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## BIOCHEMISTRY (Ph.D.)

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*Executive Officer:* Professor Edward Kennelly

The Graduate Center

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### FACULTY (AS OF JULY 2009)

Alejandra del Carmen Alonso n Jesus A. Angulo n Valeria Balogh-Nair n Probal Banerjee n Jill Bargonetti-Chavarria n Paola Bellosta n Robert Bittman n Diana P. Bratu n Derrick T. Brazill n David H. Calhoun n Avrom J. Caplan n Marco Ceruso n Emmanuel J. Chang n Hai-Ping Cheng n Shu-Yuan Cheng n Lesley Davenport n Sacha De Carlo n Ruel B. Desamero n Jason B. Dictenberg n Robert Dottin n Terry Lynne Dowd n Charles M. Drain n Laurel Ann Eckhardt n Robert R. Engel n Dan Eshel n Jimmie Eugene Fata n Karl R. Fath n Paul G. Feinstein n Maria E. Figueiredo-Pereira n Marie T. Filbin n Charlene L. Forest n David A. Foster n Diana Friedland n Eitan Friedman n Ranajeet Ghose n Brian R. Gibney n Mitchell Goldfarb n Dixie J. Goss n Paul Gottlieb n Sanna M. Goyert n Nancy L. Greenbaum n Marilyn R. Gunner n Wayne W. Harding n Ann S. Henderson n Nathalia Glickman Holtzman n Karen Hubbard n Amy E. Ikui n Andrzej A. Jarzecki n Andrei Jitianu n Ira R. Josephson n Laura J. Juszczak n Akira Kawamura n Edward J. Kennelly n Frida Esther Kleiman n Lawrence Kobilinsky n Ronald L. Koder n Sanjai Kumar n Leslie J. Kushner n William J. L'Amoreaux n Themis Lazaridis n Nathan H. Lents n Louis F. Levinger n Peter N. Lipke n Diego Loayza n Richard S. Magliozzo n Hiroshi Matsui n Alicia Meléndez n Corinne A. Michels n Carol Wood Moore n Fred R. Naider n Naphtali O'Connor n Benjamin D. Ortiz n Rafael Ovalle n Manfred Philipp n Serafín Piñol-Roma n Gary J. Quigley n Krishnaswami S. Raja n Boojala Reddy n Patricia Boyle Rockwell n Susan A. Rotenberg n Kevin Ryan n Wilma Saffran n Uri Samuni n Cathy Savage-Dunn n Anjana D. Saxena n Thomas Schmidt-Glenewinkel n Joni M. Seeling n Chang-Hui Shen n Timothy W. Short n Simon A. Simms n Shaneen M. Singh n Gillian M. Small n Linda Spatz n Ruth E. Stark n Mark Steinberg n Thomas Strekas n Barbara Studamire n Burton E. Tropp n Iban Ubarretxena-Belandia n Maribel Vásquez n Margaret M. Wallace n Daniel W. Weinstein n Eleanore T. Wurtzel n Yujia Xu n Zahra F. Zakeri n Zhi-Liang Zheng n Hualin Zhong

*For the most up-to-date faculty listings and specializations, see the program's Web site.*

### THE PROGRAM

Graduate work in biochemistry, an interdisciplinary science that draws on fundamental chemical theory and research techniques as the basis for explorations into the problems of biology, requires a firm grounding in chemistry as well as a sophisticated knowledge of biology. The

Ph.D. Program in Biochemistry is designed to provide students with the research techniques and knowledge they will need for careers as biochemists in government and industry or as teachers in colleges and universities.

Students in the Biochemistry program are expected to participate in research early in their graduate work, preferably in the first year of study, and to engage actively in a broadly based seminar and colloquium program designed to introduce students to the important problems and current research methods of biochemistry.

Areas of faculty research specialization in the Biochemistry Ph.D. program:

Biochemical Pharmacology	Lipid Biochemistry
Bioenergetics	Membrane: Structure, Function, and Transport
Bioinformatics	Metabolism and Regulation
Bioinorganic Chemistry	Molecular Biology
Bioorganic Chemistry	Neurochemistry
Biotechnology/Biomaterials	Organelle Biochemistry
Enzymology and Protein Biochemistry	Physical Biochemistry/Biophysical Chemistry
Immunochemistry	Structural Biology

Research work may be done at Brooklyn, City, Hunter, Lehman, and Queens colleges and at the College of Staten Island. Nonlaboratory courses in biochemistry are usually given at the Graduate Center.

#### ***Resources for Training and Research***

The doctoral faculty, which is drawn from the biology and chemistry faculties of the various colleges of CUNY, is often supplemented by outstanding visiting scientists, who serve either as guest lecturers or as visiting professors.

#### ***En-route M.A.***

Upon completing 45 credits with an average grade of B, passing the First Examination, and satisfactorily completing a major research paper, the student may apply for an M.A. degree. The degree is awarded formally by one of the participating senior CUNY colleges.

#### **SPECIAL REQUIREMENTS FOR ADMISSION**

In addition to meeting the general University requirements for admission stated in an earlier section of this bulletin, entering students should have a strong background in physical and biological sciences, including organic chemistry, physical chemistry, physics, and mathematics through calculus, and should have taken courses in cell biology, genetics, or biochemistry. Students may be admitted with deficiencies but will be required to correct them during the first three semesters. All applicants are required to take the Graduate Record Exam (GRE) General Test.

#### **SPECIAL REQUIREMENTS FOR THE DOCTOR OF PHILOSOPHY**

The general University requirements are stated earlier in this bulletin. The special requirements in biochemistry are as follows.

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*Course of Study* 60 credits of graduate work are required for the Ph.D. degree in biochemistry, of which 30 credits are in required core courses taken in the first year of study. These include courses—lecture and laboratory—in physical biochemistry, bioorganic chemistry, and general biochemistry, as well as two seminars in biochemistry. Of the remaining 30 credits, 6 must be in the biological sciences, 3 must be in biochemistry seminars, and 6 must be in two advanced biochemistry courses. The remainder are either elective or thesis credits. Students are required to participate in seminar and colloquium programs during the entire program of study and are urged to commence thesis research early, usually after passing the First Examination.

*First Examination* The First Examination, based on core material, is taken in two parts at the end of the first and second semester.

*Second Examination* The student must demonstrate competence in the field of advanced biochemistry by preparing a written research proposal and defending it before a faculty committee.

*Dissertation* The candidate must write a dissertation on an approved subject under the supervision of an advisory committee. After the dissertation has been completed, the student is required to make an oral defense before a dissertation committee.

*Field Experience* The student is expected to acquire experience and a measure of competence in college teaching. This requirement may be fulfilled by serving as a part-time teaching assistant in the classroom or the laboratory during the period of time that the student is enrolled in the program, unless the requirement or part of it is waived by the Executive Officer.

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## Courses

Unless otherwise stated, all courses are 45 hours, 3 credits. Please note that some courses may be offered infrequently; consult with the program for further information.

### Core Courses

*Required of all students, except for BICM 71130.*

BICM 71010 Advanced Biochemistry I

*Prerequisite: A one-semester course in biochemistry*

BICM 71020 Advanced Biochemistry II

*Prerequisite: A one-semester course in biochemistry*

BICM 71110 Research Techniques in Biochemistry I

*4 credits*

*Corequisite: BICM 71010*

BICM 71120 Research Techniques in Biochemistry II

*4 credits*

*Prerequisite: BICM 71110*

BICM 71130 Research in Biochemistry

*4 credits*

*Prerequisite: BICM 71110 and BICM 71120*

BICM 72010 Basic Seminar in Biochemistry I

*1 credit*

BICM 72020 Basic Seminar in Biochemistry II

*1 credit*

BICM 75000 Bioorganic Chemistry

BICM 77000 Physical Biochemistry

**Advanced Courses**

*Prerequisite: Completion of BICM 71010 and 71020 or permission of Executive Officer*

BICM 81000 Seminar in Biochemistry

*15 hours, 1 credit*

*Three semesters required of all students*

BICM 82000 Research Toward the Doctoral Dissertation

*Credits variable*

*Prerequisite: The First Examination*

BICM 83000 Biochemistry of Lipids and Membranes

BICM 84000 Enzymology

BICM 85000 Nucleic Acid Metabolism and Function

BICM 86000 Metabolic Pathways and Their Control Mechanisms

BICM 87000 Bioinformatics

BICM 88800 Current Topics in Biochemistry

*15 hours, 1 credit*

BICM 88900 Special Topics in Biochemistry

BICM 90000 Dissertation Supervision

*1 credit*

*Required of all students*

*Prerequisite: Completion of all required courses*