DEPARTMENT OF BIOLOGICAL SCIENCES

103 Lennon Hall
(585) 395-2193

Chairman and Associate Professor: Rey Sia, PhD, Columbia University; Provost and Vice President for Academic Affairs and Professor: Anne Huot, PhD, University of Vermont; Vice Provost and Associate Professor: P. Michael Fox, PhD, University of Illinois-Urbana; Professors: Thomas Bonner, PhD, University of Cincinnati; Stuart Tsubota, PhD, University of California-Berkeley; Associate Professors: Craig Lending, PhD, University of Wisconsin-Madison; Adam Rich, PhD, SUNY at Stony Brook; Assistant Professors: Laurie Cook, PhD, University of Rochester; Huey Hing, PhD, Yale University; Michel Pelletier, PhD, Laval University, Canada.

The Master of Science in Biological Sciences provides students with a solid and comprehensive background in the field of biological sciences, including molecular biology, cell biology, physiology, genetics, microbiology, human biology and developmental biology. Upon completion of the program, students are prepared to enter a PhD program, medical or dental schools; work in academic, industrial or government research laboratories; or teach biologically related courses at the community college level or at the K-12 grade level (providing the student holds the appropriate New York state teaching certificate). The small class size, and close working relationships with the advisor and advisory committee are ideal for students seeking a rigorous graduate education in a small-college atmosphere. A limited number of graduate teaching and research assistantships are available.

At The College at Brockport, a Master of Science in Biological Sciences may be obtained under one of three plans (Plan I, Plan II, or PSM). Students must select a plan by the end of their first semester.

Plan I
A traditional program requiring a thesis based on original research. Students considering further graduate study or employment in government or private laboratories are encouraged to enroll in this plan.

Requirements:
A. A written thesis based on original investigation.
B. Thirty to 39 credits constituted as follows: at least 15 credits of courses at the 600 level or above, which may include a maximum of six credits for thesis research (BIO 704) and a maximum of six credits for independent study (BIO 699); and at least one credit of graduate seminar (BIO 692).
C. Detailed information on requirements and regulations governing comprehensive and thesis exams, etc., in the biological sciences are presented in the departmental Handbook for Graduate Students, available from the department secretary, Room 103, Lennon Hall.

Plan II
A non-thesis program designed primarily for individuals who are employed full time and desire a more flexible course of study than that of Plan I. This plan requires an independent research experience. Plan I students may not switch to Plan II; however, Plan II students may switch to Plan I.

Requirements:
A. A written report or other appropriate product based on independent research.
B. Thirty-four to 39 credits constituted as follows: at least 15 credits of courses at the 600 level or above, which may include a maximum of six credits for independent research (BIO 702) and a maximum of six credits for independent study (BIO 699); and at least one credit of graduate seminar (BIO 692).
C. Detailed information on requirements and regulations governing comprehensive and thesis exams, etc. in the biological sciences are presented in the departmental Handbook for Graduate Students available from the department secretary, Room 103, Lennon Hall.

Admission Requirements
The applicant should have completed a baccalaureate degree at an accredited institution, including 18 credits of biology (see the Graduate Admissions section in this catalog for further details). The student should have a background in the natural and physical sciences appropriate to his or her research interests, both in course work and laboratory skills.

Applicants admitted to the program may be required by their Advisory Committee to take courses at the undergraduate level to remove any deficiencies. These courses must be included in the Plan of Study, but they will not be credited towards the master’s degree. Such courses may be taken on a Pass/Fail basis with the consent of the instructor and the candidate’s Advisory Committee.

Professional Science Master’s (PSM) Plan
The curriculum for the PSM is similar to the Plan II Master’s in Biological Sciences. Like Plan II, the PSM is a non-thesis degree. It targets students who are interested in working in biotechnology, particular at the interface between the research scientists and management. The PSM is also an ideal degree for individuals who are currently working in industry but would like to advance their careers with this interdisciplinary degree. The major differences between the PSM and the Plan II Master’s are the inclusion of courses in management and business (the Plus Courses) and an internship in a science-based business, government or non-profit organization. The Plus Courses will feature business and management topics and analytical concepts that will provide students with the background necessary to interface with research scientists and upper management in scientific organizational settings. The internship is taken in the second year, after the student has completed the Plus Courses. The knowledge obtained in these courses will be applied in a real-life setting during the internship.

The admission requirements for the PSM are the same as those for the Plan I and Plan II programs with the exception that an introductory course in statistics is required. On a case-by-case basis, the faculty will allow this requirement to be fulfilled in the first semester of the program. In such cases the students would be offered conditional admission.

Requirements:
A. A written report and oral presentation based on the internship.
B. Thirty-four to 39 credits constituted as follows: at least 15 credits of BIO courses at the 600 level or above, which may include a maximum of six credits for independent study (BIO 699); and at least one credit of graduate seminar. Included in the BIO credits are 6 credits of BIO 702 (Internship).
C. Included in the 34 to 39 credits are 9 credits of Plus Courses listed below:
   PSI 601 Management and Communication for Math and Science Professionals
   PSI 602 Accounting and Finance for Math and Science Professionals
   PSI 603 Applied Quantitative Analysis for Math and Science Professionals
   Students should note that the Plus Courses will be taught during the Winter and Summer Sessions.
D. Detailed information on requirements and regulations governing comprehensive and thesis exams, etc. in biological sciences are presented in the departmental Handbook for Graduate Students available from the department secretary, Room 103, Lennon Hall.

A sample two-year curriculum follows.
PSM Plan in Biological Sciences

Note: At least 15 credits of the total 34-39 graduate credits must be at the 600-700 level.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIO 623</td>
<td>DNA Cloning Lab</td>
<td>3</td>
</tr>
<tr>
<td>BIO 635</td>
<td>Cell Culture and Biotechniques</td>
<td>3</td>
</tr>
<tr>
<td>BIO 692</td>
<td>Graduate Seminar</td>
<td>1</td>
</tr>
<tr>
<td>BIO 702</td>
<td>Independent Research Experience (Internship)</td>
<td>6</td>
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<tr>
<td>BIO 655</td>
<td>Principles of Drug Discovery</td>
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BIO 5XX 500-level electives by advisement       6-11

Plus Courses – 9 Credits

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<tr>
<th>Course</th>
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<tr>
<td>PSI 601</td>
<td>Management and Communications for Science Professionals</td>
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<tr>
<td>PSI 602</td>
<td>Accounting and Finance for Science Professionals</td>
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<tr>
<td>PSI 603</td>
<td>Applied Quantitative Analysis for Science Professionals</td>
<td>3</td>
</tr>
<tr>
<td>Total:</td>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>

BIO XXX Alternative graduate elective       3

This elective provides the student with some flexibility in choosing either a BIO course or a course outside of Biological Sciences that serves the goals of the student. This course must be approved by the candidate’s Advisory Committee and the Program Director.

Written report and oral presentation based on internship

Total Graduate Credits: 34-39

Admission Procedures

Applicants for graduate study must submit the following documents to the Office of Graduate Admissions:

1. A completed application form for graduate study as a matriculated student, i.e., as a degree candidate.
2. A written statement of the applicant’s objectives for graduate study and main area of interest within the biological sciences.
3. Transcript(s) of records of all undergraduate and graduate studies.
4. Two letters of recommendation from persons who have knowledge of the applicant’s training and aptitude for graduate study (letters from academic referees are preferred).
5. A writing sample illustrating the applicant’s technical writing skills, up to three pages long.
6. Graduate Record Examination scores on the General Test, the Biology Subject Test or the Biochemistry, Cell and Molecular Biology Subject Test are required. In lieu of the GRE, the MCAT or DAT also will be accepted at the discretion of the department. Information on the place and time of the Graduate Record Examination may be obtained from the Office of Graduate Admissions; from the Educational Testing Service, Box 955, Princeton, NJ 08540; or on the Web at www.gre.org.

The Admission Process and the Major Advisor

Admission to the MS in Biological Sciences program is dependent not only upon the candidate’s qualifications, but also on the willingness of a faculty member to act as the major advisor for the candidate. Therefore, it is important that applicants to the MS in Biological Sciences program contact potential advisors during the application process. Potential advisors should be faculty
members with research or teaching interests similar to the applicant’s. Applicants should list potential major advisors (including those faculty members they already have contacted) in a cover letter accompanying their application materials.

Visit the program’s Web site at www.brockport.edu/biology/faculty to find out more about the research interests and background of potential faculty advisors.

The Major Advisor
The graduate coordinator assigns a temporary advisor to the student to guide the selection of courses in the first semester. The student must select a faculty member to act as a permanent major advisor by the middle of the first semester. The candidate and major advisor request the assistance of two faculty members to constitute the candidate’s Advisory Committee to guide the student through the degree program. Upon completion of one academic year or its equivalent, the candidate’s progress is reviewed by the Advisory Committee.

Candidate’s Advisory Committee
It is the responsibility of the candidate’s Advisory Committee to:

1. Draw up a Plan of Study in cooperation with the candidate by the end of the first semester of matriculation;
2. Act in an advisory capacity concerning thesis research or the independent research experience;
3. Determine the content of, administer and evaluate the candidate’s oral comprehensive examination by the start of the third semester of matriculation;
4. Evaluate the candidate’s written thesis or product of the independent research experience and judge whether it satisfies the requirements for the degree. (Formal credit for thesis is awarded under BIO 704; formal credit for independent research experience is awarded under BIO 702);
5. Determine the content of, administer and evaluate the candidate’s defense of thesis (Plan I) or defense of report (Plan II);
6. Terminate the candidate’s graduate student status at The College at Brockport if the student does not meet the deadlines above or the required GPA.

Time Limit
Degree requirements should be completed within three years of the date of matriculation. With written approval of the Advisory Committee and the graduate coordinator, extensions of up to two years (i.e., five consecutive calendar years total in the program) may be granted.

Graduate Dismissal Policy
“Students who are deemed as not making progress toward the degree, as defined by published departmental policy, may be dismissed from the program.” (Faculty Senate Resolution #3, February 1992). The departmental Handbook for Graduate Studies available from the Department of Biological Sciences provides criteria for continuing in the biological sciences program. These criteria include:

1. Maintenance of 3.0 cumulative grade point average as specified in The College at Brockport’s graduate probation and dismissal policy.
2. Completion of a Plan of Study by the end of the first semester of matriculation.
3. Successful completion of an oral comprehensive exam by the start of the third semester of matriculation.
5. For the PSM degree, successful completion of the required and elective courses, a paper based on the internship and an oral presentation on the internship. Successful fulfillment of these requirements will be determined by the candidate’s Advisory Committee.
BIO 504 Developmental Biology (A). Provides a comprehensive one-semester survey of the currently burgeoning field. Includes historical approaches, seminal discoveries and contemporary areas of research. Covers the embryonic development of sea urchins, chicks, amphibians, and human, as well as the evolution of development. 4 Cr. Fall.

BIO 514 Immunology (A). Emphasizes immunology including the structure and functions of the immunoglobulins, role of cell-mediated immunity, protective role of the immune system, and disease and injury related to malfunctions of the immune system. 3 Cr.

BIO 515 Molecular Biology (A). Prerequisite: Instructor’s permission. Covers the biosynthesis and function of macromolecules, especially nucleic acids. Includes topics in regulation, molecular virology, transposition and transformation, as well as recombinant DNA methods. 3 Cr. Spring.

BIO 520 Mechanisms of Aging (A). Prerequisites: BIO 301 and BIO 302. Covers mechanisms of aging at the physiological, cellular and molecular levels. Discusses aging as a disease that can be treated and prevented. Uses studies of aging in model organisms to provide insights into mechanisms of human aging. Discusses the evolution of aging mechanisms. 3 Cr. Fall.

BIO 526 Recombinant DNA (A). Considers theory and techniques in the recombinant DNA field. Includes topics such as cloning vectors, restriction analysis, PCR methods, and expression of cloned genes in both prokaryotes and eukaryotes. Also considers examples and implications of recombinant DNA methodology in plants and agriculture, as well as in medicine, human genetics and disease. 3 Cr. Fall.

BIO 528 Microtechniques (A). Examines the theory and techniques of tissue preparation by paraffin and plastic sectioning, with an emphasis on the application of these techniques to a hospital pathology lab. Covers photomicrography, histochecmistry and immunocytochemistry. 3 Cr.

BIO 529 Electron Microscopy (A). Covers the theory of electron optics and skills of electron microscopy, and methods of specimen preparation and skills of ultramicrotomy. Strongly emphasizes lab work and stresses technique. 4 Cr.

BIO 543 Biotechniques III - Immunoassays (A). Covers principles of radioimmunoassays (RIA) and enzyme-ligand-sorbent immunoassays (ELISA). Provides hands-on learning of either/both methods and applying them to assay biological samples. Discusses accuracy, precision and variability and limitations of the procedures. Given second four weeks of the semester only, with eight three-hour laboratory sessions. 1 Cr.

BIO 555 Neuropysiology (A). Introduction to neuropysiology emphasizing cellular and molecular processes. Examines biophysical properties and mechanisms used by neurons to code, process, propagate and transmit information. Covers neuronal function at the qualitative and quantitative level. Requires students to quantify the effects of ionic gradients on the resting membrane potential of a neuron, describe its role in neuronal function, and relate this to general effects on the human nervous system. Covers current techniques, including electrophysiology and microscopy. 3 Cr. Even Spring.

BIO 566 General Endocrinology (A). Covers the relationship between the molecular structure of a hormone and its ability to regulate growth, metabolic and reproductive processes; mechanisms of action at cell and molecular levels; various endocrine diseases. 3 Cr. Spring.

BIO 567 Biochemistry I (A). Covers proteins, lipids, carbohydrates, nucleic acids and other biomolecules with an emphasis on buffers, structures, experimental methods, main energy production pathways and biosynthesis. Requires application of concepts and information to experimental data and deduction of structures, functional roles and mechanisms. 3 Cr. Fall.

BIO 568 Biochemistry II (A). Emphasizes topics such as metabolic pathways, human nutrition, chromosomes and genes, protein biosynthesis, cell walls, immunoglobulins, muscle contraction, cell motility, membrane transport, and excitable membranes and sensory systems. Investigates the experimental evidence for the structure and functions of biomolecules. 3 Cr. Spring.

BIO 570 Biochemistry Lab (A). Course fee. Covers biochemical analyses, including preparation, separations and characterization of products from a variety of biological sources. Provides experiments with enzymes and experiments designed to measure inherent changes in the dynamics of living systems. 1 Cr. Fall.

BIO 575 Cancer Biology (A). Focuses on the biology of cancer commencing with an epidemiological overview of the major human cancers, followed
by a discussion of the major causes, progression, identification, prevention and treatments of those cancers. Emphasizes the molecular mechanisms behind the development of cancer, as well as those being targeted for pharmacological treatments. Includes a discussion of the latest medical advances. 3 Cr.

**BIO 580 Genomes and Proteomes in Biomedicine (A).** Provides a comprehensive look at how the Human Genome Project was organized and completed and how this monumental event has changed how we approach biomedical issues. Topics include how genomes evolved, genomic variation, DNA microarrays and related technologies, proteomics and understanding diseases, ethical considerations and the role of bioinformatics in biology today. Two one-hour lectures, and one one-hour computer lab per week. 3 Cr.

**BIO 589 Neurobiology: Memory, Self and the Brain (A).** Fosters the understanding that the brain is the basis of our thoughts, feelings, actions and sense of ourselves. Advances the idea that brain development and synapse formation play a major role in defining who we are. 3 Cr. Spring.

**BIO 595 Topics in Biology (A).** To be defined by the instructor in accordance with the specific topic to be covered each semester. Additional information may be obtained from the department office. May be repeated under a different title. 1-4 Cr.

**BIO 618 Experimental Endocrinology (A).** A lab course to accompany the lecture series on general endocrinology. Includes techniques such as surgery, biochemical analyses and physiological experiments to study hormone receptor interactions. Also includes library research of current literature. 3 Cr.

**BIO 622 Biology Seminar (A).** Through discussion, deals with recent advances in selected areas of biology based on current literature and guest speakers. May be repeated for up to four credits toward the MS under different subtitles. Approved subtitles include: cellular biology ecology and evolutionary biology; genetics and molecular biology; biotechnology; plant sciences; and aquatic biology. 2 Cr.

**BIO 623 DNA Cloning Laboratory (A).** Explores procedures involved in the isolation and cloning of DNA. Utilizes methods such as bacterial and viral growth, quantitation and selection; restriction digestions; gene isolation and cloning; DNA ligation and PCR experiments; as well as site-specific mutagenesis. Also utilizes DNA fingerprinting using non-radioactive detection techniques. 3 Cr. Fall.

**BIO 635 Cell Culture and Biotechniques Laboratory (A).** Provides independent, hands-on experience in cell biology techniques, including tissue culture, fluorescence microscopy, Western blots, DNA isolation and transfection, immunoprecipitation and signaling assays. Requires that students utilize these techniques, while embarking on an independent research project. Emphasizes experimental design and the inclusion of controls. 3 Cr. Two 3-hour labs per week. 3 Cr. Fall.

**BIO 655 Drug Development.** Drug development requires collaboration between biologists and chemists, as well as marketing and business professionals. Careers in the pharmaceutical industry require excellent communication skills and teamwork. Students develop an understanding of drug development from the perspective of biologists, chemists, and marketing, beginning with the selection of a suitable drug target for treatment of a specific disease. Covers examples from industry and allows students to work together to identify a drug target and to produce a drug development plan for a hypothetical company. 3 Cr.

**BIO 692 Graduate Seminar (A).** Required of all graduate students. Provides training in public speaking. Requires each student to present a seminar on some mutually agreeable topic in science that is critiqued for scientific content, style of presentation, quality of visual aids, impact on the audience, etc. 1 Cr. Every Semester.

**BIO 695 Topics in Biology (A).** Current topics to be arranged by instructor in a special field of study. Details reflect student demand, needs and timely topics of interest. 1-3 Cr.

**BIO 699 Independent Study (A).** Designed individually through consultation between student and instructor to suit the student’s needs and interests and the special competence of the instructor. Additional requirements may be imposed by the department. 1-6 Cr.

**BIO 702 Independent Research Experience (A).** Requires an independent research experience, but permits a more flexible course of study than does a traditional thesis program. Designed for Plan II of the MS program with teachers, medical technologists, lab technicians and other employed persons in mind. 1-6 Cr. Every Semester.

**BIO 704 Thesis (A).** Provides for an individual investigation of an original problem to be submitted in a format acceptable to satisfy the requirements for the master’s thesis as determined by department rules and regulations. 1-6 Cr. Every Semester.
PSI 601 Management and Communication for Math and Science Professionals. Develops key management and communications skills in professional science masters students which are essential for future development as practicing science and engineering professionals who have not been exposed to these in undergraduate programs. Includes development of skills in decision-making, leadership, group dynamics, and coverage of salient issues in power and politics, organizational culture and organizational development. Also covers project management applications and stresses professional communication. 3 Cr.

PSI 602 Accounting and Finance for Math and Science Professionals (B). Covers key concepts in accounting and finance and develops associated analytical skills for professional science masters students who have not been exposed to these in their undergraduate programs. Topics include analysis of financial statements, ration analysis, financial forecasting and planning, operational and capital budgeting, cost-volume-profit analyses and risk and return concepts. Students are also familiarized with online and commercially available sources of financial data and required to conduct financial analyses using Microsoft Excel. 3 Cr. Every summer

PSI 603 Applied Quantitative Analysis for Math and Science Professionals (B). Reinforces and builds on understanding of key concepts in statistics and operations research for professional science masters students who have taken only a single statistics course at the undergraduate level. Topics include review of data types and distributions, classification and presentation, descriptive statistics and correlations, design of experiments and surveys, hypothesis testing, ANOVA, goodness of fit, applied regression analysis, quality control statistics, selected topics in queuing theory and mathematical programming. Course utilizes integrative case studies and the use of Excel and commercial statistical packages (e.g. Minitab) for data analyses. 3 Cr. Every summer

DEPARTMENT OF BUSINESS ADMINISTRATION AND ECONOMICS

119 Hartwell Hall
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www.brockport.edu/bus-econ/

Chair and Associate Professor John Keiser, PhD, University of Illinois-Urbana Champaign; Associate Chair and Associate Professor: Jerald Weaver, PhD, Florida State University; Professors: James Cordeiro, PhD, SUNY Buffalo; John Gardner, PhD, The Ohio State University; Baban Hasnat, PhD, The University of Tennessee-Knoxville; Sandeep Singh, CFA, PhD, Kent State University; Susan Stites-Doe, PhD, SUNY Buffalo; Jeff Strieter, PhD, Syracuse University; Associate Professors: Steve Breslawski, PhD, SUNY Buffalo; Tom Cone, PhD, Pennsylvania State University-University Park; D. Donald Kent, PhD, Graduate Management Institute, Union College; Jane B. Romal, CPA, CMA, DBA, Cleveland State University; Melissa L. Waite, PhD, SUNY Buffalo; Assistant Professors: Lerong He, PhD, University of Pennsylvania, The Wharton School; M. Pamela Neely, PhD, SUNY Albany; Kyongsei Sohn, PhD, The George Washington University; Manish Tewari, PhD, University of Central Florida; Mark Vrobefski, PhD, SUNY Buffalo; Rong Yang, PhD, The State University of New Jersey-Rutgers; Michael Ziolkowski, PhD, SUNY Buffalo; Instructors: Timothy C. Hungerford, CPA, CFÉ, CIA, MBA, Rochester Institute of Technology; Kevin P Scully, EdD, Columbia University; Jacqueline Slifkin, JD, University of Pittsburgh School of Law; Anne VanGraafeiland, JD, Boston College Law School.

Graduate Programs in Accounting

The purpose of the graduate programs in accounting is to serve the mission of student success, educating qualified students and preparing graduates to serve the business community and the public trust. The programs provide qualified students with the opportunity to pursue licensure as a New York Certified Public Accountant. Depending on the program selected, students may be interested in pursuing other available certifications as well.