

**MASTER OF SCIENCE IN****Applied Science****(EXAMPLE CONCENTRATION: BIOINFORMATICS AND COMPUTATIONAL BIOLOGY)**

This degree is for working professionals with traditional discipline-oriented backgrounds who want to increase their effectiveness in industry, government, and other interdisciplinary arenas. The goals are to expand students' technical expertise and assist them in crossing boundaries between disciplines. Course plans are strongly individualized to suit student needs and interests. Among the concentration options that students can design are: analytical and environmental chemistry, applied groundwater science, biochemistry/biophysics, bioinformatics, chemistry and entrepreneurship, database management systems, microelectronics manufacturing, optimization and statistics, scientific computation, polymer science and engineering, and software engineering.

One example concentration for the M.S. in Applied Science is Bioinformatics and Computational Biology. Dramatically expanding use of computer algorithms and computational models in biology and medicine has led to a greatly increased need for well-trained computational biologists. State of the art approaches that are used include statistical modeling, simulation, database development, sequence analysis, and image analysis. These tools are applied to cross-discipline problems in medicine, molecular biology, biochemistry, ecology, and physiology.

**ADMISSION REQUIREMENTS**

- Bachelor of Science degree from an accredited undergraduate institution
- Undergraduate GPA of 3.0 or higher
- Evidence of strong quantitative and problem-solving skills
- Grades of "B" or better in courses completed since bachelor's degree
- Completed application form
- Official transcripts for all undergraduate and graduate work
- Statement of background and goals as it applies to the program
- Draft Plan of Study, prepared in cooperation with a Program Adviser
- GRE General Test is preferred
- TOEFL required for international students
- Two letters of recommendation
- Resume

**GRADUATION REQUIREMENTS**

- Matriculated Status
- Approved Plan of Study
- At least 15 credits must be at the 6000 level
- At least 15 credits must be from the School of Science
- Minimum 3.0 GPA; minimum 30 credits

**PLAN OF STUDY—Sample Illustration****(30 credit hours)****I. Core Courses: Establish basis for advanced study in Concentration (6-12 credits)**

BIOL-6410	Bioinformatics I: Sequence Analysis
BIOL-6420	Bioinformatics II: Molecular Modeling
CSCI-4020	Computer Algorithms
MATP-4600	Probability Theory and Applications

**II. Specialization Courses: Fundamental to Concentration area (6-12 credits)**

CSCI-6210	Design and Analysis of Algorithms
CSCI-6390	Database Mining
DSES-6180	Knowledge Discovery with Data Mining
CHEM-6510	Computational Chemistry

**III. Elective Courses: Allow focus within Concentration and provide skills intersecting Concentration with other disciplines (6-18 credits)**

BIOL-6690	Advanced Molecular Biology
BCBP-6879	Protein Structure Determination
BIOL-6360	Microbial Genetics
BCBP-6780	Protein Folding
CHEM-6300	Medicinal Chemistry
CHEM-6330	Drug Discovery
CSCI-6460	Advanced Database Management Topics

**PARTICIPATING FACULTY (this concentration)****Biology:**

C. Bystroff, J. F. Koretz, R.E. Palazzo, S. Nierzwicki-Bauer

**Chemistry and Chemical Biology:**

C.M. Breneman, M. Wentland

**Computer Science:**

S. Akella, M. Magdon-Ismail, L. Newberg, B. Yener, B. Szymanski, M. J. Zaki

**Mathematical Sciences:**

K. Bennett, M. Zuker, P. Kramer, M. Holmes, D. Drew

**Physics:**

S. Nayak, A. Garcia

**Chemical and Biological Engineering:**

S. Garde, J. Dordrick

**Decision Sciences and Engineering Systems:**

M.J. Embrechts