Masters of Arts in Biology

August 9th, 2018

Elizabeth O. Harrington, Ph.D.
Associate Dean, Office of Graduate & Postdoctoral Studies
Division of Biology & Medicine
Masters of Arts in Biology

- Established in 1993 via contractual agreement.
- Accredited by Connecticut Department of Education.
- Course offering is a section of an existing Brown University course.
Masters of Arts in Biology

• “The quality of student performance required is at least as rigorous as for the Master of Arts degree within any Graduate Program in the Division.

• The difference is the Pfizer students obtain breadth in Biology in more than one graduate area by not imposing strict requirements for specific courses.”
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Objectives

• Provide graduate instruction within the biological sciences for Pfizer colleagues and contractors who wish to extend their knowledge in discrete areas relating to their employment and/or interests.

• Provide a broad-based and rigorous Master of Arts training in biological sciences.
Over 180 M.A. in Biology awarded.
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Experiences

• Many colleagues have remained with Pfizer with advancement within your organization.

• Others have earned additional master’s or PhD degrees.
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Overview

• Open to Pfizer contractors and colleagues.

• Only one prerequisite required:
  • A Bachelors degree in any field.

• All courses held on-site at Pfizer-Groton campus and available via WebEx for offsite employees.
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Overview

• Pfizer employees and contractors register as Special Students via a Registration Form;
  • Standard Brown tuition fees apply.

• Students apply to Graduate School for the M.A. program after successful completion of two courses.

• Pfizer reimburses colleagues only who pass with grade of a ‘B’ or better.

• Students must comply with Academic code and Title IX training (on-line)
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Program Requirements

- 8 graduate courses:
  - 2 of 8 courses in “core” subjects
    - cell biology,
    - biochemistry,
    - genetics,
    - pharmacology;
  - 6 of 8 courses with grade of ‘B’ or better.

- Passing final paper or proposal “culminating experience” on topic approved by Assoc Dean, Graduate & Postdoctoral Studies.
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Program Requirements: Culminating Experience

• As a culminating experience for the Master of Arts in Biology Program, there are two options:
  
  • an NIH style research proposal based on an original hypothesis or
  
  • a final paper which, based on the course work taken by the student, represents an original in-depth analysis and literature review of a problem in modern biology.
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Program Requirements: Culminating Experience

• **Research proposal** (written as though you were preparing a NIH RO1 application) will include:
  • project summary/abstract,
  • specific aims,
  • research strategy,
  • literature cited.

• **Final paper** (10-15 pgs, excluding figures and references) will include:
  • introduction,
  • discussion,
  • conclusion,
  • literature cited.
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Program Requirements:
Culminating Experience

- Topics must be discussed with, and approved by the Associate Dean for Graduate and Postdoctoral Studies.

- The final project may be undertaken following completion of 7 courses, but must be completed no later than one semester following completion of the 8th course.
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Program Requirements: Culminating Experience

• Both projects are designed to demonstrate the student's ability to master and integrate the knowledge gained in the prior course work and to apply that knowledge to a specific problem in modern biology.
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Program Requirements

• No courses can be transferred from another institution.

• Must be actively employed as a colleague or contractor at Pfizer.

• Pfizer M.A. students may take courses toward the degree on Brown University campus with permission of instructor and Assoc. Dean of Graduate and Postdoctoral Studies.
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Program Requirements

• Once accepted by the Graduate School, the students are expected to enroll in courses continuously each semester;
  • with the exception of the summer term.
  • If not, a request for a Leave of Absence (LOA) must be submitted one month prior to the start of the term via the Graduate School to avoid billing.
  • Only one LOA is permissible during the course of study.
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Application Requirements

• Successful completion of two Brown University graduate courses (B or better).

• Undergraduate transcript with date of degree.

• Letter of recommendation from Supervisor at Pfizer.

• 1-2 pg. Colleague Statement

• No GRE requirement!
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Auditing of Classes

- **Auditing.** is a student who is registered in a course without earning academic credit upon successful completion under the following conditions:
  - (1) the student must be properly registered for it;
  - (2) the student is entitled to all instruction in the course, including conferences; but will not receive criticism of papers, tests, and examinations.

- Auditing of courses is available only to Pfizer students who have graduated with the Brown/ Pfizer MA degree.

- All other Pfizer students are required to enroll in the course.
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Auditing of Classes

• Auditing of courses is limited to a total of 2 courses per Brown/ Pfizer MA graduate.

• To audit a BROWN course, the student must receive permission from the instructor prior to the start of the course.
  – The audited course shall be entered on the permanent record of any student electing this privilege.
  – The status of a course in which a student has registered may not be changed from audit to credit at any time.

• Auditing of a course will be at no cost to the student.
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Upcoming Courses

• Fall 2016: Cancer Biology
• Spring 2017: Molecular Genetics
  • Core course
• Fall 2017: Virology
• Spring 2018: The Immune System
• Fall 2018: Advanced Biochemistry
  • Core course
• Spring 2018: Biotechnology and Global Health
Questions?
Advanced Biochemistry

Professor Gerwald Jogl
Fall 2018
Gerwald_Jogl@brown.edu
Core Course
We will focus on principles, not detailed reactions!

Biochemistry:
Biochemistry: Protein structure

Figure 6-1
Lehninger Principles of Biochemistry, Seventh Edition
© 2017 W. H. Freeman and Company
Biochemistry: Metabolism

**Figure 19-19**

*Lehninger Principles of Biochemistry, Seventh Edition*  
© 2017 W. H. Freeman and Company
Biochemistry: DNA/RNA binding

Figure 28-14
Lehninger Principles of Biochemistry, Seventh Edition
© 2017 W. H. Freeman and Company
Biochemistry: Protein synthesis

Figure 27-34
Lehninger Principles of Biochemistry, Seventh Edition
© 2017 W. H. Freeman and Company
The objective of this course is to study how essential concepts of biochemistry are applied in current biomedical research.

We will review core topics of biochemistry and read recent research publications relevant to these topics.
Typical Class Structure

1/3 – lecture and discussion of fundamental concepts from assigned textbook reading.

1/3 – discussion of concepts and experimental approach of assigned publications

1/3 – discussion of assigned reading

The in-class discussion will
(a) examine the experimental approach,
(b) how the results of each report fit with prior knowledge, and
(c) how these findings moved the field forward.
Course Syllabus:

1. Foundations of Biochemistry
2. Proteins
4. Enzyme function
5. Glycolysis and citric acid cycle
7. Oxidative phosphorylation
6. Exam 1
3. Carbohydrates and lipids
8. Amino acids and nucleotides
9. Integration of metabolism
10. Nucleic acids, DNA, RNA
11. Replication and transcription
12. Protein synthesis
13. Exam 2
Course Reading

Textbook
Biochemistry
First Edition 2017
Miesfeld & McEvoy, Norton

Two recent research publications for each
Example: Protein Synthesis
Shi, Kotaro et al.
*Heterogeneous ribosomes preferentially translate distinct subpools of mRNAs genome-wide.*
Molecular Cell (2017)

Florin, Maracci et al.
*An antimicrobial peptide that inhibits translation by trapping release factors on the ribosome.*
Nature Structural and Molecular Biology (2017)
Biotechnology & Global Health

Toni-Marie Achilli, PhD
Lecturer in MPPB
Spring 2019
Email
Toni-Marie_Achilli@brown.edu

Office Hours
By Appointment
Course Objectives

• Use knowledge built in biology curriculums to explore the epidemiology and pathophysiology of predominant health conditions

• Learn disease mechanisms

• Evaluate challenges in both the developed and developing world

• Gain an appreciation for the scope and interdisciplinary nature of global health initiatives
What is Biotechnology?

Genetic Modification

Pharmaceutical Sciences

Substitutive Medicine

Our focus... Biotechnology in Medicine and Global Health!
Impact of Biotechnology

People are living much longer!!
Cost of Biotechnology

<table>
<thead>
<tr>
<th>Year</th>
<th>Percent of US GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900</td>
<td>2 %</td>
</tr>
<tr>
<td>1950</td>
<td>6 %</td>
</tr>
<tr>
<td>2000</td>
<td>15%</td>
</tr>
<tr>
<td>2010</td>
<td>17%</td>
</tr>
</tbody>
</table>

U.S. Life Expectancy vs. Real GDP per Capita (log) 1929 to 2010
Burden of Disease Across the World

- Developed
  - Higher standard of living
  - Diverse economy

- Developing
  - Lower per capita income
  - Lower Human Development Index (HDI)

DALYs (Disability-Adjusted Life Years) loss rate from all causes, 2016

Age-standardized DALY (Disability-Adjusted Life Year) loss rates per 100,000 individuals from all causes. DALYs are used to measure total burden of disease - both from years of life lost and years lived with a disability. One DALY equals one lost year of healthy life.
Burden of Disease Across the World

Figure 1: Under-five mortality declined in all regions between 1990 and 2012

Figure 2: Nearly half the world’s under-five deaths were concentrated in Sub-Saharan Africa in 2012

Levels and trends in child mortality, WHO
Case studies

Each case study will examine how disease affects different parts of the world differently, many times due to the technologies available to diagnose and treat those diseases.
Impact on Policy

To reduce health inequalities among underserved populations locally and worldwide through education, research, service and development of partnerships.
Additional Topics to include:

- Cardiovascular disease
- Cancer
- Vaccine technology and the immune system
- Drug Resistance
- TOPICS OF YOUR CHOICE!
## Grading and Evaluation

<table>
<thead>
<tr>
<th>Percentage of Grade</th>
<th>Component</th>
</tr>
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<tbody>
<tr>
<td>10%</td>
<td>Attendance and in-class participation from readings</td>
</tr>
<tr>
<td>15%</td>
<td>News article assignment</td>
</tr>
<tr>
<td>25%</td>
<td>Exam 1</td>
</tr>
<tr>
<td>25%</td>
<td>Exam 2</td>
</tr>
<tr>
<td>25%</td>
<td>Semester Project (written and oral presentation)</td>
</tr>
</tbody>
</table>
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*How to get started?***

1. Register for course offering via the Brown website:
   
   ![http://www.brown.edu/pfizer](http://www.brown.edu/pfizer)

2. Educational Assistance:
   
   – **Colleagues:** Apply for via HR source. Following the successful completion of the course (‘**B**’ or better), you will be reimbursed by Pfizer to pay off your loan.
   
   – **Contractors:** None available, but Ledge Light credit union has individual educational loan options.
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How to get started???

3. Mail tuition check to:

Brown University Cashier's Office
164 Angell Street
Box 1911
Providence, RI 02912
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Pfizer Contact

- Heather Chen
  - Pfizer Global R&D; Groton Labs
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- Good luck!!