

**INFORMATION FOR PHD STUDENTS  
IN ENGINEERING SCIENCES AND APPLIED MATHEMATICS 2018–2019**

September 1, 2018

Dear Graduate Students,

This handbook is prepared to aid you in earning a Ph.D. degree in Applied Mathematics. Please read it carefully and be aware of the requirements and responsibilities described. The information contained in this handbook is more specific than that in the Graduate School Bulletin. You should also familiarize yourself with the general regulations of The Graduate School.

Please feel free to come in to see me if you have any questions, problems, or points of concern.

David Chopp, Professor and Chair

# Contents

<b>1</b>	<b>PhD Program Mission Statement and Goals</b>	<b>7</b>
1.1	Mission Statement . . . . .	7
1.2	Program Goals . . . . .	7
<b>2</b>	<b>FIRST YEAR ADVISOR</b>	<b>7</b>
<b>3</b>	<b>PhD DEGREE IN ENGINEERING SCIENCES AND APPLIED MATHEMATICS</b>	<b>8</b>
3.1	Residency and Course Load . . . . .	8
3.2	Research . . . . .	8
3.3	Course Requirements . . . . .	8
3.3.1	Students Entering with BS Degree . . . . .	8
3.3.2	Students Entering with MS Degree from another Department or Institution . . . . .	10
3.3.3	Students Entering with MS Degree from ESAM . . . . .	10
3.4	Obtaining a MS Degree after the First Year . . . . .	10
3.5	Teaching Requirement . . . . .	10
3.6	English Language Requirement . . . . .	10
3.7	The Preliminary Examinations . . . . .	11
3.8	Permanent Advisors . . . . .	11
3.8.1	The Selection Process . . . . .	11
3.8.2	The Faculty Advisor's Role . . . . .	12
3.9	The Qualifying Examination . . . . .	12
3.9.1	Time Requirements: . . . . .	12
3.9.2	Qualifying Examination Procedure and Committee Makeup . . . . .	12
3.9.3	Outcome of the Qualifying Examination . . . . .	13
3.10	Annual Reviews . . . . .	13
3.11	The Thesis Defense/Final Examination . . . . .	14

3.12 Graduate Student Tracking System (GSTS)	15
3.13 Academic Standing	15
3.14 Appeals Process	15
<b>4 GENERAL INFORMATION</b>	<b>15</b>
4.1 Stipend Checks	15
4.2 Research Registration	16
4.3 Pass/No-Credit Option	16
4.4 Academic Honesty	16
4.5 Work Obligation of Graduate Students and Other Limits on Outside Compensation	17
4.6 Vacation Policy for Graduate Students	17
4.7 Student Support and Conflict Resolution	17
4.8 Consumption of Alcoholic Beverages	18
4.9 Student's File	18
4.10 Change of Address	18
4.11 International Students	18
4.12 Colloquium Series	18
4.13 Safety	19
4.14 Keys	19
4.15 Computing Facilities	19
4.16 Student Lounge	19
4.17 Desk and Research Space Assignment	20
4.18 Telephone, Fax, Mail, Photocopying, and Printing	20
4.19 Kitchen, Large Conference Room, and Supply Cabinet	20
4.20 Automobile Regulations	21
4.21 The SIAM Student Group	21
4.22 The Women of Engineering Sciences and Applied Mathematics (WESAM) Group	21

4.23 Website/Bulletin Boards . . . . .	21
4.24 Student Tea . . . . .	22
4.25 Conference Travel Grants . . . . .	22
4.26 Bike Riding and Skateboarding . . . . .	22

## INFORMATION FOR GRADUATE STUDENTS

*Welcome to the Engineering Sciences and Applied Mathematics Department. Please keep and refer to this booklet throughout your years as a graduate student. Every effort has been made to anticipate your questions from arrival on campus through final checkout. You are responsible for knowing this material!*

**Key Personnel:** Throughout this handbook there are references to certain administrative people. Their names and contact information are below.

Title	Name	email	phone
Department Chair	David Chopp	<a href="mailto:chopp@northwestern.edu">chopp@northwestern.edu</a>	847-491-8391
Director of Graduate Studies	Alvin Bayliss	<a href="mailto:a-bayliss@northwestern.edu">a-bayliss@northwestern.edu</a>	847-491-7221
Business Administrator	Catherine Cotter	<a href="mailto:catherine.cotter@northwestern.edu">catherine.cotter@northwestern.edu</a>	847-491-5586
Graduate Student Assistant	TBD		847-491-3345
Dept. Computing Manager	David Chopp	<a href="mailto:chopp@northwestern.edu">chopp@northwestern.edu</a>	847-491-8391
Safety Coordinator	TBD		

# 1 PhD Program Mission Statement and Goals

## 1.1 Mission Statement

The PhD program is designed to develop graduate students with a broad skill-set in mathematical modeling and analytical and computational solution methods that will enable them to do original research culminating in a thesis that contributes novel mathematical techniques and/or novel applications of mathematics to current problems in the research community.

## 1.2 Program Goals

Learning objectives	Requirement	Assessment Strategies and Criteria
Demonstrate mastery of core mathematical concepts	Prelim Exams	<u>Assessment Strategy:</u> Faculty design written exams to evaluate skills in advanced calculus, linear algebra, differential equations, and complex variables. <u>Criteria:</u> Receives passing score on each exam topic during the first year of the program.
Design an original research project.	Qualifying Exam	<u>Assessment Strategy:</u> Oral presentation of a proposed thesis research topic to a thesis committee. <u>Criteria:</u> Proposes an original research topic that is consistent with the program mission. Demonstrates mastery of relevant mathematical topics required to complete the proposed research.
Communicate research progress.	Annual Review	Student presents oral progress report on research accomplishments during the academic year to the thesis committee. Student receives feedback from thesis committee on rate of progress, potential pitfalls, and advice for improvement.
Develop classroom skills.	Teaching	Teaching assistant collaborates with professor and fellow TAs. TA conducts assessments of students, consults with students during office hours. TA's are assessed for effectiveness in instruction by the supervising faculty and by use of CTEC data.
English language proficiency for international doctoral students.	Versant or SPEAK test	<u>Assessment Strategy:</u> Administration of Versant and/or SPEAK test <u>Criteria:</u> Receives passing score sufficient to a TA for an undergraduate discussion section.

## 2 FIRST YEAR ADVISOR

During New Student Week, you will meet with your first-year advisor who will assist you in selecting courses for your first quarter of study. The first-year advisor will be your course advisor during the first year of the program until you choose your research advisor in the spring of your first year.

## 3 PhD DEGREE IN ENGINEERING SCIENCES AND APPLIED MATHEMATICS

### 3.1 Residency and Course Load

The minimum residence requirement for the PhD degree is eight consecutive quarters, including summer, at Northwestern. **Course and 590 (research) units should total to 3-4 units each quarter to maintain full-time status.**

### 3.2 Research

Graduate study should be considered full-time employment. Annual academic progress reports must also be completed by the student each summer.

### 3.3 Course Requirements

#### 3.3.1 Students Entering with BS Degree

Students entering with a BS Degree must take at least eighteen graded academic courses. P/N grades are not allowed. Full-time students are required to take twelve academic courses during their first three quarters (excluding the summer quarter) of graduate study at Northwestern. Enrollment in the core curriculum is mandatory. According to University policy, students must maintain a 3.00 average to receive financial assistance. GPAs are calculated according to the following scale: A = 4, A- = 3.7, B+ = 3.3, B = 3, B- = 2.7, C+ = 2.3, C = 2 and will appear on graduate student transcripts.

##### 3.3.1.1 Core Courses in Engineering Sciences and Applied Mathematics

The following courses comprise the required core units of the graduate curriculum in engineering sciences and applied mathematics:

ES_APPM 411-1,2,3	Differential Equations of Mathematical Physics (3 units)
ES_APPM 412-0	Methods of Nonlinear Analysis (1 unit)
ES_APPM 420-1,2	Asymptotic and Perturbation Methods in Applied Mathematics (2 units)
ES_APPM 421-1	Models in Applied Mathematics (1 unit)
ES_APPM 446-1	Numerical Solution of Partial Differential Equations (1 units)
ES_APPM 445-0	Iterative Methods for Elliptic Equations (1 unit)
ES_APPM 448-0	Numerical Methods for Random Processes (1 unit)
ES_APPM 444-0	High Performance Scientific Computing (1 unit)

In addition to these core courses, students are required to take a minimum of two units of mathematical



modeling courses for a total of thirteen required courses. The remaining five course requirements are electives.

Full time students are expected to take 411-1,2,3, 412-0, 420-1,2, 421-1, 446-1 and 448-0 during the first year of study. In addition, during the first year students must take either 444-0 or 445-0 depending on which of these is offered. An additional two units of mathematical modeling courses as determined by the department are also required during the first year. The remaining required courses not taken during the first year are to be taken during the second year.

### **Waiving Core Courses:**

Students who are sufficiently prepared in the subject matter of a core course may petition for a waiver from the course requirement. The waiver must be approved both by the first-year advisor and the Department Chair. The petition will require documentation, e.g. text used, course outline, lecture notes, exams, etc. In some cases students may be asked to take an exam to demonstrate they have mastered the course material. The signed petition should be given to the Graduate Student Assistant to be placed in the student's file. Please note that waiving a core course does not decrease the total number of courses required.

### **3.3.1.2 Elective Courses**

The remaining five courses for the PhD are electives and are to be selected by the student in consultation with his or her advisor. Up to three of the elective courses can be in any department in engineering, mathematics or the physical sciences subject to the approval of the student's advisor and designated as approved Graduate School courses. The remainder of the elective courses must be taken within the ESAM department unless a request to vary from this requirement is approved by the student's research advisor and by the Department Chair. Any courses taken for the PhD must be an extension of the student's background rather than a repetition of work done as an undergraduate.

### **3.3.1.3 Responsible Conduct of Research**

Responsible Conduct of Research (RCR) training is required by the Graduate School of all first-year graduate students and consists of two parts. The first part is GEN\_ENG 519: Responsible Conduct of Research for Engineers. The second is a CITI online course. To be considered in good standing within the PhD program **both** of these requirements must be completed by the deadlines indicated below.

1. **GEN\_ENG 519:** This is a five-week course that meets weekly for three hours. The course is offered twice every academic quarter (Fall through Spring). Students should enroll in **GEN\_ENG 519** through Caesar during the regular course registration periods. A satisfactory grade of "S" is required.

**Completion Deadline:** End of the Spring Quarter of the first year of study

2. **CITI Online Course:** The course consists of 9 common core modules. A passing grade of at least 80% is required on accompanying quizzes. Information on setting up a CITI account can be found at: [http://www.tgs.northwestern.edu/documents/postdocs/Instructions for Accessing CITI.docx](http://www.tgs.northwestern.edu/documents/postdocs/Instructions%20for%20Accessing%20CITI.docx).

The CITI online completion certificate should also be emailed to the Graduate Student Assistant upon completion of the course.

**Completion Deadline:** December 1st of the first year of study

### 3.3.2 Students Entering with MS Degree from another Department or Institution

Students entering with a MS Degree must take at least eighteen graded academic courses. All requirements in Section 3.3.1 must be satisfied.

Permission to count courses taken during MS study against the thirteen required courses may be granted by the Department Chair. Approval may require documentation, e.g. text used, course outline, lecture notes, exams, etc. In some cases students may be asked to take an exam to demonstrate they have mastered the course material. If an exemption is granted, a signed waiver form should be returned to Graduate Student Assistant to be placed in the student's file. Please note that waiving a core course does not decrease the total number of courses required.

### 3.3.3 Students Entering with MS Degree from ESAM

Students entering with a MS Degree from the ESAM Department must take at least six additional graded academic courses, which also must include any core courses that were not taken when earning the MS degree. All other requirements in Section 3.3.1 must be satisfied.

## 3.4 Obtaining a MS Degree after the First Year

Students are strongly encouraged to apply to receive a MS degree at the end of the first year. To receive the degree, the student must be in good standing including successful completion of the first year course requirements. Complete an application for a MS degree in Caesar at the beginning of Spring quarter. For the exact deadline for completion of the application, see the [graduate school website](#). **For those considering applying for an NSF Graduate Student Fellowship:** A change in NSF policy has made it so that student who receive an MS prior to application for the fellowship are ineligible. We therefore recommend that those intending to apply for the fellowship in the Fall of their second year to delay applying for the MS until the beginning of Fall quarter.

## 3.5 Teaching Requirement

All students in the PhD program are required to serve in some instructional capacity for at least one academic quarter. This may include, but is not limited to, serving as a teaching assistant or a grader. Most students complete their teaching requirement during the second year of studies.

Students are required to enroll in GEN\_ENG 546-0 (Teaching Experience) during any quarters they work as a teaching assistant.

## 3.6 English Language Requirement

International PhD students must fulfill [The Graduate School's English Proficiency Requirement](#), which establishes a minimum level of spoken English proficiency. All international PhD students whose primary language is not English are required to fulfill The Graduate School's spoken English proficiency requirement before being appointed as graduate or teaching assistants. This requirement must be fulfilled by the end

of Spring quarter of the first year of study for the student to maintain good academic standing. Failure to meet the requirement may result in dismissal from the PhD program at the end of Spring quarter of the first year.

Entering PhD students who have not yet fulfilled the English Proficiency Requirement must take the [Versant English Test](#) once they arrive at Northwestern. Versant test sessions are held on the Evanston campus each year in early September. For more information about the Versant test as well as English language tutoring resources, see the [Versant testing page](#). Please also see the [2018 TGS New Student Guide](#).

### 3.7 The Preliminary Examinations

Within the first two weeks of the Winter quarter of the first year of study, students will be given four preliminary examinations on the topics of advanced calculus, differential equations, linear algebra, and complex variables. These Preliminary Examinations will be on advanced undergraduate material. Sample examinations from previous years as well as a list of textbooks that cover the topics will be e-mailed to each entering PhD student before the start of Fall quarter. The exams will be given as four separate 2-hour exams scheduled so that they do not conflict with the students' courses.

Students who fail one or more exams will be given an opportunity to retake a new exam on the same subject(s) within the first two weeks of the Spring quarter of the first year. To remain in good academic standing in the PhD program and to continue into the second year of study, students are required to pass all four preliminary examinations. Students who are unable to pass all four exams, but otherwise satisfy all the requirements for an MS degree, can be awarded an MS degree at the end of the Spring quarter, but are otherwise not permitted to continue in the PhD program beyond the Spring quarter.

### 3.8 Permanent Advisors

#### 3.8.1 The Selection Process

In the spring of the first year of the program, students in good academic standing need to identify a permanent research advisor. Students are expected to select an advisor from the ESAM faculty. Exceptions from this policy must be approved by the Department Chair. This identification process begins with faculty giving presentations on their research in a series of half-hour sessions. The sessions will include information about the technical work to be completed. Students interested in presented topics are strongly encouraged to contact the faculty individually to discuss further details about the project. Students should talk with every ESAM faculty member whose project is of interest and if appropriate, request to join the faculty's research group. Once a faculty member and student agree to work together, the faculty member becomes the student's permanent advisor for the remainder of the PhD program as long as progress remains satisfactory.

All first-year students in the PhD program must submit to the chair their choice for advisor no later than May 20 in the spring of their first year. The choice for advisor is submitted by entering the selection into GSTS under the Committee tab. Failure to obtain a research advisor by that date will remove the student from good standing and continuation in the program will be at risk. It is the student's responsibility to find a research advisor. Students having difficulty should contact their first year advisor and/or the department chair for guidance.

It is hoped that this process will provide each student with an advisor who will satisfy the student's research

interests. Faculty members in the Department conduct research over a wide spectrum of areas. Please be aware, however, that availability of any particular project is subject to the availability of funds to support that research.

In rare instances, a change of advisor may be necessary due to loss of funding or for other reasons. The Department Chair handles such changes on an individual basis.

### **3.8.2 The Faculty Advisor's Role**

The permanent advisor will provide advice concerning your graduate studies and **must** be consulted about course selection. The advisor may, especially in the early stages of your graduate career, provide fairly close direction of your thesis research. The advisor will also serve as chairman of the faculty committee that conducts your qualifying examination and your thesis defense.

*Responsibility for meeting published deadlines and degree requirements rests with the student.*

The Northwestern University Academic Calendar is available at <http://www.registrar.northwestern.edu/calendars/index.html>. The Graduate School deadlines and requirements can be found on their website at <http://www.tgs.northwestern.edu/academics/degree-requirements/index.html>.

## **3.9 The Qualifying Examination**

### **3.9.1 Time Requirements:**

Students entering the program with a B.S. degree or a M.S. degree from outside ESAM must take the Qualifying Examination by the end of the second year (including summers); students entering with a M.S. degree from ESAM, must take the exam by the end of the first year. Students are encouraged to take the examination earlier, if possible. Exceptions for extenuating circumstances must be made by petition to the Chair and signed by the student's advisor.

### **3.9.2 Qualifying Examination Procedure and Committee Makeup**

The precise nature of the examination is decided by the committee. The examination will be wholly or partially oral. The content of the exam is determined by the research advisor(s) and can include a brief presentation of the proposed thesis research project in addition to questions drawn from course material relevant to the project. The student must identify, in consultation with the research advisor(s), at least three graduate level ESAM courses that are most relevant to the proposed project. The list of courses must be approved by the committee prior to the examination and the student will be expected to answer questions based on those courses. The exam will be conducted by the student's approved thesis committee. See Section 3.11 for the rules concerning the makeup of the thesis committee.

Students should:

1. Personally contact each member of the committee to find a date and hour satisfactory to each one. Reserve a conference room for at least 3 hours.

2. Fill and submit the TGS Prospectus Form on Caesar.
3. Enter the names of the committee members in GSTS under the Committee tab and identify their role as Qualifying Exam Member.

### **3.9.3 Outcome of the Qualifying Examination**

One of three possible outcomes will result from the qualifying examination:

1. Pass: The student is now recognized by the Graduate School as a candidate for the Ph.D. degree.
2. Fail with option to retake: The Qualifying Examination Committee determines the student has not performed satisfactorily on the exam, but well enough to have an opportunity to retake the Qualifying Examination at a later date. The retaken Qualifying Examination must still be passed by the end of the twelfth quarter in order for the student to continue in the PhD program.
3. Fail: The student cannot continue in the Ph.D. program. A student who fails the Qualifying Exam may consult with his/her advisor and the Department Chair to determine the best course of action following this result.

Students failing to pass the Qualifying Examination within the time limits outlined above are generally not eligible to receive financial aid from University sources (Research Assistantships, Fellowships, and Teaching Assistantships).

The Graduate School does not recognize a candidate for the PhD degree until the Qualifying Examination is passed.

### **3.10 Annual Reviews**

The Graduate School requires programs to conduct annual academic reviews of all students in the program. As part of this review, students past their qualifying exam must schedule an annual meeting, during the Spring or Summer quarter, with their thesis committee to discuss and receive feedback about their research progress. Before this meeting, the information under the Academic Progress tab in GSTS must be completed by the student. In the meeting, the student must present to the thesis committee the work accomplished in the preceding year. It is recommended that the presentation be in the format of slides or poster comparable to what would be presented short talk at a research conference. The precise format and content should be discussed with the thesis advisor(s) prior to the meeting. As a guide, the presentation should last approximately 20 minutes followed by questions and discussion. The primary goal is to summarize the progress toward completion of the degree highlighting the work performed in the previous year and a brief summary of the goals for the following year. After the meeting, in the box labeled Annual Meeting, students must state the date the meeting with the thesis committee occurred and give a summary of the feedback received from the committee. Once the summary is reviewed by the advisor(s) and given their approval in GSTS, the Director of Graduate Studies will do a final review and submit your report to the Graduate School. Annual reports must be completed by the end of August each year.

In addition to the annual review, there are two additional tasks to be completed in GSTS. First, students must also complete/update the information in the Research Project tab in GSTS and ensure that the information is current and reflects any changes from the previous year. Second, students must sort the courses listed in the Unassigned list into the correct categories under the Plan of Study Tab.

### 3.11 The Thesis Defense/Final Examination

Each PhD candidate must successfully pass a Final Examination based principally on work presented in the dissertation. A faculty committee consisting of at least three faculty members conducts the examination. At least two committee members must be from the faculty of ESAM and at least two committee members must be graduate school faculty including the chair. This examination involves a mandatory open and publicized oral presentation and discussion during the first hour followed by a closed examination with only the committee.

#### Procedures:

Students should

1. Apply for a PhD degree in Caesar.
2. Choose faculty committee members and request their participation. Upon agreement enter the committee on the PhD Final Exam Form in Caesar, and also enter their names under the Committee tab in GSTS and mark their role as Final-Thesis Member.
3. Contact committee members to set date and time. Once the date is set, enter the date on the PhD Final Exam Form in Caesar.
4. Receive the advisor's approval that the dissertation is in final form and ready to be presented to the committee for review. ("Final form" means fully proofread. Faculty members should not be expected to serve as proofreaders.)
5. Reserve a conference room. Contact the Department office staff to reserve a room and so that a public notice of the presentation can be posted. Supply names of committee members for submission to the Graduate School **at least three weeks** before the exam. Enter information regarding committee members, date and title of thesis on the Caesar website under PhD Final Defense.
6. Note that the deadline for taking the exam and submitting the dissertation to the Graduate School varies each quarter. Consult the timetable on the Graduate School website for exact dates each year.
7. Be reminded that the format of the dissertation must conform to standards established by The Graduate School and available on their website at <http://www.tgs.northwestern.edu/documents/policies/dissertation-format-guidelines.pdf>.
8. Present each examining committee member with a copy of the dissertation **at least two weeks** before the examination.
9. After final approval, turn in one unbound copy of the dissertation to the Department office to be bound (at department expense) for the ESAM collection. (Additional copies may be given to the office to be bound at the student's expense.)
10. Provide the Department with a 1-2 paragraph summary of your dissertation in a form that is written for a general audience, and could be posted on the department website.
11. Before final departure, complete the sign-out sheet, return borrowed items (theses, library books, etc.), and be sure to leave a forwarding address with the Engineering Sciences and Applied Mathematics Department office. Upon return of all keys, the key deposit will be returned.

### 3.12 Graduate Student Tracking System (GSTS)

Students are expected to maintain their current information in the Graduate Student Tracking System (GSTS, <http://gsts.northwestern.edu>). The Graduate Student Tracking System allows students to track their progress and activity in one place. Students log in with their NetID and use the tool to communicate with their program on their plan of study, coursework, milestones, and annual progress.

### 3.13 Academic Standing

The Graduate School details procedures for determining Good Academic Standing, Probation, and Exclusion. See the Graduate School website at:

<http://www.tgs.northwestern.edu/about/policies/satisfactory-academic-progress.html>.

### 3.14 Appeals Process

The faculty make every effort to ensure that each student's progress is carefully reviewed and the resulting feedback is accurate and constructive. There may be, however, instances in which a student feels that a review decision is unjust or is based on incomplete or inaccurate information. If this occurs, there are appeal channels available to the student.

First, the student should discuss his/her concerns with their advisor in order to resolve any misconception or misperception. If the advisor and the student are not able to resolve the concern, an appeal may be directed to the Department Chair. The University policy for academic-related grievances is provided in The Graduate School Catalog. For non-academic matters, such policies are provided in the Northwestern Student Handbook.

## 4 GENERAL INFORMATION

### 4.1 Stipend Checks

Please see detailed information in the 2018 TGS New Student Guide. The TGS New Student Guide discusses the deadlines and mandatory information that you must submit in order to receive your stipend.

**Please Note: To avoid financial problems at the beginning of Fall Quarter, all incoming students should be aware that you will not receive your first check (direct deposit) until September 30th.**

**External Fellows:** In order to process supplements and stipends, we *must* have copies of your original award letter and any renewal/adjustment letters in subsequent years.

**Avoiding late fees:** Tuition bills are online. If anything other than tuition is owed, the bill will be passed on immediately to the student for payment. If you have any questions regarding your tuition bill, see the ESAM office staff.

## 4.2 Research Registration

During the first eight quarters of the program, Doctoral candidates enrolled in less than four courses should also enroll in ES\_APPM 590 Research to ensure full-time registration to fulfill the residency requirement. After the residency requirement is fulfilled TGS 500 is used in place of ES\_APPM 590 for the duration of the program. **Note: Summer registration is mandatory for all students on university support or on F-1 or J-1 visas.**

## 4.3 Pass/No-Credit Option

Students working toward an MS or a PhD in Engineering Sciences and Applied Mathematics may **not** use courses taken on a P/N basis to satisfy course requirements. Graduate students may, with the approval of their advisor, take courses on a P/N basis *after* satisfying the departmental course requirements.

## 4.4 Academic Honesty

Students are strongly advised that originality is essential in all homework, projects, exams, theses, etc. associated with graduate work. Students are required to do their own work. Ideas, data, or word-for-word quotations taken from other sources (**including the work of fellow students and other group members**) must be appropriately referenced; otherwise plagiarism will have been committed. The following statements should help define what is meant by “appropriately referenced”:

1. All ideas, data, mathematical expressions, and word quotes taken from the works of others should be clearly and directly referenced to the original author. This is best accomplished by listing a reference number after the material with the numbered references appearing at the end of the manuscript. The following format is also acceptable:  
“The equation can be derived following the approach of Jones<sup>33</sup> as follows:...”
2. Word for word quotes must have quotation marks at the beginning and end and be referenced in the manner described above.
3. Photocopied figures should be referenced as described in 1. above.
4. Redrawn figures or plots made from other people’s table of data can be appropriately labeled “after Smith<sup>43</sup>”.
5. Each person should receive proper recognition for contributions made.

**Special note: group collaboration on homework assignments is at the discretion of the professor. Unless otherwise stated, students are expected to turn in their own original work.**

In accordance with Graduate School regulations, “All cases of alleged academic dishonesty involving students of The Graduate School are to be referred by members of the faculty to the Dean of The Graduate School” as well as the Associate Dean of Graduate Studies of McCormick. A student found guilty of academic dishonesty runs the risk of being dismissed immediately from the graduate program.

*On Being a Scientist* by the Governing Board of the National Research Council is available at [http://www.nap.edu/catalog.php?record\\_id=12192#toc](http://www.nap.edu/catalog.php?record_id=12192#toc).



Northwestern University's [Office for Research Integrity](http://www.research.northwestern.edu/ori/misconduct/) provides guidance on ethical conduct of research. Information about research misconduct is available online at <http://www.research.northwestern.edu/ori/misconduct/>. Students should be familiar with the contents of these two documents. The Department expects the highest levels of integrity from students and faculty.

#### 4.5 Work Obligation of Graduate Students and Other Limits on Outside Compensation

First year students fully supported by University Fellowships are expected to concentrate their full effort on their coursework and preparation for the written preliminary examinations. Teaching Assistants are expected to average 20 hours per week on their teaching responsibilities; the remaining workweek shall be dedicated to coursework and research. Students supported by research grants are expected to work on thesis research an average of no less than twenty hours per week while taking courses, and full time otherwise, for the research project from which the stipend, supplement and/or tuition are paid. Since most support monies are derived from government or industry contracts and grants, it is the students' responsibility to perform their assigned research tasks in a timely manner. It should be noted that most contracts require formal progress reports on the research performed.

Students are not to hold additional part-time jobs, except where there are exceptional extenuating circumstances and with the consent of the advisor and department chair.

#### 4.6 Vacation Policy for Graduate Students

Students receiving financial aid through the University (Research Assistantships, Fellowships, Teaching Assistantships) are entitled to [staff holidays](#). Please note that the breaks between academic quarters, such as at Christmas and spring break, are not vacation periods. Paid vacation or excused absences must be arranged in advance with the faculty advisor. A paid vacation of two weeks per year is considered normal for a student making satisfactory progress toward a degree. If approval from the advisor is not obtained before taking any time off, loss of financial support may result. Students electing not to take vacation are not entitled to any extra compensation.

#### 4.7 Student Support and Conflict Resolution

Students should speak with the Department Chair to interact in a confidential manner when concerns arise.

#### 4.8 Consumption of Alcoholic Beverages

Consumption of alcoholic beverages in the Technological Institute, except at official departmental functions and such recognized events as post-defense celebrations, is incompatible with sound safety and work-place practices and is therefore unacceptable. **We expect our students to abide by Illinois laws concerning all controlled substances.**

## 4.9 Student's File

In addition to the information contained in GSTS, folders are kept in the department offices for each student. They contain additional materials not currently maintained in GSTS such as application materials, approved study programs, grades for completed courses, records of completed examinations, names of committee members, current address, phone numbers, etc. In accordance with Government regulations a student is allowed access to his file after submitting a written request to the department. Educational records cannot be released to any outside agency without the student's written consent. Students applying for credit cards, etc., which require employment and/or salary verification by the department, must inform the department that such a request may be forthcoming. Verification of employment may also be done through NU's Employment Verification Infoline at <https://www.theworknumber.com>.

## 4.10 Change of Address

The Department Office must be notified of any change of address. Students may change their home address through the HR website <https://nuhr.northwestern.edu> and also in Caesar. Be sure to change your address in both as the two systems are separate.

The US Citizenship & Immigration Services (USCIS) requires every international student and scholar to report a change of address within 10 days of their move. It is critical for F-1 and J-1 students to update their address in CAESAR immediately upon their relocation. For J-1 and H-1 scholars they will need to inform the international office as soon as possible. All F-1 students, J-1 students and scholars, and H-1B scholars will also need to complete a change of address form (AR-11) available on the USCIS website at: <http://uscis.gov/>. Failure to do so will be a violation of their F-1 or J-1 status and could result in severe consequences for them and their dependent(s)!

## 4.11 International Students

Upon arrival all international students must register immediately with the International Student Office, 630 Dartmouth Place, Evanston Campus, who will act as advisor on all matters concerning employment practice, visa renewals, etc.

## 4.12 Colloquium Series

The Department organizes the colloquium series that meets on Mondays at 4pm. Its primary purpose is to broaden the education of each graduate student by bringing to campus the leaders in our field. Attendance is recommended for all graduate students, but required for all first-year graduate students.

## 4.13 Safety

The department has taken a number of steps to help provide a safe environment for your research. In the event of an alarm requiring evacuation of the building, all members of the department are expected to evacuate to the department rally point in the lobby of the Catalysis Center, which is located at the end of

the bridge on the second floor of the K wing on the south side of Tech. When you arrive at the rally point, report to the Safety Coordinator so we can ensure everyone's safe exit from the building.

#### 4.14 Keys

Graduate students will receive a key for their office in the Technological Institute. In order to get your keys, you must obtain an application in the Department Office, to be filled out and returned to the Graduate Student Assistant with a key deposit of \$15 (cash only). **Keys must not be passed on to anyone else.** Students may not be in the Department Office after normal working hours, generally 8:30 AM to 5:00 PM.

#### 4.15 Computing Facilities

Linux computers are available for general academic and research use in the student offices. Some computers in student offices are not for general use, but rather are for specific research projects. Contact the Department Computing Manager, if you have any questions about which computers are available for general use. New students are assigned a user ID based on their NU net ID that allows them to log in to any of the department Linux computers, and also allots storage space that is on a shared server that can be accessed from any of the Linux computers. The Manager must be consulted prior to addition or deletion of any software or hardware on these systems, or in the event of system malfunctions. **Important: The department linux computers are backed up nightly, so they must be left on and connected to the network at all times.** Please check beforehand with the Manager if a computer must be disconnected for any reason.

Students may also access the department network via their own personal computer. To obtain access, send an email to the Graduate Student Assistant with: Name, office #, operating system, whether it is a laptop or desktop, and the Ethernet MAC address. An Ethernet connection is required to use the department printers, wireless connections are not on our local subnet, and hence will not allow access to the printers.

#### 4.16 Student Lounge

The graduate student lounge is located in room M443. It is managed by the ESAM graduate student leadership. All students are expected to comply with the rules set by the graduate student leadership to keep the lounge as a pleasant place for students to gather. Access to the student lounge is by an access code for a numeric pad on the door. Contact the Graduate Student Assistant if you do not know the access code. Please do not share the access code with non-ESAM people. Use of the lounge is intended only for ESAM students, faculty, and staff.

#### 4.17 Desk and Research Space Assignment

A desk for personal use will be assigned to each graduate student. The assignment of both desk and research space are handled by the Department on an annual basis. Office assignments may change each year, usually over the summer. No changes should be made without authorization of the Department Chair. When not in use, please unplug any appliances (e.g. coffee makers, water heaters) to reduce the risk of fires and environmental impacts.

## 4.18 Telephone, Fax, Mail, Photocopying, and Printing

**Telephones.** Telephones are provided in all student offices, however, their use should be limited to university business only. **Personal calls should be made on cell phones.** Long distance calls require an access code. Persons who may have occasion to call you for business purposes from outside the University should be given the telephone number of the main Department office (847)-491-3345. **Collect calls are not acceptable, by Northwestern regulations.**

**Postal Service.** Mail is delivered once a day to the Department Office. The student mailboxes are in M426; you will find your mail and messages in your assigned box above your name label. It is advisable to check your mailbox daily. Use of the University mailing address for personal mail is not allowed by NU regulations.

**Photocopying, Copy Cards, and Faxing.** A photocopying machine for research and teaching related copying is available in the Department Office. Copy cards for use in copying machines at the library are available through the Wildcard Office or Main Library. Photocopying services are also located at Norris Center and 2020 Ridge for large orders. Personal copying should be kept to a minimum on the department machine. Long distance faxes require an access code. See the department for personal faxes.

**Printing.** A black and white printer is provided in the Student Lounge, M443. A color printer is provided in the main office, M426. The black and white printer should be used, with duplexing turned on to save paper, unless color is **absolutely necessary.** Use of the printers is for academic and research purposes only, and not for personal use. Information about accessing the printers from the Department provided computers or your personal computer can be found on the Department website under student resources.

## 4.19 Kitchen, Large Conference Room, and Supply Cabinet

**Kitchen.** Kitchen use is restricted to ESAM department members. Please comply with the kitchen rules that are posted. Do not leave personal items in the kitchen. After washing your dishes, be sure to dry them and remove them promptly. The microwave and toaster oven should not be left unattended while in use. Clean up any food that splatters, drips or spills. Remember, it is easier to clean up the mess when it is still fresh. As a courtesy to other department members, please only take tea and other supplies on a single-use basis. Finally, to prevent flooding, make sure the hot water dispenser is completely turned off after use. There is no janitorial service to clean up this space, so it is your responsibility to keep the area clean and clear of personal belongings.

**Large Conference Room (M416).** If you need to enter/exit the conference room, please do so through the Tech hallway, not the department office. The conference room should be left in the condition that it is found. If chairs or other furniture are moved, they should be returned to their original position. Do not leave food in the room; properly dispose of any garbage. This room acts as a classroom and event space, and should be kept tidy at all times. Please do not prop open the door to M416, it should be kept closed at all times the room is not being used.

**Supply Cabinet (M426).** Limited supplies (pens, notebooks, etc.) are available for research purposes. These supplies are not for personal or class use. Please only take one of each item at a time.

## 4.20 Automobile Regulations

The University Police Parking Division controls the NU parking lots. Students requiring a sticker that will enable them to park in the various University parking lots should obtain an application from the Parking Office located at 1841 Sheridan Road, Evanston (open Monday through Friday, 8:00 A.M. to 4:00 P.M.). Applications are issued upon presenting your University I.D. card, driver's license and payment of a fee. Additional information can be found at <http://www.northwestern.edu/up/parking>. For your information, all students who park cars on campus are required to register the car with the Parking Office. Bicycles should also be registered.

## 4.21 The SIAM Student Group

The Northwestern Student chapter of SIAM (Society for Industrial and Applied Mathematics) was established in 2011. Each year (usually at the end of the Spring Quarter) an election is held to fill the offices of President, Vice President, Secretary/Treasurer, Activities Chairman, and Faculty Representative. The Officers serve as liaison to the Faculty and Department administration in representing the students' interests. They also organize various social and professional activities throughout the year. Students are automatically members and are encouraged to participate. For international students the club provides valuable interaction for the development of English proficiency.

## 4.22 The Women of Engineering Sciences and Applied Mathematics (WESAM) Group

The [WESAM](#) group is a group of Northwestern students, postdocs, and professors who promote equal opportunity for women in the mathematical sciences through outreach, professional development, and community building. WESAM meets monthly to discuss articles, plan events, and plan fun events for the group. Contact Prof. Vlahovska for more information.

## 4.23 Website/Bulletin Boards

For any events, achievements, awards, or other newsworthy information, please contact the Business Administrator in the Department Office with the information so that it can be posted to the website. The bulletin board by the front office is for department business, please contact Business Administrator if you wish to post an announcement. The research bulletin boards located in the hall are available for students to post recent conference posters. If you have a new poster you would like to post, please contact the Graduate Student Assistant. Posters are rotated in on a first in/first out basis.

## 4.24 Student Tea

Student Tea is an opportunity to network with other ESAM graduate students, share information about your research, and discuss topics of interest. Student Teas are held weekly, usually on Friday afternoons, in the Large Conference Room.

## 4.25 Conference Travel Grants

Conference Travel Grants provide funds to assist PhD students to travel to conference and seminars, and to make presentations on your research. Information on eligibility and amounts can be found on the [TGS website](#) and on the [Department website](#).

## 4.26 Bike Riding and Skateboarding

For obvious safety reasons, bike riding and skate boarding are prohibited in the corridors of Tech. **In addition, bikes may not be stored in public spaces in the building, in particular the stairwells where they can pose an evacuation hazard.**