BACKGROUND AND REQUEST

MIAMI UNIVERSITY
Master of Science in Computational Science and Engineering

EXECUTIVE SUMMARY/RECOMMENDATION

This program clearly meets Regents' standards for graduate degree programs. The Regents' Advisory Committee on Graduate Study voted approval for the new master's level program. There were no serious concerns raised in the review.

Request: The School of Engineering and Applied Science at Miami University seeks approval for a new Master of Science in Computational Science and Engineering degree.

Program Purpose/Mission: The proposed Master of Science in Computational Science and Engineering program will be an interdisciplinary thesis-based degree that applies the techniques in computer science and mathematics towards the development of innovative and efficient solutions to solve scientific and engineering problems in the physical sciences, biological sciences, business, engineering design, and manufacturing. Students complete courses in a computational core to prepare them to solve scientific and engineering problems in their area of concentration. The three areas of concentration are; Computational Mechanics, Computer Systems Modeling and Simulation, and Bioinformatics. The proposed degree meets a growing need in the State of Ohio for professionals educated in the use of computational and mathematical methods and tools in science and engineering fields. The three primary goals of the program are; 1) Meet the growing need in many companies in the State of Ohio for expertise in computational engineering, 2) Enable faculty in the engineering departments of the School of Engineering and Applied Science (SEAS) at Miami University to increase their research productivity and open new opportunities for external funding, 3) Support graduate science programs at Miami University whose faculty and student research is heavily computational. A first step in that direction is a concentration in bioinformatics. Companies such as Procter and Gamble and General Electric, and governmental entities such as Wright Patterson Air Force Base, recognize the need for engineers and scientists who are trained in computational science and engineering in order to remain competitive to serve in their industries. Collaborative efforts from Miami University in Computational Science and Engineering in Ohio have resulted in graduate level collaboration in the Southwest region of Ohio, where competencies in the core areas will be developed with other universities in Southwest Ohio (University of Cincinnati, University of Dayton, Miami University, Wright State University, and the Air Force Institute of Technology), and agreements

will be pursued with those institutions to allow cross-registration for courses that meet those competencies at the other institutions, thereby allowing Miami University students to take advantage of the expertise at those other institutions. Miami University anticipates serving in a leading role with The Ralph Regula School, directed by Dr. Steve Gordon, where an undergraduate minor program has been established and where Dr. Gordon is looking ahead to establish undergraduate major and graduate programs.

Enrollments: Enrollment levels will be managed to balance the number of students with the faculty teaching, advising and research loads. Approximately 10 new full-time students will be admitted per school year. It is anticipated that the program will reach a steady enrollment of 15 to 20 students in the degree program in any given semester. Miami University is committed to ongoing funding for 8-10 graduate teaching assistantships that will develop over the next four to five years. The balance of the students may be supported by sponsored research.

Curriculum: The proposed program will be a 33 to 37 -credit hour, thesis-based program. Credits will be distributed among the following categories: computational core (12-16 credit hours), science or engineering courses (12 credit hours), and thesis and research seminars (9 credit hours). For the engineering concentrations, entering students will come from BS programs. Thus, students selected for the Computational Mechanics track will have degrees in Mechanical or Manufacturing Engineering; those in the Computer Systems Modeling and Simulation concentration will have BS degrees in Electrical or Computer Engineering. The bioinformatics concentration requires students with a computer science background.

Faculty, Facilities and Resources: The size of the proposed masters program will allow faculty members each to advise one or two students. The low graduate student-to-faculty ratio facilitates a research-based master's degree. The SEAS provides research start-up funds for new faculty. First-year tenure-track faculty members have a reduced teaching load. After the first year, faculty members actively engaged in research (the overwhelming majority of SEAS faculty) teach on average, two courses per semester. The School of Engineering and Applied Science took complete possession of new building facilities by year end, 2007. The new building provides 103,000 gross square feet, and a renovated building that connects to the new building provides 70,500 gross square feet. The facility provides 13,000 square feet for classroom, 27,000 square feet for laboratories, 6,300 square feet for graduate student offices and research, and 10,500 square feet for faculty offices.

Evidence of Need: Computational Science and engineering expertise is vital for the state and nation. In the State of Ohio, there is no master's degree that meets these needs, thus, the proposed program is unique in the state. The proposed master's degree program will capitalize upon existing master's programs in the areas of

computer science, mathematics and physics, and will leverage established doctoral programs in the sciences at Miami University to form a novel program that uniquely addresses an urgent need in Ohio for computational science and engineering – including high performance computing, large-scale simulation, and visualization.

End of Comment Period: August 7, 2008
No Comments Received, Recommend Approval

Approved	
	9/15/08
Eric D. Fingerhut, Chancellor	Date