CENTER:** Center for Biological Physics

**OTHER:**

**ORGANIZATIONAL LOCATION**

**SCHOOL/COLLEGE/MAJOR BUDGETARY UNIT:** Department of Physics, College of Natural Sciences

**NAME(S) OF DIRECTOR(S) OR RESPONSIBLE PERSONS:**

Director: V. Adrian Parsegian, Robert L. Gluckstern Professor of Physics

Appointing authority: Donald Candela, Head, Department of Physics

**MAILING ADDRESS:**

Center for Biological Physics

Department of Physics

Hasbrouck Laboratory, Room 411

University of Massachusetts

Amherst, MA 01033

**TELEPHONE:** (413) 545-2407

**PROPOSED STARTING DATE:** 9/1/10

**I. DESCRIPTION**

**A. Brief description (60 words or less) of the proposed enterprise (name, basic mission, activity scope, clientele):**

The Center for Biological Physics (CBP) will serve as a focus of intellectual activity, research, education, and coordination of funding proposals for the biological physics group in the Physics Department. The CBP will form synergistic ties with other biophysics-oriented groups and faculty on campus and in the five-campus system and encourage their participation in CBP seminars, programs, and funding proposals.

**B. Rationale and Justification (mission, goals, objectives, relation to campus goals, needs addressed, population served, resources obtained):**

**Mission:**

The aim of the Center for Biological Physics is to coordinate physically sophisticated research on biological systems as well as to bring needed physics to collaborators from other disciplines.

**Goals:**

1. The CBP will focus the research and educational activities of a growing effort in the Physics Department, a combination of the traditionally strong condensed matter group with newly hired physicists who work on biological materials and systems.
2. The CBP will reach out to the many departments eager to see biologically relevant research in Physics and to learn more about the physical mechanisms underlying properties and behaviors observed in their own research. Happily, many departments with likely collaborators (Biology, Biochemistry and Molecular Biology, Polymer

Science and Engineering, Kinesiology, Chemical Engineering) are physically close to Hasbrouck Laboratory, permitting the best kind of informal as well as formal collaboration.

3. The CBP will coordinate research and funding possibilities from a wide range of sources, joining with other departments, UMass campuses, and institutions.

### **Objectives:**

#### **1. Coordinate the submission of funding proposals**

A major endeavor of the CBP will be to provide coordination and administrative support of grant proposals that bridge the physical and biological sciences and that connect multiple campuses and institutions. The envisaged initiative will include preparing several kinds of funding proposals of different magnitudes and groupings. These will include Program Project grants (NIH), Center grants (NSF), DoE, and private foundation grants. The coordination of these proposals, by distribution of topics and sharing of responsibilities, will strengthen the greater enterprise.

#### **2. Seminar program**

A biweekly seminar program will be established as quickly as possible. A major fraction of the seminar speakers will be from outside the campus, and these leaders will be requested to spend at least an extra day at the Center. The rest of the seminar speakers will be from the Amherst campus or the local vicinity. The seminars will be at the instructional level, focusing on research, intellectual challenges, and opportunities for physicists.

#### **3. Gluckstern scholars**

The CBP will host a Gluckstern Scholars program bringing world-class lecturers to campus to teach modules (three days to two or three weeks) in a course for credit and to confer and collaborate informally with UMass scientists and students.

#### **4. Curriculum development**

The Center will develop a curriculum for Biological physics at the graduate level. By coordinating with the curriculum committee of the Physics Department, new courses on Introductory Biological physics, Experimental Biological physics, Imaging Techniques, and special topics courses for specialized areas such as nonlinear dynamics, neuroscience, membrane physics, etc. will be composed and taught. The Biological physics program will be an integral part of the Physics Department and will be actively placed in the Department's platforms to recruit additional graduate students into Physics.

#### **5. Development**

The CBP will create new opportunities for development by raising the visibility and status of the University, and by becoming an internationally recognized center of biological physics. UMass Amherst has tremendous strength in Soft Matter Physics and Polymers. These are areas critical to making progress in the modern era of Biological Physics. The Center is poised to use these unique strengths to make UMass a world leader in tackling biological phenomena occurring on the mesoscopic length and time scales.

#### **Relation to campus goals, Needs addressed, Population served**

The University of Massachusetts at Amherst already boasts a world-class reputation for the study of biomechanical systems, notably protein folding, molecular motors, the cytoskeleton, multicomponent biological networks with novel functionalities, and biomaterials. These efforts span many colleges and departments (Physics, BMB, Chemistry, Biology, CS, Kinesiology, PSE), with an excellent track record of interdisciplinary work and joint funding. UMass Amherst's well-established strengths in condensed matter physics, polymer science and materials science give us a clear competitive advantage. Recent hires in Chemistry, Biochemistry, Physics and Kinesiology all include faculty whose research is related to biological physics. The CBP will enhance these strengths, bringing biologically inspired research to physics and addressing the widely perceived need for more research informed by physics.

**C. Specific Activities planned as an on-going part of the enterprise (types, quantities of activities, meetings, publications, seminars, research):**

An essential part of the Center activity is to build connections with other departments, for example, to teach needed courses.

Professor Jennifer Ross already offers a winter BioBootCamp, a hands-on laboratory experience in basic protein work and microscopy. The BioBootCamp serves undergraduate, graduate, postdoctoral students as well as professors and industrial partners. In addition, Dr. Ross has developed a course called "Optics for Biophysics." This course is intended for an interdisciplinary group of advanced undergraduate and graduate students from the life sciences, physical sciences, and engineering. The lectures cover basic optical design and the new laboratory centers around designing and building an optical microscope. The course is aimed to train students in hands-on innovation and tinkering skills needed for modern, competitive scientific industries.

Professor Lori Goldner proposes a single-molecule methods workshop, initially two days in connection with the Institute for Cellular Engineering. This can easily expand into a two-week undertaking with more summer lab activity in Hasbrouck.

Professor Adrian Parsegian has begun a series of advanced courses on physics of biological and colloidal materials, the first of which was taught in Spring 2010 and attracted students and post-doctoral fellows from Chemical Engineering, Chemistry, Polymers, and Biology.

Professor Parsegian is now planning an ongoing series of course/seminars, one each term, with visiting Gluckstern Scholars teaching in their research areas with the theme of "living" or "soft" matter. The first of these, planned for Fall 2010, will be organized with Professor Anthony Dinsmore and will be on the physics of biological membranes. It will use money from the Gluckstern endowment to bring in and to host visiting lecturers who will be in residence, so as to be able to talk with students and faculty, for periods of three days to two weeks.

In addition, Professor Parsegian has agreed to teach a course as part of the Biophysics IGERT being organized by Professor Lila Gierasch; Professors Goldner and Ross have taught and are developing lab modules for the Institute for Cellular Engineering (ICE) IGERT program and for a Biological physics Module in ILab (required Intermediate Laboratory course, Physics 440).

The expectation is to bring in more physically based techniques to be accessible to research on "soft" and biological matter. Two of these techniques, soon to be available, are small x-ray diffraction, particularly in connection with measurement of intermolecular forces, and membrane transport, particularly from the perspective of single-molecule dynamics.

All of this is in addition to normal teaching and the research programs of the several investigators.

**D. How does this enterprise differ from other offices or activities on campus with similar names, missions, interests?**

Dedication of the Gluckstern Chair endowment for biological physics was built on the realization that there was an opportunity to expand research of the Physics Department toward biology as well as to make physics available to other departments. In that sense, the proposed Center is distinct from the intellectually contiguous groupings, such as MassNanoTech, the Institute for Cellular Engineering, and the Chemistry Biology Interface. With the encouragement of the University leadership, the Gluckstern appointment has been made. Professor Parsegian is committed to set up a Center as now proposed.

**II. INSTITUTIONAL RELATIONSHIPS AND GOVERNANCE**

**A. List all University units involved and describe administrative arrangements with them, if any.**

The Center for Biological Physics will be wholly within the Physics Department and will not have administrative arrangements with any other unit. The Director of the CBP will report to the Head of the Physics Department.

**B. Describe any organizational relationships (as distinct from funding sources) with other agencies, public or private, outside the University.**

The Center for Biological Physics, as initially configured, will not have organizational or administrative relationships with any agencies outside the University of Massachusetts campuses.

**C. Describe the organization's advisory board or other governance group.**

The CBP will have an Executive Committee that will meet monthly and will provide written recommendations to the Director of the CBP with copy to the Head of the Physics Department. The Executive Committee will have as standing members the Director of the CBP, the Head of the Physics Department, and those faculty members in the Physics Department whose primary research activity is biological physics. In addition, the Executive Committee will include other faculty members in Physics to be appointed by the Head of the Physics Department. The initial composition of the Executive Committee will be:

Donald Candela, Physics (Head of Department)  
Anthony Dinsmore, Physics  
Lori Goldner, Physics  
Maria Kilfoil, Physics  
V. Adrian Parsegian, Physics (Director of the CBP)  
Jennifer Ross, Physics

In addition, the CBP will have a larger Steering Committee that will meet once per semester and will provide written recommendations for the overall direction and activities of the Center. The Steering Committee will include the Executive Committee along with (a) other faculty in the Physics Department with research interests related to biological physics, and (b) faculty in several other departments with research activity in biophysics. The initial composition of the Steering Committee will be as follows (in addition to the Executive Committee):

Benny Davidovitch, Physics  
Lila Gierasch, Biochemistry and Molecular Biology  
Jonathan Machta, Physics  
Craig Martin, Chemistry  
M. Muthukumar, Polymer Science and Engineering  
Barbara Osborne, Veterinary and Animal Science  
Chris Santangelo, Physics  
Mark Tuominen, Physics  
Patricia Wadsworth, Biology  
Robert Weis, Chemistry

**D. Will this be an institute—an independent organizational unit, acting as a department for purposes of non-faculty personnel actions and appointments, able to solicit its own funds without departmental head approval?**

No.

**E. If a center, describe the relationship within the department to which this organization is subordinate.**

The Center for Biological Physics will provide a focus for the research and educational activities of one of the strong, growing research groups in the Physics Department, while also fostering strong connections to faculty in other departments. The Physics faculty in the CBP are regular faculty members participating fully in departmental teaching and service roles and the CBP will be physically located in Hasbrouck Laboratory, adjacent to closely related research groups in soft condensed matter experiment and theory. Thus, while helping to coordinate biological physics activities in the department, the CBP will *not* be a separate, stand-alone unit but rather will be highly integrated into departmental teaching and research activities.

**F. Describe arrangements for any patent rights, copyrights, or other ownership components of activities, and any restrictions on access to research information.**

The Center for Biological Physics as a unit will not have ownership of patent rights, copyrights, or other intellectual property nor will it impose restrictions on access to research information. All intellectual property matters will be handled in standard manners coordinated via the CVIP office unless specific arrangements to the contrary are made and agreed to by the University administration.

**III. RESOURCES**

**A. Describe the space available for use by the organization. (If this is not a permanent location, indicate other space arrangements that are to be made in the future, if known.)**

The Center for Biological physics, under the guidance of its Director and Executive Committee, will allocate laboratory, office, and meeting spaces to the biological physics group as approved by the Physics Department Head. At the startup of the CBP these spaces, in Hasbrouck Laboratory, will comprise (by room number):

- 203/205 wet lab
- 207/207A/209 office/meeting space
- 240/240A wet lab
- 306 office/meeting space
- 309 shared microscopy lab
- 310 wet labs
- 314 instrumentation labs and wet labs
- 315 wet lab and work space
- 316 optical instrumentation room
- 317 office space

**B. Describe any requests for space that have been made.**

None. The laboratory, office, and meeting spaces that have already been committed to biological physics will suffice for the initial operations of the CBP, including moderate-scale externally funded research programs. If the CBP is successful in attracting large-scale external funding, it is possible that additional space may be requested to accommodate the funded activities.

**C. Describe any repairs, renovations, major equipment needed to make the space you have useful to the organization.**

No additional renovations are required for the initial operations of the CBP beyond those that have already been initiated in association with the hiring of Gluckstern Professor Adrian Parsegian.

**D. If any non-University employees or students are or will be using space, describe the arrangement.**

It is expected that the CBP will initiate an active program of short-term visiting faculty, postdocs, and students. All such visitors will be working closely with the University members of the CBP as part of the normal collaborative research process.

**E. Staffing (when operation is fully developed):**

**1. Non-Faculty (provide rank or grade, student status, working title, FTE, source of funding).**

During the initial operations of the CBP there will be no specific non-faculty staff. Undergraduate and graduate students and postdocs will carry out research and educational activities with CBP members, but these students and postdocs will have normal mentoring associations with the faculty members, the Physics Department, and the University rather than a formal association with the CBP. During initial operations existing departmental staff will supply administrative support to CBP members comparable to the support provided for other faculty in the Department. When CBP attracts large-scale external funding, the funding will include any additional administrative support needed, either as direct costs in the funding proposal or by using indirect cost returns as agreed to at the time of proposal submission.

Staff Type (name, PI)	Rank/grade	Student status	Working title	FTE	Funding source
Grant/Business Administrator (TBD, shared)		NA	Business Administrator	100%	Future large scale grants (P01, Center grant)
Research Assistant Professor (TBD, shared)		NA	Research Assistant Professor	100%	Future large scale grants (P01, Center grant)

Optical Technician (TBD, shared)		NA	Optical Technician	100%	Future major Research Instrumentation Grant (NSF) Large scale grants
Laboratory Technician (Carey Fagerstrom, Ross Lab)		NA	Lab Tech	100%	March of Dimes
Postdoctoral Researcher (J. Daniel Diaz, Ross Lab)		NA	Postdoc	100%	March of Dimes
Postdoctoral Researcher (Taviare Hawkins, Ross Lab)		NA	Postdoc	100%	NanoBioMechanics Grant, CMMI, Engineering (NSF)
Graduate Student (Leslie Conway, Ross Lab)		graduate	Graduate student	100%	Institute for Cellular Engineering IGERT (NSF)
Graduate Student (Jaime Hopkins, Ross Lab)		graduate	Graduate student	100%	NanoBioMechanics Grant, CMMI, Engineering (NSF)
Graduate Student (Derek Wood, Ross Lab)		graduate	Graduate student	100%	Major Research Instrumentation Grant (NSF)
Graduate Student (TBD, Ross Lab)		graduate	Graduate student	100&	TBD
Laboratory Technician (TBD, Goldner Lab)		NA	Lab Tech	100%	TBD
Postdoctoral Researcher (Mark Arsenault, Goldner Lab)		NA	Postdoc	100%	Start up funds
Postdoctoral Researcher (Dainwen Zhang, Goldner Lab)		NA	Postdoc	100%	Startup funds
Graduate Student (Peker Milas, Goldner Lab)		graduate	Graduate student	100%	NSF MCB grant
Graduate Student (Richard Buckman, Goldner Lab)		graduate	Graduate student	100%	NSF MCB grant
Graduate Student (Ben Gemari, Goldner Lab)		graduate	Graduate student	100%	NEAGAP Fellowship
Graduate Student (TBD, Goldner Lab)		graduate	Graduate student	100&	TBD
Laboratory Technician (TBD, Parsegian Lab)		NA	Lab Tech	100%	Start-up funds, then grant
Postdoctoral Researcher (TBD, Parsegian Lab)		NA	Postdoc	100%	Start-up funds, then grant
Postdoctoral Researcher (TBD, Parsegian Lab)		NA	Postdoc	100%	Start-up funds, then grant
Graduate Student (M. Selcuk Yasar, Parsegian Lab)		graduate	Graduate student	100%	Start-up funds, then grant
Graduate Student (TBD, Parsegian Lab)		graduate	Graduate student	100%	Start-up funds, then grant

Graduate Student (TBD, Kilfoil Lab)		graduate	Graduate student	100%	Start-up funds, then grant
Graduate Student (TBD, Kilfoil Lab)		graduate	Graduate student	100%	Start-up funds, then grant

**2. Faculty involved (provide name, department, extent involved, release time arrangement, if any).**

The most strongly involved are the Physics Department biological-physics faculty – Ross, Goldner, Parsegian, Kilfoil, one future hire -- together with the soft-condensed-matter faculty – Santangelo, Davidovitch, Dinsmore, Menon. We also expect active collaboration with members of the other schools and departments: NRE, NSM, Engineering, BMB, Chemistry, Biology, CS, Kinesiology, PSE.

Creation of the Center will not require teaching release time from any involved faculty. Researchers who will be part of the Center will include the following

Name, Rank	Department	Involvement	Release Time
Don Candela, Head and Professor	Physics	Executive Committee	
Anthony Dinsmore, Associate Professor	Physics	Executive Committee	
Lori Goldner, Professor	Physics	Executive Committee	
Maria Kilfoil, Assistant Professor	Physics	Executive Committee	
Adrian Parsegian, Professor	Physics	Executive Committee	
Jennifer Ross, Assistant Professor	Physics	Executive Committee	
Benny Davidovich, Assistant Professor	Physics	Steering Committee	
Lila Gierasch, Professor	Biochemistry and Molecular Biology	Steering Committee	
Jon Machta, Professor	Physics	Steering Committee	
Craig Martin, Head and Professor	Chemistry	Steering Committee	
M. Muthukumar, Professor	Polymer Science and Engineering	Steering Committee	
Barbara Osbourne, Professor	Vet and Animal Science	Steering Committee	
Christian Santangelo, Assistant Professor	Physics	Steering Committee	
Mark Tuominen, Professor	Physics	Steering Committee	
Patricia Wadsworth, Professor	Biology	Steering Committee	
Robert Weis, Professor	Chemistry	Steering Committee	
Dominique Alfandari, Associate Professor	Vet and Animal Science	Collaborator	
Tobias Baskin, Professor	Biology	Collaborator	
Mike Barnes, Professor	Chemistry	Collaborator	
Magdalena Bezanilla, Assistant Professor	Biology	Collaborator	
Eric Bittman, Professor	Biology	Collaborator	
Ken Carter, Professor	Polymer Science and Engineering	Collaborator	
Dan Chase, Professor	Biochemistry and Molecular Biology	Collaborator	
Alice Cheung, Professor	Biology	Collaborator	
Priscilla Clarkson, Professor	Kinesiology	Collaborator	

Elizabeth Connor, Professor	Biology	Collaborator	
Al Crosby, Associate Professor	Polymer Science and Engineering	Collaborator	
Nick Darnton	Physics	Collaborator	
Ned Debold, Assistant Professor	Kinesiology	Collaborator	
Geert DeVries, Professor	Psychology	Collaborator	
Gerry Downes, Assistant Professor	Biology	Collaborator	
Steve Doxey, Professor	Cell Biology, UMass Med	Collaborator	
Rafael Fissore, Professor	Vet and Animal Science	Collaborator	
Neil Forbes, Associate Professor	Chemical Engineering	Collaborator	
Caroline Goutte, Associate Professor	Biology, Amherst College	Collaborator	
David Gross, Professor	Biochemistry and Molecular Biology	Collaborator	
Jeanne Hardy, Assistant Professor	Chemistry	Collaborator	
Ryan Hayward, Assistant Professor	Polymer Science and Engineering	Collaborator	
Dan Hebert, Professor	Biochemistry and Molecular Biology	Collaborator	
Alejandro Heuck, Associate Professor	Biochemistry and Molecular Biology	Collaborator	
Matt Holden, Assistant Professor	Chemistry	Collaborator	
Abbie Jensen, Associate Professor	Biology	Collaborator	
Rolf Karlstrom, Head and Professor	Biology	Collaborator	
Michelle Klingbeil, Assistant Professor	Microbiology	Collaborator	
Mike Knapp, Professor	Chemical Engineering	Collaborator	
Wei-Lih Lee, Assistant Professor	Biology	Collaborator	
Susan Leschine, Professor	Microbiology	Collaborator	
Derek Lovley, Professor	Microbiology	Collaborator	
Jesse Mager, Assistant Professor	Vet and Animal Science	Collaborator	
Anna Martini, Professor	Geology, Amherst College	Collaborator	
Lynne McLandsborough, Associate Professor	Food Science	Collaborator	
Narayanan Menon, Professor	Physics	Collaborator	
Ricardo Metz, Professor	Chemistry	Collaborator	
Lisa Minter, Assistant Professor	Vet and Animal Science	Collaborator	
T. J. "Lakis" Mountziaris, Head and Professor	Chemical Engineering	Collaborator	
John Nambu, Professor	Biology	Collaborator	
Mark Petersen	Mount Holyoke College	Collaborator	
Sandy Petersen, Professor	Vet and Animal Science	Collaborator	
Margaret Riley, Professor	Biology	Collaborator	
Susan Roberts, Associate Professor	Chemical Engineering	Collaborator	
Vincent Rotello, Professor	Chemistry	Collaborator	

Thomas Russell, Professor	Polymer Science and Engineering	Collaborator	
Steve Sandler, Professor	Microbiology	Collaborator	
Danny J. Schnell, Head and Professor	Biochemistry and Molecular Biology	Collaborator	
Larry Schwartz, Professor	Biology	Collaborator	
Elizabeth Stuart, Associate Professor	Microbiology	Collaborator	
Lianhong Sun, Assistant Professor	Chemical Engineering	Collaborator	
Greg Tew, Professor	Polymer Science and Engineering	Collaborator	
Thai Thayumanavan, Professor	Chemistry	Collaborator	
Lynmarie Thompson, Professor	Chemistry	Collaborator	
Kimberley Tremblay, Assistant Professor	Vet and Animal Science	Collaborator	
Elsbeth Walker, Associate Professor	Biology	Collaborator	
Jim Watkins, Professor	Polymer Science and Engineering	Collaborator	
Chris Woodcock, Professor emeritus	Biology	Collaborator	
Thomas Zoeller, Professor	Biology	Collaborator	

**3. Describe how the Center or Institute may impact existing teaching responsibilities of participating faculty members through “buy-out” arrangements, reduced teaching loads, or other provisions, and how such impacts will be resolved.**

During the initial operations of the CBP there will be no buy-out arrangements or reduced teaching loads for faculty participating in the Center. If large-scale funding is obtained requiring extensive faculty time commitments, then faculty members may request a teaching buyout arrangement for one or more semesters. It is expected that the buyout funds would provide for the hiring of temporary instructors to make up for the reduced teaching of the faculty member. All such buyout agreements will be negotiated with and subject to the approval of the Physics Department Head.

**F. Attach a detailed budget showing sources of funding, full-year basic operation costs and anticipated expenditures. (This should show programmatic expenditure descriptions, kinds of funding accounts and amounts by subsidiary accounts as well as alternative funding arrangements or programmatic adjustments to be made if funding sources fail.)**

The primary function of the proposed Center is to enable the submission of proposals. Initially anticipated expenditures will be small.

seminar program	\$10,000
Gluckstern Scholar visits	\$20,000
ILab module	\$38,000 (from NSF, optical tweezers for a biological physics lab module)
BioBootCamp supplies	\$1000 (NSF funds from J. Ross)

In addition, until proposals initiated by the CBP are funded, there will be considerable activity funded by existing grants to CBP members, as detailed in Section E-1 above.