

# MASTER OF SCIENCE (M.S.)

The M.S. Degree Program in the Department of Cell Systems & Anatomy (hereinafter referred to as the Program) offers training in areas of anatomical sciences and biotechnology. The curriculum prepares students seeking a Master of Science degree for a fulfilling biomedical career, in academic, industrial or clinical settings. The overall mission of the Program is to prepare the next generation of life-long learners and critical thinkers, prepared to design and execute innovative basic and translational research, and to address the most important and challenging knowledge gaps in basic biology, human health and disease. There are two parallel tracks in the Program, Anatomical Sciences and Biotechnology, with some overlapping requirements but distinct curricula. The program of graduate study (i.e. the track elected) leading to the Master's Degree will depend upon the student and the professional career for which the student is preparing. A Committee on Graduate Studies (COGS) oversees all aspects of the Program.

## Cell Systems & Anatomy Admission Requirements

Students beginning graduate study ordinarily matriculate during the fall semester, which starts mid-August. Spring semester admission (January start date) will not be considered except in very unusual circumstances.

The following are the basic admission criteria to the Program. On a case-by-case basis and at the discretion of the M.S. Admissions Committee and with approval of COGS and the Graduate Faculty Council (GFC), one or more admission requirement(s) may be waived.

Applicants are required to have a minimum of a Bachelor's degree in a Life Science or Biomedical Engineering from an accredited institution and a minimum GPA of 3.0/4.0. Applicants should have received credit for courses taken in:

- Biology 1- A minimum of 2 years of general biology with labs for science majors.
- Chemistry 1- A minimum of 1 year general chemistry and organic chemistry
- Physics- A minimum of 1 year of general physics
- Mathematics- minimum of 1 semester of calculus

1 course should include laboratory experience

All applicants must take the Graduate Record Examination (GRE). The GRE must be taken within the last 5 years and the TOEFL / IELTS, if required, within the last 2 years.

A personal statement is required.

In addition to the GRE, international applicants are also required to take one of two English proficiency tests: Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS: Academic module only). The minimum required scores for the TOEFL are 550 for the paper test and 68 for the internet test. The minimum score on the academic International English Language Testing System (IELTS) is 6.5.

Three letters of recommendation are required.

The admission committee uses a holistic approach in making its decision. Consideration is given to a candidate's research experience, grade point average, personal statement, GRE score, interviews, letters

of recommendations, and to how they match up against other interested applicants.

## Cell Systems & Anatomy Degree Requirements

All students require a minimum of 30 semester credit hours (SCH) and a minimum overall GPA of 3.0 to graduate with a M.S. degree. See Academic Plans of Study - Anatomical Sciences and Biotechnology for details of required and elective coursework. In addition, all master's candidates must register for Thesis for at least one semester in order to graduate. Students in the Anatomical Sciences track register for "Anatomical Sciences Thesis/CSAT 6060" and students in the Biotechnology track register for "Thesis" CSAT 6098. All students must successfully defend their thesis and be recommended by the program COGS for approval of their degree to the Dean of the Graduate School of Biomedical Sciences.

A student must maintain an overall cumulative grade point average (GPA) of  $\geq 3.0$  ("B" average) each semester to continue in good academic standing. Student should receive a "B" or better in their core courses. If a student receives a grade that is worse than a "B" in core courses, or a grade that is worse than a "C" in one of the courses, or a final grade of a "C" in more than one course in the curriculum, he/she shall be dismissed from the program unless an appeal from the student is approved by COGS. If the cumulative GPA drops below 3.0, the student shall be placed on academic probation. While on probation, a student must maintain a "B" average in all courses in which he/she is enrolled. If the GPA drops below 3.0 in any semester during the probationary period or remains below 3.0 for one calendar year, the student shall be dismissed from the program unless an appeal from the student is approved by COGS. If remediation of a course is agreed upon by a course director and COGS, the director(s) of a required course will determine the mechanism for remediation. However, course directors are not required to remediate students. Situations that involve potential remediation will be resolved on a case by case basis. A student who is not required to remediate a required course may not engage in the remediation process with the intent of improving his/her original grade. This policy will be reviewed annually.

## Anatomical Sciences Track

### First Year

Fall		Credit Hours
TSCI 5070	Responsible Conduct of Research	2
INTD 5047	Neuroanatomy	2
CSAT 5060	Advanced Histology	2
CSAT 5074	Introduction to Research	0.5
CSAT 5030	Basic Histology	1
CSAT 6060	Anatomical Sciences Thesis	1.5
Total Credit Hours:		9.0

### First Year

Spring		Credit Hours
CSAT 5022	Inter-professional Human Gross Anatomy	5.5
CSAT 6060	Anatomical Sciences Thesis	1.5

CSAT 6100	Anatomy Practicum (Anatomy Practicum)	1.5
Total Credit Hours:		8.5

**Second Year**

<b>Fall</b>		<b>Credit Hours</b>
CSAT 6071	Supervised Teaching	1-12
CSAT 6072	Presentation Skills	0.5
CSAT 6060	Anatomical Sciences Thesis	3.5 or 7.5
Total Credit Hours:		5.0-20.0

**Second Year**

<b>Spring</b>		<b>Credit Hours</b>
CSAT 6060	Anatomical Sciences Thesis	4
CSAT 6071	Supervised Teaching	1-12
CSAT 6072	Presentation Skills	0.5
Total Credit Hours:		5.5-16.5

**Biotechnology Track****First Year**

<b>Fall</b>		<b>Credit Hours</b>
TSCI 5070	Responsible Conduct of Research	2
CSAT 6077	Eucaryotic Cell Biology	2
CSAT 6076	Eucaryotic Molecular Biology	2
CSAT 6096	Research Rotations	3
CSAT 5007	Methods In Cell Biology	1
CSAT 5074	Introduction to Research	0.5
Total Credit Hours:		10.5

**First Year**

<b>Spring</b>		<b>Credit Hours</b>
CSAT 6097	Research	5
CSAT 5095	Experimental Design And Data Analysis	3
Total Credit Hours:		8.0

**Second Year**

<b>Fall</b>		<b>Credit Hours</b>
CSAT 6097	Research	7.5
CSAT 6072	Presentation Skills	0.5
Total Credit Hours:		8.0

**Second Year**

<b>Spring</b>		<b>Credit Hours</b>
CSAT 6098	Thesis	3
CSAT 6072	Presentation Skills	0.5
Total Credit Hours:		3.5

**Cell Systems & Anatomy Objectives/Program Outcomes****Anatomical Science Track**

Students will have the ability to review, interpret and critically evaluate scientific literature related to areas of biomedical science relevant to the anatomical sciences in general and specifically to their project. Students will be trained to review and interpret original scientific literature through coursework and in their examination of the literature.

Students will have the ability to communicate effectively in written and verbal presentations. Students will learn to effectively communicate ideas in written format via coursework, examinations and their research and to communicate ideas/concepts in verbal presentations during progress report seminars, research advisory committee meetings, oral examinations/thesis defenses, and participation in scientific meetings.

Students will demonstrate foundational knowledge and expertise in a select area appropriate to the project. Students will be able to define, explain, and apply key concepts and fundamental principles related to the areas of anatomical science.

Students will demonstrate fundamental knowledge of ethics in biomedical research. Students will be able to recognize ethical dilemmas and behave in accordance with ethical standards of conduct in the design, implementation, analysis, and dissemination of scientific research.

Students will have the ability to teach human anatomy in the health professions environment. Students will be able to teach human gross anatomy, histology and/or neuroanatomy at the graduate level.

**Biotechnology Track**

Students will have the ability to review, interpret and critically evaluate scientific literature related to areas of biomedical sciences, relevant to cellular and molecular biology in general and specifically to their project. Students will be trained to review and interpret original scientific literature through coursework and in their research.

Students will have the ability to conduct original biomedical research. Students in the program will be able to analyze, plan, organize, and conduct high quality biomedical research under the direction of supervising professors and guidance of research advisory (thesis) committees as appropriate.

Students will have the ability to communicate effectively in written and verbal presentations. Students will learn to effectively communicate ideas in written format via coursework, examinations and their research and to communicate ideas/concepts in verbal presentations during progress report seminars, research advisory committee meetings, oral examinations/thesis defenses, and participation in scientific meetings.

Students will demonstrate foundational knowledge and expertise in a select area appropriate to the research project. Students will be able to define, explain, and apply key concepts and fundamental principles related to the areas of biomedical science relevant to their track and to their specific research projects.

Students will demonstrate fundamental knowledge of ethics in biomedical research. Students will be able to recognize ethical dilemmas and behave in accordance with ethical standards of conduct in the design, implementation, analysis, and dissemination of scientific research.

## **Courses**

### **CSBL 3005. Advanced Anatomy. Credit Hours.**

Selected students will participate in lectures, detailed dissections, presentations, and teaching of Pre-Matriculation students in the gross anatomy laboratory. A special project or readings in the surgical anatomy literature will be assigned. This elective is considered to be a full-time commitment (40 hours per week). Students are expected to 1) attend all lectures given in the Pre-Matriculation program, 2) to teach in all scheduled laboratory sessions, 3) to prepare and present prosections, 4) to help prepare a laboratory examination, 5) to write and present a literature review on an original topic of interest to the student related to the region of the body being studied.