



**MACROMOLECULAR
SCIENCE & ENGINEERING**
UNIVERSITY OF MICHIGAN

Graduate Student Handbook 2020-2021

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734-763-2316
macro.engin.umich.edu

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Macro Staff and Faculty Directory

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 NCRC, B26-133N
 Phone: 734-936-4681

Macro Program Coordinator: Julie Pollak, jpollak@umich.edu
 NCRC, B28-3006E
 Phone: 734-763-2316

Name	Title	Home Department	Office	Phone	Uniqname	IND #
Arruda, Ellen	Professor	Mechanical Eng.	3126 GG Brown	763-5328	arruda	008
Chen, Zhan	Professor	Chemistry	4809 Chemistry	615-4189	zhanc	036
Corey, Joseph	Associate Professor	Neurology, BME, VA	F223 GRECC, VA Ann Arbor	845-3056	coreyj@med	083
Eniola-Adefeso, Lola	Professor	Chemical Eng.	G046W NCRC B28	936-0856	Lolaa	082
Glotzer, Sharon	Professor	Chemical Eng.	A117 NCRC B10	615-6296	sglotzer	043
Gong, Xiwen	Assistant Professor	Chemical Eng.	TBA	TBA	xwgong	N/A
Goodson III, Theodore	Professor	Chemistry	4819 Chemistry	647-0274	tgoodson	015
Guo, L. Jay	Professor	EECS	2304 EECS	647-7718	guo	010
Kamcev, Jovan	Assistant Professor	Chemical Eng.	1044W NCRC B28	647-1195	jkamcev	088
Kennedy, Robert	Professor	Chemistry	4815 Chemistry	615-4363	rtkenn	080
Kim, Jinsang	Professor	Mat. Sci. Eng.	133N NCRC B26	936-4681	jinsang	045
Kotov, Nicholas	Professor	Chemical Eng.	A159 NCRC B10	763-8768	kotov	066
Ku, Pei-Cheng	Associate Professor	EECS	2245 EECS	764-7134	peicheng	026
Kuroda, Kenichi	Associate Professor	Biologic & Mat. Sci, Dental	2223 Dental School	936-1440	kkuroda	062
Lahann, Joerg	Professor	Chemical Eng.	133S NCRC B26	763-7543	lahann	046
Laine, Richard	Professor	Mat. Sci. Eng.	2114 HH Dow	764-6203	talsdad	004
Larson, Ronald	Professor	Chemical Eng.	A150 NCRC B10	936-0772	rlarson	017
Lee, Somin	Assistant Professor	EECS	2243 EECS	764-7054	sleee	084
Li, Victor	Professor	Civ. & Environ.	2326 GG Brown	764-3368	vcli	074

Love, Brian	Professor	Mat. Sci. Eng.	2644 CSE	763-2013	bjlove	072
Ma, Peter	Professor	Biologic & Mat. Sci, Dental	2211 Dental School	764-2209	mapx	018
Matzger, Adam	Professor	Chemistry	2823 Chemistry	615-6627	matzger	037
McCroory, Charles	Assistant Professor	Chemistry	4807 Chemistry	763-8060	cmccroory	031
McNeil, Anne	Professor	Chemistry	2817 Chemistry	615-5204	aimcneil	022
Mehta, Geeta	Associate Professor	Mat. Sci. Eng.	3044W NCRC B28	763-3957	mehtagee	078
Pena-Francesch, Abdon	Assistant Professor	Mat. Sci. Eng.	3007E NCRC B28	TBA	abdon	028
Ramamoorthy, Ayyalusamy	Professor	Chemistry	4024 Chemistry	647-6572	ramamoor	019
Sakamoto, Jeff	Associate Professor	Mechanical Eng.	G052 Auto Lab	763-9867	jeffsaka	047
Shikanov, Ariella	Associate Professor	Biomedical Eng.	2126 LBME	615-3360	shikanov	075
Shtein, Max	Professor	Mat. Sci. Eng.	2014 HH Dow	764-4312	mshtein	020
Sodano, Henry	Professor	Aerospace Eng.	3016 FXB	764-3395	hsodano	039
Solomon, Michael	Professor	Chemical Eng.	A151 NCRC B10	764-3119	mjsolo	005
Stegemann, Jan	Professor	Biomedical Eng	2122 LBME	764-8313	Jpsteg	079
Taub, Alan	Professor	Mat. Sci. Eng.	2098 HH Dow	763-1024	alantaub	087
Tuteja, Anish	Associate Professor	Mat. Sci. Eng.	A186 NCRC B10	615-2972	atuteja	024
VanEpps, Scott	Assistant Professor	Emergency Medicine	327N NCRC B26	763-2702	jvane@med	081
Wineman, Alan	Professor	Mechanical Eng.	G042 Auto Lab	936-0411	lardan	059
Zhang, Yang	Professor	Comp Med & Bioinfo	2035 Palmer Commons	647-1549	zhng	089

Program Committees

Executive Committee

L. Jay Guo, Kenichi Kuroda, Adam Matzger

Admissions Committee

Zhan Chen, Jovan Kamcev, Abdon Pena-Francesch, Kenichi Kuroda

General Graduate Student Information

Emergency: 911

UM Police: 763-1131

Athletic Ticket Office	764-0247
Building – Plant Maintenance (Lights out, pipes leaking, etc)	647-2059
Building – Services (Spill cleanup, supplies)	764-0521
CAEN	763-5041
Campus Information Center	763-4636
Computer Help Hotline	764-4357
Student Services (Pierpont Commons B430)	763-7650
Copy Services (Art & Arch. Building)	763-3584
Services for Students with Disabilities	763-3000
GG Brown Dock (Mike Lazarz)	763-6936
Health Services	764-8320
International Center – Michigan Union	764-9310
International Center – Pierpont Commons	936-4180
Key Office	764-3481
Mail Service Information	764-9227
Mail Service – Special Pickups	764-5184
Media Union Information Desk	936-3191
Media Union Library	647-5747
Media Union Room Scheduling	647-5275
Minority Engineering Program Office	647-7120
Nite Ride	763-3888
North Campus Recreation Building (NCRB)	763-4560
HR Payroll Service Center	615-2000
Parking Services	764-8291
Procurement Services	763-8212
Rackham Graduate School	764-4415
Student Financial Operations	764-7447
Women in Engineering Program Office	647-7013

Office Space

Macro students have space available on the 3rd floor in Building 28, NCRB. The Macro suite is specifically reserved for Macro students. Once a student has a formal advisor they will receive office space associated with their lab, but may continue to use the Macro suite.

Mail

When corresponding with individuals or companies requesting catalogs or placing orders for equipment with a purchase order, be sure to give your name, address of the program, and the building. This makes it much easier for the post office to direct your mail quickly.

Most often if ordering supplies they will be shipped directly to your lab space. However if needed, items (NOT personal mail) may be sent to the Macro office. The address is:

(Your Name)
Macromolecular Science & Engineering
3003E, Building 28 NCRC
2800 Plymouth Road
Ann Arbor, MI 48109-2800

For Invoicing
University of Michigan
Accounts Payable
7071 Wolverine Tower
Ann Arbor, MI 48109-1287

Student Email

Each student will have an email address. Messages and information will be sent out periodically to the group macro.students@umich.edu and as needed to individual students.

Libraries

Rackham Graduate Library – The Rackham Graduate Library is located on the southern end of the Diag on Central Campus. This is the center of all library services and houses a reference room and stacks.

Engineering Library – The Engineering Library is located in the Duderstadt Center on North Campus

Medical Library – The Taubman Medical Library is located on the medical campus at the corner of Zina Pitcher and Catherine Streets. It houses an extensive collection of journals in physiology, biochemistry, etc.

Undergraduate Library – The Shapiro Undergraduate Library is located in the Diag next to the Graduate Library. This library contains a reserve desk and reading materials for chemistry courses numbered under 500. The Science library is located on the 3rd floor.

Funding and Enrollment

Student Rights, Responsibilities, and Academic Policies

Please see the [Rackham Graduate School Academic Policies](#) for rules and regulations regarding student rights and responsibilities. The Office of Student Conflict Resolution also publishes the [Statement of Student Rights and Responsibilities](#).

Financial Aid

All Macro PhD students are guaranteed full financial support during their tenure provided they remain in good standing with the program. Those entering with just a bachelor's degree will be provided five years of funding, those entering with a Master's will be provided four years of funding. This support comes in the form of fellowships, Graduate Student Instructor (GSI) positions, or Graduate Student Research Assistant (GSRA) positions. Announcements of fellowship competitions, GSI request, and other funding

are distributed regularly to faculty and students. These include a variety of fellowship opportunities offered by the Rackham Graduate School.

Master's students admitted to the Macro program are not admitted with an offer of funding. In some cases Macro may be able to provide small fellowships for exceptional students, however these are not guaranteed. Students are encouraged to apply for a variety of funding sources to help finance their education with Macro.

Health Insurance

All PhD students holding fellowship, GSI, or GSRA appointments are eligible for GradCare. The cost of this insurance is covered by the full financial package. A detailed list of benefits and providers can be found online at www.uhs.umich.edu/gradcare. All international students are required to be enrolled in some form of health insurance. Those that do not sign up for GradCare will be enrolled in an international student plan by the International Center.

Continuous Enrollment Policy

A continuous enrollment requirement for PhD students at the University of Michigan was adopted effective Fall 2010. Once admitted students will register every fall and winter term until their degree is awarded, unless they are taking an official leave of absence. Students will register in the spring or summer terms only when they elect courses, take preliminary examinations, or defend their dissertations.

Seven Year Limit

The Rackham Graduate School has a requirement, enforced by Macro, that a student must complete all doctoral work within seven consecutive years from the date of first enrollment in the Rackham Graduate School. Any prolonged absence, whether detached study (for research purposes) or leave of absence, will count as part of the seven-year period. A leave of absence of one year or more necessitates a formal application for re-admission to the doctoral program.

Use of Facilities

Course registration or employment (GSI, GSRA) is required of any person using university facilities in progress towards a degree.

Lab Safety and Equipment Use

As a researcher in the Macro program, you are responsible for developing and implementing good safety practices in the laboratory. The labs in our department contain a variety of dangerous chemicals and machinery. Unfortunately, one careless move can result in significant injury or damage. You are therefore strongly encouraged to carefully read the rules and procedures shown below.

Lab Safety

GENERAL SAFETY RULES

1. Always wear eye protection when working in laboratories. You may wear goggles or safety glasses with side shields as appropriate.
2. Do not wear contact lenses in the laboratory, even under safety glasses. They will compound eye damage in the event of an injury.
3. Remove rings, watches, bracelets, necklaces and large earrings when working with tools, machines, or dangerous chemicals.
4. Wear clothing that will provide maximum protection from chemical splashes or flying debris. Shorts are prohibited in the Van Vlack laboratory.
5. Wear close-fitting clothing made of relatively smooth, close woven fabrics. Neckties, sweaters, and bulky shirts or blouses should not be worn. Long sleeves on shirts or blouses should be rolled snugly above the elbows.
6. Wear closed-toe shoes to protect your foot from splashes. Sandals, open-toed shoes, and high-heeled shoes are prohibited.
7. Long, loose hair styles must be safely contained in a scarf, cap, or other appropriate fashion.
8. NO horseplay in the laboratory.
9. When handling dangerous chemicals or dangerous materials, wear protective gloves, a rubber apron, and an eye splash shield. Rain suits are available. If possible, use shielding or work in the hoods with the door closed as far as possible. Anytime chemicals must be moved outside of the lab, they must be in a secondary container to prevent spills if the primary container should break.
10. Post a safety SOP (Standard Operation Procedure) for all experiments that you set up.
11. When working with machines like the band saw, drill press, or rolling mill, have a second person present.
12. Report any injury, no matter how small, to a member of the Macro staff.
13. When lifting heavy objects, lift with your legs as opposed to your back to prevent injury.
14. Be aware of the many high voltage sources in the department. Exercise extreme caution when doing work on the electronics of a machine, and always turn off the power first. However, remember that capacitors can store charge for quite some time even after the power has been turned off. If you aren't sure what you are doing, find help.

FINDING NECESSARY SAFETY INFORMATION

Each laboratory has a Chemical Hygiene Plan (CHP) either on or near the door. The CHP contains a variety of information, including SOP's for all equipment and activities that occur in the laboratory.

Each research group has a **safety officer** who is in charge of implementing and enforcing safety regulations in the laboratory belonging to his or her advisor. Safety officers meet regularly to

learn about new safety procedures being implemented by the university. See your safety officer if you see a safety problem in your lab, or are unsure of how to conduct an experiment safely.

Before using unfamiliar chemicals review any hazards associated with their use. Environment, Health, and Safety (EHS) has files containing Safety Data Sheets (SDS) on most chemicals you would use.

You may also contact our EHS safety representative Shannon Weger @ 3-3514

The Engineering Library, located in the Media Union, also contains copies of the *Merck Index* and Irving Sax' *Dangerous Properties of Industrial Materials*. The most current editions are kept at the reference desk, while the older editions are available for checkout.

The Merck Index RS356.M555 1996

Dangerous Properties of Industrial Materials, Sax, Irving T55.3 H3 S27 1992

PERSONAL INJURY, FLOOD, CHEMICAL SPILL, OR FIRE

Injury

If a person is seriously injured or ill on the job (amputation, chest pain, loss of consciousness, severe burns or trauma), call 911 immediately and request an ambulance. He or she will then be transported to the nearest Emergency Room. The person's supervisor must fill out an "Employee Accident or Illness Report" and submit it to the Risk Management office.

If the injury is less severe but still requires medical treatment, the person should be transported to the M-Works facility in Ann Arbor, provided the injury occurs on weekdays between 7 a.m. and 5 p.m. M-Works is run by the University of Michigan, and is specifically set-up to deal with workplace injuries of U/M employees (All research and teaching assistants are employees of the university). The injured person should preferably be accompanied by a supervisor, and should have an "Employer Referral Form" filled out describing the nature of the injury. If the injury occurs on an evening, weekend, or holiday, the person should be transported to the nearest Emergency Room. As in the case of a major injury, the injured person's supervisor must also fill out an "Employee Accident or Illness Report" and submit it to the Risk Management office.

Flood

If there is a flood during the day, notify a member of the Macro staff immediately. If at night, call Public Safety.

Hazardous Chemical Spill

Use your best judgment when dealing with different kinds of hazardous chemical spills. For small spills if there is no immediate danger of inhalation damage, explosion, or fire, you should use a spill kit to clean it up. Notify a member of the Macro staff as soon as possible.

If the spill is large and obviously hazardous, pull the fire alarm, call 911, and leave the building. Be sure to remain in the area to give direction to emergency personnel.

Fire

If a fire starts in your lab, use your best judgment in handling the situation. If you are confident that you can put it out with a fire extinguisher, do so. (For example, a small alcohol fire in a petri

dish can probably be put out easily.) Remember to aim at the base of the fire. Notify a member of the Macro staff as soon as possible.

If you have any doubts at all about being able to put the fire out, do not attempt to do so. Instead, pull the fire alarm, call 911, and then leave the building. The alarm will alert people to evacuate the building and will summon the fire department located on North Campus. Fire alarms are located in corridors throughout the department. Be sure to remain in the area to give direction to emergency personnel.

Special note: The fire extinguishers in the department are designed to put out a wide variety of fires, including oil fires, paper fires, etc. They are NOT designed to put out metal fires (such as burning Na or K.) There is one fire extinguisher located in 2231 Dow which is specially designed to put out combustible metal fires.

Hazardous Waste Disposal

It is important that hazardous waste be disposed of properly. Chemicals cannot simply be dumped down drains, nor can broken glass or razor blades be tossed in the trash. Chemicals must be labeled, packaged up, and then picked-up by EHS for disposal. The proper procedures for disposal can be found in the University of Michigan's "Hazardous Waste Manual", which is located in most labs with chemicals. Labels and hazardous waste manifests can be obtained from EHS. See the Facilities Engineer if you need additional assistance.

Equipment Use

There are many pieces of equipment available to the student for use at their discretion. There are, however, a few general rules that should be followed when using this equipment to avoid destroying it in the process. These are as follows:

1. Learn how to use the equipment by asking for instructions before using it. Please read the SOP in the CHP located in the safety files for that lab. The department will insist that you show that you have adequate instruction before using certain pieces of delicate equipment. Secondary training is not permitted.
2. Please make it a practice to keep the equipment clean and the parts in their proper stored location after using. **TRASHING THE WORK AREA WILL NOT BE TOLERATED.** In the event that students are discovered consistently leaving a mess in the labs, the Department will be forced to limit access to the equipment. This would create a hardship for everyone.
3. Equipment, which is for general use, is **NOT** to be modified for your private use in a semi-permanent manner. If your experiment will create hazardous conditions in the surrounding area, affecting the simultaneous use of other equipment, you must get permission from those that are affected, including Facilities Engineer.
4. If you have borrowed equipment, return it to the source as soon as you are through with it so that it is available for others.
5. If you need cooling water or fluids transferred by tubing on your equipment, please use special care in setting up the system so the tubing is well anchored at each end, and is supported properly. All of the floors have cracks and are prone to leaks. Spills and leaks are inevitable, and must be guarded against. The faculty or staff will shut you down on the spot if you insist on operating carelessly.

Do not leave your equipment unattended for more than 6-8 hours. Always come in early in the morning to make a leak check. Always leave an “Experiment Running” sign on the door.

If a spill does occur, **clean it up immediately!** Should a leak occur in the plumbing in your room (back-flow preventers or faucets are particularly bad in this respect) attempt to shut the system down immediately if you can gain entrance to the service corridor. If it is after hours, contact the security personnel so that they can do it for you. All valves are numbered and the numbers are listed on your room WATER CONTROL sheet by an exit for quick reference. Report this type of leak to your advisor and to one of the technical staff so that the department is aware of the leak. Leaks cause severe issues for the floor below so prevention and cleanup is imperative.

6. Check the posted schedules, and sign up for equipment time when you need it. However, please note that class usage takes priority over research. Therefore, check with the staff in charge before you begin your work, otherwise you may not be able to finish your project before a class demands your removal.

Degree Requirements

This section provides information on the requirements for degrees of Master of Science, Master of Science in Engineering, SGUS Master’s, and a Doctor of Philosophy. A description of graduate courses offered in relation to these degrees appears afterwards. The requirements listed here include those set by the program as well as those set by the Rackham School of Graduate Studies. Students are also advised to consult the Rackham Student Handbook online at www.rackham.umich.edu/policies/gsh.

Requirements for graduate degrees are administered by the Macro Executive Committee. This Committee has been delegated the authority by faculty to interpret rules and requirements and, when circumstances warrant, to grant exceptions upon formal appeal. Upon entry into the program the student’s advisor will be the Director until a research advisor has been selected. Course elections should be shared with and approved by the chosen advisor each semester. Students should also meet regularly with the Program Coordinator to ensure their timely progress toward degree requirements.

Please see the Rackham Graduate School Academic Policies for rules and regulations regarding student rights and responsibilities. This can be accessed at www.rackham.umich.edu/downloads/academic-policies-20100818.pdf.

Selecting a Research Advisor

Students have a great diversity of research groups to choose from in the Macro program. For both Master’s and Ph.D. students there are a variety of important factors to consider when meeting with potential faculty advisors. Students are encouraged to discuss active and proposed research projects, speak with current students in the lab (Macro and non-Macro), and if possible attend lab meetings.

Master’s Students

If pursuing a research-based degree, Master’s students are encouraged to join a research group during their first term of study. This is particularly important for students who wish to complete the program in three terms of study. Students are welcome to reach out to Macro faculty to discuss potential research positions in their lab at the start of the school year or earlier. When conducting research with students should register for their advisor’s section of Macro 890. The number of credits should appropriately reflect the time the student is contributing to the lab research effort.

Ph.D. Students

Ph.D. students may directly join a lab group during their first term or can complete two semester-long research rotations before making a final selection of a research group.

Students wishing to join a research group directly should register for Macro 790 and complete the related form (Appendix I). Students should meet with at least five Macro faculty members to discuss a position within their group. Students who choose to directly join a research group should do so by late October of their first term. Their faculty advisor would assume support of them beginning in the following Winter term.

Students wishing to complete research rotations should identify faculty members who they would like to work with the summer prior to beginning in Macro. Students will apply for rotations so that Macro can ensure students rotate with faculty members who could potentially take students into their groups following the rotation. During both the Fall and Winter terms students should register for Macro 690. Students will work with one faculty member from September-December, then another from January-April. In mid-April the student will work with the faculty members to select a permanent research group (Appendix Q). The research rotations are supported by the Macro program (or a student's other funding sources) and the faculty member would assume support of the student beginning in May.

Requirements for Master's of Science OR Master's of Science in Engineering

- All students must earn a minimum of 30 hours of graduate level credit, not including any make-up for deficiencies in program prerequisites. Students may use 4-6 credits of Master's level research (Macro 890) to partially fulfill this credit requirement.
- Complete a minimum of 9 credit hours of coursework in Macromolecular Science and Engineering
- Complete a minimum 9 credit hours of coursework in your chosen option. The selection of courses should be discussed and agreed upon with your research advisor, the Director, and the Program Coordinator.
 - Potential course options are outlined in greater detail in the 'Major Course Option Plans' section below.
- Complete a minimum of four (4) hours of Master's level research, Macro 890.
 - A written report must be submitted describing the results of this research project at the end of each semester. The report should follow a similar format to that used in the *Journal of Polymer Science*.
 - The written report should be 3-6 pages (including figures, excluding list of references).
 - The advisor and Director's approval of this report is required before the degree can be granted.
- Adhere to and fulfill all other Rackham requirements for the Master's degree as outlined in the Rackham Student Handbook at www.rackham.umich.edu/policies/gsh
- Students pursuing a PhD may add an embedded Master's degree to their program, and earn the degree by completing all above outlined requirements.
 - PhD students cannot use Macro 690, 790, 990, or 995, or any credits from a previous master's degree to satisfy the embedded master's degree.
 - Contact Macro Program Coordinator if interested in pursuing an embedded master's degree.

Requirements for the SGUS Master's Degree

The Sequential Graduate Undergraduate Studies program is an integrated program that facilitates the completion of a Master's degree with two semesters of study beyond what is required for the Bachelor's degree.

- Up to nine (9) hours of required course work can be counted for both the Bachelor's and Master's degree.
- The requirements outlined above for other Master's programs will also apply to those earning a Master's through the SGUS program. Detailed course plans should be submitted and approved by the program coordinator, relevant undergraduate program coordinator, and research advisor before beginning the program.

Requirements for the Doctor of Philosophy

If admitted prior to Fall 2019

- Students are expected to complete a minimum of 30 hours of coursework, not including research credits such as Macro 890, 990, or 995.
- Complete a minimum of 12 credit hours of coursework in Macromolecular Science & Engineering
- Complete a minimum of 12 credit hours of coursework in the chosen option.
- Complete all coursework while maintaining at least a 3.0 (B) GPA.
- Selection of a research advisor via Macro 790 (Faculty Research Activities Survey) or Macro 690 (Research Rotations). See Appendix I or Q for the selection form.
 - Only 1 credit of Macro 790 or 690 can be used to satisfy coursework degree requirements.
- Complete an annual progress report (see template in Appendix O) with research advisor.
- Form a dissertation committee
- Complete oral preliminary examination
- Complete data meeting with dissertation committee at least 4-6 months before the proposed dissertation defense date.

In order to advance to candidacy for a given term, a student must have completed all requirements no later than the third day of that term.

Advancing to Candidacy

- A minimum of 18 credit hours must be completed in residence before students are eligible to advance to candidacy.
- Students must complete all four of the Responsible Conduct of Research and Scholarship Training (RCRS) workshops before advancing to candidacy.
- It is expected that students take their oral preliminary exam and advance to candidacy no later than the conclusion of their third year of study.
- **Comprehensive Exam**
 - A comprehensive written exam is to be passed before the student can advance to candidacy. The exam is administered in two parts. Part 1 is a multiple choice exam to assess the student's general knowledge in Macromolecular Science. Part 2 is based upon the student's advanced coursework taken within the Macro program.
 - The comprehensive exam is offered twice a year, typically in February and May.
 - Parts are graded separately, and a student may pass one portion while failing another. Students will have a maximum of four attempts to pass each portion of the exam. Failure to pass both portions of the exam in the provided number of attempts will be grounds for dismissal from the program.

- **Oral Preliminary Exam**

- A preliminary oral exam is given as a requirement for the student's admission to candidacy for the PhD. This includes a review of the student's academic background and a defense of research work performed as a pre-candidate.
- Students must be registered during the term in which they take the exam.
- The preliminary exam committee should consist of at least four faculty members, two of which have Macro affiliation.
- Students should submit a written research proposal electronically to their committee two weeks prior to the exam. The proposal should be consistent with that of a formal research proposal. It must not be longer than 15 pages of text (including figures, excluding title page and list of references), single spaced.
- The background section should contain a thorough discussion of the existing literature in the areas directly related to the proposed work and a justification for the value of the work to be done.
- The proposed research section should identify the scientific merit of the proposed research, its potential impact on the scientific community and possible impact on a greater scale.
- Students should prepare a 20-30 minute presentation and anticipate at least 15 minutes for questions and discussion of the research with their committee.
- Upon passing, the written evaluation form found in Appendix K should be submitted to the program coordinator.

Candidates

- Appoint a dissertation committee to supervise program and research progress.
 - Dissertation Committee Requirements
 - Committee must have a minimum of 4 members
 - The chair or one of the co-chairs should be a member of the Macro faculty
 - Three members must be from a Rackham Doctoral Program and be considered a member of "[The Graduate Faculty](#)," this generally means a professor at the University of Michigan.
 - Two members must have Macro affiliation
 - One cognate member (any faculty with Macro affiliation can fulfill this role).
- Data Meeting
 - Complete data meeting with dissertation committee at least 4-6 months before the proposed dissertation defense date.
 - Sixty-minute formal presentation to committee members only
 - Students should be prepared to discuss their dissertation chapter plan and timeline for dissertation preparation and final defense.
 - Students are responsible for submitting the Data Meeting Form (Appendix L) within one week of the data meeting to the Program Coordinator.
 - In addition to the data meeting, students are required to register online for a [pre-defense review](#) with the Rackham Graduate School Office of Records and Dissertations (OARD) at least three weeks prior to the oral defense.
- Consult the Rackham Student Handbook for greater detail on all requirements for candidates including registration and preparing for the thesis defense.
- Adhere to and fulfill all other Rackham requirements for the Doctor of Philosophy as outlined in the Rackham Student Handbook at www.rackham.umich.edu/policies/gsh.

If admitted Fall 2019 or later

- Students are expected to complete a minimum of 25 hours of coursework, not including research credits such as Macro 990 or 995.
- Complete a minimum of 12 credit hours of coursework in Macromolecular Science & Engineering including Macro 512, 530, and 538.
 - Students can use a maximum of 3 credit hours of Macro 890 to help satisfy the degree requirements. Students will submit a written report describing the research that was conducted in their research advisor's lab. The report should follow a similar format to that used in the *Journal of Polymer Science*.
 - The written report should be 3-6 pages (including figures, excluding list of references).
 - The research advisor and Director's approval of this report is required.
- Complete a minimum of 12 credit hours of coursework in the chosen option.
- Complete all coursework while maintaining at least a 3.0 (B) GPA.
- Selection of a research advisor via the Macro 790 (Faculty Research Activities Survey) or Macro 690 (Research Rotations). See Appendix I or Q for the selection form.
 - Only 1 credit of Macro 790 or 690 can be used to satisfy coursework requirements.
- Complete an annual progress report (see template in Appendix O) with research advisor.
- Form a dissertation committee
- Complete Dissertation Proposal Oral Examination by the end of the fourth semester.
- Complete data meeting with dissertation committee at least 4-6 months before the proposed dissertation defense date.

In order to advance to candidacy for a given term, a student must have completed all requirements no later than the third day of that term.

Candidacy Requirements

Students are expected to advance to candidacy no later than the conclusion of their first year of study.

- A minimum of 18 credit hours of graded graduate coursework must be completed in residence. These hours cannot include credit for Macro 990.
 - Required courses include Macro 512, 530, and 538.
 - Students should plan to register for Macro 530 and 790 in the fall, and Macro 512 and 538 in the winter term.
 - Macro 412 is recommended for students with limited polymer science knowledge.
 - Students must complete the three required courses (Macro 512, 530, 538) with a cumulative GPA of 3.0 or better.
- Students must pass the comprehensive exam with a score of 60% or better.
 - A multiple choice exam will be used to assess the student's general knowledge in Macromolecular Science.
 - The exam is offered twice a year, typically in February and May.
 - Students will have a maximum of four attempts to pass. Failure to pass the exam will be grounds for dismissal from the program.
- Students must complete all four of the Responsible Conduct of Research and Scholarship Training (RCRS) workshops.

Candidates

Dissertation Committee

- Appoint a dissertation committee to supervise program and research progress. Submit the [Dissertation Committee Worksheet](#) to program coordinator prior to the dissertation proposal oral examination. This information will be used to formally process the student's dissertation committee with Rackham Graduate School.
 - Dissertation Committee Requirements
 - A committee must have a minimum of 4 members.
 - The chair or one of the co-chairs must be a member of the Macro faculty.
 - Three members must be from a Rackham Doctoral Program and be considered a member of "[The Graduate Faculty.](#)" this generally means a professor at the University of Michigan.
 - Two members must have Macro affiliation.
 - One cognate member (any faculty with Macro affiliation can fulfill this role).

Dissertation Proposal Oral Examination

The Dissertation Proposal Oral Examination provides an early assessment of the feasibility of a student's proposed research topic for his/her dissertation. The exam is intended to assess the suitability of the topic and the student's academic background for carrying out the proposed research. The exam is administered by the student's dissertation committee.

- Students are required to complete the dissertation proposal oral examination by the end of the fourth semester in the program.
- Students will prepare a written research proposal for their dissertation committee to review and give an oral presentation to the committee.
- Students should submit the proposal electronically to their dissertation committee at least two weeks prior to the presentation. The proposal should be consistent with that of a formal research proposal. It must not be longer than 15 pages of text (including figures, excluding title page and list of references), single spaced.
- The background section should contain a thorough discussion of the existing literature in the areas directly related to the proposed work and a justification for the value of the work to be done.
- The proposed research section should identify the scientific merit of the proposed research, its potential impact on the scientific community and possible impact on a greater scale.
- Students will prepare a 20-30 minute presentation and should anticipate at least 15 minutes for questions and discussion of the research with their committee.
- Upon passing, the written evaluation form found in Appendix R should be submitted to the program coordinator.

Data Meeting

- Complete data meeting with dissertation committee at least 4-6 months before the proposed dissertation defense date.
- Sixty minute formal presentation to committee members only
- Students should be prepared to discuss their dissertation chapter plan and timeline for dissertation preparation and final defense.

- Students are responsible for submitting the Data Meeting Form (Appendix L) within one week of the data meeting to the Program Coordinator.
 - In addition to the data meeting, students are required to register online for a [pre-defense review](#) with the Rackham Graduate School Office of Records and Dissertations (OARD) at least three weeks prior to the oral defense.
- Consult the Rackham Student Handbook for greater detail on all requirements for candidates including registration and preparing for the thesis defense.
 - Adhere to and fulfill all other Rackham requirements for the Doctor of Philosophy as outlined in the Rackham Student Handbook at www.rackham.umich.edu/policies/gsh.

Relationship with Research Advisor

The student and research advisor are jointly responsible for following the Macromolecular Science and Engineering and Rackham Graduate School requirements for the chosen degree. The advisor's responsibilities begin at the time of agreement to accept the student for research supervision. In addition to supervising the research, the faculty member is expected to advise the student in course elections, examinations, and independent study pertinent to their general development as a scientist and any other matters affecting their general progress towards the degree.

The research supervisor may be affiliated with any of the participating programs of Macro. It is not required, though strongly recommended, that the research supervisor be a macro faculty member. In such a case where a Macro faculty member is not a research advisor, one must be selected as a co-chair/co advisor.

It is recommended that students and their chosen research advisor discuss expectations and responsibilities before beginning a working relationship. You may wish to write these expectations down so that they can be referred to should issues arise in the future.

Ph.D. Major Option Course Plans

Biomaterials Engineering

- A minimum of 30 hours of course work must be elected, including at least 12 hours in Macromolecular Science and Engineering and at least 12 hours in biomaterials.
- The biomaterials courses should include courses in biomaterials, biochemistry, and biophysics.
- The Macro courses should at least include Macro 412 or 512, and 538.

Biomedical Engineering

- A minimum of 30 hours of course work must be elected, including at least 12 hours in Macromolecular Science and Engineering and at least 12 hours in biomedical engineering.
- The Biomedical Engineering courses should include at least one course in biomaterials, biochemistry, or biophysics in addition to courses in Biomedical Engineering.
- The Macro courses should include at least Macro 412 or 512, and 538.

Chemical Engineering

- A minimum of 30 hours of course work must be elected, including at least 12 hours in Macromolecular Science and Engineering and at least 12 hours in Chemical Engineering.
- Macro courses should include Macro 538.

- The Chemical Engineering courses should include a course on transport phenomena, numerical methods or mathematical modeling, and a course on polymer processing.

Chemistry (Synthetic or Physical)

- A minimum of 30 hours of course work must be elected, including at least 12 hours in Macromolecular Science and Engineering and at least 12 hours in Chemistry.
- Synthetic Option
 - The Macro courses should include Macro 412 or 512 and Macro 538.
 - Chem 507, 511, 518, 536, 540, 543 (select at least two from this list)
- Physical Option
 - The Macro courses should include Macro 412 or 512, and Macro 538
 - Chemistry courses should include Chem 571, 576, and 580

Materials Science and Engineering

- A minimum of 30 hours of course work must be elected, including at least 12 hours in Macromolecular Science and Engineering and at least 12 hours in Materials Science and Engineering.
- Macro courses should include Macro 412 or 512, and Macro 538.

Organic Electronics and Photonics

- A minimum of 30 hours of course work must be elected, including at least 12 hours in Macromolecular Science and Engineering and at least 12 hours in the field or organic electronics.
- Macro courses should include Macro 412 or 512, and Macro 538.
- Organic Electronics courses should include a course in device physics, device applications, and device fabrication.

Physics

- A minimum of 30 hours of course work must be elected, including at least 12 hours in Macromolecular Science and Engineering and at least 12 hours in Physics.
- Macro courses should include Macro 538 and a course in physical properties of polymers.
- Recommended physics courses include Physics 505, 506, 510, 511, 512, 520, 540 and 541. Consult with your research advisor to decide on the optimal course plan.

Individualized Option

- An individualized option may be proposed by students who already have a Master's degree or other graduate experience. Students should submit a detailed course plan in writing for approval by the Executive Committee. Students must substantiate that they have sufficient depth of knowledge and skills from their previous work to qualify for the individualized option. A maximum of 9 credits (3 courses) of past graduate work may be utilized as a part of this option.

Master's Major Option Course Plans

Biomaterials Engineering

- A minimum of 30 hours of course work must be elected, including at least 9 hours in Macromolecular Science and Engineering and at least 9 hours in biomaterials.
- The biomaterials courses should include courses in biomaterials, biochemistry, and biophysics.
- The Macro courses should at least include Macro 412 or 512, and 538.

Biomedical Engineering

- A minimum of 30 hours of course work must be elected, including at least 9 hours in Macromolecular Science and Engineering and at least 9 hours in biomedical engineering.
- The Biomedical Engineering courses should include at least one course in biomaterials, biochemistry, or biophysics in addition to courses in Biomedical Engineering.
- The Macro courses should include at least Macro 412 or 512, and 538.

Chemical Engineering

- A minimum of 30 hours of course work must be elected, including at least 9 hours in Macromolecular Science and Engineering and at least 9 hours in Chemical Engineering.
- Macro courses should include Macro 538.
- The Chemical Engineering courses should include a course on transport phenomena, numerical methods or mathematical modeling, and a course on polymer processing.

Chemistry (Synthetic or Physical)

- A minimum of 30 hours of course work must be elected, including at least 12 hours in Macromolecular Science and Engineering and at least 9 hours in Chemistry.
- Synthetic Option
 - The Macro courses should include Macro 412 or 512 and Macro 538.
 - Chem 507, 511, 518, 536, 540, 543 (select at least two from this list)
- Physical Option
 - The Macro courses should include Macro 412 or 512, and Macro 538
 - Chemistry courses should include Chem 571, 576, and 580.

Materials Science and Engineering

- A minimum of 30 hours of course work must be elected, including at least 9 hours in Macromolecular Science and Engineering and at least 9 hours in Materials Science and Engineering.
- Macro courses should include Macro 412 or 512, and Macro 538.

Organic Electronics and Photonics

- A minimum of 30 hours of course work must be elected, including at least 9 hours in Macromolecular Science and Engineering and at least 9 hours in the field or organic electronics.
- Macro courses should include Macro 412 or 512, and Macro 538.
- Organic Electronics courses should include a course in device physics, device applications, and device fabrication.

Physics

- A minimum of 30 hours of course work must be elected, including at least 9 hours in Macromolecular Science and Engineering and at least 9 hours in Physics.
- Macro courses should include Macro 538 and a course in physical properties of polymers.
- Recommended physics courses include Physics 505, 506, 510, 511, 512, 520, 540 and 541. Consult with your research advisor to decide on the optimal course plan.

Elective Courses

- Students may use 4-6 credits of Macro 890 towards the 30 credits required for the Master's degree, provided they have generated a written product (report, publication, Master's thesis, etc) based on their lab work.

- Students may utilize courses offered by the Center for Entrepreneurship, Ross School of Business, other CoE departments, Chemistry, or Physics to reach the 30-credit requirement.

Appendix A: College of Engineering Honor Code (Revised February 2018)

The Honor Code is part of our lives in the College of Engineering. The standards for personal integrity demanded by the Honor Code are a reflection of the standards of conduct expected of engineers. These standards allow fairness among students to ensure that no unfair advantage is gained and an equal learning opportunity is given to all students. Not only does the faculty have trust in the students with the implementation of their course policies, but the students have trust in one another. While the College of Engineering is a competitive environment, the College also holds an honorable environment in which students receive credit for their efforts and determination. For over 90 years the Honor Code has been an indication of the mutual trust that characterizes student-faculty relationships in the College. Alumni of the College of Engineering have a truly outstanding record of accomplishments. We are convinced that this is in part due to the professional attitude fostered by the standards of the Honor Code. The Honor Code is a basic part of your everyday life at the College of Engineering, University of Michigan.

Sincerely,
The Dean,
Executive Committee,
Engineering Honor Council,
Faculty Committee on Discipline
College of Engineering
University of Michigan

To report a suspected Honor Code violation, please contact:

The Honor Council Administrator
Suite 273, Chrysler Center
734-764-4139

<http://honorcouncil-admin@umich.edu>

Prepared by the Engineering Honor Council in association with the Faculty Committee on Discipline, revised February 2018.

The Engineering Honor Code

In 1915, the students of the College of Engineering petitioned for the establishment of an Honor Code. The Code was promptly adopted with faculty approval in 1916 and has since been basic to life in the College of Engineering. The Honor Code outlines certain standards of ethical conduct for persons associated with the College of Engineering at the University of Michigan. The policies of the Honor Code apply to graduate and undergraduate students, faculty members, and administrators.

The Honor Code is based on these tenets:

- Engineers must possess personal integrity both as students and as professionals. They must be honorable people to ensure safety, health, fairness, and the proper use of available resources in their undertakings.
- Members of the College of Engineering community are honorable and trustworthy persons.
- The students, faculty members, and administrators of the College of Engineering trust each other to uphold the principles of the Honor Code. They are jointly responsible for precautions against violations of its policies.
- It is dishonorable for students to receive credit for work that is not the result of their own efforts.

Responsibilities of the Engineer

Faith of the Engineer, a statement widely accepted by the professional engineering societies, contains pledges that are relevant to the Honor Code of the College of Engineering:

“As an Engineer, I will participate in none but honest enterprise. To him that has engaged my services, an employer or client, I will give the utmost of performance and fidelity.”

“Jealous of the high repute of my calling, I will strive to protect the interests and the good name of any engineer that I know to be deserving; but I will not shrink, should duty dictate, from disclosing the truth regarding anyone that, by unscrupulous act, has shown himself unworthy of the profession.”

“To my fellows, I pledge, in the same full measure I ask of them, integrity and fair dealing, tolerance and respect, and devotion to the standards and the dignity of our profession.”

The Fundamental Canons for Engineers, as it appears on the National Society of Professional Engineers website (<http://www.nspe.org/Ethics/CodeofEthics/index.html>) states

“Engineers, in the fulfillment of their professional duties shall:

1. Hold paramount the safety, health and welfare of the public.
2. Perform services only in areas of their competence.
3. Issue public statements only in an objective and truthful manner.
4. Act for each employer or client as faithful agents or trustees.
5. Avoid deceptive acts.
6. Conduct themselves honorably, responsibly, ethically and lawfully so as to enhance the honor, reputation and usefulness of the profession.”

See the above website for the “Rules of Practice” and “Professional Obligations.”

Applications of the Honor Code

The Honor Code is intended to support and enforce course policies in the College of Engineering. Course instructors have exceptional latitude when preparing the policies for their courses. This can lead to variations between policies of different courses. It is the instructor’s responsibility to craft the course policies in accordance with the doctrine of the Honor Code.

Students are responsible for understanding the Honor Code and its implementation in the College of Engineering. Because the specific policies of different faculty members can vary significantly, it is the responsibility of faculty members to specify their policies in writing at the beginning of each semester. Students are responsible for understanding these policies and should consult the instructor if they are unclear. The honor code supports the individual course policy, whatever it may be.

If a student feels that his/her instructor is not doing what the Honor Code calls for, the student should contact the instructor or a member of the Honor Council to discuss this, and consider further steps, if needed.

Students of the College of Engineering enrolled in courses offered by other colleges must abide by the policies of the school or college in which the course is offered. Any suspected policy violations will be referred to the appropriate authorities of the school in question.

Students who are not members of the College of Engineering and who take a course offered by the College are bound by the policies of the Engineering Honor Code. Any suspected policy violations will be referred to the Engineering Honor Council and Faculty Committee on Discipline. The appropriate authorities of the school or college of the students involved will be notified.

When Taking an Examination

The Honor Code holds that students are honorable and trustworthy people and encourages them to behave with integrity in all phases of university life. During examinations, the instructor is available for questions, but the examination is not proctored.

The instructor will announce the time and place of the examination. At the start of the examination, the instructor's whereabouts during the exam will be communicated to the class in case a question arises.

Students have the right to have at least one empty seat between themselves and their neighbors. This helps ensure comfort during the examination and reduces the temptation to cheat. It is the instructor's responsibility to ensure that there is adequate seating beforehand, and to obtain additional rooms if necessary.

During the examination, students are free to leave the room. Minimal essential conversation is allowed. However, no communication regarding the examination is allowed inside or outside the room. All questions about the examination should be directed to the instructor.

It is the instructor's responsibility to inform the class prior to the examination if aids, such as calculators, notes, or textbooks, are allowed during the examination.

After each examination, students must write the Honor Pledge in their test books and sign their names under it. The Honor Pledge is as follows: "I have neither given nor received unauthorized aid on this examination, nor have I concealed any violations of the Honor Code."

Instructors are not required to grade tests in which the signed Honor Pledge does not appear. The Honor Code remains enforced whether or not the student signs the Pledge.

Use of Computers and Other Facilities

Each department in the College of Engineering establishes its own general policies on the use of computers, laboratories, and other facilities. In addition, students should observe any specific instructions appearing in computer rooms, laboratories, or libraries.

Students may not submit as their own work a computer program or part thereof which is not the result of their own thought and efforts. Contributions to a program from external sources must be acknowledged and properly documented in accordance with the course policies.

Students may not attempt to access or tamper with the class account of another student unless permission to do so has been given by both the class instructor and the student to whom the account is assigned.

Computers available for students to use are the property of the University of Michigan. Software available for students to use is the property of the University of Michigan or is licensed to the University of Michigan. Any unauthorized attempt to copy software or to tamper with computers or software is a

violation of federal law, as well as the Honor Code. All laboratories, classrooms, office equipment, and libraries are meant for instruction and learning. Misuse of these facilities is a violation of the Honor Code.

Homework and Laboratory Assignments

The principles of the Honor Code apply to homework and laboratory assignments as well as to examinations. The instructor may allow collaboration among students on such assignments. The instructor is to make clear how much, if any, collaboration is permissible. The instructor may also require that students write and sign the Honor Pledge on their homework and lab reports.

It is a violation of the Honor Code for students to submit, as their own, work that is not the result of their own labor and thoughts. Work that includes material derived in anyway from the efforts of another author, either by direct quotation or paraphrasing, should be fully and properly documented.

To avoid plagiarism, it is necessary to cite all sources of both ideas and direct quotations, including those found on the internet. The basic principle is to provide enough information so that the original source of the material can be located. The University of Michigan English Department and Library web sites provide a thorough discussion of plagiarism. See

<http://www.lsa.umich.edu/english/undergraduate/plagNote.asp> and
<http://www.lib.umich.edu/handouts/plagiar.pdf>.

University Documents

Official academic forms and records are the property of the College of Engineering and/or the University of Michigan. Tampering, alteration, or other misuse of these documents is a violation of the Honor Code, as is submitting falsified or altered documents.

Course Registration

The University Registrar's Office provides students with a registration date in accordance with their own policies. Registering for a course, or asking another student to register for a course, in order to hold a seat for yourself or someone else is a violation of the Honor Code.

The Engineering Honor Council

The Engineering Honor Council is composed of students from the College of Engineering. The primary purpose of the Honor Council is to investigate suspected violations of the Honor Code.

Members of the Engineering Honor Council also visit classes every year to answer questions about the Honor Code and acquaint students with its ideals. Openings may occur on the Honor Council as members graduate and leave the University. At such times, the Honor Council accepts membership applications from students, and arranges interviews with prospective members. The Honor Council can be contacted at coe-honorcouncil@umich.edu. Also, see the following website: <http://honorcode.engin.umich.edu/>

The Honor Council investigates each suspected violation of the Honor Code and recommends action to the Faculty Committee on Discipline. Appointments to the Committee are rotated to ensure representation of all Engineering Departments. The Faculty Committee considers the recommendations of the Honor Council and follows up with appropriate disciplinary action. The decision of the Committee is ordinarily final. It may, however, be appealed to the Executive Committee of the College of Engineering.

Cases involving suspected violations on the part of students registered in another school taking and Engineering course, or involving Engineering facilities, will be reviewed by the Engineering honor Council and Faculty Committee on Discipline. The appropriate authorities of the school or college of the students involved will be notified.

When graduate students are suspected of Honor Code violations, the College of Engineering Honor Code process will be followed. In addition, communications will be sent to the Dean of Rackham School of Graduate Studies.

Reporting Honor Code Violations

The Honor Code works to the benefit of students, instructors, and administrators in the College of Engineering University of Michigan. It is based on the mutual trust that all those bound by it will uphold its principles and enforce its policies. However, this makes it the duty and responsibility of students and instructors to report promptly any suspected violations of the Honor Code.

The College of Engineering Honor Code requires that students take the following steps if a violation of the Honor Code is observed:

- Obtain the names of the people involved.
- Inform the instructor of the incident. To ensure uniformity and fairness, the instructor is required to take the appropriate actions in accordance with the Honor Code if the instructor feels there is just cause to do so.
- If the instructor refuses to submit the case for an investigation, the student may contact the Associate Dean for Undergraduate Education. The Associate Dean for Undergraduate Education will refer the case to the Honor Council.

If the instructor becomes aware of a possible violation of the Honor Code, it is his/her responsibility to contact the Associate Dean for Undergraduate Education (c/o the Honor Code Administrator, Suite 273, Chrysler Center, 734-764-4139; honorcouncil-admin@umich.edu) to report this accusation. Suspected Honor Code violations must be reported no later than two months after the end of the term in which the potential violation occurred.

The Honor Council will investigate the suspected violation. The student and any witnesses to the incident may be asked to recall their impressions and thoughts concerning the case when they appear at the inquiry. The Honor Council will report its findings and make a recommendation to the Faculty Committee on Discipline.

NOTE: The proceedings of the Honor Council are confidential. Therefore, the students and faculty involved are obligated to refrain from discussing the case with persons not directly involved in the case. Disclosure of confidential information is a violation of the Honor Code.

Being Accused of an Honor Code Violation

If a student is suspected of an Honor Code violation, the following steps will be taken:

- The instructor is instructed to report a grade of 'I' to the accused student while the student is under investigation. The accused student may not withdraw from the class in which the suspected Honor Code violation occurred until the situation is resolved. Once the case has been resolved, a final grade will be assigned.

- If the violation is reported while the Honor Council is adjourned for the spring and summer, the case will be handled as soon as possible at the start of the fall term. Alternatively, the case may be brought directly to the Faculty Committee on Discipline.
- An Honor Council member will be assigned to investigate the allegations. At this time, the accused student is given written notice of the suspected violation. The investigating member will go over the evidence with the accused student and ask for an explanation of the incident. The accused student has the right to request another investigator if the student feels uncomfortable with the investigator originally assigned to the case.
- Accused students are invited to prepare a brief written statement for use in their defense, if they feel that this is necessary.
- The Honor Council will invite the student to appear before the Council when it considers all the evidence. At that time, the student will be given second written notice of the suspected violation. The student will be asked to describe actions and motivations relevant to the incident. If the student fails to appear for the hearing, the Honor Council has the right to pass judgment in the absence of the student.
- The suspected student has the right to waive the Honor Council hearing and go directly before the Faculty Committee on Discipline for judgment.
- The Honor Council will make a recommendation to the Faculty Committee on Discipline regarding the guilt or innocence of the accused, and a suitable sanction, if applicable. The student will be notified of the recommendation and the reasons for the decision.
- The Faculty Committee on Discipline will review the recommendation made by the Honor Council. The Committee will ask the student to appear for a hearing. If the student fails to appear for the hearing, the Committee has the right to pass judgment in the absence of the student. The Faculty Committee will render a decision and will notify the student by written communication. The student may appeal the Committee's decision to the Executive Committee of the College.
- Typical sanctions for a first violation may include a zero on the assignment, a reduction in grade for the course, and community service. For especially serious or repeated violations of the Honor Code, the sanctions may also include suspension or expulsion from the College of Engineering.

Protection of the Suspected Student

In the informal procedure of an Honor Council hearing, the suspected student deals at first only with other students. This creates an atmosphere where the case can be stated fully without any inhibitions caused by the presence of faculty members or administrators. Although the hearings are confidential, the suspected student may bring a friend or advisor. The College of Engineering maintains records of all Honor Code convictions. However, all Honor Council and Faculty Committee on Discipline records are strictly confidential and are kept separate from the student's regular file.

Conclusion

The students, faculty, and administrators of the College of Engineering believe that living under the guidance of the Honor Code contributes to the success of engineers from the University of Michigan. Each student admitted to the College of Engineering is subject to the tenets of the Honor Code. Students are reminded that the principles on which the Honor Code rests apply to life in the professional world as well as on campus.

Students enrolled in the College of Engineering are expected to conduct themselves in such a manner as to be a credit to the University and to the community, and most importantly, to themselves.

Appendix B: Online Registration FAQ

Schedule of Classes

You can find the complete schedule of classes for each semester on the Registrar's website at www.ro.umich.edu/schedule. Note that Macro courses are listed under the College of Literature, Science, and the Arts. An extensive searchable database of courses can be found at www.lsa.umich.edu/cg/

When can I register?

You can register within Wolverine Access business hours any time after your official registration appointment start time. Registration appointments are assigned based standing (graduate, undergraduate) and credits earned. Students will be notified by the registrar of their appointment time and can verify this on Wolverine Access.

How do I register?

Registration is conducted online via Wolverine Access. Before your registration appointment begins you can search for classes (found under Student Business on Wolverine Access) and add them to your virtual 'backpack'.

When your registration appointment begins, you can select classes from your backpack to formally register for.

How do I find out if a class has a prerequisite or requires instructor permission?

The course information in Wolverine Access will display if there is a required or advisory prerequisite for a class. Similarly, classes that require instructor permission (override) will be indicated in this manner.

How can I get an override into a class?

For classes that require instructor permission, or if you would like to be exempt from a required prerequisite, you may email the instructor directly. Alternatively, the administrative coordinator for the home department can assist you. If you are unsure who to contact, speak with the Macro program coordinator.

How do I waitlist a class?

If a class is closed and has a waitlist available a checkbox will appear that says "Add me to waitlist if this class is closed". Select that check box and proceed to register normally, and you will be added to the course waitlist.

How do I know my registration went through?

After registering for a class you can check your class schedule via the [View Printable Schedule](#) or [View Class Schedule](#) links. The system will display all classes currently in your schedule, including those you are waitlisted for.

Appendix C: Master's Course Planning Worksheet



Master's Course Planning Worksheet

Macromolecular Science & Engineering Courses (Minimum of 9 hours)

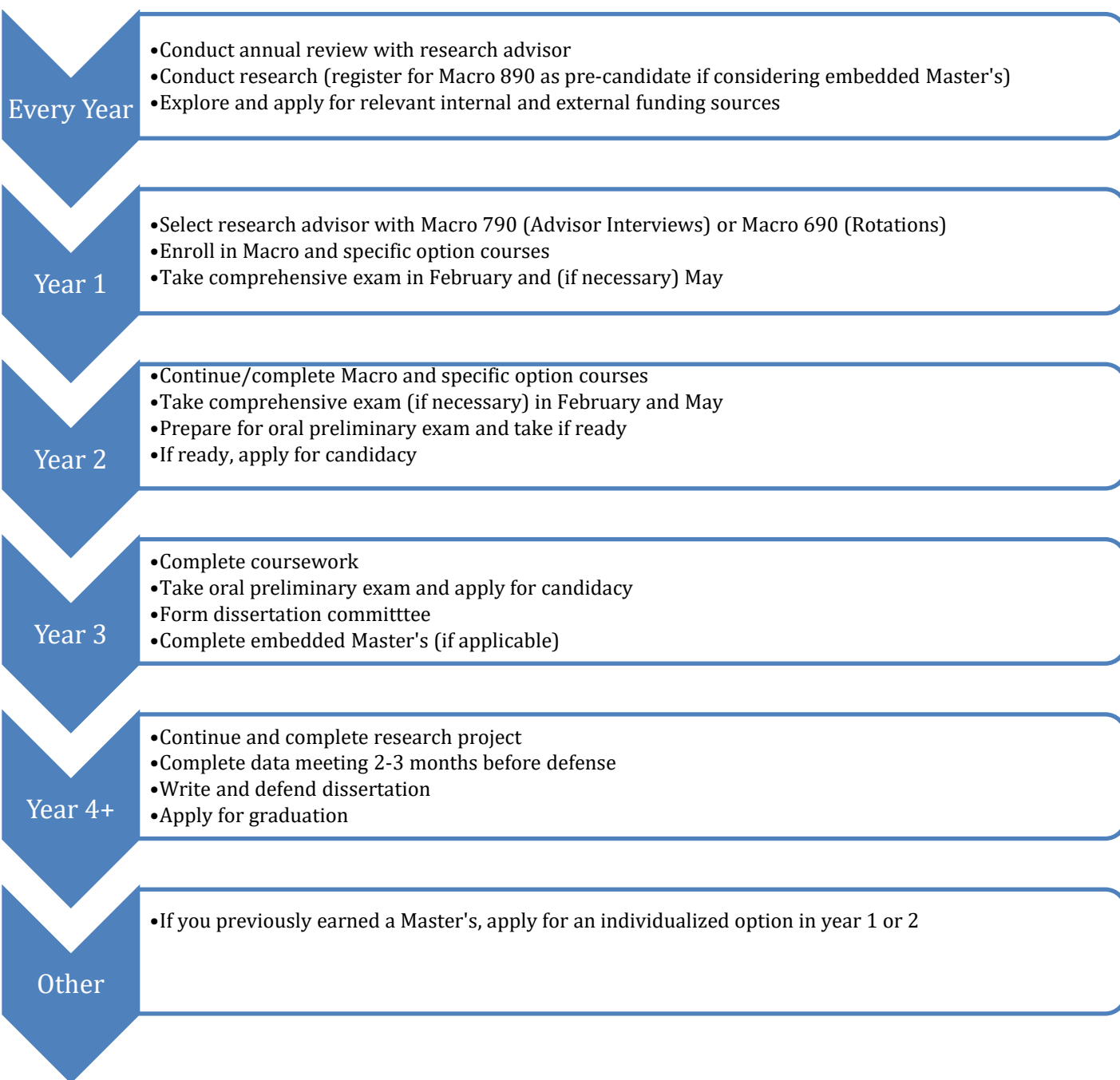
Major Option Courses (Minimum of 9 hours)

Other Courses (To attain 30 hour minimum, can include 4-6 hours Macro 890 with written report)

Appendix D: PhD Program Completion Timeline (Pre-2019)



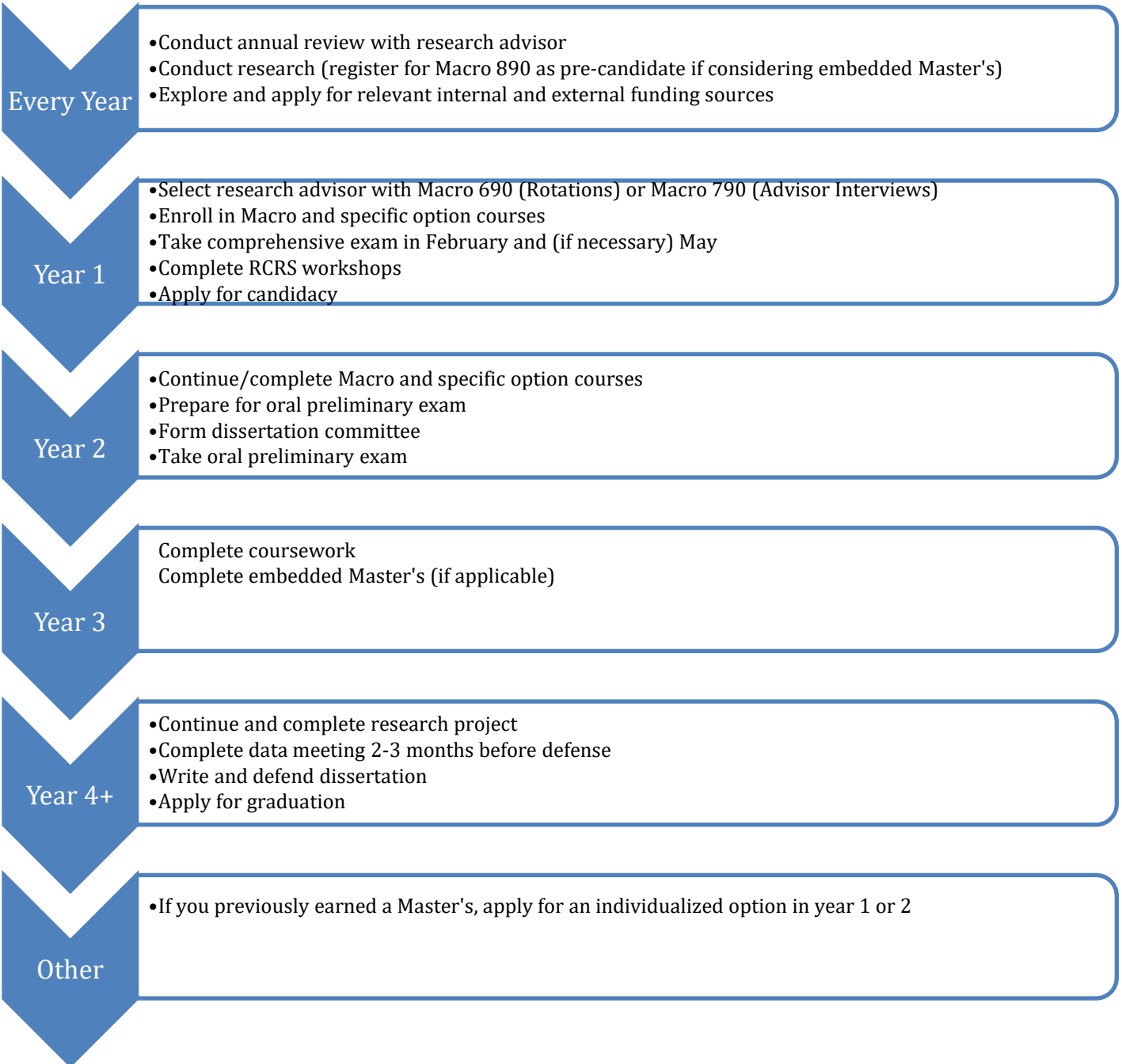
Program Completion Timeline



Appendix E: PhD Program Completion Timeline (Fall 2019 and later)



Program Completion Timeline



Appendix F: PhD Course Planning Worksheet (Pre-2019)



Ph.D. Course Planning Worksheet

Macromolecular Science & Engineering Courses (Minimum of 12 hours)

Macro 410 or 412

Macro 538

Major Option Courses (Minimum of 12 hours, majority 500 level or above)

Other Courses (To attain 30 hour minimum)

Macro 690 or 790 (1 hour)

Appendix G: PhD Course Planning Worksheet (Fall 2019 and later)



Ph.D. Course Planning Worksheet

Macromolecular Science & Engineering Courses (Minimum of 12 hours)

Macro 512

Macro 530

Macro 538

One additional Macro course

Major Option Courses (Minimum of 12 hours, majority 500 level or above)

Other Courses (To attain 25 hour minimum)

Macro 690 or 790 (1 hour)

Appendix H: Individualized Option



Petition for Individualized Option

Date:

Student Name:

Master's Institution:

Research Advisor:

This memo is to request approval from the Director and Executive Committee of my individualized option to fulfill course requirements for the PhD in Macromolecular Science & Engineering. This includes courses I have taken or will take here at the University of Michigan and courses I have taken for my Master's. I am including with this request a description of how my education and experience have prepared me for qualifying for an individualized option.

*Please include course number, name, and grade received (or term to be taken)

Macromolecular Science & Engineering Courses (Minimum 12 hours)

- 1)
- 2)
- 3)
- 4)

Individualized Option Courses (Minimum 12 hours)

- 1)
- 2)
- 3)
- 4)

Other Courses to Attain 30 Hour Level

- 1) Macro 690 or 790 (1 hour only)
- 2)
- 3)

Total Credits:

Advisor Signature

Date

Director Signature

Date

Appendix I: Selection of Research Advisor



Survey of Faculty Research & Selection of Advisor (Macro 790)

Name of Student: _____

First interview with Program Director:

Signature of Director: _____ Date: _____

Minimum of five faculty members interviewed. Have them sign below.

- | | | |
|----------|----------|----------|
| 1. _____ | 3. _____ | 5. _____ |
| 2. _____ | 4. _____ | |

Choose one faculty member as your first choice research advisor and one alternate

First choice of research advisor

Alternate choice for an advisor

Choice of a major field of study or major option in the Program:

Submit this with your short report on the interviews to the Program Coordinator.

To the chosen faculty advisor:

Are you willing to assume full support for this student commencing with the time he/she joins your group? Yes _____ No _____

Comments: _____

Signature of chosen faculty advisor: _____ Date: _____

Approval by Director on behalf of Macromolecular Science and Engineering

Signature of Director: _____ Date: _____

Appendix J: Macro 800 Guidelines and Grade Sheet

1. Six weeks before: Each student will pick a high quality journal article that is not too close to their own area of research. The article will be subject to the approval of a faculty mentor to guide them on the topic. This mentor will be a Macro faculty member who is NOT their research advisor. The article should be selected a minimum of 1.5 months (six weeks) before the presentation. Present the name of the article to your chosen mentor and your research advisor six weeks before the talk. The length of the lecture should be 25 minutes plus ten minutes for questions.
2. The article and the research area: The student should do a critique of the article. They should also do a literature search of 10 to 20 articles on the same research topic and be prepared to answer questions. A bibliography of the searched articles should be included showing how each article is related and how it helped understand the topic.
3. One month before: The student will need to submit an abstract on this article along with the listing of the research articles a minimum of one month prior to the seminar for approval by the mentor.
4. Two and a half weeks before: Draft slides of the entire talk are to be submitted to the mentor for consideration.
5. Two weeks prior to the lecture: The student should first present the talk to their chosen mentor and their own research advisor two weeks prior to the talk. The student should also present it to their research group before presenting it publicly. It is a good idea to include Macro students that have passed the 800 to get their suggestions.
6. Two days before: The revised and finalized slides should be submitted two days prior to the talk and be signed off by the mentor on the accountability sheet.
7. Missing deadlines will trigger an automatic 10 point reduction each. The faculty mentor, based on their own attendance at the lecture would assign a letter grade for the talk that would be adjusted by any late penalties. Two other faculty members other than the research advisor and mentor will grade the lecture when presented officially to a group. So, the mentor and two faculty will grade at the final talk, a total of three faculty. The research advisor should be present but does not grade the talk.
8. The check list or accountability list shown attached should be turned in and signed by the faculty mentor showing that the items were done on time.
9. A final grade of 70% or better would be considered passing. It will be a letter grade. A grade of B- or above would be considered as passing. A failure will require starting at point 1.

Step to do	Timing Before Lecture	Who is Involved	Date Done	Mentor's Initials
Select journal article	Six weeks before	Student and show article to mentor and research advisor.		
Submit abstract	One month before	Faculty Mentor (Not research advisor)		
Rehearsal talk and review of draft slides.	Two weeks before	Present talk with slides to the faculty mentor and the research advisor. Present to their own research group or other students. Good to have students that already passed 800 give suggestions.		Mentor's & Advisor's Initials
Finalized slides	Two days prior	Faculty mentor signs off.		
Present lecture	Day of lecture	At a student or special meeting		
Grading of lecture	Day of lecture	Faculty mentor and the two other Macro faculty (not the advisor) grade.		

Signature of Faculty Mentor

Date

Macro 800 Course Grade Form

Student Name: _____

JUDGMENT CRITERIA	
50 points possible	The quality of the presentation will be judged on the basis of: *Speaking speed, volume, and articulation. *Media (transparencies, etc.) quality and the quality of the use of the media during the presentation. *Appropriate use of time – the amount of material presented in the available time.
40 points possible	Technical content
10 points possible	Response to questions
	TOTAL

- | | |
|--------|-------------|
| 90-100 | A+ Superior |
| 80-90 | A Excellent |
| 70-80 | B Good |
| 60-70 | C Average |
| 0-60 | D Poor |

Grade _____

 Faculty Signature

 Date

Appendix K: Oral Preliminary Exam Report



Oral Preliminary Exam Report

Name of Student: _____

Date of Preliminary Exam: _____

Recommendations by the dissertation committee regarding any further course work or other requirements needed prior to admission to candidacy:

Recommend admission to candidacy: Yes No

Signature of all committee members:

Appendix L: Dissertation Committee Data Meeting Report



Dissertation Committee Data Meeting Report

Name of Student: _____

Date of Data Meeting: _____

Report of the research results presented by the candidate:

Specific recommendations for further research:

Other requirements set by the dissertation committee:

The dissertation committee recommends the student write his/her dissertation: Yes No

The committee agrees to the following time schedule for the preparation of the dissertation and its defense:

*Macro expects the dissertation chair to read and approve a draft of the dissertation before it is distributed to other committee members

Signatures of all committee members:

Appendix M: Degree/Diploma/Candidacy Deadlines

Master's Degree/Diploma Deadlines

*Please see Rackham's website for future deadlines:

www.rackham.umich.edu/current-students/graduation/masters-degree-diploma-application-deadlines

Students must apply to graduate in order to have the degree awarded. The deadlines for the conferrals are listed below:

*** Must apply for graduation through Wolverine Access by this date to be considered for degree conferral for the term.

Doctoral Candidacy Deadlines

*Please see Rackham's website for future deadlines:

www.rackham.umich.edu/current-students/policies/doctoral/phd-students/candidacy-deadlines

A student **must** be enrolled or otherwise be eligible for campus privileges, for a minimum of one credit, during the term in which preliminary exams are taken. Please see the Rackham Graduate School Academic Policies section [5.1 Candidacy Requirements](#) for more information.

Please Note:

Keep in mind prelims taken in the Fall or Winter term (for a student being advanced to candidacy in that term) will be assess 8 hours of 995 for that term.

Students registered full time (8 hours, or 6 if a GSI, GSSA, or GSRA) during the previous Fall and Winter terms have through the end of May to complete the preliminary examination without registering for the spring or spring/summer term.

Recommendation for Candidacy

A doctoral student may be advanced to candidacy by the graduate school upon recommendation of the student's department. Advancement to candidacy will be granted when it is determined that the student has completed all requirements for the doctoral degree except the dissertation, and been approved for subsequent dissertation work. To recommend a doctoral student for candidacy the graduate coordinator (not the student) must [submit the recommendation through the online system](#).

Advancement to Candidacy

When candidacy is approved, the Registrar's staff will change all 990 enrollments to 995 for the student. **Tuition will then be reassessed at the candidacy rate**; only 990 registrations will be changed to 995; other courses would require an official drop/add form initiated by the student if changes are needed.

Doctoral Degree Deadlines

*Please see Rackham's website for future deadlines:

www.rackham.umich.edu/current-students/policies/doctoral/phd-students/doctoral-degree-deadlines

Deadlines are based on intended final term of enrollment. All requirements must be complete, final, and approved by Rackham, no later than 5:00 PM EST on the deadline day.

Notes

1. A doctoral student must be enrolled for eight hours of candidacy during the full term in which s/he defends. It is expected that the defense will occur prior to the last day of classes for the intended final term of enrollment.
2. Degrees are conferred by the University of Michigan board of Regents three times a year. You may participate in commencement on or after the conferral date when all requirements have been completed.
3. This is a firm deadline and extensions will not be considered. The majority of students require a minimum of two weeks to make revisions and complete all requirements.
4. This is a firm deadline and extensions will not be considered. The majority of students require a minimum of two weeks to make revisions and complete all requirements. Additional term(s) of registration will be necessary if requirements are not met by this date.

Appendix N: GSI and GSRA Terms and Conditions

A Graduate Student Research Assistantship (GSRA) is an appointment which is provided to a student in good standing in a University of Michigan graduate degree program who performs personal research (including thesis or dissertation preparation) or who assists others performing research that is relevant to his or her academic goals.

A Graduate Student Instructor (GSI) is generally in charge of teaching small introductory classes, facilitating discussions in small sections connected to large lecture courses, running laboratory sections, and holding office hours where one-on-one teaching can occur. Your responsibilities frequently include grading and giving feedback on students' written work.

Please review the below as an example of terms and conditions of a GSRA/GSI appointment. You will receive specific terms and conditions from the department providing your appointment.

Enrollment Requirements

- You must be in good standing in a graduate degree program
- You must be registered for the entire term you are appointed as a GSRA for at least 6 credit hours during the fall or winter terms. No registration is required for a spring/summer appointment.
- Appointment is contingent on a successful background check
- If you withdraw from the university after the drop/add deadline, or your appointment is terminated before the end of the term, you will become responsible for the full tuition and fees for that term.
- Please refer to the Office of the Registrar's Academic Calendar website for registration deadlines: www.ro.umich.edu/calendar

Period of Appointment

- GSRA/GSI appointments will typically be made for periods coinciding with academic terms.
- Your appointment for the term will not normally be reduced unless you fail to meet the enrollment requirements, or if it is determined that you are not making satisfactory progress toward your degree

Grant or Contract Support (GSRA only)

- A stipend that is made available as a result of an externally funded grant or contract may be contingent on continuation of that grant or contract and must be subject to all of its terms. You will be notified in the event that external sponsor support is reduced or terminated resulting in an impact on the funding of a GSRA. In such cases, every effort should be made to maintain an equivalent amount of financial aid from other sources for not less than the stated period of appointment.

Effort, Hours, and Certification

- You will be expected to work an average of 10 hours per week if you have a 25% appointment and 20 hours per week if you have a 50% appointment.
- Where GSRA activity is funded by external sponsors, it is particularly important to ensure that effort during the appointment periods is not less than indicated on the appointment.
- You will be required to certify your work effort at the end of each term if your funding is from an external sponsored grant.

Stipends

- Your stipend will be paid to you on the last working day of each month in the term you are appointed.

Benefits

- If your appointment effort is 25% or greater, you are eligible for Grad Care health insurance.
- The Benefits Office will mail you an enrollment packet once your appointment is processed. It is your responsibility to sign up for benefits, using Wolverine Access (under Student Business).
- You have 30 days from the time your appointment was processed to enroll in benefits.
- If you choose not to elect any benefits, you must waive your coverage for the term and mail or fax it to the benefits office.
- Funding changes from GSRA/GSI to fellowship support will affect your benefits. Please see the program coordinator if your status changes.

Appendix O: Annual Review for Doctoral Students

This report must be completed annually at the end of the Winter Term by all Macromolecular Science and Engineering Ph.D. students.

This report serves several purposes. Most importantly, it is used by you and your dissertation advisor(s) to formally review progress towards completing your dissertation research. You are encouraged to work closely with your advisor(s) when drafting the report. Prior to submitting this report to the Macro Graduate Program office, it must be signed by you and your advisor(s). Annual reports will be maintained by the Macro Graduate Program Office as part of your academic record.

This report focuses on progress leading to successful completion and defense of your dissertation. There are other aspects of professional development (GSI and GSRA employment, off-campus employment, consulting, community service, etc.) that are very important. You are encouraged to update your curriculum vitae and personal web page on a regular basis, and to submit the most-current version of your CV as an appendix to this report.

Information in the progress reports and the submitted CVs will be used by your advisor(s), the Executive Committee and the Macro faculty for several purposes including: monitoring research progress, advising, assessment of eligibility and qualifications for honors and awards, and evaluation of progress for continued financial support.

Questions regarding the report should be directed to the Graduate Committee Executive Committee.

EXAMPLE

Annual Progress Report for Doctoral Candidates Macromolecular Science and Engineering

Report Period: May 1, 2019 – April 30, 2020

Student Name _____ UMID No. _____

Term Entered Ph.D. Program (e.g., Fall 2018) _____

Advisor _____

The following section is completed by the student

1. List members of your dissertation committee. Highlight changes from last year.

Chair _____

Co-chair _____

Member _____

Member _____

Member _____

If committee has not been **formally** appointed (i.e., nomination form submitted to Rackham), please explain why:

Do you anticipate any problems or barriers that will delay you from successfully defending your dissertation within the period of financial support described in your admission offer? If so, please explain. If you do not expect to complete your degree with your period of guaranteed funding, what is your plan to complete your degree, including when you will complete it.

2. On a separate page(s), please list all publications and presentations you have prepared during your doctoral studies at U of M. This is a cumulative report that will be updated and appended each year. New publications prepared/submitted/presented/ revised or published during the May 2019-April 2020 reporting period should be shown in **BOLD**. Use the following categories:
 - a. Articles in peer-reviewed journals (provide full citation, e.g., authors, title, journal name, year of publication, volume, and page numbers) and book chapters. If article has not appeared, give status: submitted, under revision following review, accepted, in press, etc.
 - b. Articles in conference proceedings (provide full citation, e.g., authors, title, meeting name, location, date, and page numbers).
 - c. Oral presentations (including poster sessions)
 - d. Working papers
3. On a separate page, list all honors, awards, fellowships, grants, etc. received since starting your doctoral studies at U of M. This is a cumulative report that will be updated and appended each year. New honors, etc. received during the May 2019-April 2020 reporting period should be shown in **BOLD**. List items related to your dissertation research first, followed by items related to teaching and/or service.

The following section is to be completed by the advisor(s)

1. Have you discussed the content of this report with your student? Yes No
2. Please provide a short commentary on the student's progress, strengths, and weaknesses.
(If necessary, attach a separate page.)
3. Give your best estimate of the anticipated date for the dissertation defense (term and year).

All that sign attest and agree to the accuracy of this report:

Student Signature _____ Date _____

Advisor Signature _____ Date _____

Co-Advisor Signature _____ Date _____

Appendix P: Macro Course Offerings

Macro 410 – Design and Applications of Biomaterials (Fall Term)

Biomaterials and their physiological interactions. Materials used in medicine/dentistry: metals, ceramics, polymers, composites, resorbable, smart natural materials. Material response/degradation: mechanical breakdown, corrosion, dissolution, leaching, chemical degradation, wear. Host responses: foreign body reactions, inflammation, wound healing, carcinogenicity, immunogenicity, cytotoxicity, infection, local/systematic effects.

Macro 412 – Polymeric Materials (Fall Term)

The synthesis, characterization microstructure, rheology, and processing of polymeric materials. Polymers in solution and in the liquid, liquid-crystalline, crystalline, and glassy states. Engineering and design properties including viscoelasticity, yielding, and fracture. Forming and processing methods. Recycling and environmental issues.

Macro 512 – Polymer Physics (Winter Term)

Structure and properties of polymers as related to their composition, annealing and mechanical treatments. Topics include creep, stress relaxation, dynamic mechanical properties, viscoelasticity, transitions, fracture, impact response, dielectric properties, permeation, and morphology.

Macro 514 – Composite Materials (Winter Term)

Behavior, processing, and design of composite materials, especially fiber composites. Emphasis is on the chemical and physical processes currently employed and expected to guide the future development of technology.

Macro 515 – Mechanical Behavior of Solid Polymeric Materials (Winter Term)

The mechanical behavior of polymers from linear viscoelastic to yield and fracture are covered. Specific topics include dynamic-mechanical relaxations, creep, yielding, crazing, fatigue, and fracture mechanics. The materials include toughened plastics, polymer alloys and blends, and composite materials. Structured design with plastics is also considered.

Macro 517 – Mechanics of Polymers (Every other Winter Term)

Viscoelastic stress-strain relations; generalized creep and relaxation models, operational approach. Correspondence between viscoelastic and elastic solutions of boundary value problems. Three-dimensional theory of linear viscoelastic media. Quasi-static problems; sinusoidal oscillation problems; use of complex modulus and compliance; dynamic problems, impact.

Macro 518 – Organometallic Chemistry (Every other Winter Term)

Systematic consideration of modern aspects of organometallic chemistry including main group and transition metal complexes. The structure and bonding in organometallic compounds are covered. Particular emphasis is placed on applications of homogeneous organometallic catalysis in polymer synthesis, industrial processes, and synthetic organic chemistry.

Macro 530 – Advanced Functional Polymers: Molecular Design & Applications (Fall Term)

Development of global perspective of interdisciplinary issues involved in functional polymers. Learn how to design, synthesize, evaluate, and analyze functional polymers.

Macro 536 – Laboratory in Macromolecular Chemistry (Every other Winter Term)

Experimental methods for the study of macromolecular materials in solution and in the bulk state.

Macro 538 – Organic Chemistry of Macromolecules (Winter Term)

The preparation, reactions, and properties of high molecular weight polymeric materials of both natural and synthetic origin.

Macro 559 – Foundations of Nanotechnology (Every other Fall Term)

This course will cover the synthesis and processing of nano-sized metal, metal oxide, and semiconductor powders. It will also include organic/inorganic and nanobiomaterials. Emphasis will be on particle properties and their use in making nanostructured materials with novel properties.

Macro 790 – Faculty Activities Research Survey

This course introduces students to research activities of Macro faculty with the intent of helping a student to choose his research advisor in the first term.

Macro 800 – Research Seminar

Student presentation of selected seminar topics in Macromolecular Science and Engineering.

Macro 890 – Introduction to Research Techniques

This course is used for research carried out to earn the master's degree.

Macro 990 – Dissertation Research Precandidacy

This course is used for doctoral research by student not yet admitted to candidacy.

Macro 995 – Dissertation Research Candidacy

This course is used for doctoral research by students who have been admitted to candidacy.

Appendix Q: Rotation Advisor Selection Form



Selection of Advisor via Research Rotations

Name of Student: _____

Minimum of five faculty members interviewed. Have them sign below.

- | | |
|----------|----------|
| 1. _____ | 4. _____ |
| 2. _____ | 5. _____ |
| 3. _____ | |

1st Rotation Advisor: _____

Start Date: _____

2nd Rotation Advisor: _____

Start Date: _____

Choice of a major field of study or major option in the Program:

To the chosen faculty advisor:

Are you willing to assume full support for this student commencing with the time he/she joins your group? Yes _____ No _____

Comments: _____

Signature of chosen faculty advisor: _____ Date: _____

.....

Approval by Director on behalf of Macromolecular Science and Engineering:

Signature of Director: _____ Date: _____

Appendix R: Dissertation Proposal Oral Examination Report



Dissertation Proposal Oral Examination Report

Name of Student: _____

Date of Dissertation Proposal Exam: _____

Title: _____

- Dissertation proposal oral examination was satisfactory.

- Student did not present an acceptable proposal and will take immediate steps to refine the proposal.

Comments (optional):

Committee Member Signatures:
