

**Miami University**  
**M.S. and Ph.D. in Cellular, Molecular and Structural Biology**

**Recommendation**

**The proposed Master of Science and Doctor of Philosophy in Cellular, Molecular and Structural Biology (CMSB) clearly meet the Chancellor's standards for graduate degree programs. The Regents' Advisory Committee on Graduate Study recently voted unanimous approval for the new program. There were no serious concerns raised in the review.**

**Request:** Miami University requests approval for a Master of Science (M.S.) and a Doctor of Philosophy (Ph.D.) in Cellular, Molecular and Structural Biology.

**Program Background and Purpose:** Currently, a non-degree granting graduate program in Molecular Biology exists at Miami University. Faculty members in the Departments of Botany, Chemistry and Biochemistry, Microbiology and Zoology created this program to support a shared interest in cell and molecular biology research and scholarship. Miami University is proposing to restructure the current program and develop it as an interdisciplinary degree-granting program, which leads to a M.S. and a PhD in "Cell, Molecular and Structural Biology" (CMSB).

CMSB is an extremely broad discipline, which seeks to understand the molecular mechanisms involved in controlling and mediating cellular metabolism, biosynthesis and function. The scientific progress in genomics, functional genomics and bioinformatics provides vital tools for life sciences research. In particular, the ever-increasing amount of genomic data offers biologists unprecedented opportunities to pursue the molecular and cellular mechanisms of life. Given the complex nature of genomes and gene functions, it is important that graduate students are trained across traditional disciplines. The education of graduate students in the CMSB program will reflect the discipline's transdisciplinary nature and its relevance to life sciences research.

The proposed graduate program in Cellular, Molecular and Structural Biology will appeal to students who wish to pursue careers in CMSB rather than as Botanists, Biochemists, Chemists, Microbiologists or Zoologists. The CMSB program will modernize Miami University's graduate training in the biosciences and will contribute to the strength of the academic and research experiences of undergraduates at the institution.

**Enrollments:** Based on the number of CMSB faculty associates and the number of Ph.D. students they supervise, Miami University estimates that the initial enrollment in CMSB will be a cohort of 6 new students per year (plus any additional students who may transfer into the new program). The number of students in CMSB is expected to increase, as the reputation of the program grows and as new assistantships are offered.

**Curriculum:** The CMSB Program Director and the CMSB Executive Committee will administer the program. The proposed curriculum is built around Miami University's current non-degree granting molecular biology program, which consists of four core courses: CHM 532 (Fundamentals of Biochemistry) or CHM 533 (Biochemistry), BMZ 605 (Advanced Molecular Biology), BMZ 606 (Advanced Cell Biology), and BCMZ 650 (Seminar in Molecular Biology). Miami University plans to include a structural biology component to the curriculum and require students to take courses in three of four areas

(Biochemistry, Cell Biology, Molecular Biology and Structural Biology). These requirements are designed to ensure a rigorous, core curriculum that still allows sufficient flexibility to meet the needs of individual students. The remaining courses will be tailored to the particular research interest of the individual student. The minimum number of credit hours for the M.S. and Ph.D. programs are 30 and 90 credit hours, respectively. Each student will present and defend a thesis or dissertation proposal by the end of the third semester for M.S. students or the end of the sixth semester for Ph.D. students in residence.

**Faculty, Facilities and Resources:** Miami University has the requisite number of faculty members and sufficient space and resources to support the CMSB graduate program. Participating departments will initially support the costs associated with the new programs, so very few additional resources will be needed. The CMSB program will seek additional sources of funding from external sources for graduate students performing research. The university has recently invested significant resources to support CMSB research, and all those facilities (e.g., High Field NMR & Structural Biology Laboratory, a new pulsed Electron Paramagnetic Resonance (EPR) spectrometer, a new animal facility that supports the IT computing research group, etc.) are available to CMSB faculty and students.

**Evidence of Need:** Rapid advances in CMSB research over the last 20 years have spawned much of today's biotechnology industry and have led to significant changes in the pharmaceutical, health care, and agricultural industries. The growth rate nationally in the biotechnology industry has been estimated at 14-17% annually, and various projecting indicate that the biotech research industry will employ 500,000-800,000 people nationally by 2010. A recent U.S. Department of Labor report cites shortages of workers in biotechnology at all educational levels, and includes establishment of degree programs in Molecular Biology and Biotechnology among its recommended steps. Although most universities in Ohio offer programs in the general areas of cell, molecular and structural biology, the proposed program is unique and will not duplicate those efforts.

Graduates of the proposed program will find positions as faculty members in higher education and as researchers in medical school laboratories. They will also find positions as scientists within the growing number of high tech industries in the state. As Ohio increases its efforts to attract high tech, biotech and biomedical industries to the state, most prominently through the Ohio Third Frontier Project, the proposed CMSB graduate program will play a role in ensuring that an educated workforce is locally available.