Information Sheet

Interdisciplinary Graduate Track in Structural and Computational Biophysics (SCB)

Programs of Biology, Chemistry, Computer Science, Mathematics, Molecular and Cellular Biosciences and Physics

Director, Freddie R. Salsbury Jr (salsbufr@wfu.edu)

This document provides a general overview of the requirements for students participating in the SCB Track. For specific up-to date requirements, please see the Wake Forest University Graduate Bulletin.

Track Overview: The Interdisciplinary Graduate Track in Structural and Computational Biophysics (SCB) is designed to meet the need for scientists and educators with broad, interdisciplinary training in the quantitative biological, biochemical, and biomedical sciences. Students who successfully complete the SCB Track and degree requirements will receive a certificate in Structural and Computational Biophysics, as well as the degree in the program in which they matriculate. The Track is implemented by collaboration among the programs of Biology, Chemistry, Computer Science, Mathematics, Molecular and Cellular Biosciences and Physics at Wake Forest University.

Student Admission Requirements: Following matriculation and at least one semester of coursework in a participating program (currently, Biology, Chemistry, Computer Science, Mathematics, Molecular and Cellular Biosciences and Physics), students can apply for admission to the SCB Graduate Track. Admission to the Track is initiated by meeting with the SCB program representative or with the track directory. The student will then submit a letter of intent and a Wake Forest University graduate transcript to their department representative who will present it to the SCB advisory committee. The letter of intent should express the student's interest in the SCB program, a proposed plan of study, and how the SCB program meets the student's career and academic goals. Following favorable evaluation, applicants may be recommended for admis-

sion by the SCB advisory committee, with final approval determined by the Graduate School. atics, molecular and cellular biosciences or computer science).

Students in the Interdisciplinary Graduate SCB Track must complete all graduate degree requirements in the individual program to which they were admitted. In addition, at least 15 hours of the student's graduate coursework should consist of courses approved as part of the SCB Track (listed in this bulletin), including a general, introductory SCB course and two hours of journal club credit. At least one course must be at the 700 level. Students must take at least two graduate hours in each of the curriculum areas: chemistry/biochemistry, computer science/mathematics, and biophysics. All students in the SCB Track must complete and defend a PhD dissertation (or MS thesis for computer science or mathematics) that involves original, interdisciplinary research in the area of structural and computational biophysics or computational biology; broadly defined. The dissertation committee will consist of members from at least three participating SCB departments. All students must successfully complete a course in scientific ethics. Each semester, several seminars from the participating departments will be designated as SCB discussion group seminars. Students in the Track are required to attend these seminars.

Students in the SCB Track have access to state-of-the-art equipment and facilities in multiple departments, including the Wake Forest Structural Biology Facility (csb.wfu.edu), the DEAC Linux cluster (www.deac.wfu.edu), and well-equipped research laboratories in biophysics, biochemistry, and biomedical engineering.

The Interdisciplinary Graduate Track in Structural and Computational Biophysics began in 2005. Information on the program and links to faculty research interests can be accessed at scb.wfu.edu.

Courses listed in this bulletin are those currently approved for the Interdisciplinary Graduate Track in Structural and Computational Biophysics at Wake Forest University. (Other courses may be allowed with prior approval by the SCB Track advisory committee. Course descriptions can be found under the department which administers the course.)

SCB-specific courses.

SCB 701. Structural and Computational Biophysics Journal Club. (1) Seminal and current publications in structural and computational biophysics are read and discussed. P—Admission to the SCB graduate track or POI.

SCB 710. Research Topics in Structural and Computational Biophysics. (1) Lectures and discussions on research topics in the field of structural and computational biophysics and biology. Topics depend on the specialty of the instructors in a given semester. P—Admission to the SCB graduate track or POI.

Curriculum Area 1. Chemistry/Biochemistry

General prerequisites: Two semesters of undergraduate chemistry and one semester of undergraduate biochemistry or molecular biology; one semester of organic chemistry is considered ideal, but is not required for most courses. (If additional prerequisites are required, they are listed individually by course.)

CHM 641. Fundamentals of Physical Chemistry. (3 or 4)

BICM 716. Special Topics in Biochemistry: Macromolecular X-ray Crystallography. (2)
P—one semester graduate level biochemistry.

BIO 672. Molecular Biology. (3 or 4)

BIO/CHM 670. Biochemistry: Macromolecules and Metabolism. (3)

BIO/CHM 670L. Biochemistry Laboratory: Macromolecules and Metabolism. (1)

CHM 672. Biochemistry: Protein and Nucleic Acid Structure and Function. (3)

CHM 751. Biochemistry of Nucleic Acids. (3)

CHM 752. Protein Chemistry: Structures, Methods and Molecular Mechanisms. (3)

CHM 756. Biomolecular NMR. (1.5) P—POI.

CHM 757. Macromolecular Crystallography. (1.5) P—CHM 356A/656 highly recommended.

MCB 700. Analytical Skills (1) Taught every August.

MCB 701. Molecular and Cellular Biosciences A. (1) Taught every fall.

Curriculum Area 2. Physics

General prerequisites: Two semesters of undergraduate physics. (If additional prerequisites are required, they are listed individually by course.)

PHY 607. Biophysics. (3)

PHY 625. Biophysical Methods Laboratory. (1) C—PHY 607.

PHY 685. Bioinformatics. (3) P—Introductory courses in biology, chemistry, and molecular biology or biochemistry or permission of instructor; also listed as CSC 685, though requirements and prerequisites are different.

PHY 620. Physics of Biological Macromolecules. (3) P—PHY 651 or CHM 641, or POI.

Curriculum Area 3. Computer Science/Mathematics

General computer science prerequisites: Programming in a high level language. (If additional prerequisites are required, they are listed individually by course.)

CSC 621. Database Management Systems. (3)

CSC 631. Object-oriented Software Engineering. (3)

CSC 646. Parallel Computation. (3)

CSC 652. Numerical Linear Algebra. (3)

CSC 655. Introduction to Numerical Methods. (3)

CSC 671. Artificial Intelligence. (3)

CSC 685. Bioinformatics. (3)

CSC 721. Theory of Algorithms. (3)

CSC 753. Nonlinear Optimization. (3) P—Computer Science 655.

CSC 754. Numerical Methods for Partial Differential Equations. (3) P—CSC 655 or
MTH 655.

MTH 652. Partial Differential Equations. (3) P—MTH 251.

MTH 653. Mathematical Models. (3)

MTH 656. Statistical Methods. (3)

MTH 659. Multivariate Statistics. (3) P—MTH 656 and 602.

MTH 750. Dynamical Systems. (3) P—MTH 611.

MTH 761. Stochastic Processes. (3)