INFORMATION FOR MASTER DEGREE STUDENTS

IN MATERIALS SCIENCE AND ENGINEERING

2020-2021

Nondiscrimination Statement:

Northwestern University does not discriminate or permit discrimination by any member of its community against any individual on the basis of race, color, religion, national origin, sex, pregnancy, sexual orientation, gender identity, gender expression, parental status, marital status, age, disability, citizenship status, veteran status, genetic information, reproductive health decision making, or any other classification protected by law in matters of admissions, employment, housing, or services or in the educational programs or activities it operates. Harassment, whether verbal, physical, or visual, that is based on any of these characteristics is a form of discrimination. Further prohibited by law is discrimination against any employee and/or job applicant who chooses to inquire about, discuss, or disclose their own compensation or the compensation of another employee or applicant.

Northwestern University complies with federal and state laws that prohibit discrimination based on the protected categories listed above, including Title IX of the Education Amendments of 1972. Title IX requires educational institutions, such as Northwestern, to prohibit discrimination based on sex (including sexual harassment) in the University's educational programs and activities, including in matters of employment and admissions. In addition, Northwestern provides reasonable accommodations to qualified applicants, students, and employees with disabilities and to individuals who are pregnant.

Any alleged violations of this policy or questions with respect to nondiscrimination or reasonable accommodations should be directed to Northwestern's Office of Equity, 1800 Sherman Avenue, Suite 4-500, Evanston, Illinois 60208, 847-467-6165, equity@northwestern.edu.

Questions specific to sex discrimination (including sexual misconduct and sexual harassment) should be directed to Northwestern's Title IX Coordinator in the Office of Equity, 1800 Sherman Avenue, Suite 4-500, Evanston, Illinois 60208, 847-467-6165, TitleIXCoordinator@northwestern.edu.

A person may also file a complaint with the Department of Education's Office for Civil Rights regarding an alleged violation of Title IX by visiting www2.ed.gov/about/offices/list/ocr/complaintintro.html or calling 800-421-3481. Inquiries about the application of Title IX to Northwestern may be referred to Northwestern's Title IX Coordinator, the United States Department of Education's Assistant Secretary for Civil Rights, or both.

September 4, 2020

Dear Incoming MS Graduate Students,

Welcome to our Department!

This booklet is prepared to aid you in your educational endeavors. Please read it carefully and be aware of the requirements and responsibilities described. The information supplied herein is more specific than that in the Graduate School's *Academic Policies and Procedures (http://www.tgs.northwestern.edu/about/policies/index.html)*. You should also familiarize yourself with the general regulations of The Graduate School.

We hope your stay with us will be a most rewarding and pleasant experience. I look forward to getting to know you and working with you. I am always (well, almost always) available to help you with problems and to discuss your life at Northwestern. Please feel very free to come in to see me.

Erik Luijten
Professor and Chair

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INFORMATION FOR MS GRADUATE STUDENTS

Welcome to the Materials Science and Engineering Department. Please keep and refer to this booklet throughout your tenure as a graduate student. Every effort has been made to anticipate your questions. You are responsible for knowing this material!

I. ADVISING

Professor Yip-Wah Chung serves as the MS program Director and advisor to MS students. The Director of Graduate Studies (currently Professor Ken Shull) is also available to assist you in selecting courses. You will have time to meet with your advisor and/or the Director of Graduate Studies before the online course registration for new students begins on September 11th.

II. MS DEGREE REQUIREMENTS

A. Courses

The MS degree requires a total of twelve advanced (graduate level) 300 and 400 level courses. Eight of the twelve must be advanced MSE courses, of which 5 must be 400 levels, not including Mat Sci 499. The remaining four courses may be in other technically related disciplines. One unit of Mat Sci 499 (independent projects) may be taken in your second quarter or later. Classes must be taken for a grade rather than pass/fail. Our department course offering for the current academic year is shown at:

https://www.mccormick.northwestern.edu/materials-science/courses/

Other McCormick departments have analogous listings on their websites. The appendix of this handbook lists some sample course sequences based on registration of former MS students, as well as courses that may not be applied to the MS degree.

Students in the Northwestern-Shanghai Jiao Tong University (SJTU) dual MS program must enroll for three units of MatSci 590 (research) and satisfy a different set of requirements. Please see the appendix for details.

The Department provides $500 to each student enrolled in MatSci 499 and $1500 to each SJTU dual MS student enrolled in MatSci 590 (three units) to support his/her research. These expenses are to be charged to specific department accounts. Please contact Shirley Bar-Meir (shirley.bar-meir@northwestern.edu) to obtain such account numbers. Students in this program are not eligible for financial support such as research assistantship or tuition from the department.

B. Part-time Students

Part-time students may study for the MS degree in Materials Science and Engineering. Responsibility lies with the student to be aware of modified residency requirements and other conditions described by the Graduate School:

http://www.tgs.northwestern.edu/academics/academic-services/index.html

III. GENERAL INFORMATION

A. Pass/No-Credit Option

Students working toward an MS in Materials Science and Engineering may not use courses taken on a P/N basis to satisfy course requirements.

B. Academic Honesty

Students are strongly advised that originality is essential in all laboratory reports, term papers, exams, 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) must be appropriately referenced; otherwise, plagiarism will have been committed. The following statements should help define what is meant by "appropriately referenced":

a. 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[33] as follows ..."

b. Word-for-word quotes must have quotation marks at the beginning and end and be referenced in the manner described above.

c. Photocopied figures should be referenced as described in a. above.

d. Redrawn figures or plots made from other people's table of data can be appropriately labeled "after Smith[43]".

e. 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, e.g., copying a sentence from a paper in his/her report or term paper without citation, runs the risk of failing the course or being dismissed immediately from the graduate program.

On Being a Scientist by the Governing Board of the National Research Council is available at:

https://www.nap.edu/catalog/12192/on-being-a-scientist-a-guide-to-responsible-conduct-in

Northwestern's Office for Research Integrity policies are available online at:

http://www.researchintegrity.northwestern.edu/research-misconduct/

These two documents discuss ethical standards in the scientific community. Students should be familiar with the contents of these two documents. The Department expects the highest levels of integrity from students and faculty.

C. Student Support and Conflict Resolution

The department has designated the following representatives as points of contact to interact in a confidential manner with students who have concerns as they arise:

Erik Luijten, Department Chair
Lincoln Lauhon, Associate Department Chair
Kathleen Stair, Assistant Department Chair
Alice Camacho, Department Business Administrator

Students who would benefit from support due to personal difficulties or interactions with persons outside the department are encouraged to contact any of the above representatives for guidance to appropriate university counseling resources. Students who have concerns arising from personal interactions within the department should raise said concerns as early as possible with any of the above representatives. We encourage students with a personal conflict to first attempt to resolve the conflict by speaking directly with the other party. If the student is not comfortable doing so for any reason, or the student is not sure whether there really is a "problem", Alice Camacho and Kathleen Stair serve as confidential, non-research faculty points of contact. If a problematic situation is identified, and the student agrees, the Department Chair will be informed of the situation and the plan to address the conflict. If at any time the student feels that his or her concerns are not being understood or addressed, he or she may contact the Department Chair directly.

D. Consumption of Alcoholic Beverages

Consumption of alcoholic beverages in Cook Hall, except at official departmental functions, 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.

E. Student's File

Each student has an electronic file in the Graduate Student Tracking System. It contains application materials, approved study programs, grades for completed courses, current address, phone numbers, etc. In accordance with Government regulations, a student is allowed access to his/her file. Educational records cannot be released to any outside agency without the student's written consent.

F. Change of Address
The Department Office must be notified of any change of address. Students may change their addresses in CAESAR.

The US Citizenship & Immigration Services (USCIS) requires every international student or scholar to report a change of address within 10 days of the move. It is critical for F-1 and J-1 students to update their addresses 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: *www.uscis.gov*. Failure to do so will be a violation of their F1 or J1 status and could result in severe consequences for them and their dependent(s)!

G. International Students
Upon arrival, all international students must register immediately with the International Student Office, 630 Dartmouth Place, Evanston Campus, who will provide advice and assistance on all matters concerning visa renewals, etc.

H. Colloquium Series
The Department organizes, at considerable expense, the colloquium series, "Advances in Materials Science". Its primary purpose is to broaden the education of each student by bringing to campus the leaders in our field. Attendance is strongly encouraged.

I. Safety
Although the University and faculty project advisers strive to maintain a safe environment, students must continually be vigilant regarding safe laboratory practice and equipment. No amount of information and training can replace common sense on the part of the experimenter. If you are uncertain about the safety of a procedure, contact your lab instructor or 499 research advisor. If this is still not resolved, please notify Prof. Yip-Wah Chung.

The department has taken a number of steps to help provide a safe environment for your research. Each incoming student is given a copy of the Cook Hall Emergency Plan, which describes the building's alarm system and evacuation procedures. You must read this material carefully and retain it for future reference. Safety glasses and appropriate clothing must be worn at all times when carrying out experiments in the laboratory or the shop. Safety glasses are available through the Office of Research Safety. Handbooks of dangerous materials and lists of biohazardous/carcinogenic chemicals are available from Research Safety in Tech NG71. Attendance at department safety meetings is required.

Special safety procedures apply to the Instrument Shop. Students are encouraged to use certain shop equipment only when they are familiar with the equipment.

Students are not to enter the office of a faculty member at any time when the faculty member is not present, and students may not be in the Department Office after normal

working hours, generally 8:30 AM to 5:00 PM. Office hours may be limited due to COVID-19.

J. Computer/Design Labs

Computers are available for individual use in the Bodeen-Lindberg Materials Design Studio in Tech C115 and the teaching lab in Cook Hall. Access is generally limited: classes and MSE undergraduates are given first and second priority use of the machines. The room may be unavailable during lab periods. These facilities are intended for academic use only. New students are assigned a user ID based on their NU net ID. Other individuals who require access may submit their request to the lab/studio manager, Dr. Kathleen Stair. Do not add or delete software or hardware to these computers. Access to the lab is by an access code for a numeric pad (Tech C115). Please do not share the access code with non MSE people.

K. Mail Service

Mail is delivered once a day to the Department Office, usually around lunchtime. You will find your mail in mail slots alphabetized by last name. Due to current COVID restrictions, mail pick-up is by appointment only. Use the below link to schedule a pick-up time.

https://outlook.office365.com/owa/calendar/NorthwesternMaterialsScienceDepartment@nuwildcat.onmicrosoft.com/bookings/

We strongly encourage you to send all mail to your personal address as we receive excessive amount of paper mail to the department office which can lead to mailings being lost. Use of the University mailing address for personal mail is not allowed by NU regulations. The outgoing US mail basket in the office is for university business only.

L. Photocopying, Copy Cards, and Faxing

Copy cards for use in copying machines at the library are available through the Wildcard Office or at Seeley Mudd Library. Photocopying services are also located at Norris Center and 2020 Ridge for large orders. A fax machine is located in the Department Office. International faxes require an access code. See the department for personal faxes.

M. 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.

N. The Materials Science Student Association (MSSA)

The MSSA was established in 1960 as the Student Chapter of ASM/AIME. Jointly with the undergraduates' Materials Science Club, it is an official student chapter of ASM and TMS-AIME. 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.

O. U-Pass

All full-time students will receive a U-Pass, which allows unlimited rides on the CTA. Information about use of the U-Pass and distribution dates is available at:

https://www.tgs.northwestern.edu/campus-life/housing-transportation/u-pass.html

P. Bike Riding and Skateboarding

For safety reasons, bike riding and skate boarding are prohibited in the corridors of Tech and Cook. In addition, bikes may not be stored in labs or in public spaces in the building.

APPENDICES

A. Sample Course Sequences

a. For those interested in pursuing a PhD after degree completion

Example 1:
Fall
MSE 391 Process design
MSE 401 Chem & stat thermos
Elective
Elective

Winter
MSE 376 Nanomaterials (not offered this year)
MSE 408 Phase transf
MSE 458 Comput mat sci
MSE 499 Projects

Spring MSE
390 Mat design
MSE 406 Symmetry & mech prop
MSE 461 Diffraction
Elective

Example 2:
Fall
MSE 391 Process design
MSE 401 Chem & stat thermos
MSE 451 Adv phys materials (prior quantum mechanics exposure strongly rec)

Winter
MSE 361 Crystallography
MSE 499 Projects
MSE 458 Comput mat sci
Elective

Spring
MSE 405 Physics of solids
MSE 406 Symmetry & mech prop
Elective

Fall
MSE 415 Fundmtl of thin film mats
MSE 458 Comput mat sci

b. For those interested to look for jobs after degree completion

Example 3
Fall
MSE 391 Process design
MSE 401 Chem & stat thermos
MSE Elective
IEMS 407 Decision tools for managers

Winter
MSE 381 Energy materials (offered in Fall)
MSE 404 Imperfections in mat
MSE 499 Projects
IEMS 402 Engineering management

Spring
MSE 382 Electrochem en mats & devices (not offered this year)
MSE 405 Physics of solids
MSE 406 Symmetry & mech prop
IEMS Selected topics in IE

Example 4:
Fall
MSE 391 Process design
MSE 401 Chem & stat thermos
MSE 340 Ceramics processing (offered in Spring)
IEMS 419 Tech entrpren

Winter
MSE 381 Materials for energy eff tech (offered in Fall)
MSE 408 Phase trans
MSE 499 Projects
IEMS 402 Engineering management

Spring
MSE 382 Electrochem en mats & devices (not offered this year)
MSE 390 Mat design
MSE 406 Symmetry & mech prop
ECON 410 Microeconomics (prior econ exposure strongly rec)

B. Courses excluded from the MS degree

Most MSE undergraduate courses may be taken towards completion of an advanced degree. The exclusions are 201, 301, 394, 396, and 399. MSE 314, 315, and 316-1,2 may be counted towards the MS degree by permission only. For courses outside of the Materials Science department, consult with Prof. Chung and the Graduate Coordinator.

C. Northwestern-Shanghai Jiao Tong University dual MS course requirements

While at Northwestern, the students are required to take a total of 12 units, three of which must be MatSci-590 (research). The remaining nine units are advanced (graduate level) 300 and 400 level courses, with a minimum of six units from materials science and engineering, of which five must be 400 level courses. The remaining courses may be in other technically related disciplines.