

UNIVERSITY FACULTY SENATE

SUMMARY OF AGENDA

SEPTEMBER 12, 1994

- I. **ADOPTION OF THE AGENDA**
- II. **APPROVAL OF THE MINUTES: May 2, 1994**
- III. **REMARKS UNIVERSITY PROVOST SCHIAVELLI and/or VICE PROVOST ANDERSEN**
- IV. **ANNOUNCEMENTS: Senate President McLaughlin**
ANNOUNCEMENTS FOR CHALLENGE
 1. Revision of the minor in Geology
 2. New minor in Statistics
 3. Revision of the Master of Urban Affairs and Public Policy
- V. **OLD BUSINESS**
 - A. Election of Senate President-Elect
 - B. Recommendation for the creation of a new standing committee of the University Faculty Senate
 - C. Revision of the Credit-by-Examination Regulations and Form
- VI. **NEW BUSINESS**
 - A. Recommendation for the establishment of an Interdisciplinary Graduate Program in Biomechanics and Movement Science
 - B. Introduction of new business





University of Delaware

UNIVERSITY FACULTY SENATE
219 McDOWELL HALL
NEWARK, DELAWARE 19716

(302) 451-2921
(302) 451-2922

August 31, 1994

TO: All Faculty Members

FROM: Thomas S. Angell, Vice President
University Faculty Senate

A handwritten signature in cursive, appearing to read "T. Angell", written in black ink.

SUBJECT: Regular Faculty Senate Meeting, September 12, 1994

In accordance with Section IV, paragraph 6 of the Constitution, the regular meeting of the University Faculty Senate will be held on Monday, September 12, 1994 at 4:00 p.m. in room 110 Memorial Hall. The agenda will be as follows:

AGENDA

- I. Adoption of the Agenda.
- II. Approval of the minutes of the Senate meeting of May 2, 1994.
- III. Remarks by University Provost Schiavelli and/or Vice Provost Andersen.
- IV. Announcements: Senate President McLaughlin
Announcements for Challenge
 1. Revision of the minor in Geology (Attachment 1)
 2. New minor in Statistics (Attachment 2)
 3. Revision of the Master of Urban Affairs and Public Policy (Attachment 3)
- V. Old Business
 - A. Election of Senate President-Elect. (Biographies of the two nominees are presented in Attachment 4.)

Harrison Hall

Vivian Klaff

- B. Recommendation from the Faculty Senate Executive Committee '93-94, with the concurrence of the Committee on Committees and Nominations (F. Dilley, Chairperson '93-'94), for the creation of a new standing committee of the University Faculty Senate. This item was originally brought before the Faculty Senate on May 2, 1994 and returned to the Executive Committee. (See Attachment 5 for a full description of the Committee's charge.)

WHEREAS, faculty need to have an advocacy position directly with the Provost concerning long-term planning, be it therefore

RESOLVED, that the University Faculty Senate approves the creation of a Faculty Senate committee to be called the Academic Priorities Review Committee, effective immediately,

AND BE IT FURTHER RESOLVED,

that the Senate encourages DUSC to form a parallel committee of students for similar liaison with the Office of the Provost.

- C. Recommendation from the Committee on Undergraduate Studies (B. Viera, Chairperson '94) with the concurrence of the Coordinating Committee on Education (J. McLaughlin, Chairperson '93-'94) for revision of the Credit-by-Examination Form. This item was originally brought before the Faculty Senate on May 2, 1994 and returned to the Committee on Undergraduate Studies. (A copy of the revised form is at Attachment 6.)

WHEREAS, some abuses of the credit-by-examination option have been noted, and

WHEREAS, the current credit-by-examination application form contains a misleading option as a basis for request, and

WHEREAS, the current credit-by-examination application permits only three grades (A, B, P), and

WHEREAS, a broader range of grades can be achieved in most University courses, be it therefore

RESOLVED, that the relevant paragraph in the Academic Regulations section of the Undergraduate Catalog, page 21, be amended as follows: [Deleted text is double underlined and added text is in bold type.]

CREDIT BY EXAMINATION

The University provides to all matriculated and Continuing Education students the opportunity to obtain college credit by examination for demonstrated competence attained through professional experience, independent study, or some similar learning experience, but not by previous enrollment in a **University of Delaware** course. General inquiries concerning credit by examination should be directed to the department offering the course for which the student seeks credit. **Credit by examination is not allowed in experimental courses or independent study courses.** A credit-by-examination form, available at the

AND BE IT FURTHER RESOLVED,

that A, B, or C grades may be assigned to performance in credit-by-examination substitutions and that the application form reflect that range of grades.

VI. New Business

- A. Recommendation from the Committee on Graduate Studies (P. Hooper, Chairperson '93-'94), with the concurrence of the Coordinating Committee on Education (J. McLaughlin, Chairperson '93-'94), for provisional approval of an Interdisciplinary Graduate Program in Biomechanics and Movement Science. (Attachment 7)

RESOLVED, that the Faculty Senate approves provisionally, for four years, the establishment of an Interdisciplinary Graduate Program in Biomechanics and Movement Science.

- B. Such items as may come before the Senate. (No motion introduced under new business, except a motion to refer to committee, shall be acted upon until the next meeting of the Senate.)

TA/rg

Attachments:

1. Revision of the minor in Geology
2. New minor in Statistics
3. Revision of the Master of Urban Affairs and Public Policy
4. Biographies
5. Charge for the Academic Priorities Review Cte.
6. Revised Credit-by-Examination Form
7. Interdisciplinary Graduate Program in Biomechanics and Movement Science

INTERDEPARTMENTAL
MEMORANDUM

TO: Dr. Louis Arena, Chairperson
A&S Educational Affairs Committee

FROM: Billy P. Glass, Chair *B. Glass*
Geology Department

DATE: December 8, 1993

SUBJECT: Change in Geology Minor

At the November 30, 1993, faculty meeting the faculty voted to make the following changes in the Geology Minor:

- Eliminate GEOL 402 as a requirement and add GEOL 203 as a requirement.
- Eliminate GEOL 203 from the list of courses two of which are required.
- Reword the last part so that it reads "Any 400-level geology courses must be used to obtain the remaining credits to reach a total of 18."

Thus the proposed requirements would read:

The minor in geology consists of at least 18 credit hours in geology. The requirements are: GEOL 107 and GEOL 203; at least two of the following: GEOL 204, 301, 303, 304, and 305; any 400-level courses must be used to obtain the remaining credits to reach a total of 18.

Rationale: Under the present requirements GEOL 402 is required. If a student takes all of the prerequisites required for GEOL 402 he/she would have to take 26 credits. In order to eliminate that problem we propose to eliminate GEOL 402 as a requirement. GEOL 203 was added as a requirement because it is a prerequisite for most of the upper level courses. The "may" in "Any 400-level geology courses may be used to obtain..." was changed to "must" in order to avoid confusion. It was the original intent to require that the additional course be at the 400-level.

BPG/jrl

DEPARTMENT OF MATHEMATICAL SCIENCES
Proposal for a Minor in Statistics

1. Description

It is proposed to add a minor in statistics. The description for the catalog is as follows:

A student seeking a minor in statistics must obtain permission from the chairperson or his/her designee in the Department of Mathematical Sciences. Course requirements include ST370-371 and 9 credits in statistics above ST371 (excluded are ST555, ST650, ST656 and ST657).

2. Rationale and Demand

The Department of Mathematical Sciences presently offers a minor in mathematics. However, only one statistics course is accepted for this minor. It was felt that since the department offers a B.S. in statistics, it should also offer a minor in statistics. The proposal was discussed and formulated by the department's Undergraduate Studies Committee and approved by the full department during a meeting on Nov. 9, 1993. It is not anticipated that the proposal will have any significant impact on other instructional, research or service programs of the University of Delaware. It is hoped that the existence of a minor in statistics may in a modest way encourage increased enrollment in middle level and upper level statistics courses. The number of students electing to have a minor in statistics is certain to be small and the approval of this proposal is unlikely to have any impact on staffing the relevant statistics courses.

COLLEGE OF URBAN AFFAIRS AND PUBLIC POLICY

MASTER OF URBAN AFFAIRS AND PUBLIC POLICY

Areas of Concentration

Energy and Environmental Policy

CORE COURSES: (Five courses required)

- URAF 613 Planning Theory and Urban Policy
- URAF 615 Urban and Regional Planning
- URAF 828 Urban Policy Alternatives and Analysis

choose two of the following:

- URAF 800 Research Design and Methodologies
- URAF 815 Public Management Statistics
- URAF 816 Advanced Social Statistics

Total required core credits 15

In addition to the five core courses, students in the energy and environmental policy concentration must take four 3-credit courses.

Two seminars are required:

- URAF/POSC 625 Energy Policy and Administration
- URAF/POSC 818 Environmental Policy and Administration

Total required seminar credits 6

In addition, at least two of the following courses must be taken:

- URAF 867 Conservation and Renewable Energy Policy
- ECON/MAST 676 Environmental Economics
- ECON 670/MAST 672 Applied Policy Analysis
- MAST 873 Marine Policy Seminar
- PHIL 647 Philosophy of Technology
- URAF 821 Technology and Society Seminar
- URAF 867 Political Economy of the Environment
- URAF 868 Research in Energy/Environmental Policy
- URAF 870 Readings in Energy/Environmental Policy

Total Area Course Credits 6

Analytical Paper or Thesis

- Thesis (6 credits)
- or
- Analytical Paper (3 credits)
- Elective in concentration area (3 credits)

Total required 6

Elective Credit (May be selected from course or tutorial work in the concentration or a related area or an internship, depending on student's program of study) 3

Total required credits 36

To qualify for this concentration, a student's proposed program of study must meet the above requirements and have received the approval of his/her faculty advisor and the program director.

Historic Preservation

CORE COURSES: (Five courses required)

- URAF 613 Planning Theory and Urban Policy
- URAF 615 Urban and Regional Planning
- URAF 828 Urban Policy Alternatives and Analysis

choose two of the following:

- URAF 800 Research Design and Methodologies
- URAF 815 Public Management Statistics
- URAF 816 Advanced Social Statistics

Total required core credits 15

In addition to the five core courses, students in the historic preservation concentration must take four 3-credit courses.

Required specialization courses are:

- URAF/HIST/MISST 629 Seminar in Historic Preservation
- URAF 630 Historic Preservation Studio (offered every other year)

Total required specialization credits 6

choose two of the following:

- URAF 800 Research Design and Methodologies
- URAF 815 Public Management Statistics
- URAF 816 Advanced Social Statistics

15

Total required core credits 15
 In addition to the five core courses, students in the community analysis and development concentration must take four 3-credit courses.

One seminar is required:

- URAF 667 Community Analysis and Development Seminar

3

Total required seminar credit

Three of the following courses must be taken:

- URAF 606 Local Economic Development: Policy and Practice
- URAF 612 Urban Housing Policy and Administration
- URAF 840 Introduction to the Nonprofit Sector
- URAF 867 Poverty, Neighborhoods and Community Development
- URAF 868 Research in Community Analysis and Development
- URAF 870 Readings in Community Analysis and Development

9

Total area course credits

Analytical Paper or Thesis:

Thesis (6 credits)

or

Analytical Paper (3 credits)

Elective in concentration area (3 credits)

6

Total required

Elective Credit (may be selected from course or tutorial work in the concentration or a related area or an internship, depending on student's program of study)

3

Total required credits

36

To qualify for this concentration, a student's proposed program of study must meet the above requirements and have received the approval of his/her faculty advisor and the program director.

One of the following four courses in Architectural History:

- URAF/ARTH/HIST 654 Vernacular Architecture
- Studies in American Architecture of the Colonial and Federal Periods
- ARTH 633 Studies in Nineteenth-Century American Architecture
- MSST 805 Historic Properties

Total Architectural History credits 3

One of the following four courses in Evolution of Landscapes and the Urban Built Environment:

- URAF/HIST 632 Making the American City (offered every other year)
- GEOG 625 The Internal Structure of the City
- URAF/GEOG/HIST 635 Evolution of American Urban Landscape
- URAF/ARTH 667 Research Seminar on Preservation (offered every other year)

Total Evolution of Landscapes credits 3

Analytical Paper or Thesis:

Thesis (6 credits)

or

Analytical Paper (3 credits)

Elective in concentration area (3 credits)

6

Total required

Elective Credit (may be selected from course or tutorial work in the concentration or a related area or an internship, depending on student's program of study)

3

Total required credits 36

To qualify for this concentration, a student's proposed program of study must meet the above requirements and have received the approval of his/her faculty advisor and the program director.

Community Analysis and Development

CORE COURSES: (Five courses required)

- URAF 613 Planning Theory and Urban Policy
- URAF 615 Urban and Regional Planning
- URAF 828 Urban Policy Alternatives and Analysis

PRESIDENT ELECT (Vote for one)

NAME: Harrison Hall DEPARTMENT: Philosophy
 RANK: Associate Professor DATE OF HIRE (FULL TIME): 9/1/73
 HAVE YOU SERVED ON A SENATE COMMITTEE(S) IN THE PAST? YES NO

NAME: Vivian Z. Klaff DEPARTMENT: Sociology
 RANK: Associate Professor DATE OF HIRE (FULL TIME): 9/1/77
 HAVE YOU SERVED ON A SENATE COMMITTEE(S) IN THE PAST? YES NO

IF YOU ANSWERED 'YES' PLEASE COMPLETE THE FOLLOWING:

IF YOU ANSWERED 'YES' PLEASE COMPLETE THE FOLLOWING:

1.	COMMITTEE NAME	ACADEMIC YEAR	IN WHAT CAPACITY? (MEMBER, CHAIRPERSON, ETC.)
1.	Senator	1992-1994	MEMBER, CHAIRPERSON, ETC.
2.	Off. on Diversity and Affirmative Action	1993-Present	Member
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

1.	COMMITTEE NAME	ACADEMIC YEAR	IN WHAT CAPACITY? (MEMBER, CHAIRPERSON, ETC.)
1.	Vice President Senate	1991-92	
2.	Executive Committee	1991-92	Member
3.	Undergraduate Studies Coordinating Cte.	3 years	Member
4.	Faculty Welfare and Privileges	6 years	Member and chair
5.	Instructional Resources	1991-1993	Member and chair
6.		2 years	Member
7.	Computer Committee	1 year	Member
8.	Beverage Alcohol Visiting Scholars	1 year	Member
9.	and Speakers	1 year	Member
10.	Senator	4 years	

PLEASE USE THIS SPACE FOR ANY COMMENTS YOU MAY HAVE CONCERNING YOUR QUALIFICATIONS FOR THIS POSITION.

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Educational Affairs Cte., Arts and Sciences (1978-79)
 COPE Cte., Review of Dept. of Political Science (1979)
 Promotion and Tenure Committee, Arts and Sciences (1983-1985)
 Educational Affairs Committee, Arts and Sciences (1985-1987)
 Search Committee member for Director of Academic Computing Support (1988)
 President's Ad hoc Committee on Racism and Anti-Semitism on campus.

Appellate Court 4 years, Provost's Task Force on Multicultural Education 1 year, Advisory Committee to the Provost on Middle States Review 1 year, Ad Hoc Committee to Redesign COPE 1 year, Research Committee of the Provost's Task Force on Computing 1 year, COPE Task Force for Sociology 1 year, College Cte. on Educational Affairs 4 year 4 years, College Cte. on Academic Freedom 2 years, Acting Department Chair 1 semester, Dept. Graduate Cte. 3 years.

UNIVERSITY FACULTY SENATE
CHARGE TO THE ACADEMIC PRIORITIES REVIEW COMMITTEE

This committee shall provide direct faculty advice concerning long-term priorities for the University to the Office of the Provost. The committee will also advise the Office of the Provost in preparing materials for Middle States Accreditation reviews and updates, which occur on a five year interval. The committee will be provided with information secured by the Coordinating Committee on Education and other Faculty Senate committees concerning such matters as budgets and programs under review, and it will meet regularly with the Provost.

The Committee shall consist of five members, who shall be the present and three most recent former chairpersons of the Faculty Senate Coordinating Committee on Education and one former winner of the Francis Alison award. In the event that a former chair of the Coordinating Committee cannot serve, another former Senate officer may be appointed as a substitute. Members shall serve four year terms, with one Senate member joining and one leaving each year. The committee will elect its own chair.

CREDIT BY EXAMINATION

Office of the University Registrar
UNIVERSITY OF DELAWARE

STUDENT SECTION

SOCIAL SECURITY NUMBER

CLASSIFICATION

Payment must be made prior to sitting for examination.

EXAMINATION IN COURSE:
Enter only one course per form

PLEASE PRINT ALL DATA

COURSE SYMBOL AND NUMBER

OF CREDIT HOURS

STUDENT'S MAILING ADDRESS

COURSE TITLE

Name (F.M.L.)

Street or Dorm

City, State, Zip

BASIS FOR REQUEST

Professional Experience

Independent Study

Study at another institution - Not acceptable as Transfer Credit

OTHER (SPECIFY)

TODAY'S DATE

INSTRUCTIONS

- Student must be currently enrolled at the University of Delaware to earn Credit by Examination.
- Student consults with department chairperson regarding basis for awarding credit and obtains signature.
- Student pays non-refundable ~~\$25~~^{\$30} per credit hour fee at Cashiers Office.
- Cashier records payment amount and date stamps all copies.
- Student retains last copy (gold) as a receipt.
- Student presents remaining five part set to department chairperson and completes arrangements for evaluation.
- After completion of evaluation, department chairperson checks method of evaluation. *ENTERS A LETTER GRADE OF C*
- Department chairperson ~~enters grade of A, B, or C~~ *enters grade of A, B, or C*. Number of credit hours must equal the number of credit hours for which the course is approved.
- Department forwards all five copies with grade entered to University Recorder in the Office of the University Registrar.
- Recorder enters credit by examination data in student's record.
- Recorder distributes copies.

DEPARTMENT SECTION

APPROVED FOR EXAMINATION

Course Department Chairperson

DEPARTMENT SECTION

COURSE KNOWLEDGE EVALUATED BY

Written Examination

Oral Examination

Other (Specify)

GRADE

A, B, or ~~C~~ only

C

RECOMMENDED BY

Course Department Chairperson

RECORDER'S USE ONLY

Term	Date Entered	Initials

CASHIERS OFFICE USE ONLY

DISTRIBUTION: WHITE-Recorder; GREEN-Student; CANARY-Dean; PINK-Department; BLUE-Cashiers Office; GOLD-Student Receipt.

II.A.1 Compatibility with the University of Delaware Mission

The Biomechanics and Movement Sciences degree program was created by applying the ideals of excellence in scholarship and service as identified in the University Mission Statement to an area of study which has unlimited potential in serving the needs of the physically challenged. It is a program which by definition combines the areas of science, engineering, orthopedics and rehabilitation in order to create a more comfortable and functional environment for this substantial and growing segment of the world population. It is a program which thrives on the diversity of students and faculty from different backgrounds, all working towards the same common goal.

II.A.2 Description of the Planning Process

This proposal was formed by a group of twenty faculty and administrators from four different departments over the course of the past year. The impetus for a single unified program of study grew out of the realization that each of the four units was seeking a vehicle to create an academic program which dealt with the application of science and engineering toward solving the problems realized by the physically challenged. During the initial phase of planning, the group examined and analyzed models of existing programs in biomedical and rehabilitation engineering from institutions around the country (primarily the University of Michigan and Louisiana Tech University). In addition, advice was sought from administrators of Operations Research, the University's only intercollegiate, interdisciplinary graduate program. Directors of other graduate degree programs on campus were contacted for input on how the creation of this program would impact existing graduate degree programs. The resulting proposal represents the synthesis of countless communications between group members, and an astounding quantity of consensus decisions reached through in-depth discussions of course requirements, seminar formats, student recruitment and admission policies, administrative structures and responsibilities, and numerous additional details.

II.A.3 Impact on Other University Programs

There are no known negative impacts that this program will impose on any other programs within the University. There are several anticipated positive effects that this program will provide to the University. It is expected to improve our position for obtaining external funding which will subsequently provide research assistants and/or teaching assistants to programs that currently have no graduate student support. It will increase the scope and quality of the interaction between the University and the Delaware medical community. It will provide academic support to the Center for Applied Science and Engineering in Rehabilitation at the A.I. DuPont Institute, and the Orthopedic and Biomechanical Engineering Center at the University of Delaware.

II.A.4 Utilization of Existing Resources

Faculty with expertise and interest in working with graduate students in the area of biomechanics and movement sciences (BIOMS) must currently do so within the academic requirements of their own departments. In all cases, the academic requirements set forth by the departments are inappropriate for a student wishing to work in BIOMS, and modification of these requirements would necessitate a substantial and unjustifiable revision of a department's curriculum. However, by using existing coursework both on and off campus and combining the research capabilities and coursework of the four departments, structuring an academic curriculum for a student in BIOMS becomes feasible. A degree program which will have an immediate positive impact on the

Interdisciplinary Graduate Program

in

Biomechanics and Movement Science

Submitted to the Graduate Committee
of the
University of Delaware

Mission Statement for the Interdisciplinary Graduate Program in Biomechanics and Movement Science

The human body is comprised of a variety of complex, integrated systems. Therefore, a group of faculty have assembled with a mission to study the body from an interdisciplinary approach. Both the static and dynamic components of this complex structure will be explored. An understanding of the structural integrity along with the generation of movement are the basis for this course of study. The faculty come from diverse backgrounds in the areas of applied physiology, biomechanics, computer science, engineering, motor control and rehabilitation science. Interests range from robotic interfaces for environmental controls for the disabled, to fracture fixation, to understanding of normal and pathological movement.

A significant percentage of the population has some form of physical disability that restricts them from functioning freely in our society. The form of these disabilities may be progressive deterioration of tissue, congenital defects or trauma-inflicted damage. The adverse effects of many disabilities could be reduced or alleviated through appropriate, applied research on topics ranging from microscopic bone remodeling to corrective device development.

There is clearly a present need for research in the area of biomechanics covering a continuum from basic tissue studies to rehabilitation device applications. Appropriate engineering analyses of the human system provide new insight and understanding of the operation of this system. In time, this will not only advance and amplify the ability of medical practitioners to respond to maladies, it will also enable them to prescribe appropriate preventative or corrective measures.

We believe that this program will provide a unique opportunity for graduate students to study the body human in a way not possible through any of the traditional programs currently offered at this university.

community will be created from existing resources, without diminishing the resources of any of the departments from which it is supported.

II.B.1 Student Demand

Maximum enrollment will initially be limited to approximately 10 matriculated students, dependent upon the amount of funding which can be generated for student support. Two-year startup funding is available to support three new students a year for the next three years. Based on past inquiries and requests for a BIONS program, it is anticipated that at least 20-30 students will apply to the program on an annual basis.

The curriculum for the BIONS program will be based on existing courses offered at the University and will not, as a consequence, provide service courses or electives to other majors. Majors in the BIONS program may be new students or may transfer into the program from elsewhere on campus.

II.B.2 Targeted Student Populations

The proposed program in Biomechanics and Movement Sciences has not been designed around any special student population, although it is expected to attract some students who are themselves physically handicapped, and students who are currently employed professionals in the area of rehabilitation services.

II.C Articulation

Virtually all of the coursework which provides the basis for this program is already in existence. Since no other programs in the state or region provide this type of degree, transfer of credit to other programs in the state would follow standard University policy.

II.D Access to Graduate and Professional Programs

Not Applicable

II.E Demand and Employment Factors

Graduates of the Biomechanics and Movement Sciences program are expected to find, but not be limited to, employment in the following areas:

1. Clinical Research Labs (ie. Cleveland Clinic)
2. Academic Positions in Physical Therapy
3. Academic Positions in Biomechanics
4. Hospital/Private Gait Laboratories
 - Design and testing of orthotic/prosthetic equipment
 - Design and analysis of surgical instrumentation
 - Biomechanics laboratories (Reebok, Nike, Steadman Foundation...)
 - Sports medicine clinics/research facilities

II.F.1 Regional, State, and National Factors

There are no known programs in the state or surrounding region that provide an interdisciplinary approach to the area of Biomechanics and Movement Sciences. Regional programs in Biomechanics, Engineering, Physical Therapy, Motor Control, and Physiology are all subject to the limitations of our own individual programs in preparing

students in this diverse area. In addition, there are no institutions in the region which have the resources or facilities to create a program which equals the quality of the one described in this proposal.

II.F.2 Accrediting and Licensing Requirements

There are no national, regional, or local accrediting agencies which govern this field of study. The proposed program is independent of any external timetables, content requirements, facilities needs, or budgetary requirements.

II.G.1 Other Strengths

This proposed graduate program builds upon the strengths of four established academic and research activities at the University of Delaware. Each of the participating units is recognized within its own field of specialization. This new effort combines the strengths of the individual units and focuses attention on a unified program in biomechanics and movement science.

In most other universities, the study of biomechanics and movement science is undertaken from the limited perspective of a single department. While there are many highly respected curricula in the nation, few offer students the opportunity to view the field with such depth and breadth as this proposed curriculum. The availability of faculty members with backgrounds in sport biomechanics, physical therapy, applied physiology, engineering, and computer science, affords students a rich educational environment.

In addition to the faculty, the collective research laboratories of the participating units provide exposure to facilities that are superior to most existing graduate curricula. The laboratories of the Ice Skating Science Development Center, the Department of Physical Therapy, and the Center for Applied Science and Engineering in Rehabilitation represent an array of equipment for both upper and lower extremity biomechanics and movement studies. Computing capabilities in these programs support analytical and quantitative approaches to research.

Within the University there are three different motion analysis systems. Few curricula offer exposure to more than one system. Facilities for computation include an impressive array of Sun Microsystems, Silicon Graphics, and Digital Equipment Corporation Workstations, as well as a variety of microcomputers. Students in this program will be well prepared to meet the needs of their future research activities.

This curriculum combines the resources of a number of existing University activities into one strong and highly visible program. This will prove to be more cost effective than developing separate graduate programs, and will create a curriculum which provides an exciting educational program that achieves national prominence.

II.G.2 Anticipated strengths

This new program will offer students the opportunity to consider biomechanics and movement science from the medical and sports perspectives. The affiliations with the A. I. duPont Institute, an internationally known orthopedic facility, and the Ice Skating Science Development Center, known for its activities with national ice skating community, offer breadth of study that is unmatched by most existing curricula. The significance of these efforts will aid in the recruitment of graduate students to the curriculum. The relationship between the A.I. duPont Institute and the University was

III.B.2. Anticipated Levels of Student Financial Support

Student finances will be provided through personal means, research grants, training grants, corporate sponsorships, and other external grants. In addition, the Office of Graduate Studies has pledged three graduate tuition lines to this program.

IV.A. Degrees to be Awarded

The degrees awarded to those who complete this program will be either a Master's of Science in Biomechanics and Movement Sciences, or a Doctor of Philosophy in Biomechanics and Movement Sciences. These degrees are appropriate since the RIONMS program is based upon an application of the sciences toward understanding and influencing the static and dynamic functions of the human musculoskeletal system.

IV.B.1. Curriculum Requirements

- MS Degree
- 24 Credits in courses
- 6 Credits in thesis

Ph.D. Degree

- 39 credits of coursework plus 9 credits of dissertation (beyond MS)
- 69 credits of coursework plus 9 credits of dissertation (without MS)

Required Courses

- Seminar 3 Semesters () Credit for Ph.D.
- Seminar 2 Semesters () Credit for MS
- Experimental Design/Statistic
- Instrument/Computing/Engineering Applications
- 2 courses outside of principal area of study

Thesis/Dissertation

- Thesis/dissertation proposal written in MIT grant format
- Open Defense of proposal (serves as qualifying exam)
 - Minimum 50% of program faculty present
 - Must receive majority vote from attending faculty
- Open thesis/dissertation defense
 - Only thesis/dissertation committee votes
 - Committee consists of:
 - 3 faculty from within program
 - (1 of 3 from outside area of concentration)
 - 1 faculty member from outside of program

established in 1988 with the development of the Center for Applied Science and Engineering in Rehabilitation. The Center is supported by grants to the University from governmental agencies, and by the Nemours Foundation, through the Institute. The Center currently supports 13 graduate students in various University departments.

The affiliation with the Institute has expanded beyond the Center and now includes joint activities between the University Department of Physical Education and the Institute Department of Orthopedics. One of these activities has involved the development of a clinical gait analysis service for the Institute. This relationship resulted in the creation of a state-of-the-art gait analysis laboratory at the A.I. duPont Institute in late 1993.

The Department of Physical Therapy has also established a number of collaborative efforts both outside and within the University. Projects are currently ongoing with the Children's Rehab Hospital of Thomas Jefferson Medical Center, Presbyterian Medical Center, The Rothman Institute of Pennsylvania Hospital and the University of Pennsylvania Sports Medicine Center. Additionally, joint projects are ongoing with the Department of Mechanical Engineering, the Department of Electrical Engineering, and the Sports Science Laboratory.

III.A.1. Enrollment Limits

Enrollment will be limited by the amount of external funding which is available to support students in this program, and by the availability of faculty members to serve as advisors within the demands of their individual workloads. Students will be admitted to the program based upon enrollment availability and their ability to meet the following recommended entrance requirements.

- All minimum University requirements
- Recommended GRE 1050 (or 75th percentile), recommended GPA 3.0
- Math through calculus
- Anatomy/Physiology
- Physics (2 Semesters)
- Chemistry (2 Semesters)
- Acceptance by a primary advisor
- Identification of course prerequisites added by advisor
- Written statement of goals and objectives
- 3 letters of recommendation

III.A.2. Transfer/Retention Policy

The RIONMS program will adhere to the policies on transfer and retention as described in the current (1993-1994) Graduate Catalog.

III.A.3. Effective Academic Year

This program is targeted to begin formal operation in the fall semester of 1994.

III.B.1. Additional Required Student Expenses

There will be no required student expenses beyond the traditional book and supply costs

IV.B.2. Sample Curriculum in Biomechanics and Movement Science

Student 1: Ph.D. in Biomechanics and Movement Science with a primary focus on rehabilitation technology.

Background: Masters degree in Biomedical Engineering, 2 year post masters experience both with clinical rehabilitation engineering and research.

Year 1 Course work

Multivariate methods (STAT 617)
Introduction to applied mathematics (MATH 616)
Research Design (PSYC 809)
Neuroscience I (PSYC 626)
Neuroscience II (PSYC 627)
Cognitive Neuroscience (PSYC 650)
BIONIS Seminar

Year 2 Course work

Medical Science II (PIIYT 802)
Biomechanics (NIEG 667)
Neural Networks (CISC 689-10)
Computer graphics (CISC 640)
Mechatronics (CISC 667)
Independent study - (Human Factors Engineering)
Independent study - (Computer Human Interaction)
BIONIS Seminar

Year 3 Course work

BIONIS Dissertation
BIONIS Seminar

Student 2: Masters in Biomechanics and Movement Science with a primary focus on rehabilitation technology.

Background: Bachelor's in Mechanical Engineering.

Year 1 Course work

Engineering Analysis I (NIEG 863)
Engineering Analysis II (NIEG 864)
Research Design (PSYC 809)
Digital Signal Processing (EEIG 631)
Biomechanics (NIEG 667)
BIONIS Seminar

Year 2 Course work

Mechatronics (CISC 667)
Computer Aided Design (NIEG 663)
Functional Anatomy and Biomechanics (PIIYT 604)
BIONIS Seminar
BIONIS Thesis

Student 3: Ph.D. in Biomechanics and Movement Science with a primary focus on applied physiology.

Background: Master's Degree in Physical Therapy

Year 1 Course work

BISC 605/606 Advanced Mammalian Physiology
BISC 667 Neuroscience IV
CIEM 527 Introductory Biochemistry
PHED 803 Introduction to Laboratory Instruments
BIONIS Seminar

Year 2 Course work

ANSC 609 Comparative Vertebrate Histology
BISC 661 Biology of Striated Muscle
PSYC 860 Psychological Statistics
PIIYT 800 Advanced Physiology of Exercise
Course in other discipline within BIONIS program
BIONIS Seminar

Year 3 Course work

BIONIS Dissertation
BIONIS Seminar

Student 4: Ph.D. in Biomechanics and Movement Science with a primary focus on applied physiology.

Background: Master's Degree in Biology

Year 1 Course work

BISC 605/606 Advanced Mammalian Physiology
BISC 626 Neuroscience I
BISC 627 Neuroscience II
PHYS 645 Electronics for Scientists
PHYS 646 Instrumentation for Scientists
BIONIS Seminar

V.A Existing Learning Resources

Students matriculated in the BIONIS degree programs will have formal access to three libraries: The A.I. duPont Institute Library located at the A.I. duPont Hospital in Wilmington, the Thomas Jefferson Medical Library in Philadelphia, and the University of Delaware library in Newark (Attachment A). In addition, the following laboratories and research facilities will be available:

•Physical Therapy Research Facilities: 3rd Floor, McKinley Laboratory.

Facilities for Physical Therapy include a 235.4 square feet motion analysis laboratory. The laboratory is equipped with a VICON infrared-based, high speed motion analysis, 4 camera system and a Digital Equipment Corp. Vaxstation 3100 for collecting and analyzing movement kinematics as well as ground reaction forces during locomotion. Ground reaction forces are obtained from a Bertec Corporation load cell that is mounted on an optical bench in the floor of the laboratory. Two photoelectric cells and a timer also provide a means for monitoring locomotion speed. Foot strike indicators allow the monitoring of gait events. The laboratory also houses a PEAK Performance Technologies, Inc. video-based motion analysis system which is used for movement analysis both in-house and at remote collection sites. In addition, a Therapeutics Unlimited electromyography (EMG) system and 16 channel Data Translation analog-to-digital board is available for collecting electromyography (EMG) data via a Hewlett-Packard Vectra RS-20 computer. A torque motor-manipulandum system is available for the study of human manual coordination and muscle reflexes. This lab supports software for determining rigid body kinematics and kinetics along with determination of muscle length changes during activity.

An animal laboratory for basic and applied muscle physiology research is also supported by the Physical Therapy program. This lab includes a Gould stimulator for muscle stimulation, load cells for monitoring muscle force and a Colson EMG system for recording EMG data. The data is captured by a 16-channel analog-to-digital board that is housed in a 486 computer.

Finally, a human physiology laboratory includes muscle stimulators and a KinCom isokinetic dynamometer and is used by several faculty members to study human muscle physiology.

•Sport Science Laboratory Research Facilities: Ice Skating Science Center

The Sport Science Laboratory within the College of Physical Education, Athletics and Recreation supports state-of-the-art motion analysis and exercise physiology facilities. This laboratory is capable of non-invasive measurement of three-dimensional position information combined with three axes ground contact force measurement. The lab also supports and develops a variety of software for the determination of key motion parameters and the calculation of joint reaction forces. The laboratory is also capable of a variety of pulmonary and cardiovascular measures, including estimates of body composition, physical work capacity, blood lipids, blood lactate, and basal metabolic rates. Equipment available at the lab includes:

- 1 Motion Analysis' high speed video digitizing system
- 6 240 Hz CCD cameras
- 1 Video Processor
- 2 AMTI 3-axis force plates
- 3 Mac II level machines
- 1 Mac Quadra 800 with 64 channel A/D input

Year 2 Course work

BISC 667 Neuroscience IV
CHEM 527 Introductory Biochemistry
BISC 661 Biology of Striated Muscle
PSYC 860 Psychological Statistics
PHED 800 Advanced Physiology of Exercise
BIONIS Seminar

Year 3 Course work

BIONIS Dissertation
BIONIS Seminar

Student 5: Ph.D. in Biomechanics and Movement Science with a primary focus on applied exercise physiology.

Background: Master's Degree in Physical Education

Year 1 Course work

PHYT 801 Medical Science I
BISC 605/606 Advanced Mammalian Physiology
PHED 800 Advanced Physiology of Exercise
BISC 675 Cardiopulmonary Physiology
PSYC 860 Psychological Statistics
BIONIS Seminar

Year 2 Course work

PHED 665 Cardiovascular Assessment I
PHED 803 Introduction to Laboratory Instruments
BISC 661 Biology of Striated Muscle
PHED 675 Cardiovascular Assessment II
PHED 800 Advanced Physiology of Exercise
BIONIS Seminar
Course in other discipline within BIONIS program

Year 3 Course work

BIONIS Dissertation
BIONIS Seminar

V.B.3 Approval from Involved Colleges

See Appendix A

V.B.4 University, College, and Department Required Courses

These requirements are not applicable at the graduate level.

added in late 1992. The lab has a six degree of freedom head electromechanical head tracking unit for the study of the range of motion of spinal cord injured individuals.

The Speech Processing Laboratory has been provided with a sound booth and digital audio recording equipment. Specialized software for speech processing is supported on the Sun and MS-DOS computers. This laboratory also supports development of software for specialized digital signal processors.

The Natural Language Processing and Speech Synthesis Laboratories jointly maintain several large corpora of English text as well as on-line dictionaries of English spelling and usage.

The Sign Language Laboratory is supported by image processing hardware and software, extensive video processing equipment, as well as a transputer based parallel processor for real time image processing and animation. The laboratory is also equipped with a pair of VPL Data Gloves and associated electromagnetic six degree of freedom sensors for the study of the biomechanics of sign language.

The Systems Development Laboratory includes a variety of microcomputers that have been selected as target devices for application software. These are enhanced with a number of peripherals including speech synthesizers, speech recognizers, and specialized interfaces.

The Upper Extremity Control Laboratory includes a VPL Data Glove and a Polhemus Three Space Tracker. The laboratory also includes a two site Ascension Technologies electromechanical tracker.

The entire facility is supported by a local area network of 6 Silicon Graphics workstations, 29 Sun Microsystems Spare stations, 25 386 and 486 personal computers, and two Apple Quadra microcomputers. The research laboratories are also supported by mechanical and electronic fabrication, audiovisual and computer systems capabilities.

In addition, the gait laboratory at the A.I. duPont institute will be available for clinical experiences. The A.I. duPont gait laboratory contains the following equipment:

- 6 camera 60hz video analysis system
- 2 AMTI forceplates
- HEKSCAN multimat pressure sensor system
- 16 channel Bio Sentry telemetry EMG
- Spare 1+ workstation
- Macintosh Quadra 950
- 486DX Microcomputer

- 8 Piezoelectric load rings
- 2 80486DX2 PC-Compatibles with A/D subsystems
- 1 8-Channel Transkinetics EMG unit with telemetry
- 1 Sun 3/60 workstation
- 1 Sun SPARC 1+ Workstation
- 1 Sun Spare IPX Workstation
- 1 Silicon Graphics Indigo 2 Extreme Workstation
- 1 Tekscan foot pressure sensor system
- 1 Kodak Ektachem blood analyzer
- 1 MedGraphics metabolic cart
- 2 Research grade treadmills
- 1 Hydrostatic weighing tank
- 1 Lactate analyzer
- 1 SM pulmonary function analyzer
- 1 Sismomedics 12-lead ECG
- 1 Hewlett Packard telemetry ECG

• **Mechanical Engineering Research Facilities: Spencer Laboratory**

The Mechanical Engineering Department supports complete machine shop capabilities which can be used by researchers to fabricate any needed equipment. Two full-time machinists are also available. Primary equipment in the machine shop includes:

- 1 Bridgeport R2E4 CNC Milling Machine
- 1 Clausing 15" CNC Lathe
- 1 Mitsubishi M25 Electro-Discharge Plunge Machine
- 4 Manual Lathes (15", 10", 6" and 6")
- 2 Bridgeport Manual Milling Machines
- 1 Caneby Otto Radial Drill Press
- 4 Drill Presses of various sizes
- 1 DoAll 36" Vertical and 1 15" Horizontal band saw
- 1 Linde Welder with TIG welding capability
- 1 Douglas Vertical Milling Machine
- 1 Flaring Tool and Cutter Grinder
- 1 4' Jump Shear
- 1 10" Delta Table Saw
- Assorted manual and power hand tools

The Mechanical Engineering Department also has an extensive material testing laboratory. In addition to a variety of small equipment, major mechanical testing equipment includes:

- 3 Static Instron tension/compression test machines
- 2 Hydraulic Instron tension/compression test machines
- 1 Hydraulic Instron high strain rate tension/compression test machine
- 1 Hydraulic Instron high frequency tension/compression fatigue test machine
- 1 Hydraulic Instron high force tension/compression/torsion test machine
- 1 Ultra high strain rate Split Hopkinson Bar
- 1 High velocity impact test system

• **Applied Science and Engineering Facilities: A.I. duPont Institute**

Individual laboratories within ASIL are supported with a variety of specialized facilities. The Robotics Laboratory is equipped with four Universal Machine Intelligence RIX scara-type robot transportable Manus robot, from the Institute for Rehabilitation Research in the Netherlands, was added in 1991. Two advanced Zebra Zero robots were

V.B Core Program Faculty (Summary Information)

Avron Abraham, Ph.D.

Assistant Professor in Physical Education
Research Interests: Physiological responses to exercise

Robert Allen, Ph.D.

Assistant Professor of Mechanical Engineering
Research Interests: Birth mechanics, computer modeling

Stuart A. Binder-Macleod, Ph.D., P.T.

Assistant Professor, School of Life and Health Sciences, Program in Physical Therapy
Research Interests: Neurophysiology, relationship between activation frequency and force output of skeletal muscle, muscle fatigue

H. Timothy Bunnell, Ph.D.

Research Associate professor in Computer and Information Sciences
Research Associate, Center for Applied Science and Engineering
Research Interests: Speech processing, speech mechanisms

Ralph D. Cope, Ph.D.

Assistant Professor of Mechanical Engineering
Research Interests: Robotics, motion analysis, gross musculo-skeletal modeling, device design.

Richard Foulds, Ph.D.

Director of the Applied Science and Engineering Laboratories and Research Professor in the Department of Computer and Information Sciences
Research Interests: Gesture biomechanics, oculomotor study, telemanipulation, computer/human interaction, and gesture recognition.

William Harwin, Ph.D.

Adjunct Assistant Professor Mechanical Engineering
Director of Rehabilitation Robotics, Center for Applied Science and Engineering
Research Interests: Robotics, human/robot interactions, rehabilitation technology, engineering design, pattern recognition and signal processing.

Michael Keefe, Ph.D.

Associate Professor of Mechanical Engineering
Research Interests: Geometric modeling of complex biological surfaces.

Irene S. McClay, Ph.D., PT

Assistant Professor, School of Life and Health Sciences, Program in Physical Therapy
Research Interests: Biomechanics, lower extremity mechanics, injury, locomotion, treatment, intervention

Freeman Miller, MD

Department of Orthopedics, A.I. duPont Institute
Research Interests: Pediatric biomechanics, birthing injury analysis, gait analysis of children with cerebral palsy

Robert E. Neeves, Ph.D.

Associate Professor in Physical Education
Research Interests: I:KG interpretation, physiological response to exercise induced stress, cardiovascular function, and human organ stimulation

Michelle Provost-Craig, Ph.D.

Assistant Professor in Physical Education
Research Interests: Physiological profiles of female athletes, resting energy expenditure and weight control, aerobic power and anaerobic threshold in elite athletes

Tariq Rahman, Ph.D.

Research Assistant Professor, Computer and Information Sciences
Research Assistant Professor Mechanical Engineering (Drexel University)
Research Associate, Center for Applied Science and Engineering
Research Interests: Application of extended physiological proprioception to the control of robots, and prostheses.

James G. Richards, Ph.D.

Associate Professor in Physical Education
Research Interests: Device design and gross musculoskeletal modeling, including gait analysis and sport biomechanics.

Michael H. Santare, Ph.D.

Associate Professor, Department of Mechanical Engineering
Research Interests: Fracture mechanics, continuum mechanics, composite structures, orthopedic biomechanics

John P. Scholz, Ph.D., P.T.

Assistant Professor, School of Life and Health Sciences, Program in Physical Therapy
Research Interests: Movement coordination; movement disorders; regulation of limb stiffness

Lynn Snyder-Mackler, P.T., Sc.D.

Assistant Professor, School of Life and Health Sciences, Program in Physical Therapy
Research Interests: Neuromuscular physiology, applied anatomy, anterior cruciate ligament injury.

V.C External Funding

A grant from the Rehabilitation Services Administration will provide 2 years of funding for each of three new students admitted to the program over the next three years. With this funding, three students will be funded the first year, six the second year, six the third year, and three the fourth year. In addition, a training grant for Ph.D. students will be submitted to the N.I.H. Center for Rehabilitation Research.

VI.A Additional Required Learning Resources

No additional learning resources are required to support the BIONIS program.

dissertation, the student must successfully defend the dissertation proposal before a minimum of 50% of the BIONIS faculty. The defense of the dissertation proposal constitutes the qualifying examination for candidacy into the Ph.D. degree program. Candidacy is completed when the student successfully defends the dissertation.

VI.B Additional Required Personnel Resources

No new faculty positions are required to support the BIONIS program.

VI.C Budgetary Needs

Annual operating costs which include monies for stationary, telephones, mailings, and other office expenses associated with student recruitment are estimated to be in the range of \$2600 per year. These costs will be shared between the Colleges of Arts and Sciences and Engineering. A part-time secretary, an office, and a copy machine will be supplied by the College of Physical Education, Athletics, and Recreation. The Applied Science and Engineering Laboratory at the A.I. duPont Institute will bear the costs for recruitment brochures, and three tuition lines have been pledged by the University of Delaware Office of Graduate Studies. Additional costs such as student travel to professional conferences will be covered by faculty grants. No other startup or recurring costs are anticipated.

VII.A Implementation Plan (Graduate Catalog Description)

Program of Study

The Biomechanics and Movement Sciences program is a graduate level interdisciplinary program that combines faculty and physical resources from several different units including the Department of Mechanical Engineering, the Department of Physical Therapy, the Department of Physical Education, the Department of Computer and Information Sciences, The Applied Sciences and Engineering Laboratory, the Sport Science Laboratory, the Orthopedic and Biomechanical Engineering Center, and The A.I. duPont Institute. Programs of study are created to serve the interests of both the student and sponsoring faculty member, and may focus on topics in the areas of Biomechanics, Motor Control, Applied Physiology, Exercise Physiology, and Rehabilitation Technology. Core courses for all areas of study include 2(NIS) or 3(Ph.D.) semesters of BIONIS seminar, an experimental design/statistics course, a course in computing, laboratory instrumentation or engineering applications, and two courses outside of the principal area of study.

The Master's degree program requires 2-4 credit hours of coursework plus 6 credit hours of thesis. The student's program of study should be created by the student and his/her advisor as part of the admission process. This program of study must then be reviewed and approved by the BIONIS Graduate Committee. The thesis committee must consist of at least two BIONIS faculty members from the area of specialization, one BIONIS faculty member from outside the area of specialization, and one faculty member from outside the BIONIS program. Prior to conducting the thesis, the student must successfully defend the thesis proposal before a minimum of 50% of the BIONIS faculty. The final thesis defense must then be approved by the thesis committee.

The Ph.D. program requires 39 credit hours of coursework beyond the Master's degree plus 9 credit hours of dissertation. A student entering the Ph.D. program without a Master's degree must complete a minimum of 69 credit hours of coursework plus 9 credit hours of dissertation. As with the Master's degree, the student's program of study should be created by the student and his/her advisor as part of the admission process. This program of study must then be reviewed and approved by the BIONIS Graduate Committee. The dissertation committee must consist of at least two BIONIS faculty members from the area of specialization, one BIONIS faculty member from outside the area of specialization, and one faculty member from outside the BIONIS program. Prior to conducting the

Admission Procedures

Applicants to the BIONIS program should meet the minimum recommended GRE requirements of 1050 on combined quantitative and verbal scores, and an undergraduate grade point index of 3.0. They must then submit an admission application, the application fee, two official transcripts of previous college records, at least three letters of recommendation, and TOEFL scores (foreign students only) to the Office of Graduate Studies. Applicants will then be directed to faculty with appropriate expertise. Once a faculty advisor has been secured, the student will then submit a program of study to the BIONIS graduate Committee. The student will then be admitted to the BIONIS program provided that they 1) meet all admission requirements of the Office of Graduate Studies and the BIONIS program, 2) are successful in securing a faculty advisor, and 3) receive approval on their program of study from the BIONIS graduate committee.

Financial Aid

Financial assistance for students in the BIONIS program is obtained from a variety of external sources and will therefore vary in form and availability. Assistance will be awarded on a competitive basis to applicants best fitting the needs of the granting agencies and sponsoring faculty. Students receiving full stipends will be expected to work up to 20 hours per week on faculty projects and students are expected to maintain full-time status.

VII.B Evaluation Plan

This program will be evaluated by a Program Review Committee four years after its implementation in order to monitor the project's progress in achieving its stated objectives, and to see that the students receive a comprehensive and interdisciplinary education that meets the standards of the University of Delaware. The Program Review Committee will be comprised of individuals who are experienced in graduate education, biomechanics, movement science, rehabilitation research, as well as clinical and medical practice. The membership of the Program Review Committee will be determined by the Associate Provost for Graduate Studies. The responsibilities of the Program Review Committee will be to evaluate the success of the program in achieving its stated objectives in relation to established University policies.

VIII. Program Administrative Structure

The following structure is proposed for administrative control.

The Core Faculty are brought together from four different units at the University follows:

1. Center for Applied Science and Engineering/ A.I. DuPont Institute
2. Mechanical Engineering
3. Physical Therapy
4. Physical Education

The program will be administered through the office of Graduate Studies. The remaining administrative structure will consist of a **Chairperson** and two committees: an **Executive Committee** and a **Seminar Committee**. Each committee will be comprised of four members, one from each unit in order to obtain equitable representation. The chairperson will be appointed by the President of the University upon the recommendation of the Associate Provost for Graduate Studies and the Vice President for Academic Affairs. In addition, this appointment will have the approval of a majority of the core faculty of the Biomechanics and Movement Sciences program. Members of the Executive and Seminar committees will be appointed by the program chairperson.

Responsibilities of the Administration

Chairperson

Term

The chairperson will be appointed for a 5-year term. Following his/her tenure as chairperson, s/he will then be placed on the executive committee for an additional year in order to provide continuity in administration of the program and offer assistance to the newly appointed chairperson.

Responsibilities

As referenced from the Faculty Handbook, the responsibilities of the chairperson are as follows:

The chairperson serves both as the chief representative of the program within the institution and as a program administrator, responsible for communicating and administering policies and procedures of the University and for developing and organizing courses of study. Together with the Associate Provost for Graduate Studies and the Provost, the chairperson is charged with the recruiting and professional development of staff. The chairperson will make recommendations to the Associate Provost for Graduate Studies for faculty appointments to and termination from the interdisciplinary program. The chairperson will be expected to consult in a formalized way with the appropriate program body on matters of faculty status. The chairperson should also establish appropriate vehicles for obtaining student opinion on curricular matters.

Executive Committee

Term

The members of the executive committee will serve a 2-year term on a staggered basis. Members will be nominated by the BIONIS faculty in their own department. Initially, two members will serve a 1-year term and two will serve a 2-year term. After the initial year, two more members will be appointed for 2-year terms. In this way, the committee will always be comprised of two first-year and two second-year members. This will provide for continuity in the administrative structure. It is expected that all faculty will be willing to serve in an administrative role on a rotating basis.

Responsibilities

The responsibilities of the Executive Committee are as follows:

1. Serve as the major governing board for the BIONIS program making recommendations to the chairperson regarding issues such as curriculum, funding, etc.
2. Review all applications and make decisions regarding admission of students into the BIONIS program
3. Serve as a review board to assist in resolution of problems/conflicts which arise with either students or faculty within the program.

Seminar Committee

Term

The members of the seminar committee will serve a 1 year term. Members will be appointed by the BIONIS faculty in their own department.

Responsibilities

The responsibilities of the Seminar Committee are as follows:

- Organize and plan 2 seminars per semester (1 per year)
- a) Decide upon the content for the seminar series for the given year
 - b) Recruit appropriate speakers
 - c) Secure funding for speakers when necessary
 - d) Plan student involvement (projects, presentations) in seminar



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Fax: 302.831.1046

April 19, 1993

MEMORANDUM

TO: Richard A. Fouids
Research Professor
Computer and Information Sciences

FROM: Susan Brynteson *Susan Brynteson*
Director of Libraries

I am responding to your request for a library statement regarding the proposed PhD in Biomechanics and Movement Science.

As you pointed out, this is an extremely interdisciplinary program related to Mechanical Engineering, Physical Education, Physical Therapy, and Applied Science and Engineering. Library collections are strong in these areas. Therefore, Library Collections in the interdisciplinary field of Biomechanics and Movement Science are able to support the proposed degree program and the goals of the proposed program can be met by existing collections and services. Additional library resources will not be required beyond the current level of allocation and support. Thus, the library can adequately support the new program both in terms of the existing collections and funding for new acquisitions with the exception that new journal subscriptions that might be requested cannot be supported (unless existing titles of similar financial value are cancelled). This exception applies to all disciplines.

I am aware of the journal collections at your Center and at the A. I. Dupont Institute and their availability to University students in your program and this is excellent. Such collections focused on rehabilitation and orthopedic medicine complement well the University's collection.

I also wish you to know that a dialogue is taking place now, about which I am very optimistic, between the Thomas Jefferson University Library and the University of Delaware Library for shared access to collections and services. I am hopeful that such an agreement could be in place sometime during the 1994/95 academic year.

Thank you.

SB/jm

Report Summary

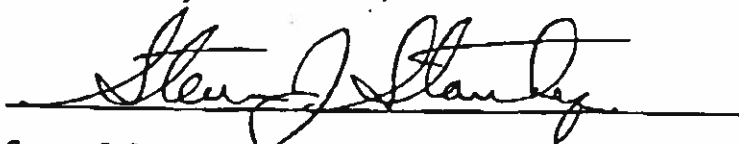
The University of Delaware has an opportunity to embark on an interdisciplinary graduate program that few other public or private institutions could contemplate. There is a great deal that has been said about the proposed program and the plan by which it would be implemented. Quite frankly, this is destined to be a stellar program which should bring distinction to the University of Delaware and particularly to those academic units that will be most directly associated with it.

It was a pleasure to visit the University of Delaware and observe the most impressive activities and accomplishments that will be incorporated to form the interdisciplinary graduate program in Biomechanics and Movement Studies.

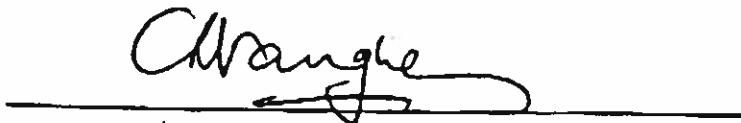
Respectfully submitted,



Clifford B. Brubaker, Ph. D.
Professor and Dean, School of Health and Rehabilitation Sciences, and Professor, Departments of Industrial Engineering and Neurological Surgery University of Pittsburgh



Steven J. Stanhope, Ph.D.
Chief, Biomechanics Section, Rehabilitation Medicine Department, Warren Grant Magnuson Clinical Center, National Institutes of Health



Christopher L. Vaughan, Ph.D.
Associate Professor of Orthopaedics and Biomedical Engineering
Director, Motion Analysis Laboratory, University of Virginia

