January 8, 2013

Professor Richard Williamson
Chair, Faculty Senate
University of Miami

Dear Professor Williamson,

This is to inform the Faculty Senate that the Medical School Faculty Council met on January 8, 2013 to review the Executive PhD Degree in Biochemistry and Molecular Biology.

The Department of Biochemistry and Molecular Biology (BMB) is requesting approval of a new Executive Doctor of Philosophy (PhD) degree program in the area of Biochemistry and Molecular Biology. The most common types of executive doctoral programs available are found in business and management. To our knowledge, there is only one program available in the United States that offers a PhD degree in Biological Sciences to full-time professionals. Thus, the proposed new program will bring the University of Miami to the forefront of educational innovation and it will help to establish ties between industry and the University.

The program will be known as “The Executive Doctor of Philosophy in Biochemistry and Molecular Biology”, and it will utilize the elements of our existing graduate program. This will be the first program nationally that will offer a PhD degree to full-time industrial and/or government laboratory professionals who are working in non-academic fields in the area of biochemistry, molecular biology, biotechnology, nanotechnology, and medicine. The program is intended to help individuals who are seeking to either move ahead in their field or switch careers altogether. This will also fulfill the lifelong learning desire of executives who have and/or wish to continue their education to the highest level.

In the last decade, the discipline of Biochemistry has undergone a revolution as detailed mechanistic understanding of biochemical pathways and processes becomes increasingly necessary in academic and industrial discovery as well as in clinical medicine. Moreover, students trained in molecular biology techniques and protein chemistry studies are sought after for industrial positions. In response to the rising demand for individuals with extensive training in the area of Biochemistry and Molecular Biology, the BMB department is seeking to establish
a new executive PhD degree program in the area of Biochemistry and Molecular Biology. Many universities are offering executive graduate programs both at the master and PhD levels in business management, but only one university offers a PhD degree to working professionals in the area of biological sciences in the United States, namely the University of California Davis.

The executive PhD degree program in Biochemistry and Molecular Biology will bring the University Of Miami Miller School Of Medicine at the forefront of educational innovation. The aim of this program is to enhance the knowledge base of individuals who are involved in significant research activities in their current professional careers for future growth in the area of biochemistry and molecular biology. This program will provide the individuals with outstanding educational opportunities and a broad knowledge in the various aspects of modern biochemistry and molecular biology.

The Medical Faculty Council members discussed the new institute in detail and voted to unanimously approve it.

Respectfully submitted,

[Signature]

Norman H. Altman, V.M.D.
Speaker, Medical School Faculty Council

Attachments:

1. Letters of support from industries that indicate interest in our proposed program.
2. All graduate courses offered by the Department of Biochemistry & Molecular Biology.
3. The proposal for the Executive Ph.D. Program in Biochemistry and Molecular Biology
Appendices:

1. A list of all graduate courses offered by the Department of Biochemistry & Molecular Biology.
2. A list of all graduate courses offered by the PIBS program.
3. A list of the Biochemistry & Molecular Biology Graduate Faculty.

1. **LIST OF GRADUATE COURSES OFFERED BY THE BMB DEPARTMENT**

   - BMB 601 – Journal Club
   - BMB 609 – Advanced Topics in Biochemistry & Molecular Biology
   - BMB 610 – Advanced Topics in Biochemistry & Molecular Biology
   - BMB 614 – Molecular Genetics
   - BMB 615 – Structural Biology and Applications to Drug Discovery
   - BMB 616 – Macromolecules: Physical Biochemistry
   - BMB 631 – Special Work
   - BMB 645 – Research Problems
   - BMB 730 – Doctoral Dissertation
   - BMB 750 – Research in Residence

1. **BMB 601- Journal Club**

   All registered BMB graduate students must participate in the Research Journal Club/Seminar. Junior students are required to critically review published paper(s) of their choice and describe in detail the findings described therein. Senior students are required to present their research finding in an open form.

2. **BMB 609- Advanced Topics in Biochemistry & Molecular Biology**

   This course is offered every fall. This course brings the student to the forefront of research in Molecular Biology. The course material is discussed exclusively in the form of original research papers. Based on this experience, students are required to propose experimental approaches to biological problems and defend them.

3. **BMB 610- Advanced Topics in Biochemistry & Molecular Biology**
This course comprised of lectures and student-led literature discussion. The intended of this course is to provide students broad-based instruction on the modern research in the area of biochemistry and molecular biology.

4. **BMB 614- Molecular Genetics**

This course deals with fundamental genetic concepts and their application to biomedical research. The objective is to provide students with the tools of molecular genetics and an understanding of how genetic principles apply to organisms at various levels of complexity. The course is divided into two parts with an exam following each module. The first module is devoted to fundamental genetic mechanisms including complementation, recombination, suppression and gene regulation as established by experiments with bacteria and bacteriophages. The second module deals with genetic mechanisms in eukaryotic systems including yeast, mice and humans. Problem solving is emphasized in homework and exams. Since the focus is on understanding the biological consequences of underlying genetic mechanisms, this course will provide valuable insights for students interested in molecular mechanisms encountered in diverse areas of biomedical research including molecular biology, microbiology, cell biology, cancer biology, pharmacology, and human genomics.

5. **BMB 615- Structural Biology and Applications to Drug Discovery**

This course provides an introduction to structural biology, and illustrates how understanding the relationship between structure and function of biological macromolecules drives drug discovery. The course will be in three parts, with the first covering experimental and computational tools of structural biology—X-ray crystallography, cryo-electron microscopy and molecular modeling. The second part of the course will look at two examples where structural biology has influenced drug design—traditional enzyme inhibitor type drugs and channel blocker drugs. The final part of this course will look at structures of nucleic acid (DNA and RNA) binding proteins and how they inform drug discovery.


The Physical Biochemistry course is designed to introduce essential theoretical concepts associated with a variety of physical methods and to illustrate how these techniques can be used to explore macromolecular structure and function. The course material is composed of 4 main topics: X-ray crystallography, spectroscopic methods, hydrodynamic methods and mechanisms of catalysis.

7. **BMB 631- Special Work**
This course covers special work, lecture, or laboratory or a combination of these, as determined by advisor in accord with student's individual interest. Prerequisite: Approval of Operating Committee.

8. **BMB 645- Research Problems**

This course covers laboratory research problems in various areas of biochemistry and molecular biology, including literature search, experimental design, data gathering and evaluation of results. This course is the mechanism by which graduate laboratory rotations will be done in preparation for selection of Ph.D. mentor.

9. **BMB 710- Master Thesis**

The requirements are 30 credits at the graduate level; a thesis showing results obtained during work on a research problem, for which six credits will be earned; a written comprehensive examination covering the entire field of biochemistry; an oral defense of the thesis. Credit is not awarded until the thesis has been accepted.

10. **BMB 720- Research in Residence**

This course covers research in residence for the master's degree after the student has enrolled for the permissible cumulative total in BMB 710 (usually six credits). Credit not granted. May be regarded as full time residence.

11. **BMB 730- Doctoral Dissertation**

Required for all Ph.D. candidates. The student will enroll for credits as determined by the Office of Graduate Studies but not less than a total of 24. Not more than six in the summer. If a student has A) passed qualifying exam(s) and (B) is engaged in an assistantship, he/she may still take the maximum allowable credits.

12. **BMB 750- Research in Residence**

This course covers research for the Ph.D. degree after the student has been enrolled for the permissible cumulative total in appropriate doctoral research. Credit not granted.
September 12, 2012

Sapna Deo  
Associate Professor  
Graduate Program Director  
Department of Biochemistry and Molecular Biology  
R. Bunn Gautier Bldg.  
1011 NW 15th Street  
Miller School of Medicine  
University of Miami

Dear Dr. Deo:

I am pleased to submit this letter in support of The Department of Biochemistry and Molecular Biology (BMB) is planning to offer an Executive Doctor of Philosophy (PhD) degree program in the area of Biochemistry and Molecular Biology. The most common types of executive doctoral programs available are found in business and management areas. I strongly believe in the need of this type of program, it will be the first program nationally that will offer PhD degree to full time industrial/ government lab professionals who are working in the area of biochemistry, molecular biology, biotechnology, and medicine. The program is intended to help individuals who are seeking to either move ahead in their field or switch careers altogether. This will also fulfill the need of executives that have lifelong learning desire and wish to continue their education to the highest level which has a need in the market.

I am delighted to support this initiative. I wish you success in your efforts and look forward to hearing from you as you move forward with your plans.

Sincerely,

Claudia Zylberberg, PhD.  
President & CEO  
Email czylberberg@akronbiotech.com  
www.akronbiotech.com
Dear Dr. Deo,

This letter supports the executive PhD program proposed by the Department of Biochemistry and Molecular Biology of the Miller School of Medicine at the University of Miami. This program is created to give an opportunity for industrial scientist to continue their higher education. Many industrial scientists who are involved in research do not have a PhD degree. However, many such scientists would like to advance their careers by getting a higher degree. Getting a traditional PhD degree would mean giving up their jobs, which may not be feasible in this economy. I have few acquaintances in Long Island, NY area that are taking advantage of such a program and have only praise for such a platform. The executive PhD program that will be offered by the Department of Biochemistry and Molecular Biology is structured in such a way that the scientist do not have to leave their jobs. The course work will be also conducted through an online system, which provides flexibility. The research part will be performed at the industrial site with a co-mentoring by the University of Miami faculty and industrial mentor. I anticipate that many industrial scientists will take advantage of this opportunity to advance their careers. I am very excited about this program and would like to learn more about it once it is implemented.

Sincerely,

Praveen Pande, Ph.D., Director of Chemistry
ppande@enzolifesciences.com, 631-694-7070 x392.
September 19, 2012

Sapna Dev, PhD
Associate Professor
Graduate Program Director
Dept. of Biochemistry and Molecular Biology
1 R. H. E. Mum Bio Medical Bldg.
1011 N.W. 13th Street
Miller School of Medicine
University of Miami
Miami, FL 33106

Dear Dr. Dev,

This letter is in support of the "executive PhD program in Biochemistry and Molecular Biology" proposed by the Department of Biochemistry and Molecular Biology at Miller School of Medicine, University of Miami. The proposed program is targeted at industrial scientists who would continue their education towards obtaining a PhD degree. Scientists with research experience in industry, but without a PhD, will be attracted to this program since it gives them an opportunity to get a higher degree while working. The opportunity to take courses online and continue research at their work location will make it feasible for industrial researchers to obtain a PhD. We expect that a number of people will be interested in joining this program. This is a new concept and a novel idea. We support this idea and would be excited to see it come to fruition.

Sincerely,

Enrique M. Raballino, MD
Director of Medical Affairs
Beckman Coulter, Inc.
Tel: (305) 370-3009
enrique.raballino@beckman.com
Super Dean
Associate Professor
Graduate Program Director
Department of Biochemistry and Molecular Biology
1094 Lake Shore Blvd.
Toronto, Ontario M5G 1L7
University of Toronto
Super Dean

The faculty, staff, and students of the Department of Biochemistry and Molecular Biology at the University of Toronto are pleased to announce the availability of our new graduate program. This program is designed to attract talented individuals who are interested in research in the field of biochemistry and molecular biology. The program offers a flexible approach to education and research, allowing students to pursue their interests in a variety of areas.

Through this initiative, we hope to attract the best and brightest students from across the country. Our goal is to provide a stimulating and supportive environment that will foster the development of new ideas and the advancement of knowledge.

We are committed to excellence in teaching and research, and we believe that our program offers a unique opportunity for students to gain valuable skills and knowledge. We encourage all interested individuals to apply and look forward to welcoming new members to our community.

Sincerely,

[Signature]

[Name, Title, PhD]
October 2, 2012

Dr. Richard Williamson
Chair, Faculty Senate
325 Ashe Building
Coral Gables, Florida 33146

Dear Dr. Williamson:

This letter is in support of the petition for approval of the proposed Executive Ph.D. Program in Biochemistry and Molecular Biology. As part of the educational mission of our Department, we strive to provide innovative and timely curriculum opportunities to students while delivering high quality of teaching and service. The Executive Ph.D. Program is unique and timely since it will be one of the first programs nationally that will offer a Ph.D. degree to full time industrial/government laboratory professionals, who are working in discovery biomedical research.

The proposed Executive Ph.D. Program will, through coursework and research, provide highly motivated and deserving individuals with outstanding educational opportunities to broaden their knowledge and enhance their skills in biomedical discovery. The program will use on-line coursework and elements of our graduate programs and, therefore, there is minimal need for investment of funds; these funds will be fully covered by BMB and administrative support will be provided by BMB. The students will have a mentor in their industry and a mentor of their choice within BMB. We will ensure that the industrial mentor is an accomplished researcher of high scientific standing. This will be determined by following the guidelines developed by the BMB Director of Graduate Studies and overseen by the Graduate Program Committee. We anticipate that our proposed Executive Ph.D. program will be an attractive program for a population of students, who are academically advanced with respect to their peers given their years of experience and significant contributions to research in Biochemistry and Molecular Biology, but that, for a number of varied reasons, could not give up their industrial careers to fulfill their dreams of obtaining a Ph.D. degree. The program is also ideal for individuals (1) seeking to either move ahead in their field, (2) switch careers altogether, (3) executives with lifelong desire to continue their education to the highest level.

We envision that upon graduation, the students will have acquired a unique perspective on fundamental biochemical problems, preparing them to contribute to scientific breakthroughs while advancing in their own careers. Additional benefits of the proposed program are (1) enrichment the quality of our undergraduate and graduate programs in BMB by attracting a class of exceptional students, the Executive Ph.D. Program, (2) strengthen the alumni base and establishing ties with industries of BMB, the MSOM and the University of Miami as a whole, (3) traditional Ph.D. students will be exposed to the latest industrial innovation in discovery science, (4) ability of our traditional Ph.D. students to network, which may lead to employment opportunities upon graduation.

There is no doubt in my mind that this new program will bring the Miller School of Medicine of the University of Miami to the forefront of innovative biomedical educational. Given all of the
above, I am strongly in favor of the creation of the Executive Ph.D. Program in Biochemistry and Molecular Biology and urge you to support it as well.

Sincerely,

Sylvia Daunert
Professor and Lucille P. Markey Chair
Associate Director, Dr. JT Macdonald Biomedical Nanotechnology Institute
Editor, Analytical and Bioanalytical Chemistry
Executive Editor, Analytical Biochemistry
October 18, 2012

Dr. Richard Williamson
Chair, Faculty Senate
325 Ashe Building
Coral Gables, Florida 33146

Dear Dr. Williamson,

I am pleased to present to the Faculty Senate a proposal to create a new Executive PhD degree program in Biochemistry and Molecular Biology. In my role as Sr. Associate Dean for Graduate & Postdoctoral Studies, I strongly support this proposal.

The Provost’s Strategic Plan calls for continued strengthening of our undergraduate student credentials and the growth and strengthening of our university’s PhD programs (prominently including the programs at the Miller School of Medicine). Innovative programs such as the Executive PhD will be one of the first programs nationally that will offer a Ph.D. degree to full time industrial/government laboratory professionals, who are working in translational and discovery biomedical research. This new program will not only enrich the quality of our undergraduate and graduate programs, it will also be helpful in establishing ties with industries and the University of Miami. This proposed program is therefore fully aligned with each of the above goals.

The new PhD program has obtained the explicit support of the Chair of Biochemistry and Molecular Biology and myself. Please let me know if the Senate requires any additional information. Dr. Sapna Deo and I look forward to meeting with the Senate to discuss any suggestions or concerns that might arise.

Yours Sincerely,

Zafar Nawaz, Ph.D.
Request to the Graduate School and the Faculty Senate for the Approval of the Executive PhD Degree in Biochemistry and Molecular Biology

October 8, 2012

Title of the Degree: Ph. D. in Biochemistry and Molecular Biology

Introduction
The Department of Biochemistry and Molecular Biology (BMB) is requesting approval of a new Executive Doctor of Philosophy (PhD) degree program in the area of Biochemistry and Molecular Biology. The most common types of executive doctoral programs available are found in business and management. To our knowledge, there is only one program available in the United States, that offers a PhD degree in Biological Sciences to full time professionals. Thus, the proposed new program will bring the University of Miami to the forefront of educational innovation and it will help to establish ties between industry and the University.

The program will be known as “The Executive Doctor of Philosophy in Biochemistry and Molecular Biology”, and it will utilize the elements of our existing graduate program. This will be the first program nationally that will offer a PhD degree to full-time industrial and/or government laboratory professionals who are working in non-academic fields in the area of biochemistry, molecular biology, biotechnology, nanotechnology, and medicine. The program is intended to help individuals who are seeking to either move ahead in their field or switch careers altogether. This will also fulfill the lifelong learning desire of executives who have and/or wish to continue their education to the highest level.

The admission process will be rigorous and follow similar guidelines as those of our regular PhD program. Specifically, an executive PhD program admission/operating committee will select the students. Admission into the program will be highly selective, and selection will be based on a number of criteria such as undergraduate/master of science performance, GRE scores, letters of recommendation, personal statements, and work experience (three to six years) in the area of biological sciences, biophysical sciences, environmental sciences, pharmaceutical sciences, nutritional biochemistry, medicine, agricultural sciences, nanotechnology, or chemical sciences. We anticipate offering this program to ~5 new students every year.

Rationale
In the last decade, the discipline of Biochemistry has undergone a revolution as detailed mechanistic understanding of biochemical pathways and processes becomes increasingly necessary in academic and industrial discovery as well as in clinical medicine. Moreover, students trained in molecular biology techniques and protein chemistry studies are sought after for industrial positions. In
response to the rising demand for individuals with extensive training in the area of Biochemistry and Molecular Biology, the BMB department is seeking to establish a new executive PhD degree program in the area of Biochemistry and Molecular Biology. Many universities are offering executive graduate programs both at the master and PhD levels in business management, but only one university offers a PhD degree to working professionals in the area of biological sciences in the United States, namely the University of California Davis. Our executive PhD degree program in Biochemistry and Molecular Biology will bring the University of Miami Miller School of Medicine at the forefront of educational innovation. The aim of this program is to enhance the knowledge base of individuals who are involved in significant research activities in their current professional careers for future growth in the area of biochemistry and molecular biology. This program will provide the individuals with outstanding educational opportunities and a broad knowledge in the various aspects of modern biochemistry and molecular biology. After the successful completion of this program, individuals will have a unique perspective on fundamental biochemical problems, resulting in more career options and increasing the likelihood of their making important contributions to scientific progress and society. This will be an attractive program for individuals who are contributing significantly to research in Biochemistry and Molecular Biology, but, for a number of reasons could not give up their industrial careers to fulfill their dreams of obtaining a PhD degree.

This program will also help the University of Miami and the BMB department to establish ties with industries and develop a stronger alumni base. Our current traditional students in the PhD program will benefit from these interactions, which may open up employment opportunities for them. Further, our students will be exposed to the latest trends in industrial research as well as the latest innovations. This will also serve as the catalyst for curriculum improvements.

Admission Requirements
In order to be admitted to this program, eligible students must have a Bachelor's and/or Master of Science degree in a basic science and three to six years of work experience in an industrial setting in the areas of biological sciences, physical sciences, medicine, agricultural sciences, or chemical sciences, and see above. The students selected will be the ones who are actively involved in research in their jobs. Individuals with industrial work experience and government laboratory research experience are highly encouraged to apply for this program.

A cumulative grade point average of at least 3.0 is generally required; however, students with a lower GPA but compensatory credentials (such as extensive industrial/research experience) may be admitted into the program at the discretion of the executive PhD program admission/operating committee. Applicants must submit scores of their Graduate Record Examination, and while not required, a good score on a subject test in biology or chemistry can bolster an application. Additionally, the applicants are required to submit two letters of
recommendation and a personal statement. Foreign applicants who have not received a degree from a university in the United States must satisfy the English proficiency requirements by submitting TOEFL scores.

Demand for the Program.
Please find letters of support from industries that indicate interest in our proposed program. The executive PhD programs in business schools are popular and are expanding in number. There is only one PhD program in the biological sciences at University of California Davis that started only two years ago. This program already has several students enrolled. This program requires students to be physically present on campus for one year while taking coursework, it narrows the student profile to those who are located in the surrounding areas. We expect a high demand for our proposed program since the course work will be done through on-line approaches, making it easier for industrial scientists to fulfill the requirements remotely.

Ph. D. Programs for working professionals:
Ph. D. program in Biochemistry UC Davis: 10 students enrolled in 2 years
Ph. D. program in Business - Georgia State: 38 students enrolled
Ph. D. program in Business - Kennesaw State University: 42 students enrolled in 2 years
Ph. D. program in Business - Oklahoma State University: 20 students from 600 applicants

Additional examples of Ph. D. programs in Business Schools include the following: Case Western Reserve University, University of North Carolina Chapel Hill, Syracuse University, and George Washington University.

In Europe, the U.K. has at least 16 Executive Doctorates programs of Business Administration, and at least 20 such programs were created in Australia from 1993 to 2005. The programs are also popular in Germany, where an estimated 58.5 % of executives hold doctoral degrees.

http://www.businessweek.com/bschools/content/aug2010/bs20100816_081076.htm#p1

Recruitment
We will inform several biotech and pharmaceutical companies, especially in South Florida, about the existence of our program. We will target specific conferences that are well attended by industrial scientists such as the AAPS, Piticon, etc. We will inform our undergraduate academic counselors about this program so that they can inform graduating students. We will also contact our undergraduate students and alumni to inform them about the program. The BMB department also must prepare, update, and mail out information to potential applicants and industries. The Graduate Program Director or his/her designate will need to communicate or speak with prospective students as well.
Administration

a) Administration and Academic Direction.
1) Graduate Program Director, GPD. The administration and direction of this program will be under BMB's GPD. The GPD will report to the Chair of BMB. The BMB Admission/Operating committee will evaluate applicants and process the admission into the program. The academic advising of students will be performed by the GPD who will be part of the Admission/Operating committee. The GPD will organize the symposium of the industrial scientists and students with the help of the graduate coordinator. The Operating Committee will set-up an initial orientation of incoming students to describe the program structure and advise about course selection by the coordinator. The progress of the student will be monitored by the GPD in collaboration with the Operating committee.

2) Graduate coordinator/Secretarial assistance. The admission of the students is assisted by the UM Miller School of Medicine Office of Graduate and Postdoctoral studies. In addition, the BMB graduate program coordinator/secretary will help with the admission process, functioning of the program, ensuring that students attend courses, completing assignments on time, that their course evaluations are performed and records are properly entered, they are credited for courses they have completed and also help address specific questions that may arise during the course of running the program. He/she will also provide support to the GPD for managing the program and providing support for the overall mission.

Budget

Program Revenue
Students enrolling in the executive PhD program will be charged the UMMSOM tuition fee. Students are expected to cover their tuition, travel, and living expenses. We anticipate that we will enroll 5 students the first year followed by 5 more students each year during the first 3 years from the establishment of the program.

Year 1: ($35,000 tuition) X 5 + $1000 X 5 technology fee = $180,000
Year 2: ($35,000 tuition) X 10 + $1000 X 10 technology fee = $360,000
Year 3: ($35,000 tuition) X 15 + $1000 X 15 technology fee = $540,000
Total revenue in 3 years: $1,080,000

Program Expenses
In the first year expenses will include the costs associated with recruitment efforts that will be covered by the departmental budget. The current graduate coordinator in the department and the GPD of the department will be involved in initial implementation of the program. In the subsequent years we will hire a part-time program coordinator using the program income.
Graduation Requirements
The requirements for graduation include the following:

☐ Successful completion of 12 credit hours of required courses and electives.
☐ Successful completion of the Qualifying Examination
☐ Execution of an original research project facilitated by a thesis committee that attests to research sufficiency (48 credit hours)
☐ Submission and defense of a doctoral dissertation

For the didactic phase of graduate training, students will participate in a set of courses chosen based on their prior experience and the research they perform in their industrial setting. Through these courses, the students obtain a broad, coherent background in basic and advanced aspects of biochemistry, molecular biology, structural biology, and cell biology. This material is supplemented with presentations at research journal clubs.

Participation in Courses
Since, the students who will be enrolled in this program will be off campus, they will participate in courses using distant learning technologies. The recorded course lectures will be hosted through iTunes. Students will have access to these lectures by downloading iTunes U. We already have existing iTunes U-based downloadable available lectures in our PIBS curriculum. The students will enroll in their desired/needed courses and then will download these courses. The assignments will be posted at the UM Blackboard. Students will participate in presentations through Skype and the existing videoconferencing set-up of our department’s smart board(s). Students will visit campus every year and will present their research in the format of a mini-symposium. The industrial mentor will also be invited to attend the symposium.

Participation in Research Work
The students will perform research at the institution where they are employed. They will have a mentor at his/her work place and a mentor at BMB. This mentor selection will be based on the research interests of the student. The student will present their plan of research to the dissertation committee and they will determine if the work to be performed is of the PhD thesis standard. The industrial mentor will be included in all of the committee meeting, however will not have right to vote on pass/fail for any exams conducted. The industrial mentor will be assigned to a specific industrial student and will not have the right to be on the committees of regular graduate student in the department.

Qualifying Examination
At the end of the first year, students will be evaluated on the basis of their academic performance and by completion of the Qualifying Examination (QE). The format of this examination is the definition of a novel research problem and the development of a proposal to address the stated question and hypothesis.
The significance, feasibility, and the relationship of the proposal to the literature will be important criteria for evaluation. The Qualifying Examination determines, in part, the student's eligibility for admission to candidacy for the Ph.D. degree. The examination is designed to test the student's basic knowledge of biochemistry and molecular biology, as well as assess creativity and rationality of research design.

The Qualifying Examination is comprised of two parts:
1. Submission and Oral presentation of thesis proposal
2. Oral defense of the proposal

**Thesis Proposal**

Students should submit a 12-page NIH style grant proposal on their thesis research topic. The proposal should include:

1. **Face Page**: Face page should include, Name, Title of Proposal, Mentor, Dissertation Committee Members, Date of Oral Qualifying Exam, MENTOR SIGNATURE stating that the document was written entirely by the student.

2. **Abstract**: State the broad, long-term objectives and goals of the research proposal, making reference to the health relatedness of the project (if such exists). Describe concisely the research design and methods for achieving these goals. (250 words)

3. **Specific Aims**: State the specific purpose(s) of the research proposal, the hypotheses to be tested and significance. (One page only)

4. **Background, Significance and Novelty**: Provide the background to the proposal. State concisely the importance and novelty of the research described in this application by relating the specific aims to broad, long-term objectives. (Two-three pages)

5. **Preliminary Results**: Provide the preliminary data that support your hypothesis. (One-two pages)

6. **Research Design, Methods and Expected Outcome**: Provide a description of the research design of the experiments proposed and the procedures to be used to accomplish the specific aims. Normally, this section is laid out in the order of the specific aims. For each specific aim, describe the proposed experiments including controls. Describe the major experimental techniques and methodologies you plan to use. Do not provide detailed descriptions of standard models. Describe the rationale for the choice of methods as well as potential problems or limitations. Explain how problems and limitations will be dealt with for each specific aim. Discuss the anticipated results of the proposed experiments (include alternative possibilities), and how they will be interpreted. How will the anticipated results support or disprove your hypothesis? Include any statistical methods by which the data will be analyzed. You may want to include expected outcomes and a tentative time table for the proposed experiments. (Five-seven pages)

7. **Literature Citation**: Insert these at the end of the research proposal. Each citation MUST include names of all authors, the complete title, book or journal, volume number, page numbers (beginning and end), and year of publication. The
citations are not part of the twelve page limit.
The proposal should be submitted to the student’s dissertation committee, BMB Graduate Program Director and Coordinator two weeks prior to the oral examination. The proposal presentation and oral examination is the student’s defense of the proposal and normally lasts from two to three hours. The grading of the qualifying exam is equally weighted between the written research proposal, presentation and the student’s oral defense, and is pass/fail. In order to be admitted to candidacy, the student should maintain a grade point average of 3.0 or better and must pass the qualifying examination. All BMB students should bring the qualifying/proposal form to the meeting for committee members to sign along with signed data verification form. These forms are available at the BMB website under Academics-BMB graduate program-forms.

Dissertation Committee
The dissertation committee will consist of three members from the Department of Biochemistry and Molecular Biology and the student’s industrial mentor. At least one member from the committee must hold a primary appointment in the BMB department. The students will present their progress report in front of the dissertation committee every six months either in person on campus or remotely. The dissertation committee will comprise of three members from BMB’s graduate faculty, including the student’s mentor from the BMB Department. The student’s industrial mentor will also serve on this committee. In August of every year, the BMB Department will host a research forum/mini-symposium in which all the executive PhD program students will participate and present their research in the form of a poster or oral presentation. In addition to the student dissertation committee members selected by the student, the dissertation proposal examination committee will comprise two additional BMB Graduate Faculty members. The Operating Committee will select the two additional committee members. The two additional members after the first meeting will not further participate on the dissertation committee. The Qualifying Examination Committee will consist of five members. Please complete and submit the form entitled “request for permission to take qualifying examination” for the approval of your thesis committee. This form is available at the BMB website under Academics-BMB graduate program-forms.

Progress Reports and Meetings:
The students are required to meet with their dissertation committee every six months and present progress reports both in written and oral format. The progress report should follow the same format as the Qualifying Examination proposal. The student should highlight recent research progress and any changes made to the project since the Qualifying Examination and previous progress meeting. The proposal should be submitted to the committee one week prior to the meeting. It is the responsibility of the student to ensure that the dissertation proposal and progress meetings are held every six months (or less if stipulated by the Dissertation Committee). Students are required to bring the progress evaluation form to the meeting for committee members to sign.
along with signed data verification form. These forms are available at the BMB website under Academics-BMB graduate program-forms. In addition, students are required to present their research in the mini symposium organized on a yearly basis.

If the Dissertation Committee determines that the student is not making satisfactory progress or that there is a consistent lack of progress, the Dissertation Committee will take appropriate action. If the student’s progress remains unsatisfactory for more than one six months, the Dissertation Committee must decide whether the student should: 1) Change his/her research project and 2) change mentor and laboratory.

Consistent lack of progress for more than a year may result in dismissal from the BMB graduate program.

The students who are in the BMB program for 5 years or more will meet with their Dissertation Committee every three months. The Committee will make a determination that adequate progress towards the Ph.D is being made.

**Sufficiency Requirements**

1. Grade point average of 3.0 or better
2. Completion of 12 credit hours of required courses
3. Successful completion of research work with at least one first author published and/or accepted manuscript (not review article) or filing of a patent. However, the student’s dissertation committee can waive this rule if the committee feels that the student has done scholarly work and made significant progress.
4. Students have 4 months to write and defend the thesis work starting from sufficiency date.

**Submitting The Dissertation To The Graduate School**

In order for the student to graduate, the Graduate School must accept the dissertation. The Office of the Graduate School has a set of extremely detailed rules regarding the format of dissertations. The student should obtain these guidelines when beginning to write the dissertation. Note that the Graduate School sets extremely detailed guidelines.

http://www.miami.edu/index.php/graduate_school/current_students/electronic_theses_dissertations

**Thesis Defense**

Students are required to present a public seminar where they can formally defend their written document in front of Dissertation Committee and external examiner. The Graduate School requires that all members of the Dissertation Committee and external examiner must attend the seminar, private defense, and sign off on the final document. In the case of emergencies the Graduate Program Director can consult with the Mentor to allow a single individual to be absent from the defense. The defense involves the review of all experimental data and the entire written thesis. During the defense, the Dissertation Committee Chair is responsible for allotting appropriate time for questions by all participants. Students are expected to understand the significance of their findings, display
adequate knowledge of the relevant literature and know the theory and limitations of methods employed. Candidates must demonstrate the ability to independently design, execute and interpret original experiments. The written thesis and the oral defense must be approved by all committee members. This group is empowered to pass or fail a student’s dissertation document and or the oral defense. The signed forms will be submitted to the Graduate School unless revisions are required. If revisions are necessary, signatures will be held until the document is revised and approved.

Graduation
The academic calendar has specific deadlines for graduation. It is the student’s responsibility to be aware of the exact dates and to coordinate the dissertation defense accordingly after submission of a final thesis is accepted by the Graduate School. Questions regarding deadlines, graduation fees and other requirements or regulations concerning the details of preparation and submission of the thesis dissertation should be directed to:
Doreen Yamamoto Dissertation Editor Ph: (305) 284-4154 Email: dyamamoto@miami.edu

Plagiarism
Plagiarism is explicitly outlawed at University of Miami Miller School of Medicine (UMMSM). The BMB graduate program will not tolerate Plagiarism. Students who are found to have plagiarized may be asked to withdraw from the program. Plagiarism is not always easy to define; students who are unsure whether a particular practice is acceptable are urged to discuss the issue with the faculty instructor or mentor.

Dismissal And Appeals
Students can be dismissed by the Program for academic or professional reasons. Decisions on dismissal are made by majority vote of the Operating Committee. To appeal a major programmatic decision (e.g., dismissal, denial of degree, termination of stipend), students should first present their reasons for appealing to the Graduate Program Director and Operating Committee. This appeal will be given a fair and impartial hearing followed by a decision made by majority vote. If the student remains dissatisfied with the result of this appeal, the student may appeal the program decision, in writing, to the Associate Dean for Graduate Studies, within 30 days of the program’s final decision. Decisions by the Associate Dean are appealable to the Dean of the Graduate School through the filing of a formal Graduate School Grievance.
http://www.miami.edu/index.php/graduate_school/current_students/

Appendices:
1. A list of all graduate courses offered by the Department of Biochemistry & Molecular Biology.
2. A list of all graduate courses offered by the PIBS program.
3. A list of the Biochemistry & Molecular Biology Graduate Faculty.
1. **LIST OF GRADUATE COURSES OFFERED BY THE BMB DEPARTMENT**

BMB 601 – Journal Club  
BMB 609 – Advanced Topics in Biochemistry & Molecular Biology  
BMB 610 – Advanced Topics in Biochemistry & Molecular Biology  
BMB 614 – Molecular Genetics  
BMB 616 – Structural Biology and Applications to Drug Discovery  
BMB 616 – Macromolecules: Physical Biochemistry  
BMB 631 – Special Work  
BMB 645 – Research Problems  
BMB 730 – Doctoral Dissertation  
BMB 750 – Research in Residence

1. **BMB 601- Journal Club**

All registered BMB graduate students must participate in the Research Journal Club/Seminar. Junior students are required to critically review published paper(s) of their choice and describe in detail the findings described therein. Senior students are required to present their research finding in an open form.

2. **BMB 609- Advanced Topics in Biochemistry & Molecular Biology**

This course is offered every fall. This course brings the student to the forefront of research in Molecular Biology. The course material is discussed exclusively in the form of original research papers. Based on this experience, students are required to propose experimental approaches to biological problems and defend them.

3. **BMB 610- Advanced Topics in Biochemistry & Molecular Biology**

This course comprised of lectures and student-led literature discussion. The intended of this course is to provide students broad-based instruction on the modern research in the area of biochemistry and molecular biology.

4. **BMB 614- Molecular Genetics**

This course deals with fundamental genetic concepts and their application to biomedical research. The objective is to provide students with the tools of molecular genetics and an understanding of how genetic principles apply to organisms at various levels of complexity. The course is divided into two parts with an exam following each module. The first module is devoted to fundamental genetic mechanisms including complementation, recombination, suppression and gene regulation as established by experiments with bacteria and bacteriophages. The second module deals with genetic mechanisms in eukaryotic systems.
including yeast, mice and humans. Problem solving is emphasized in homework and exams. Since the focus is on understanding the biological consequences of underlying genetic mechanisms, this course will provide valuable insights for students interested in molecular mechanisms encountered in diverse areas of biomedical research including molecular biology, microbiology, cell biology, cancer biology, pharmacology, and human genomics.

5. **BMB 615- Structural Biology and Applications to Drug Discovery**

This course provides an introduction to structural biology, and illustrates how understanding the relationship between structure and function of biological macromolecules drives drug discovery. The course will be in three parts, with the first covering experimental and computational tools of structural biology—X-ray crystallography, cryo-electron microscopy and molecular modeling. The second part of the course will look at two examples where structural biology has influenced drug design—traditional enzyme inhibitor type drugs and channel blocker drugs. The final part of this course will look at structures of nucleic acid (DNA and RNA) binding proteins and how they inform drug discovery.


The Physical Biochemistry course is designed to introduce essential theoretical concepts associated with a variety of physical methods and to illustrate how these techniques can be used to explore macromolecular structure and function. The course material is composed of 4 main topics: X-ray crystallography, spectroscopic methods, hydrodynamic methods and mechanisms of catalysis.

7. **BMB 631- Special Work**

This course covers special work, lecture, or laboratory or a combination of these, as determined by advisor in accord with student's individual interest. Prerequisite: Approval of Operating Committee.

8. **BMB 645- Research Problems**

This course covers laboratory research problems in various areas of biochemistry and molecular biology, including literature search, experimental design, data gathering and evaluation of results. This course is the mechanism by which graduate laboratory rotations will be done in preparation for selection of Ph.D. mentor.

9. **BMB 710- Master Thesis**

The requirements are 30 credits at the graduate level; a thesis showing results obtained during work on a research problem, for which six credits will be earned; a written comprehensive examination covering the entire field of biochemistry; an
oral defense of the thesis. Credit is not awarded until the thesis has been accepted.

10. **BMB 720- Research in Residence**

This course covers research in residence for the master's degree after the student has enrolled for the permissible cumulative total in BMB 710 (usually six credits). Credit not granted. May be regarded as full time residence.

11. **BMB 730- Doctoral Dissertation**

Required for all Ph.D. candidates. The student will enroll for credits as determined by the Office of Graduate Studies but not less than a total of 24. Not more than six in the summer. If a student has A) passed qualifying exam(s) and (B) is engaged in an assistantship, he/she may still take the maximum allowable credits.

12. **BMB 750- Research in Residence**

This course covers research for the Ph.D. degree after the student has been enrolled for the permissible cumulative total in appropriate doctoral research. Credit not granted.

**Qualifying Examination**

In the Fall semester following the second academic year, students will be evaluated on the basis of their academic performance and by completion of the Qualifying Examination (QE). The format of this examination is the definition of a novel research problem and the development of a proposal to address the stated question and hypothesis. The significance, feasibility, and the relationship of the proposal to the literature will be important criteria for evaluation.

The Qualifying Examination determines, in part, the student's eligibility for admission to candidacy for the Ph.D. degree. The examination is designed to test the student's basic knowledge of biochemistry and molecular biology, as well as assess creativity and rationality of research design.

The student's dissertation committee will be comprised of three faculty members. The dissertation mentor will be BMB Graduate Faculty members while other two members will be selected from the industry based on their research experience. The dissertation proposal exam committee will comprise of student's dissertation committee and two additional members. The Operating Committee will select the two additional committee members. The two additional members will not further participate on the dissertation committee. The Qualifying Examination Committee will consist of up to five members.
The Qualifying Examination comprises two parts:
1. Oral presentation of the proposal
2. Oral defense of the proposal

2. LIST OF GRADUATE COURSES OFFERED BY THE PIBS

1. PIBS 601 - Introduction to Biomedical Sciences
   This course is a comprehensive overview of proteins, DNA and RNA, through molecular signaling and cell biology, to genomics and organism biology.

2. PIBS 602 - Scientific Reasoning
   Students are taught with a combination of lectures, scientific reasoning and methods classes, and small group sessions devoted to primary literature.

3. PIBS 660 - Research Ethics
   The NIH Guide for Grants and Contracts stipulates that Institutions receiving support for National Research Service Award Training Grants are required to develop a program in the principles of Scientific Integrity. This program should be an integral part of the proposed training effort. The University of Miami Miller School of Medicine has chosen to respond to this requirement with this course.

4. EPH 501 Medical Biostatistics I
   This course introduces students to the fundamentals of statistical thinking from the standpoint of modeling data. The focus is on inference, primarily parameter estimation in the context of a given parametric family. Issues of experimental design, confidence, correct interpretations of results, and conditions for validity of methods are discussed. Nonparametrics is included as a contrasting collection of methods. Hypothesis testing is also introduced, focusing on correct interpretation, design issues, and conditions for validity of the techniques. Computing is an essential component of this course.

5. Advanced Literature Searching and Management
   The Calder library staff gives a hands-on tutorial covering advanced PubMed, QUOSA, and Scopus searches to PIBS students.

6. Bioinformatics Workshop
   All students will be enrolled in Bioinformatics in either Spring A or Spring B. There will be 5 sessions per half semester.
3. BMB RESEARCH PROGRAMS

The BMB graduate faculty consists of 22 primary faculty members and 20 secondary faculty members. Some of the BMB faculty are also affiliated with other departments in the University, with the VA hospital, the Sylvester Comprehensive Cancer Research Center, the Braman Family Breast Cancer Institute. Thus, research facilities for a large variety of specialties are available to our students. The BMB department has established a record of scientific contributions and collaborative activities in the following areas:

1. **RNA structure and metabolism:** The BMB department has been at the forefront in understanding the enzymology of RNA modification and RNA degradation. Crystal structures of several RNA modifying enzymes and exoribonucleases have been determined. The recent discovery of regulatory functions of small RNAs in both prokaryotes and eukaryotes has highlighted the importance of basic research on RNA structure and stability for future progress in both the basic and clinical sciences. At the University of Miami, expertise in RNA metabolism is uniquely situated in the department of BMB.

2. **DNA replication, repair, recombination, and eukaryotic chromosome maintenance:** The BMB department has established a strong contingent of investigators in DNA repair and recombination and the related areas of chromatin structure and function. A central theme of this program involves research that covers repair of DNA damage and characterization of the multicomponent nucleoprotein complexes involved in DNA repair, recombination and chromatin structure. DNA cross-link repair is of special interest because it plays a major role in the activity of many cancer chemotherapeutic agents.

3. **Molecular biophysics and structure of protein-ligand interactions:** The BMB Department has recognized the importance of obtaining fundamental information about enzyme catalysis and small molecule interaction with proteins that are involved in basic cellular signaling including DNA replication and repair, RNA biology, translation and cell cycle regulation. The faculties involved in this program characterize protein-ligand interactions at the atomic level using kinetic and thermodynamic methods as well as crystallization and characterization of protein-ligand conformation.

4. **Molecular mechanisms of development, differentiation and signal transduction:** The faculties of the BMB department have also directed their research efforts at elucidating mechanisms of cellular response to extracellular stimuli and regulation of cell function during development and differentiation. The objectives of this program are to understand
regulatory mechanisms at a molecular level using cultured human cells, genetically modified mice lines and yeast systems.

5. **Molecular mechanisms involved in genetic disease and cancer:** The BMB Department has a critical mass of investigators who study molecular mechanisms in the development of cancer. This range from biophysical and functional analysis of proteins involved in signal transduction and includes the study of single gene perturbation of evolutionarily conserved metabolic pathways that produce human disease.

6. **Biomolecules and bionanotechnology:** The BMB department has recently established a new research program in the area of biomolecules and biotechnology. The focus of this program is to design and develop new natural and semi-synthetic biomolecules, as well as molecular-based devices that can be employed in translational medicine and other bionanotechnology applications.

7. **Nutritional Biochemistry:** The BMB department is actively developing a new area of research emphasis in nutritional biochemistry. Nutritional biochemistry research involves understanding the chemical properties of nutrients and their role in biochemical, metabolic, physiological, and epigenetic functions. Understanding nutrition-related biochemical and cellular processes and pathways help in designing nutrition-based public health interventions. Nutritional biochemistry research is interdisciplinary in nature such that it involves disciplines of basic biochemistry, physical sciences, and biomedical sciences. For example, chemistry principles are employed to determine the structures of nutrients, biochemistry knowledge is applied to identify the metabolic pathways that are regulated, and genetics studies are performed to study the gene expression changes ultimately leading to studying the effect of nutrients on human health.

8. **Medicinal Chemistry:** The BMB department is also looking to establish an active research program in Medicinal Chemistry, a multi-disciplinary area of research that focuses on the design and synthesis of therapeutically active drugs. The research questions asked in this area may target on the identification of biological mechanisms of action, metabolism studies, the development of techniques, and the rational design and synthesis. Medicinal chemistry research requires collaborative efforts from many disciplines such as chemistry, biochemistry, pharmacology, pharmaceutical sciences, toxicology, microbiology, and molecular biology to identify, synthesize, and evaluate therapeutic effectiveness of the drug produced. An integrated approach combining design, synthesis, pharmacological and biochemical characterization is essential in drug discovery. Detail
molecular insights enable efficient drug discovery approaches. In that regard, expertise of the current BMB faculty in biochemical characterization, biomarker discovery, and drug delivery approaches combined with new faculty recruitment in synthetic medicinal chemistry would prove ideal for moving into medicinal chemistry research direction.
RNA structure and metabolism


Chaitanya Jain, Ph.D.: To understand RNA metabolism in a model organism, the bacterium Escherichia coli.

Arun Malhotra, Ph.D.: Use of X-ray crystallography and molecular biology to carry out structure/function studies of exoribonucleases and RNA modification enzymes.

Kenneth Rudd, Ph.D.: Research combines bioinformatics predictions with experimental verifications to discover new functions encoded in the Escherichia coli genome.
DNA replication, repair, recombination, and eukaryotic chromosome maintenance

Feng Gong, Ph.D.: To understand the molecular basis of chromatin dynamics during nucleotide excision repair using cell culture and budding yeast as model systems and to address basic questions concerning histone modifications in response to DNA damage.

Jennifer Hu, Ph.D.: Molecular and genetic epidemiology studies of DNA-repair genotypes and phenotypes in human cancer risk, progression, treatment outcome and prevention.


Walter Scott, Ph.D.: Study of DNA synthesis catalyzed by HIV reverse transcriptase and an excision mechanism also catalyzed by this enzyme that can remove chain terminating nucleotides after they have been incorporated. The objective of these studies is to characterize biochemical mechanisms of drug resistance due to mutants in the gene for HIV reverse transcriptase.

Yanbin Zhang, Ph.D.: Mechanisms of Human DNA Repair, Interstrand Cross-Link Repair and Mismatch Repair.
Molecular biophysics and structure of protein-ligand interactions

Amjad Farooq, Ph.D.: Structure, dynamics, thermodynamics and kinetics of proteins involved in cellular signal transduction pathways using a diverse array of biophysical techniques including nuclear magnetic resonance (NMR), isothermal titration calorimetry (ITC) and stop-flow spectroscopy (SFS). Our long term goals are to extend this physico-chemical approach to the rationale design of novel anti-cancer drugs with greater efficacy coupled with low toxicity.

Thomas K. Harris, Ph.D.: NMR and Kinetic Studies of Multidomain Protein Kinase Action and Regulation. The foregoing approach is determination of the kinetic mechanisms of target protein kinases, which further focuses on establishing the degree of activation or inhibition that a regulatory event such as second messenger binding or phosphorylation exerts on one or more reaction steps.

Kurt Schesser, Ph.D.: Genetic and cellular based analysis of microbial virulence factor activity. Our lab is interested in both how the functioning of this secretion system activity is coordinated with other bacterial cellular processes as well as deciphering the activity of the toxins within the eukaryotic host cell (referred to below as ‘delivery’ and ‘cellular microbiology’, respectively).

Molecular mechanisms of development, differentiation and signal transduction
Ralf Landgraf, Ph.D.: Molecular control and manipulation of cell surface receptor signaling with a focus on ERBB2 and ERBB3 receptors. Special emphasis is placed on the role of the macromolecular context in which signaling occurs, its organizing principles and consequences of and opportunities for perturbation.

Guy Howard, Ph.D.: The cell- and molecular biology of bone marrow-derived adult stem cells and the potential they hold for regenerative medicine in the area of age-related bone loss as well as a number of other applications, including osteoarthritis and spinal cord injury.

Mary Lou King, Ph.D.: Cell fate determinations in the early Xenopus embryo with special emphasis on genetic mechanisms that preserve stem (germ) cell totipotency and promote cell migration.

Paul Schiller, Ph.D.: Marrow-isolated adult multilineage inducible (MIAMI) stem cells: molecular mechanisms of self-renewal, proliferation and differentiation; and their use in regenerative medicine.

Molecular mechanisms involved in genetic disease and cancer
Julio Barredo, Ph.D.: Pediatric Hematology-Oncology, Pediatric Oncology, Bone marrow and stem cell transplantation, Childhood brain and spinal tumors, Pediatric sickle cell disease.

Antoni Barrientos, Ph.D.: To understand the basic processes underlying the biogenesis of the mitochondrial respiratory chain (MRC) and how they bear on human neuromuscular and neurodegenerative disorders.

Sanjoy Bhattacharya, Ph.D.: Neuroproteomics, posttranslational modification of deimination, local protein synthesis in neuronal dendrites.

Karoline Briegel, Ph.D.: Transcription factors in normal and cancerous stem cell development with focus on cardiogenesis, mammogenesis and breast cancer.

Ronald Goldberg, M.D.: The prevention of metabolic syndrome and type 2 diabetes and their complications especially cardiovascular disease, and on biomarkers of cardiometabolic damage, particularly the lipoproteins.

Frans Huijing, Ph.D.: To integrate and apply new findings in biochemistry and molecular biology to medicine.

Zafar Nawaz, Ph.D.: Understand the mechanisms of steroid hormone receptor and coactivator action in the development of normal and cancerous tissues, with important emphasis on estrogen receptor (ER) regulation in breast cancer & neurodegenerative diseases and androgen receptor (AR) regulation in prostate cancer.

Michael D. Norenberg, Ph.D.: Mechanisms of astrocyte swelling in trauma and other neurological conditions; biology of astrocytes and their role in disease.

Joyce Slingerland, M.D. Ph.D.: Breast cancer, molecular mechanisms, molecular genetics, epidemiology, cell cycle, and estrogen receptors.

Biomolecules and bionanotechnology
Sylvia Daunert, Ph.D.: The research interests of our group lie in the area of Bionanotechnology, at the interface between Bionalytical Chemistry, Molecular Biology, and Bioengineering. More specifically, our group employs recombinant DNA technology to design new molecular diagnostic tools and biosensors based on genetically engineered proteins. Additionally the research of the group focuses in the design of sensing arrays for the detection of molecules in small volumes and microfluidic platforms, and in the development of smart biomaterials for responsive drug delivery systems.

Sapna Deo, Ph.D.: The focus of Deo research group is both fundamental and translational biochemical in nature. We employ highly sensitive bioluminescent proteins, fluorescent proteins, and quantum dot nanoparticles to develop biodiagnostic technologies for microRNAs. MicroRNAs are a class of newly discovered small RNAs that are involved in genetic regulation and are considered biomarkers of cancers. We also develop nanosensors for the detection of biomolecules of environmental and biomedical relevance.

Ram Datar, Ph.D.: Dr. Datar's laboratory is interested in the area of molecular prognostic marker analysis and expression profiling in cancers. Dr. Datar has developed novel technologies including microfilters for circulating tumor cell capture and characterization and nanosensors for serum markers in association with his collaborators.
Silvia Daunert, Ph.D.: The research interests of our group lie in the area of Bionanotechnology, at the interface between Biological Chemistry, Molecular Biology, and Bioengineering. More specifically, our group is developing sensitive novel strategies using biosensors for quantifying metabolites present in the blood and in cells.

Sapna Deo, Ph.D.: The focus of Deo research group is both fundamental and translational biochemical in nature. We employ highly sensitive bioluminescent proteins, fluorescent proteins, and quantum dot nanoparticles to develop biodiagnostic technologies for quantifying metabolites present in the blood and in cells.

Ronald Goldberg, Ph.D.: The prevention of metabolic syndrome and type 2 diabetes and their complications especially cardiovascular disease, and on biomarkers of cardiometabolic damage, particularly the lipoproteins.

William Whelan, D.Sc.: To understand the multiple aspects of the mechanism of the biogenesis of energy-reserve polysaccharides, principally glycogen and starch.

Michal D. Toborek, M.D., Ph.D.: Dr. Toborek's research is focused on the molecular and signaling mechanisms of the disruption of the blood-brain barrier (BBB) in chronic and acute CNS diseases and the protective effects of exercise and nutrition. Specific interest involves studies on the role of the BBB in HIV-1 and/or drug of abuse-induced neurotoxicity. Dr. Toborek's laboratory has also interest in studies on the effects of environmental pollutants and nanoparticles on the development of brain metastases and pathogenesis of stroke.
Antoni Barrientos: To understand the basic processes underlying the biogenesis of the mitochondrial respiratory chain (MRC) and how they bear on human neuromuscular and neurodegenerative disorders.

Sanjoy Bhattacharya, Ph.D.: Neuroproteomics, posttranslational modification of deimination, local protein synthesis in neuronal dendrites.

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Zafar Nawaz, Ph.D.: Understand the mechanisms of receptor and coactivator action in neurodegenerative diseases and novel compounds that block steroid functions.