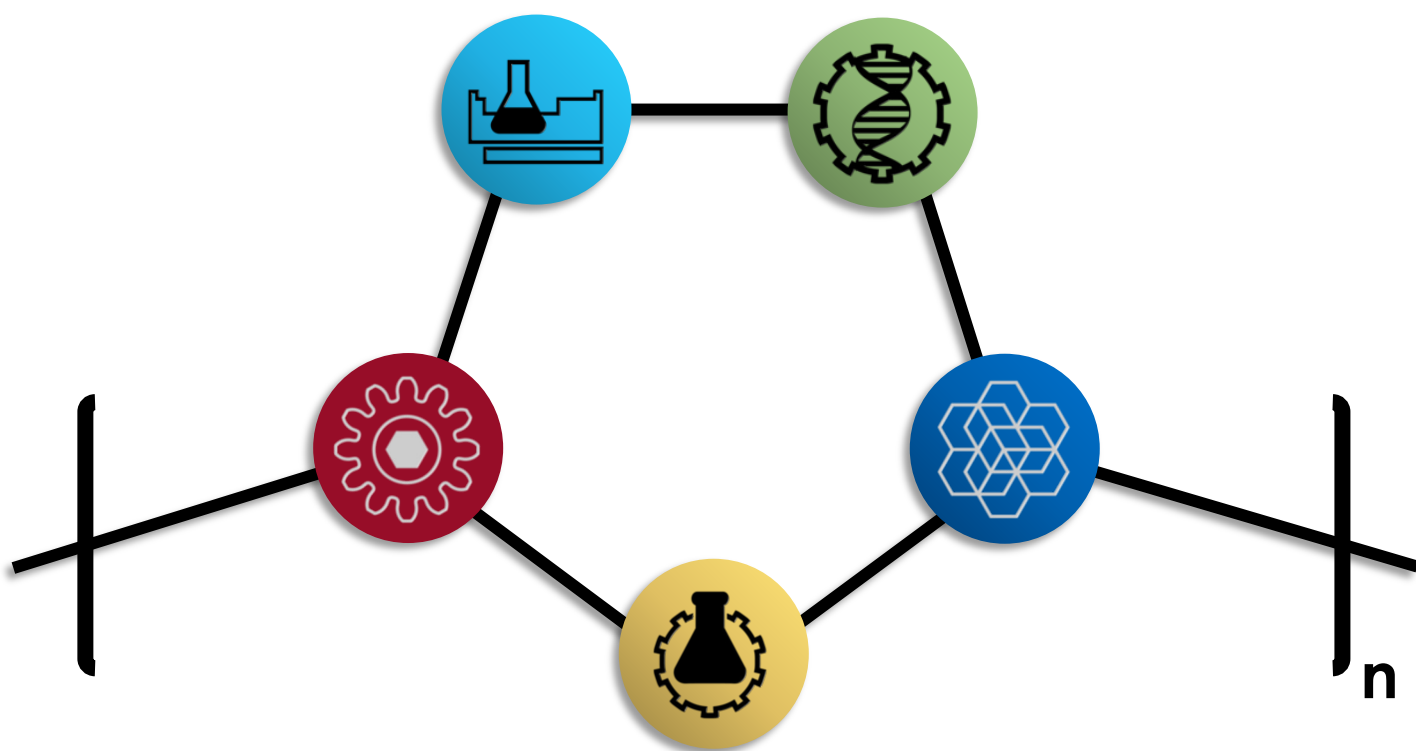




Program in Polymers and Soft Matter

Student Handbook
2022-2023



Dear New PPSM Student,

Welcome to PPSM, MIT's distinguished doctoral program in polymer and soft matter science and engineering!

On the following pages, you will find information about helpful resources in the PPSM community, and about the structure of PPSM as it relates to your "home department." During your time at MIT, we look forward to assisting you with any questions or concerns that may arise regarding policies, procedures and program requirements.

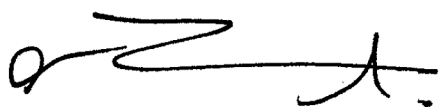
For over three decades, PPSM has established itself as a nucleus for polymers and soft matter-related study, research, and comradery at MIT. Among our unique strengths are the polymer/soft matter-focused core curriculum, our seminar series bringing internationally-recognized scientists to MIT, and the wide spectrum of research topics under investigation.

We encourage your active participation in the PPSM Graduate Student Association (PGSA), which actively organizes events large and small throughout the year to assist with qualifying procedure preparation, building community, and more.

PPSM alums are a specially-qualified few whose membership includes current faculty at Harvard, MIT, Princeton, Yale and a number of leading overseas universities; leadership positions in both start-ups and established firms such as 3M, DuPont, Millennium Pharmaceuticals, and Bridgestone Tire; and prominent government appointments with US government agencies including NASA, NIST, and the FDA.

We are delighted to welcome each of you to MIT, and invite you to contact either myself (aalexand@mit.edu) or Administrative Assistant Gregory Sands (gsands@mit.edu) regarding any questions that may arise as you progress. Best wishes for a rewarding year ahead!

Sincerely,

A handwritten signature in black ink, appearing to read 'Alex Katz', with a stylized flourish at the end.

Prof. Alfredo Alexander-Katz, Director

MIT Program in Polymers and Soft Matter (PPSM)

Faculty, MIT Dept. of Materials Science & Engineering

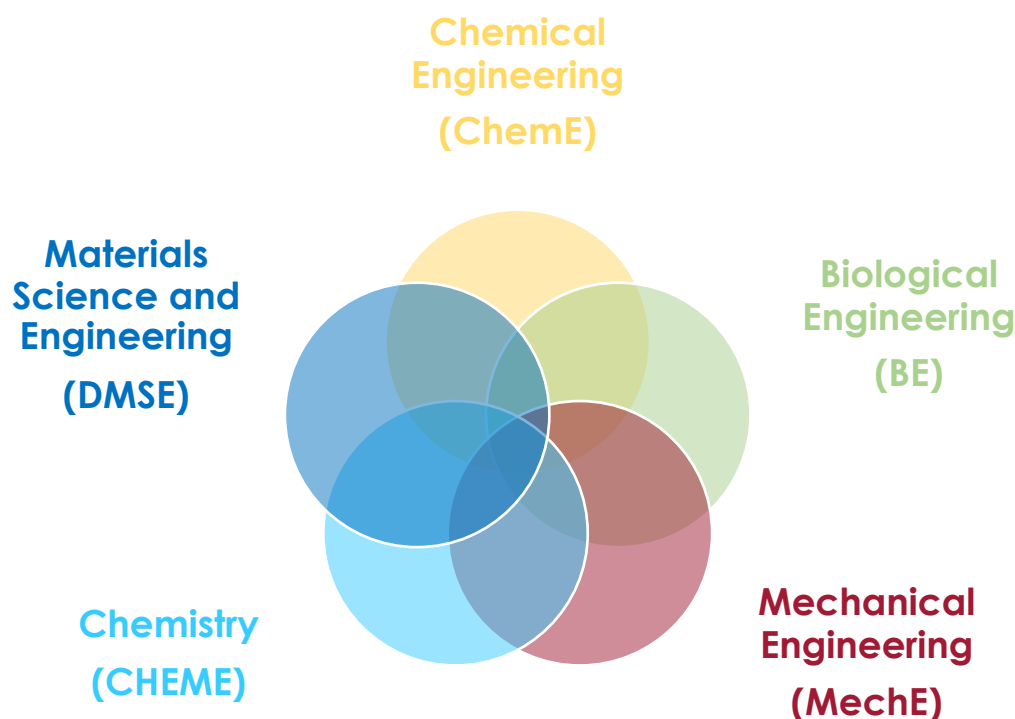
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What is PPSM?

The MIT Program in Polymer and Soft Matter (formerly PPST, Program in Polymer Science and Technology) was founded in 1986, with the goal of providing educational opportunities for students who wish to focus their graduate education within the broad field of polymers.

Polymer research activities at MIT started in the 1920's and 1930's as exciting advances were being made in the field of polymer technology. Since then, several MIT departments have joined forces to develop a strong educational program in polymers and soft matter. The Program in Polymers and Soft Matter is an interdepartmental program which fosters collaborations in these fields by bringing together students from different departments, who share a common interest in polymers.



PPSM provides a core curriculum in polymer studies and a doctoral qualifying examination that is accepted in place of departmental exams by five participating MIT departments (Biological Engineering, Chemistry, Chemical Engineering, Materials Science and Engineering and Mechanical Engineering).



Camille

2nd year DMSE/PPSM

Prof. Aristide Gumyusenge's group (DMSE)

"PPSM is not only a great program for students who wish to carry on a career in the fields of polymers and soft matter, but it is also an environment auspicious to collective emulation and intellectual stimulation, where one can learn from inspiring scientists and professors of the field, and work with highly motivated, like-minded students. What I really love in PPSM is the spirit of community and collaboration that exists between students from different backgrounds."



Eric

2nd year DMSE/PPSM

Prof. Krystyn Van Vliet's group (DMSE)

"PPSM is a program which provides interdisciplinary exposure to its students while providing fundamental knowledge in polymer science. Though there will be challenges, PPSM fosters a very close-knit community that allows students to support each other so that everyone can succeed."

The goal of PPSM is to foster a spirit of community and collaboration among the large group of students, post-docs, faculty, and visitors involved in polymer-related activities at MIT.

PPSM produces a popular weekly research seminar, coordinates the schedules of visitors to MIT from the worldwide community of polymer specialists in industry, academia and government, and arranges special events and research poster competitions for the MIT polymer community.

PPSM Faculty & Affiliates

PPSM Director



Prof. Alfredo Alexander-Katz*

aalexand@mit.edu – (617) 452-2238

Polymer physics, drug-delivery, self-assembly, adhesion, driven systems.

PPSM Faculty

Prof. Daniel Blankschtein

dblank@mit.edu – (617) 253-4594

Statistical mechanics, thermodynamics and physical chemistry of complex fluids and micellar solutions.



Prof. Patrick S. Doyle

pdoyle@mit.edu – (617) 253-4534

Microrheology, biophysics, microfluidics separation, polymer physics, transport phenomena.

Prof. Ariel L Furst*

afurst@mit.edu – (617) 253-4677

Bioelectrochemistry, clinical diagnostics, biotechnology, surface chemistry, self-assembly.



Prof. Paula T. Hammond

hammond@mit.edu – (617) 258-7577

Molecular design and synthesis, functionalized polymers, optical properties of polymers, liquid crystalline polymeric materials.

Prof. Bradley D. Olsen

bdolsen@mit.edu – (617) 715-4548

Block copolymers, soft condensed matter physics, protein-based materials, bioelectronics.





Prof. Qin (Maggie) Qi*

qmqi@mit.edu – (617) 253-0096

Complex fluids, transport phenomena, biomechanics, microfluidics, microphysiological systems, biomedical engineering.

Prof. Gregory C. Rutledge*

rutledge@mit.edu – (617) 253-0171

Polymer physics, thermodynamics of bulk polymers, molecular modeling.



Prof. Hadley D. Sikes

sikes@mit.edu – (617) 253-5224

Functional polymeric materials, macromolecular design, clinical diagnostics.

Prof. Zachary P. Smith*

zpsmith@mit.edu – (617) 715-4503

Membrane separations, polymer physics, polymer chemistry, porous materials, nanotechnologies.



Prof. Gareth H. McKinley

gareth@mit.edu – (617) 258-0754

Non-Newtonian fluid dynamics, polymer processing, viscoelasticity, flow stability, extensional rheology and filament stretching.

Prof. Ritu Raman

ritur@mit.edu – (617) 253-2201

Soft materials, biological actuators, tissue engineering.



Prof. Ioannis Yannas

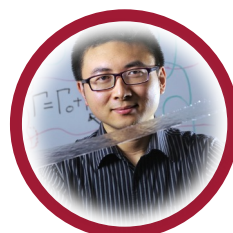
yannas@mit.edu – (617) 253-4469

Biodegradable polymeric templates for organ regeneration, design and clinical testing of artificial skin.

Prof. Xuanhe Zhao

zhaox@mit.edu – (617) 324-6367

Soft materials, solid mechanics, bioinspired skin, electroactive polymers, surface instabilities, tough hydrogels.





Prof. Aristide Gumyusenge

aristide@mit.edu – (617) 452-3524

Electronic materials, semiconducting polymers, surfaces, interfaces and thin-films.

Prof. Rafael Gomez-Bombarelli

rafagb@mit.edu – (617) 253-5632

Computational materials science, atomistic simulations, machine learning.



Prof. Robert J. Macfarlane*

rmacfarl@mit.edu – (617) 253-3300

Biomaterials, composites, electronic, photonic, and magnetic materials, materials chemistry, mechanical behavior of materials, nanotechnology, polymers, self-assembly.

Prof. Christine Ortiz

cortiz@mit.edu – (617) 452-3084

Macromolecular systems, nanomechanics, structure-property relationships, biomimetic materials design.



Prof. Julia Ortony

ortony@mit.edu – (617) 253-2063

Molecular engineering, self-assembly, energy materials, biomaterials, dynamics, water.

Prof. Darrell J. Irvine

djirvine@mit.edu – (617) 452-4174

Biomaterials surfaces, tissue engineering, polymer-biopolymer nanosystems, bioengineering of the immune system.



Prof. Katharina Ribbeck

ribbeck@mit.edu – (617) 715-4575

Physiological transport, mucus barriers, biofilms, pathogen/host interactions.



Prof. Jeremiah A. Johnson*

jaj2109@mit.edu – (617) 253-1819

Drug-delivery, hydrogels, biopolymers, nanoparticles, semiconducting polymers, organometallic polymers, photoactive polymers.

Prof. Timothy M. Swager

tswager@mit.edu – (617) 253-4423

Synthesis and characterization of electronically and optically active polymers and polymeric sensory materials.



PPSM Faculty Affiliates



Prof. Robert C. Armstrong

rca@mit.edu – (617) 253-4581

Polymer fluid mechanics, rheology, polymer processing kinetic theory and rheology, applied mathematics.

Prof. Robert S. Langer

rlanger@mit.edu – (617) 253-3107

Polymeric, controlled drug-delivery systems.



Prof. Keith A. Nelson

kanelson@mit.edu – (617) 253-1423

Femtosecond-millisecond time resolved spectroscopy of polymers and other viscoelastic media.



Chemical
Engineering



Mechanical
Engineering



Materials Science
and Engineering



Biological
Engineering



Chemistry

* will have lab openings this September for PPSM 1st-year students.

Other Faculty may also have openings in the Fall. Please, reach out to them if you are interested in joining their research group.

PPSM Contacts



PPSM Office

Room 76-253
Massachusetts Institute of Technology
77 Massachusetts Avenue
Cambridge, MA 02139



Director

Professor Alfredo Alexander-Katz
Department of Materials Science and Engineering



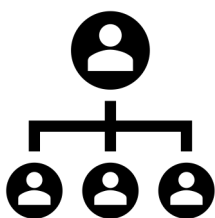
NE46-605



(617) 452-2238



aalexand@mit.edu



Administrator

Gregory Sands



76-253



gsands@mit.edu



(617) 253-0949 or (617) 301-0091

*Office Hours: Mon—Wed 3-7 pm (Please email/call ahead)
Available via Email or Phone on Thu-Fri 3-7 PM*



PPSM Web Site

<http://polymerscience.mit.edu>

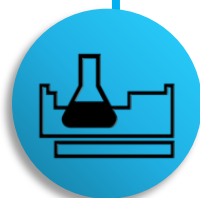
Home Department Graduate Offices and Faculty Contacts



- ❖ Academic Administrator: **Dalia Fares**
16-267 (617) 253-5804 dalia@mit.edu
- ❖ Faculty: **Prof. Katharina Ribbeck**
56-341C (617) 715-4575 ribbeck@mit.edu



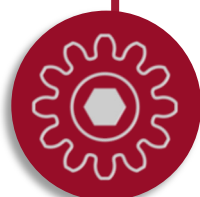
- ❖ Academic Administrator: **Melanie Charette**
66-366A (617) 253-4577 melaniec@mit.edu
- ❖ Graduate Academic Coordinator: **Matthew Sweeney**
66-366 (617) 452-2162 vsweeney@mit.edu
- ❖ Faculty: **Prof. Gregory C. Rutledge**
E17-504D (617) 253-0171 rutledge@mit.edu



- ❖ Academic Administrator: **Jennifer Weisman**
6-205 (617) 253-1845 jweisman@mit.edu
- ❖ Graduate Adm. Assistant: **Brandon Milardo**
54-912 (617) 253-1851 bmilardo@mit.edu
- ❖ Faculty: **Prof. Timothy M. Swager**
18-597 (617) 253-4423 tswager@mit.edu



- ❖ Academic Administrator: **Angelita Mireles**
6-107 (617) 253-3302 angelita@mit.edu
- ❖ Graduate Adm. Assistant: **Amanda Bendzel**
6-107 (617) 258-5793 abendzel@mit.edu
- ❖ Faculty: **Prof. Alfredo Alexander-Katz**
NE46-605 (617) 452-2238 aalexand@mit.edu



- ❖ Graduate Administrator: **Saana J. McDaniel**
1-112 (617) 253-2291 saana@mit.edu
- ❖ Graduate Adm. Assistant: **Una Sheehan**
1-112 (617) 253-2291 oona@mit.edu
- ❖ Faculty: **Prof. Gareth H. McKinley**
3-250 (617) 258-0754 gareth@mit.edu

PPSM Doctoral Path

1st year



Choose Advisor

- Timeline for choosing an advisor is the same as in home department



Core

- Classes subject to change every year
- Typically, Biomaterials, Mechanics, Physics, and Synthesis (see page 14)

2nd year



Minor

- Class requirements determined by home department (see page 18)



Electives

- 2 required polymer-related electives chosen by student

3rd year +



Minor/Electives

- Complete unfinished class requirements



Thesis Research

- Continue with thesis research



Nadia, 2nd year DMSE/PPSM, Prof. Ariel L. Furst's group (ChemE)

"PPSM is a unique and inspiring community that I can lean on for support in classes, research, and life in general!"



Qualifying Exams

- Based only on core classes
- Written and oral exam
- Typically held in late May after finals



Advance to
doctoral
candidacy!



Thesis Proposal

- Thesis committee assembled by student
- Can be done any time in second year
- NOT an exam



Thesis Defense

- On average, around 5th year
- Includes written dissertation and thesis presentation



Graduate
with PhD!

PPSM Curriculum (2022-2023)

PPSM Core Classes



Fall 2022

- **10.568/3.942** Physical Chemistry of Polymers/Polymer Physics
- **3.963** Biomaterials Science and Engineering
OR **2.79** Biomaterials: Tissue Interactions
- **2.075** Mechanics of Soft Materials
- **3.903/10.960** Seminar in Polymers and Soft Matter



Spring 2023

- **10.569** Synthesis of Polymers



Nick

2nd year MechE/PPSM

Prof. John Hart's group (MechE)

"PPSM gives you access to resources, faculty, and courses in five separate departments - it's invaluable."

Additional Class Options

In addition, students are encouraged to enroll in Elective Classes depending on their individual backgrounds and interests. Some of these classes may be required by student's home department (see "Departmental Minor Requirements" section page 18). A selection of elective subjects that may be of interest to the student are listed below:

Fall 2022

- ❖ **BE**: Any class that counts towards your minor.
- ❖ **ChemE**: Any core class or elective that would count towards your minor. Taking 10.40 Chemical Engineering Thermodynamics is highly recommended, if the schedule permits.
- ❖ **Chemistry**: 5.53 Molecular Reactivity
- ❖ **DMSE**: 3.20 Materials at Equilibrium or an elective that is not polymer related.
- ❖ **MechE**: Any class that counts towards your minor. MechE is very flexible in the classes you need to take.

Spring 2023

- ❖ **BE**: Any class that counts towards your minor.
- ❖ **ChemE**: Any core class or elective that would count towards your minor.
- ❖ **Chemistry**: 5.53 Molecular Reactivity
- ❖ **DMSE**: 3.21 Kinetic Processes in Materials or an elective that is not polymer related.
- ❖ **MechE**: Any class that counts towards your minor.

PPSM 1st year Summary

Choose your advisor(s)

- Meet with at least 5 MIT faculty and complete the Advisor Research Form (see page 27)
- Follow your home department's administrative requirements if applicable

Core Classes

- 20.363 Biomaterials Science and Engineering
- 3.942 Polymer Physics
- 2.075 Mechanics of Soft Materials

SUMMER/FALL/SPRING

FALL

Qualifying Exams

- Written exam ~1-2 weeks after finals
- Oral exam ~1 week after written
- Progress to doctoral candidacy!

Classes

- 10.569 Polymer Synthesis
- Polymer elective and/or home department requirement
- PGSA qual prep sessions

END OF YEAR

SPRING

Note: This is a suggested timeline. Core class offerings are subject to change every year. Minor requirements and electives can be taken at any time during the doctoral path.

Recommended textbooks

In addition to the textbooks recommended by your instructors, the following textbooks will be helpful for understanding the PPSM core coursework and preparing for your qualification exams:

- **Young, Robert K. and Lovell, Peter A. Introduction to Polymers, 3rd Ed.** Boca Raton: CRC Press, 2011, ISBN: 978-1-138-45957-1
- **Rubinstein, Michael. and Colby, Ralph H. Polymer Physics.** Oxford University Press, 2003, ISBN: 978-0-19-852059-7
- **Lodge, Timothy P. and Hiemenz, Paul C. Polymer Chemistry, 3rd Ed.** Boca Raton: CRC Press, 2020, ISBN: 978-1-4665-8164-7
- **Odian, George. Principles of Polymerization, 4th Ed. Hoboken:** John Wiley & Sons, 2004, ISBN: 0-471-27400-3

Many of these texts should be available in the MIT Library – check out the Hayden Library Reserve Stacks, Science Library Stacks, and Barker Engineering Library Stacks.

Additional recommended textbooks include:

- **Contemporary Polymer Chemistry** by Allcock, Lampe, and Mark
- **Fundamentals of Polymer Processing** by Middleman;
- **The Physics of Polymers: Concepts for Understanding their Structures and Behavior** by Strobl;
- **An Introduction to Polymer Science** by Elias.



Departmental Minor Requirements

Current Minor Requirements for BioEng/PPSM, Chemistry/PPSM, ChemE/PPSM, DMSE/PPSM, and MechE/PPSM students are shown below. These menus are subject to change and are shown here for general guidance. PPSM students are expected to check with the Graduate Office of the home department for periodic updates.

❖ Department of Biological Engineering

REQUIREMENT: [SUBJECT TO REVISION] Complete a minimum of 3 BE subjects, including:

- 20.440 Analysis of Biological Networks
- 20.420 Bimolecular Kinetics and Cellular Dynamics
- 20.430 Fields, Forces, and Flows in Biological Systems

❖ Department of Mechanical Engineering

REQUIREMENT: Complete with a grade of B or higher, a minimum of 3 additional ME graduate-level (G or H level) subjects that are distributed over at least two of the seven ME Thrust Areas (<http://me.mit.edu/research>)

❖ Department of Chemical Engineering

REQUIREMENT: Complete with a grade of B or higher, a minimum of 3 ChemE subjects, at least two of which must be from the list of core subjects shown below:

- 10.34 Numerical Methods Applied to Chemical Engineering
- 10.40 Chemical Engineering Thermodynamics
- 10.50 Analysis of Transport Phenomena
- 10.65 Chemical Reactor Engineering



Yehlin

2nd year DMSE/PPSM

Prof. Bradley L. Pentelute's group (Chemistry)

"PPSM is an interdisciplinary program that helps students to learn polymer science from fundamental to various applications. Four core courses and qualifying exams helped us to broaden and strengthen our perspectives on polymers and utilize them as tools for our graduate research. I strongly recommend this program to anyone who really wants to pursue their graduate research in polymer science."

❖ Department of Materials Science and Engineering

REQUIREMENT: Complete a minimum of 3 DMSE subjects, including:

- 3.20 Materials at Equilibrium
- 3.21 Kinetic Processes in Materials
- One additional non-polymer graduate subject, 9+units

In addition, students are encouraged to enroll in Elective Courses depending on their individual backgrounds and interests. A selection of elective subjects can be found in the related course offerings section of this document.

❖ Department of Chemistry

REQUIREMENT: Complete the subject listed below

- 5.47 Tutorial in Organic Chemistry (graded P/F)

PPSM Seminars

Fall 2022 Polymer Seminars

PPSM sponsors a series of seminars covering a broad range of topics of general interest to the polymer community, featuring speakers from both on and off-campus.

Fall 2022 Seminars may be presented in person, or virtually. Seminars usually start at 3:30 PM. Live events occur in MIT 56-114.

For further information, please contact Professor Ariel L. Furst at afurst@mit.edu.

Additional fall 2022 speakers:

- SEPT. 4** – Prof. Michael B. Ross (U. Mass. Lowell)
- SEPT. 21** – Prof. Qin (Maggie) Qi (MIT)
- SEPT. 28** – Prof. Prof. Ritu Raman (MIT)
- OCT. 19** – Prof. Cassandra E. Callman (UT Austin)
- OCT. 26** – Prof. Crystal Chu (Lehigh University)
- NOV. 2** – Prof. Björn M. Reinhard (Boston University)
- NOV. 9** – Prof. Michael Schulz (Virginia Tech)
- DEC. 7** – Prof. Quentin Michaudel (Texas A&M)
- DEC. 14** – Prof. Jodie L. Lutkenhaus (Texas A&M)

Please visit the PPSM website for PPSM Seminar Calendar updates as the term progresses, and for the most up to date information on how each seminar will be presented.

Emails with detailed information will be sent to the PPSM community a few days before each seminar.



Other Seminar Series

❖ Department of Biological Engineering

BE offers a series of seminars given by faculty from MIT and other institutions. More information can be found here:

<https://be.mit.edu/news-events/seminars>

❖ Department of Chemical Engineering (ChemE)

ChemE offers MIT faculty seminars for PPSM first-year graduate students. This “Introduction to Chemical Engineering Research” (10.990) focuses on recent developments and research projects available to new graduate students. More information is available on:

<https://cheme.mit.edu/news-events/seminar-series/>

❖ Department of Chemistry

MIT Department of Chemistry offers Faculty Research Talks, which will occur on September 6th, 9th, 14th and 16th in 4-270. Information about other Chemistry seminars can be found here:

<https://chemistry.mit.edu/seminar-programs/>

❖ Department of Materials Science & Engineering (DMSE)

3.201 Introduction to DMSE, (open only to DMSE/PPSM students) may be very helpful in guiding students in their search for a suitable research group. For non-DMSE/PPSM students, materials seminars (which may include some seminars presented by DMSE faculty) information may be found on the DMSE Events Calendar web page:

<http://dmse.mit.edu/events>

❖ Department of Mechanical Engineering (MechE)

The Soft Materials Structures and Devices (SMSD) Seminar series, jointly supported by MIT MechE and MIT DMSE, may be interesting for PPSM students. For the most up to date information on the SMSD seminar series, please contact Coordinator Morgan Middlebrook (mmiddleb@mit.edu). MechE seminars information may be found here:

<http://meche.mit.edu/events>

Quals: Your gateway to doctoral candidacy!

The **PPSM Doctoral Qualifying Exam** is traditionally held in late May just after the conclusion of Final Exam week.

WRITTEN EXAM

- Single day exam (grading P/F) consisting of four to six one-hour problems.
- Exam content is based upon the required PPSM core classes for your year of entry.
- Written exam is open book/online resources and calculators are permitted.

ORAL EXAM

- One-hour process based upon four to six problems (grading P/F).
- Oral exam questions are authored by PPSM core class faculty.
- Student receives four to six exam questions for 15-minute private study period.
- At conclusion of private study period, student is directed to nearby exam room.
- Student participates in oral exam adjudicated by PPSM core faculty.
- Student's advisor is invited to participate in the panel in a non-grading capacity.

For both the Written and Oral exams:

- All PPSM Written and Oral Qual exam grades are reported to examinees on the day of the oral exam, after all students have completed their oral exams. Students can pass, fail, or conditionally pass.

Conditional Pass...

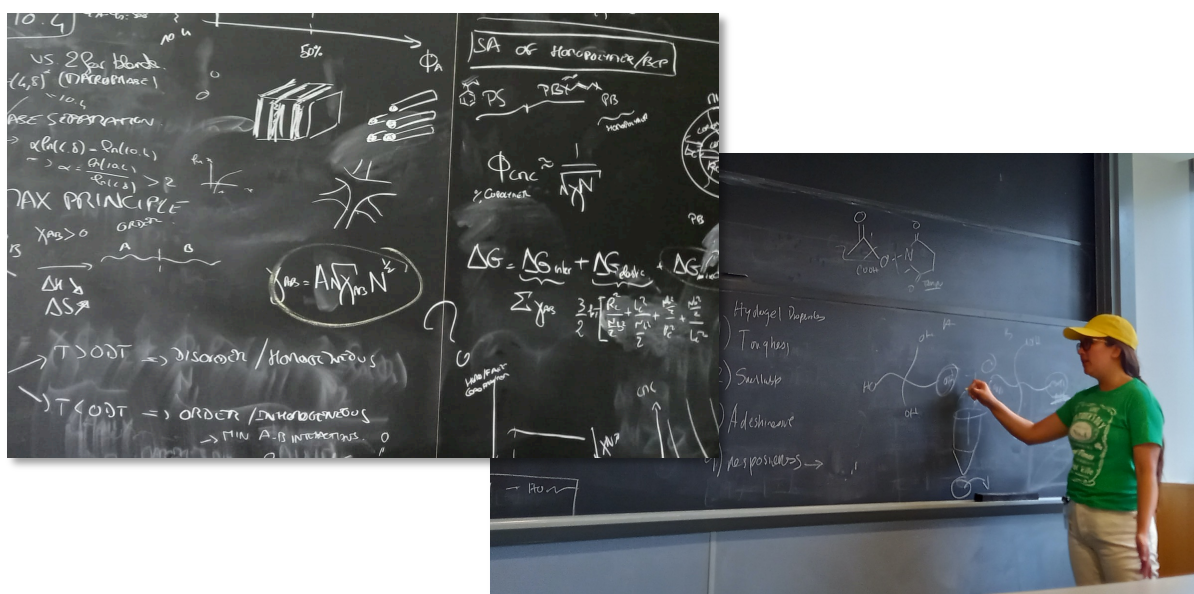
- ...may occasionally be granted for the oral and/or written exam(s)
- ...indicates generally satisfactory exam performance except one area
- ...entails a short-term additional commitment to improvement in that area
- ...is accompanied by specific instructions as to what is being recommended and why
- ...may require or advise the student to take remedial steps such as the following:
 - ✓ Enroll in/Retake one class, in a specific area needing improvement
 - ✓ Serve as a TA for one class in a specific area needing improvement
 - ✓ Other short-term measures recommended by the examining faculty

If you Fail a PPSM Written or Oral Qualifying exam...

- ...students are permitted a maximum of ONE RETAKE per oral or written exam
- ...the retake may occur either:
 - ✓ in concurrence with the next regularly scheduled PPSM Qual exams in late May of the following year, OR...
 - ✓ ...if warranted, faculty may instead allow a free-standing retake exam on a more urgent basis, for example, during the following academic year.

PGSA Quals Training Sessions

In the Spring, upper-year PPSM students volunteer to help first-year students practicing for the Quals oral exam. Around Spring break, the PGSA Academic Chairs will organize an event to chat and answer questions about the qualification exams. Quals Training Sessions will then be held once or twice a week for PPSM students to practice answering questions in a format mimicking the exam setting.



Mae

2nd year DMSE/PPSM

Prof. Paula T. Hammond's group (ChemE)

"Your PPSM peers are your greatest allies!"



Rebecca

2nd year DMSE/PPSM

Prof. Julia Ortony's group (DMSE)

"My favorite thing about PPSM is the community of students who are very willing to support and help one another!"

PPSM Research Proposal

PPSM Doctoral Candidates who have passed the PPSM Qualifying Exams must complete a Research Proposal to receive their doctoral degree. Usually, PPSM Research Proposals are scheduled within the year following Quals.

Departmental Thesis Policies

Each Department follows different policies regarding the Research Proposal. Please follow the link corresponding to your department to learn more about this important step of your Doctoral Path.

❖ Biological Engineering

<https://begradhandbook.mit.edu/>

❖ Chemical Engineering

<https://cheme.mit.edu/wp-content/uploads/2021/03/Grad-Handbook-20-21.pdf>

❖ Chemistry

<https://chemistry.mit.edu/academic-programs/graduate-programs/thesis-preparation/>

❖ Materials Science and Engineering

<https://dmse.mit.edu/graduate/programs/doctoral/thesis#>

❖ Mechanical Engineering

https://meche.mit.edu/sites/default/files/MechE_Grad_Guide.pdf

In Summary...

PPSM Pre-Graduation Audit Checklist

Required Core PPSM Subjects

Below is an overview of all PPSM requirements. Please see page 14 of this handbook for the exact core class requirements for students entering Fall 2022.

Core Subjects Completed (Excluding 10.960/3.903 Seminar)	Y1/Fall:	Polymer Seminar (10.960/3.903) Term/Years Registered
	Y1/Spring:	

	Y2/Fall:	
	Y2/Spring:	

	Y3/Fall:	
	Y4/Spring:	

PPSM Doctoral Quals Exam Written/Oral

☐ Oral-passed month/yr: _____ ☐ Written-passed month/yr: _____

Departmental minor requirements

❖ Biological engineering:

☐ 20.420 ☐ 20.430 ☐ 20.440 ☐ Other: _____

❖ Chemical Engineering

2 or more of the following: ☐ 10.34 ☐ 10.40 ☐ 10.50 ☐ 10.65

AND **1 or more** additional non-core ChemE subjects: _____

❖ Chemistry

☐ 5.47 Tutorial in Organic Chemistry

❖ Materials Science and Engineering

☐ 3.20 Materials at Equilibrium

☐ 3.21 Kinetic Processes in Materials

☐ ONE ADDITIONAL non-polymer graduate subject (9+ units)

❖ Mechanical Engineering

Minimum of **THREE** additional graduate level MechE subjects – must be distributed over **AT LEAST TWO** of the seven THRUST AREAS:

SUBJ1: _____ SUBJ2: _____ SUBJ3: _____

MIT Polymer Day



MIT Polymer Day is an annual day-long symposium to highlight the latest polymers and soft matter research. Polymer Day is organized by active members of the Polymer Graduate Student Association (PGSA) to provide a home for a diverse and interdisciplinary group of scientists and engineers from various US universities, industry professionals, and the broader polymer and soft matter science community.

Each year the symposium holds a poster session, an alumni career panel, seminars on cutting-edge research, and career development workshops. Additionally, the symposium's networking lunch and career fair offers attendees generous opportunities for networking with our industry sponsors.



MIT POLYMER DAY

Graduate and postdocs students at MIT and other institutions are invited to participate in the poster competition where prizes are awarded.

The symposium brings together researchers and representatives from polymer and soft matter-related industry (including Arkema, Dow, PPG, 3M) to network, create connections, and discuss new collaborations.



After a two year hiatus, in April 2022, our traditional in-person MIT Polymer Day event made a successful post-COVID-19 return, attracting almost 200 participants and 40 poster presenters.



Emily

5th year ChemE/PPSM

Co-advised by Prof. Martin Z. Bazant (ChemE) and
Prof. Alfredo Alexander-Katz (DMSE)

"Polymer day was a great opportunity to get feedback on my research, learn about my colleagues' work, and open the door to many potential collaborations within and outside of MIT."

MIT Polymer Day's Sponsors



Cabot Corporation is an American specialty chemicals and performance materials company headquartered in Boston, Massachusetts.

The **Dow Chemical Company** is an American multinational chemical corporation and is among the three largest chemical producers in the world. Dow manufactures plastics, chemicals, and agricultural products.



The **3M Company** is an American multinational conglomerate corporation operating in the fields of industry, worker safety, U.S. health care, and consumer goods.

Arkema S.A. is a specialty chemicals and advanced materials company headquartered in France. Arkema is organized into three business segments: Coating Solutions, Industrial Chemicals, and Performance Products.



PPG Industries, Inc. is an American Fortune 500 company and global supplier of paints, coatings, and specialty materials.



Heejung

3rd year MechE/PPSM

Prof. Aristide Gumyusenge's group (DMSE)

"What I like about MIT Polymer Day is that it gives you the opportunity to meet people from both industry and academia, who work in the field of polymers and soft matter. The poster session is also a great opportunity to learn about your peers' research at MIT and at other institutions. Especially, when the research overlaps your interests and own research, it's fascinating to learn from others' approaches and points of view."



Avni

3rd year DMSE/PPSM

Prof. Rafael Gomez-Bombarelli's group (DMSE)

"Polymer Day is a great opportunity to share your research with others interested in polymers, network with industry representatives, and to connect with the wider polymer science community!"

"PGSA aims to build a community in PPSM and to support you throughout your time in the program, whether that be through holding coffee hours, running quals prep, or organizing events like Polymer Day. Always feel free to reach out to your PGSA officers with thoughts, ideas, questions, or concerns!"

PGSA

The **PPSM Graduate Student Association (PGSA)** organizes social and academic events, helps to maintain PPSM's website, and provides an important channel of communication between PPSM students and faculty.

PGSA annually plans and produces MIT's flagship event for polymer researchers from MIT and beyond. This event includes a poster session, presentations, and workshops with the goal of fostering the polymer community in the Boston area, while also inviting anyone interested in polymers, from anywhere.

In addition, PGSA plays an important role in helping first-year students along their academic path. Notably, the academic chairs organize Quals Training Sessions in the months before the first year PPSM Qualifying Exams to help better prepare the students for the exams.

Several events are organized by PGSA to foster a community within PPSM. For instance, PGSA Coffee Hours are usually held once a month and are a great opportunity for PPSM first-year students to meet upper-years students. Off-campus outings, like bowling, dinner, sailing, picnics, day trips, etc., are also organized during the year. Stay tuned for the upcoming ones!



PGSA board 2022-2023

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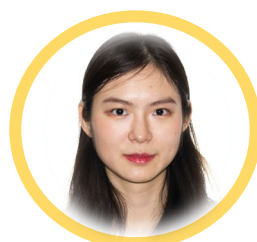


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Do I need to have a strong polymer background to join PPSM?

No, but a strong interest in the polymer field is important. As an interdisciplinary program, most of its entering students have backgrounds in much of the underlying foundational material, but not necessarily any extensive experience in polymers specifically. The core curriculum is designed to accommodate this diversity of backgrounds, and provides a thorough yet accessible introduction to the field.

Is PPSM its own department?

No. PPSM is an interdepartmental program, so each PPSM student has a home department (the participating department that admitted the student to graduate study at MIT). While all five of the participating departments accept the PPSM graduate core curriculum and doctoral quals in place of the equivalent departmental offerings, each department has a graduate office that sets rules and guidelines for its graduate students, including those who are participating in PPSM. These guidelines include thesis committee composition and frequency of meetings, minor subject requirements, arrangements for co-advising, teaching assistant responsibilities and others. PPSM students are expected to fulfill the requirements of the home department in every case. PPSM students end up being well versed in both their traditional disciplinary field and in polymer science; this is a significant asset in the current interdisciplinary research and development environment.

Which MIT faculty member can serve as my thesis research advisor?

If agreeable to the home department, any MIT faculty member can serve as a thesis advisor regardless of their affiliation with PPSM. PPSM Faculty and Faculty Affiliates provides a listing of MIT faculty that are actively involved in PPSM and/or polymer research. Co-advising of students across departmental boundaries is encouraged and is common practice for PPSM research. Updates on the availability of research support and on the latest thesis topics being offered are obtained by direct contact with the faculty.

Are PPSM students required to have a PPSM Faculty member on their Thesis Committees?

No—PPSM does not have a fixed policy on the composition of thesis committees. Instead, PPSM students are expected to follow the guidelines of their home departments. Please contact the Academic Administrator for your department with questions about Thesis Committee procedures and regulations.

Will my PhD degree designation be in my home department or PPSM?

PPSM students have the option of having their PhD degree designation be either PPSM or their home department. For example, a DMSE/PPSM student can have a “Ph.D. in Materials Science and Engineering with an Emphasis in Polymers and Soft Matter” OR “Ph.D. in Polymers and Soft Matter with an Emphasis in Materials Science and Engineering.”

How should I study for the PPSM qualification exams?

The best ways to prepare for your qualification exams are 1) reviewing your course notes, handouts, and problem sets, 2) reading the recommended textbooks listed in this handbook, and 3) practicing solving problems from past qualification exams on a whiteboard in front of your peers. Around Spring break, the PGSA Academic Chairs will organize an event to chat and answer questions about the qualification exams, and afterwards will hold weekly sessions for PPSM students to practice answering questions in a format similar to the exam setting



Program in Polymers
and Soft Matter

