University at Buffalo
Graduate Studies Manual
Policies and Procedures for Graduate Students and Advisors

Academic Year 2018-2019 Graduate Studies Committee

Dr. Panagiotis Anastasopoulos Director
Dr. Satish Mohan Director of Graduate Studies
Dr. Nallan C. Suresh Associate Director,
School of Management
Dr. Lu Su Assistant Professor,
Computer Science & Engineering
Dr. Jee Eun Kang Assistant Professor
Industrial and Systems Engineering
Ms. Kaeleigh Peri Graduate Coordinator

Office: 117 Bell Hall
Department Email: istlgrad@buffalo.edu
Website: buffalo.edu/istl.html
Preface

The policies and procedures summarized in this manual are applicable to all graduate students in the Stephen Still Institute for Sustainable Transportation and Logistics Master of Science program (SSISTL), effective August 1, 2018. Exceptions to these policies and procedures must be approved by the SSISTL Director or Director of Graduate Studies. The graduate studies committee reserves the right to modify the procedures and requirements described herein. Unless otherwise noted, policy changes will not apply retroactively to students who matriculated into the Master of Science in Sustainable Transportation and Logistics (STL) degree program to the effective date of this manual.

In accordance with federal and state laws, no person in whatever relationship with the State University of New York at Buffalo shall be subject to discrimination on the basis of age, religion or creed, color, disability, national origin, race, ethnicity, sex or sexual orientation, martial or veteran status.

October 2018
# Table of Contents

Chapter 1: General Information .................................................................4  
  1.1 Introduction .................................................................................4  
  1.2 Petition .......................................................................................4  
  1.3 Orientation and Initial Advisement ..............................................4  
  1.4 Advisors .....................................................................................4  
Chapter 2: Admissions Requirements .......................................................5  
  2.1 Overview .....................................................................................5  
  2.2 How to apply................................................................................5-6  
    2.2.1 Application Components ......................................................6  
  2.3 Exceptions ..................................................................................6  
Chapter 3: Degree Requirements ..............................................................7  
  3.1 Overview of program .................................................................7  
  3.2 Course Outline ..........................................................................7-8  
  3.3 Culminating Experience ..............................................................8  
    3.3.1 Comprehensive exam ..........................................................9  
    3.3.2 Master’s Thesis ...................................................................9  
    3.3.3 Master’s Project ................................................................10  
    3.3.4 Advisors Information for Thesis/Project ..............................10  
    3.3.5 Master’s Project vs. Thesis ...............................................10  
  3.4 Master’s Thesis General Requirements .........................................11  
  3.5 The Graduate School Requirements for Master’s Thesis ..............11  
    3.5.1. Master’s Thesis Copywriting ..........................................11  
    3.5.2 Master’s Thesis Formatting Requirements .......................12  
  3.6 Program Milestones ...................................................................12  
    Table 3.6 .....................................................................................13  
Chapter 4: Graduation Requirements .........................................................14  
  4.1 Master’s Requirements Overview ...............................................14  
  4.2 Master’s Graduation Checklist ....................................................14  
  4.3 Application to Graduate ...............................................................15  
    4.3.1. Petition to Change Graduation Conferral Date ...............15  
  4.4 Degree Time Limits ...................................................................15  
Chapter 5: Academic Standards .................................................................16  
  5.1 Grading Policy ..........................................................................16  
  5.2 Scholastic Standing ....................................................................16  
  5.3 Review of Academic Progress ....................................................16  
  5.4 Probation ....................................................................................16-17  
  5.5 Academic Dismissal and Transcripts ............................................17  
    5.5.1 Reinstatement ....................................................................17
5.6 Academic Integrity ........................................................................................................ 17-18
  5.6.1. Examples of Academic Dishonesty ................................................................. 18
5.7 Certification of Full-Time Status .............................................................................. 18
5.8 Continuous Registration ......................................................................................... 19
5.9 Leave of Absence ..................................................................................................... 19
5.10 Transfer of Credits ................................................................................................. 19
  5.10.1 Transfer Credit Process .................................................................................... 19
5.11 Informal Courses .................................................................................................... 20
5.12 Undergraduate Courses for Graduate Credit ......................................................... 20
5.13 Inapplicable Credits .............................................................................................. 21
5.14 Resigning From a Course ....................................................................................... 21
5.15 Repeating Courses ................................................................................................. 21
5.16 Non-matriculated Studies ....................................................................................... 21-22
Appendix .......................................................................................................................... 23
  Forms .............................................................................................................................. 24-26
  STL Student Plan of Study ......................................................................................... 24
  Project Proposal ........................................................................................................... 25
  Thesis Proposal ........................................................................................................... 26
  Independent Study ....................................................................................................... 27-28
  Useful Links/Resources for Graduate Students ......................................................... 29
  Course Outline and Class Descriptions ................................................................. 30-38
Chapter 1: General Information

1.1 Introduction
This manual is designed to be a general reference for affiliated faculty associated with, and/or students pursuing a Master of Science in Sustainable Transportation and Logistics (hereby referred to as STL). Included are policies and procedures as set forth by the Stephen Still Institute for Sustainable Transportation and Logistics (SSI STL), as well as the School of Engineering and Applied Sciences (SEAS), and the Graduate School of the University of Buffalo.

1.2 Petitions
Should a student need special consideration in regards to any of the policies or procedures outlined in this handbook, they may submit a petition in writing to the Director of Graduate Studies for review.

1.3 Orientation, Initial Advisement and Course Registration
Students should be familiar with the Graduate Coordinator’s Office for the STL program, located in 117 Bell Hall. The Graduate Coordinator is the central resource for all administrative issues related to graduate studies.

For initial registration, students should refer to the course curricula and be aware of what classes are offered in fall/spring only, particularly the core classes. The preliminary advisor or graduate coordinator can assist students with course selection and/or registration questions.

International students, particularly those registering for the first time, should be familiar with the International Student Services (ISS) office, located in Talbert Hall room 210. This office provides assistance on housing and immigration and visa status. ISS also hosts a separate orientation for International students, which is mandatory to attend. Students will have a hold on their student account until they check in with the ISS office at orientation. If an incoming student cannot attend orientation, ISS will send out additional check-in times, but students will not be able to register until this is completed.

The School of Engineering and Applied Sciences also hosts an orientation for all incoming graduate students the week prior to the fall semester, and program-specific orientations will be offered as needed. All incoming students must attend the STL program orientation, which provides a general overview of the policies and procedures related to graduate study in the STL program.

1.4 Faculty Advisors
At the time of acceptance, students are assigned a preliminary advisor. Students should seek a major faculty advisor no later than the end of the first semester, based on their intended concentration of study and interest in culminating experience- all course option, 3-credit hour project or 6-credit hour thesis.
Chapter 2: Admissions

2.1 Overview
The program requires a Bachelor’s degree in either engineering, business administration, or a relevant degree including a minimum of 15 credit hours of mathematics and/or economics, and at least one calculus course.

An admissions committee, consisting of faculty members from the founding departments of the Stephen Still Institute (namely Civil, Structural and Environmental Engineering; Industrial and Systems Engineering; Computer Science and Engineering and Operations Management and Strategy) will make all admissions decisions.

Applications for admission are evaluated by the committee on the basis of criteria reflecting academic quality and probable success in advanced study. These criteria are:

- Undergraduate grades:
  - A minimum cumulative undergraduate grade-point-average (GPA) of 2.8 on a United States 4.0 scale
- GRE scores (optional):
  - A minimum quantitative score in at least the 65th percentile
- Two letters of recommendation
  - From instructors who have taught the student; professional sources (supervisors at work, etc.) are also acceptable
- Personal Statement
  - A statement outlining past accomplishments, professional objectives, special interests, and educational plans

The Graduate School at the University at Buffalo also require that students who are not native English speakers must demonstrate English proficiency. Applicant must take the Test of English as a Foreign Language (TOEFL), Pearson Test of English (PTE), or the International English Language Testing System (IELTS) within 2 years prior to the proposed admission date to UB. The State University of New York at Buffalo has a minimum TOEFL score requirement of 550 (paper-based) or 79 (internet-based). On IELTS, UB requires an overall score of 6.5 with no band score below 6.0. On PTE Academic, the university minimum score is 55, with no subsection score below 50.

Applicants can review this requirement under the English Language Proficiency Requirement web page.

2.2 How to Apply
Admission to the STL graduate program will be done online via the Interactive Graduate Admissions site that has been established at UB (www.gradmit.buffalo.edu). Students
should choose their intended concentration and fill out all of the supporting questions and upload required documentation.

No physical documents should be sent to our office. Everything should be sent electronically and uploaded via GrAdMIT.

### 2.2.1 Components
Using the GrAdMIT website, every applicant must submit the following:
- Completed application on the website, filling out all required fields
- Email address for two (2) individuals who will provide letters of recommendation
- Resume/Curricula Vitae
- Personal Statement
- GRE scores (optional)
- English language proficiency scores (if applicable)
- Scanned copies of academic transcripts from undergraduate and graduate (if applicable) students - English translation is required
- Pay $85 application fee

Applicants may start and return to the application at any time, you do not need to submit all components at once. However, an application will not be reviewed until you have formally submitted it, the application fee has been paid, and all supplemental materials have been received.

### 2.3 Exceptions to Admission Requirements
The committee will be responsible for evaluating the applicant’s background and credentials, and deciding whether an exception is to be granted and the grounds upon which such an exception can be granted.
Chapter 3: Degree Requirements

3.1 Overview of Program
The M.S. program in Sustainable Transportation & Logistics is a 30-credit program that can be completed in 1-2 years on a full- or part-time basis. The average length to complete the degree is 1.5 years over the course of 3 semesters (12 credits for the first two semesters, 6 credits in the last). The curriculum consists of five courses that are designed to provide a common platform of relevant engineering principles & practices, coupled with managerial concepts and practices. Additionally, candidates will complete 15 credit hours in one of the following two tracks: (1) Sustainable Transportation; or (2) Logistics.

The objective of the program is to train globally competitive graduates who are well rounded technically and managerially, and who intend to assume leadership positions in transportation and logistics. A basic thrust of the program is sustainability, both from environmental and economical viewpoints.

3.2 Course Outline
The program consists of five core courses and 5 elective classes. Students will declare a concentration in either transportation or logistics. Student will choose their electives backed on their intended concentration, but may get approval from the Director of Graduate Studies if they wish to take an elective from outside of their concentration. General electives can be counted toward either concentration without direct approval. Course descriptions are included in the Appendix. The list of elective courses are not exhaustive and additional courses can be added over time. The graduate coordinator will email students with new course offerings that can be taken to satisfy degree requirements. Students should check their UB email each semester for this information. If there is a course not on the list that the student would like to take as an elective, s/he should ask the Director of Graduate Studies for approval.

<table>
<thead>
<tr>
<th>Core Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>STL 501 (MGO 638) Logistics &amp; Distribution Management</td>
</tr>
<tr>
<td>STL 502 (IE 550) Optimization and Resource Planning</td>
</tr>
<tr>
<td>STL 503 (MG0 636) Supply Chain Design, Modeling &amp; Optimization</td>
</tr>
<tr>
<td>STL 504 (CIE 573) Transportation Analytics</td>
</tr>
<tr>
<td>STL 505 (CIE 539) Transportation Systems Modeling Fundamentals</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>General Electives</th>
</tr>
</thead>
<tbody>
<tr>
<td>IE 678: Urban Operations Research (Spring Class)</td>
</tr>
<tr>
<td>CSE 503 Computer Science for Non-Majors I (Fall Class)</td>
</tr>
<tr>
<td>CSE 504 Computer Science for Non-Majors II (Fall Class)</td>
</tr>
<tr>
<td>CSE 601 Data Mining and Bioinformatics (Fall Class)</td>
</tr>
<tr>
<td>STL 500 Special Topics</td>
</tr>
</tbody>
</table>
### Logistics Electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGO 604</td>
<td>Financial Analysis and Reporting</td>
</tr>
<tr>
<td>MGO 615</td>
<td>Econometric Methods and Managerial Applications I</td>
</tr>
<tr>
<td>MGO 616</td>
<td>Econometric Methods and Managerial Applications II</td>
</tr>
<tr>
<td>MGO 617</td>
<td>Service Operations, Healthcare and Reverse Logistics</td>
</tr>
<tr>
<td>MGO 633</td>
<td>Supply Chains and Global Operations</td>
</tr>
<tr>
<td>MGO 631</td>
<td>Production and Inventory Management</td>
</tr>
<tr>
<td>MGO 637</td>
<td>Purchasing and Global Supply Management</td>
</tr>
<tr>
<td>IE 572</td>
<td>Linear Programming</td>
</tr>
<tr>
<td>IE 675</td>
<td>Game Theory</td>
</tr>
</tbody>
</table>

### Transportation Electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIE 500</td>
<td>Highway Geometric Design</td>
</tr>
<tr>
<td>CIE 536</td>
<td>Traffic Operations and Design</td>
</tr>
<tr>
<td>CIE 537</td>
<td>Traffic Flow Theory</td>
</tr>
<tr>
<td>CIE 538</td>
<td>Discrete Choice Modeling</td>
</tr>
<tr>
<td>CIE 631</td>
<td>Transportation Network Analysis</td>
</tr>
<tr>
<td>CIE 632</td>
<td>Transportation Systems Management and Culture</td>
</tr>
<tr>
<td>IE 573</td>
<td>Discrete Optimization</td>
</tr>
<tr>
<td>IE 575</td>
<td>Stochastic Methods</td>
</tr>
<tr>
<td>IE 603</td>
<td>Location Theory</td>
</tr>
<tr>
<td>IE 662</td>
<td>Queuing Theory</td>
</tr>
<tr>
<td>IE 677</td>
<td>Network Optimization</td>
</tr>
</tbody>
</table>

Courses not on the outline must be approved by the Director of Graduate Studies and major advisor in order to count towards degree requirements, and a written approval must be given to the Graduate Coordinator in order to override degree requirements in HUB. The written approval should come in the form of an email.

### 3.3 Culminating Experience

As part of each Master’s program of study, there is a culminating ("capstone") experience that ranges from a comprehensive exam to an M.S. thesis. Although the all-course option, which requires 30 credit hours of coursework and a comprehensive exam, is the recommended path for most Masters’ students, a student, with approval of his/her major advisor, has the opportunity to choose a thesis or project as the culminating experience. The culminating experience will determine the number of electives the student must take in their course plan. The Thesis will replace 2 elective courses and the project will replace 1 elective course, as shown on the following table:
<table>
<thead>
<tr>
<th>Option</th>
<th>Minimum Credits of Approved Coursework</th>
<th>Minimum Electives Needed</th>
<th>Culminating Experience</th>
<th>Minimum Time to Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>All-Course</td>
<td>30</td>
<td>15 Credits (5 courses)</td>
<td>Comprehensive Exam</td>
<td>2-3 semesters</td>
</tr>
<tr>
<td>Project</td>
<td>27</td>
<td>12 credits (4 course)</td>
<td>3- or 6- credit project</td>
<td>3 semesters</td>
</tr>
<tr>
<td>Thesis</td>
<td>24</td>
<td>9 credits (3 courses)</td>
<td>6- credit M.S. thesis and defense</td>
<td>3 semesters</td>
</tr>
</tbody>
</table>

### 3.3.1 Comprehensive Examination
Upon completion of 30 credit hours of course work, each student enrolled in the all-coursework option must pass a comprehensive (C-exam), which will be scheduled during the semester final examinations. The comprehensive examination is designed to evaluate the student’s mastery of his/her program of study and his/her ability to integrate knowledge acquired through his/her program. The comprehensive examination date will be determined by the Director of Graduate Studies. The examination will primarily focus on content from the core curriculum and will be a written exam.

### 3.3.2 Thesis
The M.S. thesis must be successfully defended before the student’s M.S. Thesis committee. The M.S. thesis committee is chaired by the student’s major advisor and includes at least one additional graduate faculty member from the core or affiliated faculty of SSISTL. The student’s major advisor will help to form the committee. Prior to the M.S. thesis defense, the student in consultation with his/her advisor will prepare a first draft of the thesis. The student’s committee members will have one week to review the document and decide whether revisions are required or if the defense can be scheduled. If revisions are necessary, additional time will be given for revisions. The thesis must include a cover page listing the student’s advisor and committee members, along with spaces for their signatures. Once the thesis is ready for defense, the student should contact the graduate coordinator to send out a general announcement, which must be posted at least one week prior to the defense.

The defense consists of an oral presentation open to the public of about 30-45 minutes in length, with an additional 10 to 15 minutes for questions. Immediately after the open session, the defense will continue with the student’s thesis committee only. After the defense, the committee will determine whether the student has successfully defended the thesis or whether additional work is required. After successfully completing the thesis defense, the student and committee must sign an M-Form approving the thesis. The graduate coordinator will assist with this form and acquiring signatures, and send to the Graduate School. Further, the candidate must submit to the Graduate School an electronic copy of the thesis as described at [http://grad.buffalo.edu/study/graduate/etd.html](http://grad.buffalo.edu/study/graduate/etd.html).

**Note:** Please be advised of Electronic Thesis & Dissertation (ETD) Submission based on intended degree conferral.
3.3.3 Master’s Project
The Master’s Projects provides students with the opportunity to work on an applied problem in their field of study, without an extensive research component. The project can be 3- or 6- credits and is typically completed during the final semester. For all M.S. projects, a report shall be submitted to the student’s project advisor, who has sole responsibility for its review, revision and acceptance. The report must demonstrate the student’s technical and communication skills, and an oral presentation may be included as the discretion of the advisor. The approach and deliverables will be determined by the advisor and student and should be attached to the Master’s Project Approval form, where the student outlines their project idea.

The advisor must be a faculty member in SSISTL and a member of the Graduate Faculty. There are no committee requirements for M.S. projects. The student should identify an advisor in their second semester of the program to oversee the project, and must work with them on an agreement regarding the details of the paper in the beginning of the third semester. The Master’s Project Approval Form should be signed by the student, advisor, and Director of Graduate Studies and submitted to the Graduate Coordinator no later than the second week of class during the semester in which the student is registered for the course.

3.3.4 Advisors for Master’s Project/Thesis Option
All Masters Students opting for project or thesis as the culminating experience of their Master’s degree must select, with mutual agreement, a major faculty advisor as soon as possible, but no later than the end of their first semester of full-time study. Once selected, students are required to consult with their advisor to plan their coursework and research for each remaining semester, in preparation of applying for graduation. The advisor provides guidance and helps direct the student’s project or thesis. The student’s M.S. thesis committee is chaired by the student’s major advisor.

3.3.5 Project vs. Thesis
A thesis is typically longer than a project and is a well-organized, thoroughly documented scholarly paper, detailing research purpose, methods, results, analysis and conclusions. Research for a thesis maybe more extensive than research for a project in terms of the amount required, but also depends on the number of credit hours related to the thesis and/or project. Students in the STL program will choose between a 6 credit thesis or a 3- or 6-credit project.
According to the Graduate School Policy Library: While a thesis must be defended orally in a public forum, a project does not need to be defended or presented public. A master's project only needs approval at the department level. A master's thesis must receive final approval from the Graduate School and will be kept in perpetuity in the university's thesis/dissertation database within the library.

3.4 Master's Thesis Requirements
Master's theses should be written in English. Students who complete the thesis option for the master's degree should generally undertake the following steps in its preparation:

- Design an appropriate research or other scholarly study with the help of his/her faculty advisor(s).
- Conduct and document the necessary background literature review.
- Investigate a specific aim or focused question(s).
- Analyze the results.
- Write their findings according to guidelines outlined in the Graduate School's Guidelines for Electronic Thesis and Dissertation Preparation and Submission pdf booklet.

Since 2005, all master's theses and doctoral dissertations completed by UB students in fulfillment of graduate program requirements have been archived and accessible through ProQuest’s dissertations and theses database. Beginning with the June 1, 2018 degree conferral, all theses and dissertations will also be accessible for public access through UB’s Institutional Repository. Students will continue to have the option to request a temporary embargo (delayed release) of their thesis/dissertation containing patentable material or content being submitted to peer-reviewed journals or for commercial publication. See the Public Access of Theses and Dissertations and Embargo (Delayed Release) of Thesis and Dissertation policies.

3.5 The Graduate School Requirements for Master’s Thesis

3.5.1 Master’s Thesis Copywriting Option
It is the student's choice whether to copyright his or her thesis. Copyrighting formally protects the student’s rights as an author. These rights include the ability to make copies of the work, to distribute them, to make derivative works, or to perform or display the work. By copyrighting a thesis, a student can control the rights to it or may authorize others (i.e., a publisher) to exercise them. It is the student's responsibility to guarantee that the work is original and that he or she has followed accepted standards for documenting the use of references and citations of other works. Students should discuss the option to copyright their work with their major professor before reaching a decision. Once the decision has been made to copyright, the appropriate symbol, the date and the author's name needs to be included on the page immediately following the title page. The copyright will run for the life of the author plus 50 years. The law requires that two
copies of the work be submitted to the appropriate federal agency. Students may request this service to be provided through the Graduate School's online submission system available on the Graduate School website as an option under the ProQuest Thesis Publishing Agreement they sign when submitting the final master's thesis.

### 3.5.2 Master's Thesis Formatting Requirements

The Graduate School will accept any self-consistent format that follows conventions of a recognized discipline, but some general formatting standards are also expected as outlined in the [Guidelines for Thesis and Dissertation Preparation and Submission](#) pdf booklet.

### 3.6. Milestones During STL Program

As shown in table 3.6 on the following page, M.S. students, in consultation with their advisor, are required to meet milestones as they progress through their academic program. The dates are general guidelines to assist students to make sure they are academically on track. It is the student’s responsibility to meet with any available resources and meet appropriate guidelines.

In addition to the completion of the coursework and culminating experience, students must submit the required documentation to the Graduate School, as outlined on their website and in [Chapter 4: Graduation Requirements](#).

When all requirements for graduation have been completed (course work plus culminating experience), the M-Form must be submitted to the Graduate School. The M-Form provides information on the degree option and dates for completion and must be signed by the student’s advisor, committee members (if applicable), and the Director of Graduate Studies.

For the project option, the advisor will notify the Director of Graduate Studies and Graduate Coordinator when all degree requirements have been fulfilled.

For the all-course degree option, the Director of Graduate Studies will confirm when the comprehensive exam is successfully completed.

Exit Survey: Upon completion of all requirements, students are required to complete an Exit Survey administered by SEAS. Data collected in this survey are used to evaluate program strengths and areas needing improvement, employment benchmarking, and student evaluation of their graduate experience at UB. The Departing Student Form also must be filled out and submitted. This form documents that the student has cleaned up her/his lab and office space. It must be signed by the faculty advisor and turned in to the graduate coordinator before final conferral documents will be processed.
<table>
<thead>
<tr>
<th>Table 3.6</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student Action</strong></td>
<td><strong>Initial Course Registration</strong></td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>First semester of program</td>
</tr>
<tr>
<td><strong>Process</strong></td>
<td>Meet with preliminary advisor to map out courses and register for first semester. Can also contact Graduate Coordinator for list of available courses.</td>
</tr>
<tr>
<td><strong>Resources</strong></td>
<td>Attend graduate student orientation before start of classes and/or contact Graduate Coordinator</td>
</tr>
</tbody>
</table>
Chapter 4: Graduation Requirements

4.1 Master’s Requirements Overview
Candidates must meet the Graduate School’s degree conferral requirements to be eligible to graduate:

1. Maintain continuous registration each spring and fall semester until all requirements for the degree have been completed
2. Complete a minimum of 30 credit hours of graduate study
3. Fulfill the minimum residency requirement of 24 UB credits of registration
4. Apply to graduation/submit an Application to Candidacy form before deadline
5. Pass a comprehensive exam or successfully complete a project or thesis
   a. Thesis must be orally defended at the department level and electronically submitted to the Graduate School for approval and filing

4.2 Master’s Graduation Checklist
The following documents must be on file in the Graduate School prior to any deadlines for degree conferral. Students should work with the Graduate Coordinator who will serve as the liaison between the student and Graduate School for processing.

- Apply for graduation in HUB
- An M-form ** for Master’s students completing Exam, Paper, Project or Portfolio
- An M-form ** for Master’s students completing Thesis

In addition, the Graduate School must verify satisfactory completion of all courses to be applied towards the degree.

For candidates completing a thesis: An oral defense of the thesis must be authorized and held. To graduate, the following must be on file in the graduate school prior to authorized deadlines:

- Approved application to graduation (in HUB)
- An M-form for candidates completing a thesis
- Electronic submission of the master’s thesis

4.3 Application to Graduate
Students must apply for graduation in HUB prior to the deadline below:

<table>
<thead>
<tr>
<th>For Degree Conferral On:</th>
<th>June 1</th>
<th>September 1</th>
<th>February 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application to graduation due:</td>
<td>March 1</td>
<td>July 1</td>
<td>October 1</td>
</tr>
<tr>
<td>All required conferral materials due:</td>
<td>May 18</td>
<td>August 10</td>
<td>January 18</td>
</tr>
</tbody>
</table>
4.3.1. Petition to Change Conferral Date

A student may only apply for graduation in HUB once (per degree program). If you have already applied for graduation in HUB, you will not be able to do it again. If you are changing the graduation date from what was noted on your original application to graduation, you must file a petition to change expected conferral date form.

4.4 Time Limits
Master’s degrees must be completed within four years from the student’s first registration date in the STL program. Requests for extensions of time limits must be petitioned using the Extension of Time Limit to Complete a Degree Program Form.
Chapter 5: Academic Policies

5.1 Grading Policy
Grades in courses applicable to the degree must be letter grades: A, A-, B+, B, B-, C+, C, D, F, an FX (never attended), carrying quality points of 4.0, 3.67, 3.33, 3.0, 2.67, 2.33, 2.0, 1.0, 0 and 0 respectively. This requirement applies to informal courses as well.

For all graduate courses, an interim grade of incomplete (IU) may be assigned if the student has not completed all requirements for the course. An interim grade of Incomplete (IU) shall not be assigned to a student who did not attend the course. The default Unsatisfactory (U) grade shall become the permanent course grade of record if the 'IU' is not changed through formal notice by the instructor upon the student’s completion of the course within twelve (12) months after the close of the term for which the 'IU' is assigned. A shorter time frame for removal of the IU grade may be specified by the instructor.

5.2 Scholastic Standing
Exclusive of “S” grades, grades earned in courses counted toward the student’s M.S. program must average a “B” (3.0) grade point average or better to be in good academic standing in the graduate program. A minimum grade of B in the required core courses must be achieved.

5.3 Review of academic progress
At the end of each semester, the department will review the progress of all graduate students in the program. Students who are not making satisfactory progress will be notified by e-mail and should meet with their advisor and/or the Director of Graduate Studies to discuss the matter.

5.4 Probation
If a student’s GPA falls below 3.0 at the end of any semester, or the student receives a grade of D or F in any course, he/she will automatically be put on probation from the start of the next semester. He/she will be given a target that must be reached in order to continue in the program. Normally, the target will be that he/she raise their cumulative GPA to 3.0 or higher by the end of the current semester.

First-year students who fall below 3.0 in their very first semester will be given two semesters to raise their cumulative GPA to a 3.0 or higher.

Probation for other causes shall commence from the student being notified in writing by the Director of Graduate Studies. In consultation with the student’s advisor, the student will be given requirements for regaining good academic standing. Being on probation is grounds for withdrawal of academic financial support, if applicable.
Graduate students not meeting the written terms of their academic probation may be academically dismissed from the program by the Director of Graduate Studies or the Director of the Stephen Still Institute for Sustainable Transportation and Logistics. Such dismissals shall be done in a timely fashion but no later than three weeks after the completion of the term. The Graduate School will be notified in writing of all such academic dismissals.

5.5 Academic Dismissal and Transcripts
A student may be dismissed from the program if any of the following conditions apply:

1. A grade of “F” is earned in any course that could be applied towards the degree
2. More than 2 grades are “C”, “D”, and/or “U” in courses which could be applied to the degree
3. Probationary status has not been removed after one semester, or within the timeframe determined by the Director of Graduate Studies as noted in the formal letter sent to the student
4. The cumulative GPA for courses which could be counted towards the degree falls below 2.5 at the end of any semester
5. The student is found guilty of academic dishonesty according to Graduate School regulations
6. More than four resigned “R” grades have been obtained in courses that could be applied to the degree.

Students who are dismissed will be given a letter from the Director of Graduate Studies, with a copy also going to the Graduate School as well as the student’s advisor.

Graduate students who are dismissed for academic reasons from a graduate program will have a “GRD” (Graduate School) service indicator placed on their academic record to prevent future registration.

5.5.1 Reinstatement
A graduate student who has been officially dismissed and who seeks reinstatement shall submit a formal request for reinstatement, along with a supporting statement of explanation, to the Director of Graduate Studies and the Director of the Stephen Still Institute for Sustainable Transportation and Logistics. The request shall be acted upon by the established procedure or review group appropriate to the particular graduate program. If a student is subsequently reinstated to the program which he/she was dismissed or is admitted into another graduate program, the “GRD” service indicator will be removed from the student record by written request from the academic program to the Graduate School.
5.6 Academic integrity
The Institute for Sustainable Transportation and Logistics approves of and abides by the University Policy on academic integrity, as stated in the Graduate School policy library:

“Academic integrity is a fundamental university value. Through the honest completion of academic work, students sustain the integrity of the university while facilitating the university’s imperative for the transmission of knowledge and culture based upon the generation of new and innovative ideas.

When an instance of suspected or alleged academic dishonesty by a student arises, it shall be resolved according to the procedures set forth herein. These procedures assume that many questions of academic dishonesty will be resolved through consultative resolution between the student and the instructor.

It is recommended that the instructor and student each consult with the department chair, school or college dean or the Graduate School if there are any questions regarding these procedures.”

5.6.1. Examples of academic dishonesty include, but are not limited to:
- Using previously submitted work
- Plagiarism
- Cheating
- Falsification of academic materials
- Misrepresentation of documents
- Confidential academic materials
- Selling academic assignments
- Purchasing academic assignments

*Students should familiarize themselves with the full details of the academic integrity policy online at [http://grad.buffalo.edu/study/progress/policylibrary.html](http://grad.buffalo.edu/study/progress/policylibrary.html)*

5.7 Certification of Full-Time Status
At the graduate level, full-time status is considered 12 credit hours or more (9 credit hours if the student holds a TA/GA/RA position).

Under certain circumstances, a graduate student can be certified full-time even though they are registered for fewer than 12 credits (or fewer than 9 credits if they are holding an assistantship). Eligible circumstances include:
- A student who is at the candidacy stage of their program and is working full-time on a project, thesis, or a final comprehensive exam.
- A student who is engaged full-time in required field work, practica, or internship.
- A student who is participating in a university-approved foreign exchange program.

If a student meets the conditions described above, certification must be formally requested through use of a [Certification of Full-Time Status form](#).
5.8 Continuous Registration
Students are required to register every semester for the appropriate courses according to the established registration procedures and within the deadline dates announced by the Office of the Registrar. Graduate students must register for a minimum of one credit hour each fall and spring term until all requirements for the degree are completed. If continuous registration is impossible at any time, the student must secure a leave of absence from the Office of the Registrar.

Students may request a waiver of continuous registration by filing the Graduate School Petition for Waiver of Continuous Registration form with the Graduate School.

5.9 Leave of Absence
Students who need to file a leave of absence should petition prior to the start of the semester in which the leave is to begin. Typically, leave absences are granted for one year at a time.

Leaves of more than one semester require valid justification and documentation from the student and their advisor. Documented cases of financial hardship include illness, or compulsory military service.

5.10 Transfer of Credits Taken at Other Universities
No more than 20 percent of a master’s program may be comprised of credits from another graduate degree program.

STL is a 30 credit graduate program; master’s students may transfer up to six graduate credits either from UB, or other accredited intuitions, into the program. The Graduate School will consider for transfer credit graduate level coursework from nationally accredited institutions of higher education, as well as graduate-level coursework form any international institution that UB recognized as equivalent to nationally accredited institution.

Only those graduate courses completed at accredited or recognized international institutions and with grades of full B or better are eligible for transfer credit. Courses with a grade of S or P are eligible for transfer except when the transfer intuition’s grading policy equates S or P with lower than a full B grade.

5.10.1 Transfer Credit Process
The Director of Graduate Studies must formally evaluate any transfer coursework for its applicability toward the STL degree. Once transfer credits are deemed appropriate and applicable by the department, the student files a Graduate Student Petition for Transfer Credit form during the student's first year of matriculation to UB.

Upon receipt of the transfer credit petition, the Graduate School will evaluate credit and grade equivalences, and verify that the courses were completed at an
accredited or recognized institution. UB must receive a final official transcript from the transfer institution before the transfer credits may be formally approved and recorded on the student’s UB record.

Students initiate this process and it should be done during the first semester of the program, before registering for second semester classes. Both the major advisor and the Director of Graduate Studies must sign the petition.

5.11 Informal Courses (Independent Study, Individual Problems)
Informal courses usually include registration in project, thesis, or independent study.

Students interested in an Independent Study course must complete and Independent Study Form (see appendix) and have both the faculty supervising the course and the Director of Graduate studies approve the Independent Study. This agreement must established by the end of the first week of classes.

Once all of the signature are on the required form, it should be returned to the graduate coordinator to register the students for the class. The approved Independent Study form authorizes the graduate coordinator to register students for the class and the changes will appear in HUB within 2-3 days of submission.

Independent Study Agreements are not needed if the study is working on a master’s project or thesis. In this case, students should submit an STL Project or STL Proposal Form (See appendix) and get approval from the student’s advisor. This will serve as the formal agreement and approval of student’s course content.

5.12 Undergraduate Courses for Graduate Credit
If a student wishes to use an undergraduate course for graduate credit, they must submit a petition to the Graduate School prior to registering for the course in order to receive approval. Students must complete the “Petition for Course Credit Outside Your Primary Career” Form from the Graduate School website. The petition must include a clear statement from the instructor of the course regarding what additional work will be required of the student to qualify for graduate credit. Copies of these petitions must be submitted to the graduate coordinator. Retroactive approval will not be granted.

- To be considered, the undergraduate courses must be at the 400 level
- A maximum of two such courses (6 credits) can be applied toward a graduate degree
- If an undergraduate course is 4 or more semester hours of credit, only 3 credits maximum can be applied towards graduate credits.

Remedial courses, taken to make up deficiencies in a student’s undergraduate background, will not be considered for graduate credit or towards the students major requirements.
5.13 Inapplicable Credits
English language courses, courses not included in the curriculum outline, and remedial
courses taken to fulfill department admission requirements may not be applied towards
the minimum requirements towards the STL degree.

5.14 Resigning From a Course
The current UB Graduate School policy regarding course resignation states:
"Graduate Students have the prerogative to resign any course for which they
have registered without GPA penalty through the end of the 11 week of the fall or
spring term. All course resignations processed during the permissible dates (as
published in the class schedule available through the Office of the Registrar) will
be indicated as officially resigned courses by the notation R on all grade reports,
transcripts and other official university documents. Resignation from all courses
should be done through the HUB Student Center, which students may access
through the MyUB portal. There are no quality points attached to an R
designation."

5.15 Repeating Courses
The current UB Graduate School policy regarding repeating courses states:
"If a graduate student repeats a course that is not normally “repeatable”
("repeatable" courses include dissertation, research, thesis, project, or portfolio
guidance; independent study; directed readings; etc.) only the highest grade
earned in the course will be counted toward the degree and used to calculate the
grade point average associated with the graduate degree program requirements.
However, the student’s official graduate transcript will record all courses
attempted (including repeated courses). All resulting grades earned are
calculated in the cumulative GPA reflected on the students" final official
transcript."

5.16 Non-Matriculated Studies
Domestic students may take classes as a non-matriculated student and International
students must be on an on an F1 visa in order to take classes as a non-matriculated
student. Students must apply through GrAdMIT and get approved by the Director of
Graduate Studies to take non-matriculated courses in the program. A maximum of 12
credit hours can be taken, and then a service indicator will be placed on the student’s
account in HUB, preventing further registration without admission as a matriculating
student.

A Master’s student may be admitted on a provisional basis as a non-matriculated
student. In this case the student must demonstrate their ability to perform satisfactorily
at the graduate level before being admitted to the degree program as a matriculated
student. The department will specify the conditions in the letter of admission offering
provisional status.
APPENDIX

Forms .......................................................................................................................... 23-28
   STL Student Plan of Study ..................................................................................... 23
   Project Proposal ..................................................................................................... 24
   Thesis Proposal ...................................................................................................... 25
   Independent Study ................................................................................................. 26-27

Useful Links/Resources for Graduate Students ......................................................... 28

Course Outline and Class Descriptions ..................................................................... 29-37
The MS program in Sustainable Transportation and Logistics is a 30-credit, 3-semester program (if completed full-time) and requires a minimum GPA of 3.0 every semester.

**Curriculum**
The degree culminates in one of three options:
1. Comprehensive Exam (0-credit exam, all-course option)
2. Master’s Project (3 credits)
3. Master’s Thesis (6 credit)

- For the Master’s Project, students will complete 5 course courses (15 credits, 4 electives (12 credits) and a 3-credit project for a total of 30 credits.
- For the Master’s Thesis, students will complete 5 core courses (15 credits), 3 electives (9 credits), and a 6-credit thesis for a total of 30 credits.

<table>
<thead>
<tr>
<th>Core Course</th>
<th>Semester Taken</th>
<th>Grade Earned</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLT 501 (MGO 638) Logistics and Distribution Management</td>
<td>(Spring Only)</td>
<td></td>
</tr>
<tr>
<td>STL 502 (IE 500) Optimization and Resource Planning</td>
<td>(Fall Only)</td>
<td></td>
</tr>
<tr>
<td>STL 503 (MGO 636) Supply Chains: Design Modeling and Optimization</td>
<td>(Fall Only)</td>
<td></td>
</tr>
<tr>
<td>STL 504 (CIE 573) Transportation Analytics</td>
<td>(Fall Only)</td>
<td></td>
</tr>
<tr>
<td>STL 505</td>
<td>(Fall Only)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Elective Course</th>
<th>Semester Taken</th>
<th>Grade Earned</th>
</tr>
</thead>
</table>

**Culminating Experience (circle one):** Comprehensive Exam  Project  Thesis

**Student Signature:** ___________________________  Date ______________________

**Advisor Signature:** ___________________________  Date ______________________
Master of Science in Sustainable Transportation and Logistics

Culminating Experience: M.S. Project Proposal

Student Name: __________________________ Person No.: ________________
(Please print)

Semester:  Fall _______ Spring _______ Summer _______
(Year) (Year) (Year)

Title of Project: _______________________________________________

Faculty Member Supervising: ______________________________________

Course Number: _____________ Credit Hours: _____________

Project Proposal/Overview:
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

Student Signature: _______________________/______________________
(Signature) (Please Print)

Faculty Signature: _______________________/_______________________
(Signature) (Please Print)

Director of Graduate Studies

Signature: _______________________/_______________________
(Signature) (Please Print)
Master of Science in Sustainable Transportation and Logistics
Culminating Experience: M.S. Thesis Proposal

Student Name: ____________________ Person No.: ______________
(Please print)

Semester: Fall __________ Spring __________ Summer __________
(Year) (Year) (Year)

Title of Thesis: _______________________________________________

Additional Faculty Committee Members
Faculty #1 _____________________ ____________________________
(Print Name) (Signature)

Faculty #2 _____________________ ____________________________
(Print Name) (Signature)

Course Number: _____________ Credit Hours: _____________

Thesis Proposal:

____________________________________________________________

____________________________________________________________

____________________________________________________________

____________________________________________________________

____________________________________________________________

_____________________________ _______________________________
(Student Signature) (Faculty Signature)
(Please Print) (Please Print)

Director of Graduate Studies
Signature:
____________________________________________________________

(Signature) (Please Print)
Name of Student:  
Person Number:  

Title of Independent Study:  

Name of Professor Providing Independent Study:  

Number of Credits Requesting (1-3):  

Grading type (pass/fail, letter grade):  

Directions:

1. Work with your supervising faculty member to complete this Graduate Independent Study agreement.
2. Attach a tentative schedule for when/how often the student and instructor will meet during the given term and when assigned work (as noted above) will be submitted.
3. Submit the completed, signed form to the Director of Graduate Studies prior to the first day of the semester for which you wish to register.
4. If approved, the Director of Graduate Studies will sign and forward to the department graduate coordinator and you will automatically be registered for the course. You will see the update in your HUB student center.

Signature of Student:  
Date:  

Signature of Faculty:  
Date:  

Signature of Director of Graduate Studies:  
Date:  

(_Send to Graduate Coordinator for Registration)  

Processed by Graduate Coordinator  
Initial & Date:  

What is the purpose of the independent study? (Describe Briefly)

What are the learning objectives? (List)

What is the relevance of this Independent Study to your educational program for this degree?

In what way are the current course offerings inadequate to meet these objectives?

Description of work required to complete the course:
## Useful Links/Resources for Graduate Students

<table>
<thead>
<tr>
<th>Title</th>
<th>Publisher</th>
<th>URL Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>UB Rules &amp; Regulations</td>
<td>Student Conduct and Advocacy</td>
<td><a href="http://www.buffalo.edu/studentlife/who-we-are/departments/conduct.html">http://www.buffalo.edu/studentlife/who-we-are/departments/conduct.html</a></td>
</tr>
<tr>
<td>Graduate School Policies and Procedures</td>
<td>The Graduate School</td>
<td><a href="http://grad.buffalo.edu/study/progress/policylibrary.html">http://grad.buffalo.edu/study/progress/policylibrary.html</a></td>
</tr>
<tr>
<td>Forms for Graduate Students</td>
<td>The Graduate School</td>
<td><a href="http://grad.buffalo.edu/study/progress/forms.html">http://grad.buffalo.edu/study/progress/forms.html</a></td>
</tr>
<tr>
<td>Estimated Cost of Attendance</td>
<td>The Graduate School</td>
<td><a href="http://grad.buffalo.edu/apply/funding/cost.html">http://grad.buffalo.edu/apply/funding/cost.html</a></td>
</tr>
<tr>
<td>Financial Aid</td>
<td>Financial Aid</td>
<td><a href="http://financialaid.buffalo.edu/graduate-students/">http://financialaid.buffalo.edu/graduate-students/</a></td>
</tr>
<tr>
<td>SEAS Website</td>
<td>SEAS</td>
<td><a href="http://engineering.buffalo.edu/">http://engineering.buffalo.edu/</a></td>
</tr>
<tr>
<td>The Graduate School Website</td>
<td>The Graduate School</td>
<td><a href="http://grad.buffalo.edu/">http://grad.buffalo.edu/</a></td>
</tr>
<tr>
<td>Stephen Still Institute for Sustainable Transportation and Logistics</td>
<td>SSISTL</td>
<td><a href="http://www.buffalo.edu/istl/education.html">http://www.buffalo.edu/istl/education.html</a></td>
</tr>
<tr>
<td>Computer Science &amp; Engineering</td>
<td>CSEE</td>
<td><a href="https://engineering.buffalo.edu/computer-science-engineering.html">https://engineering.buffalo.edu/computer-science-engineering.html</a></td>
</tr>
<tr>
<td>School of Management</td>
<td>SOM</td>
<td><a href="https://mgt.buffalo.edu/">https://mgt.buffalo.edu/</a></td>
</tr>
<tr>
<td>Industrial Engineering</td>
<td>ISE</td>
<td><a href="http://engineering.buffalo.edu/industrial-systems.html">http://engineering.buffalo.edu/industrial-systems.html</a></td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>CSEE</td>
<td><a href="http://engineering.buffalo.edu/civil-structural-environmental.html">http://engineering.buffalo.edu/civil-structural-environmental.html</a></td>
</tr>
<tr>
<td>Registrar Website</td>
<td>Registrar</td>
<td><a href="http://registrar.buffalo.edu/">http://registrar.buffalo.edu/</a></td>
</tr>
<tr>
<td>UB Website</td>
<td>The University at Buffalo</td>
<td><a href="http://www.buffalo.edu/">http://www.buffalo.edu/</a></td>
</tr>
<tr>
<td>International Student Services</td>
<td>International Student Services</td>
<td><a href="http://www.buffalo.edu/isson">http://www.buffalo.edu/isson</a></td>
</tr>
</tbody>
</table>
Course Outline and Descriptions

Core courses
STL 501 - MGO 638 – Logistics and Distribution Management (Spring Class)
STL 502 – IE 550 – Optimization & Resource Planning (Fall Class)
STL 503 - MGO 636 – Supply Chains: Design, Modeling and Optimization (Fall Class)
STL 504 – Transportation Analytics (Fall Class)
STL 505 – Transportation Systems Modeling Fundamentals (Fall Class)

Transportation concentration electives
CIE 500 PA1 Highway Geometric Design (Fall Class)
CIE 536 – Traffic Operations and Design (Spring Class)
CIE 537 – Traffic Flow Theory
CIE 538 – Discrete Choice Modeling (Spring Class)
CIE 539 – Travel Demand Forecasting (Fall Class)
CIE 631 – Transportation Network Analysis (Spring Class)
CIE 632 – Transportation Systems Management and Control IE 603 – Location Theory
IE 573 – Discrete Optimization (Spring Class)

IE 575 – Stochastic Methods (Fall Class)
IE 662 – Queuing Theory
IE 677 – Network Optimization (Fall Class)

Logistics concentration electives
MGA 604 – Financial Analysis and Reporting (Fall Class)
MGO 615 - Econometric Methods and Managerial Applications I (Fall Class)
MGO 616 - Econometric Methods and Managerial Applications II (Spring Class)
MGO 617 - Service Operations & Healthcare Supply Chains (Fall Class)
MGO 631– Production and Inventory Planning (Fall Class)
MGO 633 – Supply Chains and Global Operations (Spring Class)
MGO 637 – Purchasing and Global Supply Management (Spring Class)
IE 675 – Game Theory (Fall Class)
IE 572 – Linear Programming (Fall Class)

General Electives
IE 678 – Urban Operations Research (Spring Class)
CSE 503 Computer Science for Non-Majors I (Fall Class)
CSE 504 Computer Science for Non-Majors II (Fall Class)
CSE 601 Data Mining and Bioinformatics (Fall Class)
STL 500 – Special Topics

http://www.buffalo.edu/ist/education/ms/courses.html
Core courses

STL 501 - MGO 638 – Logistics and Distribution Management
This course covers global logistics and distribution issues, dealing with the management of physical material flows, documentation, and information flows in cross-border supply chains. Logistics issues such as intermodal transportation, e-fulfillment, cross-border trade regulations, reverse logistics, and design of sustainable supply chains are dealt with. The optimum design of distribution systems, inventory positioning in distribution networks, selection of optimal transportation modes, inter-modal transport, etc. are also covered. Emerging technologies such as warehouse management systems (WMS), distribution requirements planning (DRP), radio frequency identification (RFID), geographical information systems (GIS), global positioning systems (GPS) applications are also covered. Both qualitative issues (such as regulatory issues, INCO terms and documentation) as well quantitative tools and techniques such as the use of Route Assist software will be covered. Prerequisite: MGO 630.

Concepts of operations research methodology including objective functions, constraints and optimization. An introduction to linear and integer programming emphasizing transportation and logistics applications and an optimization software tool such as OPL/CPLEX. If time permits, elementary mathematical models of Markov decision processes and waiting-line (queueing) models with Poisson arrival and exponential service.

STL 503 - MGO 636 – Supply Chains: Design, Modeling and Optimization
This course focuses on design, modeling and optimization of global supply chain networks. The course deals with modeling approaches and quantitative tools and techniques for design and optimization of global supply chain networks. The course also covers information systems and technologies for supply chain planning and coordination. The topics covered include: supply chain strategy formulation, performance metrics, new forecasting models applicable for supply chain contexts, newsvendor models for capacity and aggregate planning, models for location and design of supply and distribution entities, inter-organizational planning, advanced planning systems, multi-echelon inventory management techniques, distribution requirements planning (DRP) systems, joint transportation-inventory models, and pricing and revenue management techniques. The course will be taught in a manner that will enable you to obtain APICS professional certification (CPIM / CFPIM) with minimum preparation after the course. Prerequisite: MGO 630.

STL 504 – Transportation Analytics
This course aims to provide students with a general background of various statistical analysis techniques and data mining methods that are used in transportation systems. It covers various practical analytical topics in transportation and logistics, including model estimation, data analysis, traffic forecasting, and incident prediction. A broad range of transportation related techniques are covered in statistics, data mining and optimization skills, such as Logistic Regression, Poisson Regression, Time Series Modeling, Survival
Analysis, Classification, and Clustering. Popular statistical modeling software will be used to solve various practical problems.

**STL 505 – Transportation Systems Modeling Fundamentals**
As an example of a Complex Adaptive System (CAS), the behavior of transportation systems emerges as a result of the interactions among the many different components that make up the system. This course will introduce students to the different transportation system components, and will then review some of the fundamental concepts regarding transportation systems and how they may be modeled. The discussion will include both passenger transportation as well as freight transportation.

**Transportation concentration electives**

**CIE 500 PA1 Highway Geometric Design (Fall Class)**
This course is designed to provide students with the fundamentals of highway design including layout, horizontal and vertical alignment, earthwork requirements, intersection design, and safety considerations. Students will be taught how to use existing computer software to generate and evaluate designs. The course includes a significant project component.

**CIE 536 – Traffic Operations and Design (Spring Class)**
This course addresses the design, operation, control and management of transportation facilities. Topics covered in the course include geometric design of roadways, capacity analysis for freeway segments, signal timing and design, and intersection design and layout. Students are introduced to a number of traffic analysis and traffic simulation software, including SYNCHRO and SimTraffic. Students are required to undertake a comprehensive term project that involves detailed analysis and/or simulation of a transportation facility and write a survey-type paper on a topic of recent interest that is related to traffic operations and design. LEC. Prerequisite: Senior or graduate standing.

**CIE 537 – Traffic Flow Theory**
Research in traffic flow theory focuses on developing mathematical models that describe the interaction among the vehicle/driver unit and the infrastructure. The mathematical models derived provide the basis for evaluating the quality of service provided by the transportation system, and for assessing the impact of the system on the surrounding environment. This course addresses traffic stream and driver characteristics, car following and macroscopic models, traffic impact models, signalized intersections models, and traffic simulation. LEC. Prerequisite: Graduate standing.

**CIE 538 – Discrete Choice Modeling (Spring Class)**
The focus of this course is the theory and the state-of-practice of individual discrete choice modeling with applications in transportation and other fields. The course provides students with an understanding of the theory, methods, application and interpretation of Binary Logit, Multinomial Logit (MNL), Nested Logit and other members of the Generalized Extreme Value (GEV) family of models. The general theory and modeling methodology applicable to the discrete choice problems are discussed.
Classroom examples and assignments focus on applications in the context of travel related choices. LEC. Prerequisite: Senior or graduate standing.

CIE 539 – Travel Demand Forecasting (Fall Class)
The focus of this course is current and state-of-the-art methods for forecasting travel demand. A major component of the course focuses on the four-step urban transportation planning process consisting of the trip generation, trip distribution, mode split, and traffic assignment steps. Recent refinements to the process are discussed together with a brief introduction to activity-based models. LEC. Prerequisites: Senior or graduate standing.

CIE 631 – Transportation Network Analysis (Spring Class)
The focus of this class is modeling flow patterns through urban transportation networks. An analytical approach to modeling the resulting flow pattern is adopted, based on the formulation and solution of the traffic assignment problem as a non-linear optimization problem. Among the topics covered in the course are transportation networks and optimality, cost functions, deterministic and stochastic user equilibrium assignment, origin-destination matrix estimation, and network reliability and design. LEC. Prerequisite: CIE 539.

CIE 632 – Transportation Systems Management and Control
This class focuses on the operations, control and management of integrated surface transportation networks, including the use and application of intelligent transportation systems. Topics covered in the course include traffic monitoring systems, advanced traffic management systems, dynamic traffic assignment and route guidance, adaptive traffic control systems, the development and application of traffic simulation models to the control and management of integrated transportation systems, and automated highway vehicle systems. LEC. Prerequisite: CIE 536.

IE 573 – Discrete Optimization (Spring Class)
Basic theory of Discrete Optimization as well as the computational strategies for exact and heuristic solution of problems having discrete decision variables. Discrete Models can be divided into two main categories: Integer Programming and Combinatorial Optimization. Integer programming encompasses models with a mixture of discrete and continuous decision variables, and ones for which efficient algorithms are not likely to be found. On the other hand combinatorial models may deal with problems having pure discrete elements for which clean and efficient procedures exist. This latest class includes Network Optimization. This course will place emphasis on Integer Programming and related areas. The course is a good one for students who are planning to apply OR tools in Production or Manufacturing problems or supply chain/service/logistics related problems as well as continue using an optimization software tool called CPLEX.
IE 575 – Stochastic Methods (Fall Class)
This course teaches the fundamentals of applied probability theory. Topics include
algebra of events; sample space representation of the model of an experiment (any
non-deterministic process); random variables; derived probability distributions; discrete
and continuous transforms and random incidence. The course also introduces
elementary stochastic processes including Bernoulli and Poisson processes and
general discrete-state Markov processes. This is followed by a discussion of some basic
limit theorems and some common issues and techniques of both classical and Bayesian
statistics.

IE 603 – Location Theory
This course is concerned with analyzing the problem of optimally locating one or more
facilities. The approach is a purely analytical one, and the focus is on studying the vast
academic literature in this field of Operations Research. Specific topics that are covered
include the p-median, p-center, and stochastic queue median problems. Both network
and planar location topologies are considered. Analytical tools are developed for these
various problems and solution algorithms are detailed.

IE 662 – Queuing Theory
Development and application of mathematical models for queuing systems. Topics
include Poisson and Erlang systems, bulk and priority queues, queuing networks, and
the optimal design and control of queuing systems. A prerequisite knowledge of
stochastic processes is recommended.

IE 677 – Network Optimization (Fall Class)
Solutions to graph theory and optimization problems on directed and undirected graphs.
Shortest path, maximum flow, minimum weight flows, and matching problems. Also, the
traveling salesman and Chinese postman problems.

Logistics concentration electives

MGA 604 – Financial Analysis and Reporting (Fall Class)
This course provides an introduction to the fundamental concepts and issues of
financial accounting with emphasis on the interpretation of financial statements. The
course addresses the economic consequences of transactions and their presentation on
corporate financial statements. A primary objective is to introduce corporate financial
statements as a tool for company valuation and decision making. Emphasis is on the
analysis of effects of decisions on financial performance and use of financial statements
to evaluate organizations.

MGO 615 - Econometric Methods and Managerial Applications I (Fall Class)
The basic objectives of the course are to enable students:
- To learn many useful econometric methods, from the emerging body of
econometric tools and techniques, from a managerial perspective
- To know how to apply the models properly, in the right context and to solve
  relevant and significant business problems
To understand how econometric models facilitate the undertaking of business research
To show how different types of data (e.g., cross-sectional, time-series, panel, etc.) are gathered, and correctly fitted into various econometric models
To realize the importance of theory, methodology, and measurement in business practice and research

**MGO 616 - Econometric Methods and Managerial Applications II (Spring Class)**
The basic objectives of the course are to enable students:
- To learn many useful econometric methods, from the emerging body of econometric tools and techniques, from a managerial perspective
- To know how to apply the models properly, in the right context and to solve relevant and significant business problems
- To understand how econometric models facilitate the undertaking of business research
- To show how different types of data (e.g., cross-sectional, time-series, panel, etc.) are gathered, and correctly fitted into various econometric models
- To realize the importance of theory, methodology, and measurement in business practice and research

**MGO 617 - Service Operations & Healthcare Supply Chains (Fall Class)**
The service sector is the largest sector of all developed countries and evidence suggests that productivity in the service sector has lagged behind that of its manufacturing counterpart. It is therefore critical in the global market to improve the efficiency and competitiveness of these service processes. This course is designed to apply theory with practice in service business process management. The objective of this course is to provide the student with an understanding of the issues, models and numerical methods particular to service management, with attention to both the strengths and weaknesses of these devices. **Prerequisite:** MGO 630.

**MGO 631– Production and Inventory Planning (Fall Class)**
This course focuses on production and inventory management problems in the entire supply chain, and the application of quantitative models and information systems and technologies for these problems. An enterprise resource planning (ERP) system platform is assumed and the course also covers the implementation aspects of ERP systems. The topics covered include supply chain strategy and coordination mechanisms, forecasting systems, aggregate planning, advanced planning systems (APS), master production scheduling, materials requirements planning (MRP) systems, inventory management for suppliers, manufacturers and distributors, cellular manufacturing, just-in-time (JIT) systems, lean manufacturing, optimized production technology (OPT), and flexible manufacturing systems (FMS) technologies. The completion of this course will enable students to take the certification examinations (CPIM/CFPIM) for American Production and Inventory Control Society (APICS). **Prerequisite:** MGO 630.
MGO 633 – Supply Chains and Global Operations (Spring Class)
This course deals with design, control, and operation of supply chains for competing effectively in the context of global operations management. Both manufacturing and service (such as health care) industry supply chains are covered. The topics covered include: state-of-the-art qualitative and quantitative techniques for optimum configuration of in-bound and outbound logistics, principles of postponement in design, processes and logistics, mass customization, global location factors for offices, plants and distribution centers, collaborative planning, forecasting and replenishment (CPFR) systems, countering bullwhip effects in supply chains, vendor managed inventory (VMI), strategic alliances and partnering, global purchasing and buyer-supplier relationships, and the complexities of the material, information, and cash flows across international borders. This course supplements MGS 616, which covers e-commerce integration aspects of supply chains. Prerequisite: MGO 630.

MGO 637 – Purchasing and Global Supply Management (Spring Class)
This course focuses on purchasing and supply management principles and practices in the context of global supply chains. The importance of purchasing is primarily due to the fact that the value of materials procured in manufacturing, and service supply chains such as retail can be more than 65% of the cost of the goods sold. Given the globalization of supply sources, it has become increasingly necessary to understand the complexities of global supply markets, cross-border legal aspects of purchasing, global vendor development, systematic reduction of supply risk, strategic alliances and supply network building, vendor managed inventory (VMI) contracts, and new forms of negotiation strategies with suppliers. Purchasing practices to support lean organizations to ensure just-in-time delivery on a global basis are also covered. In addition, given the growth of internet technology, e-commerce technologies to support purchasing, and supplier relationship management (SRM) systems are also be covered. Prerequisite: MGO 630.

IE 572 – Linear Programming (Fall Class)
This course will be an intensive study of Linear Programming (LP). LP deals with the problem of minimizing or maximizing a linear function in the presence of linear equality and/or inequality constraints. Both the general theory and characteristics of LP optimization problems as well as effective solution algorithms and applications will be addressed. The course is a good one for students who are planning to apply Operations Research (OR) tools in all areas of application in the public and private sectors including production or manufacturing problems and service/logistics related problems as well as to learn an optimization software tool called OPL/CPLEX. This course is part of the core for the MS and PhD degrees concentrating in OR; therefore comprehension of the underlying mathematical theory/why things work is emphasized.

IE 675 – Game Theory (Fall Class)
A development of the mathematical theory of conflict, cooperation competition, and coercion among economic decision-makers. Classical n-person game theory and its relationship to linear programming. Dynamic cooperative games, their applications to
decentralized control systems and the analysis of the behavior of decision-makers in organizations.

**General Electives**

**IE 678 – Urban Operations Research (Spring Class)**
This is an applied Operations Research course, where the focus is on the utilization of the analytical tools that students have learned in other Operations Research courses to study problems of urban significance. The course starts off with a review of basic probabilistic concepts. The first topic covered is that of geometrical probability, a powerful tool to approach urban problems. Then a discussion on queuing theory is presented. This is followed by a discussion of spatial queues that are used in modeling urban emergency service systems. The next topic is on network problems that are useful in an urban context. The final topic is on simulation modeling as applied to urban problems. All topics are reinforced with real-world examples and in-depth homework assignments.

**CSE 503 Computer Science for Non-Majors I (Fall Class)**
This course introduces students to algorithm design and implementation in a modern, high-level, programming language (currently, Java). It emphasizes problem-solving by abstraction. There will also be a brief coverage of the social and ethical aspects of computing. Topics include data types, variables, expressions, basic imperative programming techniques including assignment, input/output, subprograms, parameters, selection, iteration, Boolean type, and expressions, and the use of aggregate data structures including arrays and records. Students will also have an introduction to the basics of abstract data types and object-oriented design, as well as the mathematics of computer science such as Boolean algebra, basic number theory, etc.

**CSE 504 Computer Science for Non-Majors II (Fall Class)**
This course is a continuation of CSE 503, in which heavy emphasis is placed on abstract data types (ADTs) and object-oriented methodology, where the student will be expected not only to understand ADTs, but also to design and implement robust ADTs using a modern, object-oriented, programming language. Topics such as encapsulation, polymorphism, templates, and inheritance will be emphasized. Essential topics to be integrated in this framework include the use of recursion; pointers; dynamic memory management; linked structures including linked lists, binary trees, stacks, queues, and other advanced data structures; and algorithms, including advanced searching and sorting algorithms. The analysis of algorithm complexity ("big O" notation) will be introduced.

**CSE 601 Data Mining and Bioinformatics (Fall Class)**
This course focuses on the fundamental techniques in data mining, including data warehousing, frequent pattern mining, clustering, classification, anomaly detection and feature selection methods. Specifically, we will cover the following topics: Data warehousing--model design; Frequent pattern mining--association rules mining;
Clustering--partition-based, hierarchical-based, density-based approaches, spectral clustering; Feature selection--dimensionality reduction; Classification--decision-tree, Bayesian, rule-based, SVM, ensemble methods; Anomaly detection--statistics-based, density-based, clustering-based; Evaluation and validation of data mining results; Correlation analysis--metrics and analysis; Graph and network mining; Visualization of patterns--mapping between high-dimensional data and low-dimensional data; and Multi-source information integration. To demonstrate how data mining techniques are applied to various domains, we focus on the software systems design of bioinformatics, discussing the applications of data warehousing and data mining in biological and biomedical related fields. The class discusses various software systems and provides insight that will help students gain a comprehensive understanding of the bioinformatics field. Projects will be designed based on these applications.

**STL 500 Special Topics**

STL 500 presents advanced topics in sustainable Transportation and Logistics to meet the needs and interests of students. LEC. Content varies each semester. May not be offered on a regular basis.