

UNIVERSITY OF MICHIGAN MIP STUDENT HANDBOOK



MOLECULAR AND INTEGRATIVE PHYSIOLOGY GRADUATE PROGRAM 2021 - 2022 EDITION



Sept 2021

Dear Graduate Students,

Greetings and welcome to the Graduate Program in Molecular and Integrative Physiology (MIP). MIP has over a century of tradition as one of the country's premier graduate programs. Our graduates have gone on to become leaders in academic research, industry, education, and medicine. To give yourself an idea of the range of careers that are open to those that excel in our Ph.D. program, we invite you to browse Appendix 2 of this handbook, which provides a list of some alumni along with their present positions.

You were chosen for admission because we value you as students and colleagues, and we expect that you will add your successes to this illustrious list. Yes, you will work hard, but you will also have a great deal of fun and develop relationships that will last a lifetime. Indeed, your time in graduate school will forever be marked as a period in life with great challenges and achievement; we are proud to be a part of it.

This Handbook will help you navigate graduate school and make the most of your opportunities within the MIP Graduate Program. As you know, first year Ph.D. students here at UofM are officially under the umbrella of PIBS, in which you are free to explore opportunities in each of the 13-member Graduate Programs. For those of you with strong interests in MIP, we and other members of the department will serve as mentors during the first year to answer questions and provide guidance. This Handbook will help during this time by providing important information related to MIP program policies, course requirements, academic standards, and student activities. After your first year of classes, you will select a Ph.D. mentor and a program for continued pursuit of your degree, and the Handbook will continue to be useful to you by providing critical information as you progress into candidacy, execute your dissertation research, and prepare and defend your thesis.

We encourage all of you to get to know MIP, discover your research passion, become part of our program and let us help begin to develop your scientific career and help you reach your career goals and aspirations. Engage your fellow students and explore involvement in departmental functions, our elementary school outreach program "SEEK" and policy-making. We value student input tremendously and at all levels. Such experiences enrich and diversify the Program as well as promote professional development and leadership skills in our students. As leaders of the MIP Graduate Program, we encourage you to embrace your opportunities to the fullest.

Welcome!

Sue Brooks, Director
Dan Beard, Associate Director

MOLECULAR & INTEGRATIVE PHYSIOLOGY PhD GRADUATE STUDENT HANDBOOK

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DIRECTORY

MOLECULAR & INTEGRATIVE PHYSIOLOGY PhD GRADUATE PROGRAM

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734-936-8813 fax
physioinfo@umich.edu

Websites

MIP Department <http://medicine.umich.edu/dept/molecular-integrative-physiology>
MIP PhD Program <http://medicine.umich.edu/dept/molecular-integrative-physiology/education/phd-program>

PIBS <http://medicine.umich.edu/medschool/education/phd-programs/phd-admissions>

Program Director: **Sue Brooks**
2029 BSRB
734-936-2147
svbrooks@umich.edu

Associate Director: **Daniel Beard**
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Student Services: **Michele Boggs**
(Program Coordinator) 7744E Medical Science Building II
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PIBS Office: 2nd Floor Taubman Library
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Ann Arbor, MI 48109
734-647-7005
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MSTP Office: 2nd Floor Taubman Library
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Ann Arbor, MI 48109
Phone: 734-764-6176
Fax: 734-764-8180
MSTP@umich.edu

KEY MIP GRADUATE PROGRAM PERSONNEL

MIP Graduate Committee (2017-2018)

Sue Brooks, PhD, Director	936-2147	svbrooks
Dan Beard, PhD, Associate Director	763-8040	beardda
Christian Burgess, PhD	647-9862	crburge
Lisa Larkin, PhD	936-8161	llarkin
Scott Leiser, PhD	647-9746	leiser
Costas Lyssiotis, PhD	615-9133	clyssiot
Mathias Truttman, PhD	615-0567	mtruttma

Present and Past Student Members on Graduate Committee

2021-present

Nick Urban	647-3941	urbanni
Anne Weitzel	764-2682	weitzela

2020-present

Johanna Fleischman		johf
Megan Schaller	764-3054	meschall

2019-2020

Sierra Nance	615-8708	sanance
Jonathan Herrera	763-5115	jonjoe

2018-2019

Joseph "Rudi" Starrett	647-1750	jstarret
Brenda Cisneros	647-3875	bcisne

2017-2018

Liz Ronan	615-9547	lizronan
Daniel Torrente-Quintero	615-5548	torrente

Student Representatives to MIP Faculty Meetings

Noah Nelson		noahnels
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Student Representatives to Biomedical Graduate Student Government

Elissa Hult	647-9968	emhult
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Student Representatives to Rackham Student Government

No MIP Students currently serving.

MIP TRAINEE SERVICE BY YEAR

2 nd year class	Fall Picnic
3 rd year class	Graduate committee/faculty meeting representative
4 th year class	Organize and lead Candidate Seminar Series, pub nights
All years	Graduate Student Recruiting, Outreach, PIBS service

CURRENT GRADUATE STUDENTS BY YEAR

1st Year PIBS students with a primary interest in MIP and 1st year MSTP students

Allison Duensing (duensing), Lindsey Lammlin (zlammlin), Justin Redmond (jvblue), Stephanie Steltzer (ssteltz), Hannah Thompson (hanntho), Warren Yacawych (yacawych), Hongyu Liu (hongyl), Jiaao Su (jiaaosu).

2nd year

Garrett Chavis (gchavis)
Hsin-yu Chen (hyswen)
Leeann Flowers (flowersl)
Jer-en Hsu (jerenhsu)
Christopher Huynh (chrihuyn)
Jessica Maung (jmaung)
Chrystian Phillips (chrystip)

Mentor

Mike Sutton
Daniel Michele
Megan Killian
Jun Hee Lee
Ken Inoki/Ormond MacDougald
Ormond MacDougald
Sue Moenter

3rd year

Elizabeth Dean (esdean)
Jer-en Hsu (jerenhsu)
Chesta Jain (chestaj)
Ziyi Meng (ziyimeng)
Ryan Neff (rneff)
Noah Nelson (noahnels)
Lloyd Ruiz (llruiz)
Nicholas Urban (urbanni)
Anne Weitzel (weitzela)

Mentor

Scott Leiser
Jun Hee Lee
Yatrck Shah
Jiandie Lin/Liangyou Rui
Geoff Murphy
Costas Lyssiotis
Susan Brooks
Matthias Truttmann
Chuck Burant

4th year

Johanna Fleischman (johf)
Megan Schaller (meschall)
Steve Guzman (sdguzman)
Hancheng Mao (hancheng)
Nick Glynos (nglynos)

Mentor

Chuck Burant
Scott Leiser
Susan Brooks
Ling Qi
Michael Wang/Jimo Borjigin

5th year

Jonathan Herrera (MSTP jonjoe)
Elissa Hult (emhult)
Rachel Lopez (ralopez)
Kevin McGowan (kpmcg)
Sierra Nance (sanance)
Shuangcheng "Alivia" Wu (scalivia)

Mentor

Sharlene Day
Beth Moore/Howard Crawford
Dan Beard
Linda Samuelson
Carey Lumeng
Ling Qi

6th year

Benedict Abdon (babdon)
Hyo Sub Choi (choihp)
Brenda Cisneros Larios (bcisne)
Kristina Holme (kjweaver)
Edith Jones (jonesedi)
Andrew Marquis (admarqui)
Joseph Starrett (jstarret)
Vi To Ba Tang (tvi)

Mentor

Ling Qi
Scott Leiser
Carol Elias
Scott Pletcher
Dan Beard
David Pinsky
Sue Moenter
David Ginsburg/Sharlene Day

7th year

Elizabeth Ronan (lizronan)
Daniel Torrente-Quintero (torrente)
Thomas Vigil (thvigil)

Mentor

Shawn Xu
Dan Lawrence
Rick Mortensen

Ph.D. DEGREES AWARDED IN 2020-2021 ACADEMIC YEAR

<u>Student</u>	<u>Present Position</u>
Judy Baek	MSTP Program, University of Michigan
Ally Cara	Postdoctoral fellow, UCLA
Ian Gonzalez	Postdoctoral fellow, University of Michigan
Lindy Jensen	Pursuing job opportunities in California
Jacob Johnson	Pursuing job opportunities in Consulting
Wenyang Liang	Research Laboratory Specialist Inter, University of Michigan
Steven Romanelli	Senior Consultant, TRINITY
Huilun Wang	Postdoctoral fellow, University of Michigan
Kelly Young	MSTP Program, University of Michigan

Ph.D. DEGREES AWARDED IN 2019-2020 ACADEMIC YEAR

<u>Student</u>	<u>Present Position</u>
Jeanine Ruggeri	Bioanalytical Scientist, Discovery Genomics
Allison Kowalsky	Postdoctoral fellow, Astrazenica/University of Michigan
Chayarndorn Phumsatitpong	Postdoctoral fellow, UC Berkley
Megan Hoffman	Postdoctoral fellow, Dana Farber Cancer Institute
Natalie Warsinger-Pepe	Postdoctoral fellow, UCSD
Devika Bagchi	MSTP Program, University of Michigan
Jon Dean	Postdoctoral fellow, UCSD

Ph.D. DEGREES AWARDED IN 2018-2019 ACADEMIC YEAR

<u>Student</u>	<u>Present Position</u>
Eden Dulka	Postdoctoral fellow, University of Michigan
Surojit Sural	Postdoctoral fellow, Columbia University
Amelia Glazier	Postdoctoral fellow, University of Ulm
Matthew Taylor	Postdoctoral fellow, Northwestern University
Kevin Swift	Postdoctoral fellow, Walter Reed National Military Medical Center
Andrew Schwartz	Postdoctoral fellow, Novartis
Haocheng Lu	Postdoctoral fellow, University of Michigan

CALENDAR OF MIP ACTIVITIES: 2020-2021 (not all inclusive)

– see description of MIP activities later in this handbook

All year	Monthly MIP Pub Night	Postponed due to COVID-19	
Sept 1	MIP Fall Welcome	4-5 p.m.	BSRB ABC classrooms
Sept 19	MIP Fall Picnic	12 p.m.	Dehli Metropark
October	Annual student meeting Decide on student activity budget Nominate speakers for 2020 research forum		
Jan 10	Departmental Retreat	All Day	Virtual on Zoom
Jan 27, 28 Feb 3, 4	PIBS Recruiting Weekends	Afternoon	Virtual on Zoom
TBD	Annual MIP Research Forum Speaker: TBA Host: TBA	All Day	Virtual on Zoom

GENERAL

What makes me a Physiologist?

In today's scientific world, the distinctions between disciplines are often hard to discern. Just walk into any research lab on the medical campus and you will likely see a lot of similarities: lab benches, micro-centrifuges, gel electrophoresis units, plasmid maxi prep kits, etc. Almost all laboratories do some molecular biology, some biochemistry, or some cell biology. **So, what makes a Ph.D. in Physiology different? Is that difference important?**

Physiology is the study of how organisms' function in an integrative sense. This means physiologists study how molecules, cells and organs interact together to produce wonderfully complicated and intricately woven functions in the whole animal, such as muscle contraction producing movement, digesting a meal into fuels that sustain body function, responding to a stressful situation, or regulating and accomplishing reproduction. Naturally, this leads to the important study of conditions where physiology goes wrong, causing significant disorders such as cardiovascular disease, obesity, diabetes, and infertility. As a result, **the approach of a modern physiologist is both molecular and integrative**. The modern physiologist must master and take advantage of molecular approaches that have driven research of the past decade and blend with it integrative knowledge of what these molecules, their functions and their interactions mean in terms of how organisms function normally, and how their dysfunction causes disease.

The MIP Graduate Program is designed to make you become a modern physiologist. We will provide you with academic training in the integrative functioning of living organisms and how molecular, cellular and whole animal approaches can be used to study these functions. Our research labs will give you the opportunity to develop a thesis project that utilizes molecular tools and cellular or animal models to understand normal physiological functions or study mechanisms of human disease. You will be surrounded by faculty, students and staff who share your curiosity for what makes animals and humans work the way they do.

Modern physiologists have a bright future. The technical advances in genomics, proteomics, metabolomics and cell biology have resulted in an explosion of available research tools. But without integrative context, the significance of these areas falls short. It is the modern physiologist that puts these tools and the data they generate into a context that enables us to understand the importance and significance of the molecule's contribution to cell function, the cell's contribution to organ function, and the organ's contribution to the overall life and health of living organisms. In essence, **we put it all together!**

So, do you want to become a physiologist? Join the MIP and give us a try!

Opportunities for Students in MIP

- Broad-based training in modern physiology with emphasis on integrating cell and molecular processes with coordinated systems physiology.
- Affiliation with a program that has a tradition of excellence in preparing young investigators for a variety of productive careers.
- A faculty and program dedicated to graduate student education and career development.
- A chance to conduct research in a wide variety of areas ranging from cell and molecular biology to whole animal integrative physiology.
- Development of teaching skills as part of the curriculum.
- A seminar course for training in critical thinking and presentation skills and a special seminar series presented by students who have achieved candidacy.
- Participation in administration and policy setting within the MIP Graduate Program.
- Leadership training with opportunities to serve as graduate student representative to faculty meetings, student member of the MIP Graduate Committee, host keynote speaker of Research Forum and outside seminar speakers, host visits of graduate student recruits, service on PIBS Committees, etc.
- Interaction with visiting scientists and MIP seminar speakers at student luncheons.
- Opportunities to invite and host external seminar speakers.
- Widespread recognition by departmental, university and external awards.
- A wide variety of informal social activities involving students and faculty.

Basic information and Timetable

This Handbook outlines steps needed to complete the requirements for the Ph.D. degree in Molecular and Integrative Physiology. Students may select MIP at the start of their graduate training, during the 1st year in the Program in Biomedical Sciences (PIBS), or after the 2nd year of course work in the Medical Scientist Training Program (MSTP). A typical timetable for the Ph.D. is provided below. Students are encouraged to discuss any aspect of this Handbook with the Graduate Chair or other members of the Graduate Committee.

Milestone

Pre-Candidate:

1st Year (PIBS)

Plan overall program; select courses for current year

Lab Rotations (3 mandatory; 4 is typical)

Complete required course work

Select dissertation mentor/lab

Pass preliminary exam (candidacy achieved)

MSTP student's complete prelim

Completion date

May 1st for July start

July 1st for Sept start

4 mo after selecting dissertation lab

Apr 15th of 1st year in MIP

Candidate:

2nd Year (MIP)

Graduate Student Instructor (GSI)

Conduct research

Additional elective courses

Form dissertation committee

Conduct dissertation research

Third Year Seminar

Hold regular committee meetings

Complete degree requirements

Winter term of 2nd year

Twice a year

Usually 4th – 6th year

Financial Support – PIBS, MIP Training Grant, Other Sources

During the first 10 months of their graduate program, students receive financial support from PIBS. Thereafter, students in good standing are supported by research grants, endowment funds, institutional training grants (see below), and individual fellowships available from the University and individual fellowships from outside sources (e.g., NIH, American Heart Association, NSF, HHMI). A portion of student support in the second year is derived from GSI funding during their teaching experience.

Training grant opportunities at the University. Numerous NIH [training grants](#) are available to support research in targeted areas. Currently NIH accepts applications only from US citizens and permanent residents, but some foundations accept applications from all students. MIP students have been successful in receiving fellowships from these training grants and are encouraged to apply to those that match their interests. Each training grant has individual rules on course requirements and when during training they provide support so students are encouraged to investigate these sources early to be aware of deadlines and other application details ([training grants](#)).

Training grants of interest to MIP students include (* = directed by MIP faculty):

- *Biology of Aging
- Cancer Biology
- *Career Training in Reproductive Biology
- Cellular Biotechnology
- Chemistry Biology Interface
- Genetics
- Genome Science
- Hearing and Chemical Senses
- Molecular Biophysics
- Neuroscience
- Organogenesis
- Pharmacological Sciences
- *Systems and Integrative Biology
- Tissue Engineering and Regeneration
- *Training in Basic and Translational Digestive Science
- *Training program in translational cardiovascular research and entrepreneurship
- *Vision Research

Sources of Fellowship Support

Rackham Information about [fellowships](#) is available through the Rackham Graduate School at <http://www.Rackham.umich.edu/funding/>. MIP students have been successful in obtaining the following awards from Rackham:

- Rackham Merit Fellowship
- Rackham Predoctoral Fellowship
- Barbour Scholarship
- Rackham Graduate Student Research Grant (precandidate and candidate)

External fellowship support. Many external fellowships are available from private and government organizations. These fellowships are often targeted toward specific areas of study or diverse groups depending upon ethnicity, sex, nationality, etc. A listing of potential sources is provided by Rackham at the above [fellowships](#) link.

Departmental Seminars

MIP Seminar Series. The MIP Department offers a weekly seminar series in which scientists from outside the University, as well as faculty within the University of Michigan, present and discuss their research findings. The seminars are held every Wednesday at 4 p.m. in the MIP seminar room (7745 Med Sci II). The MIP seminar series provides a highly valuable learning experience, and all MIP graduate students are expected to attend seminars on a regular basis unless extenuating circumstances prevent them from doing so. The seminars are important to professional development because they update students on the latest developments within their own field as well as outside their field of research, they introduce new techniques and experimental approaches, and they increase breadth of knowledge and overall understanding. Attending seminars not only can have direct benefits on a student's own research project, but it is also enormously important when applying for postdoctoral fellowships or jobs, because it enables one to converse intelligently with others, even those outside one's own area of research. MIP sponsors student luncheons with seminar speakers from outside the University on Wed at noon, which provides a great opportunity for networking and scientific discussion. Third-year seminars for MIP students (see below) will be held during this time. Note that the *Student Seminar Course* (Physiol 606, described below under Academics) is a requirement taken by first year students. It is separate from, and not to be confused with, the departmental seminars.

Student-Hosted Seminars. This seminar program, which was inaugurated in 2007, provides MIP students the opportunity to invite and host seminar speakers from outside the University. This enables our students to interact extensively with world-renowned scientists, to gain first-hand knowledge with new techniques and approaches, to develop collaborative ties and initiate a dialogue with potential post-doctoral mentors or employers. Students meet as a group to discuss potential speakers and select invitees.

MIP Candidate Seminar Series. This is an initiative that was launched in the 2008-09 academic year. Once a month during the academic year two Ph.D. candidates in MIP present a public seminar on their thesis research. The primary goals of the MIP Candidate Seminar Series are to provide an opportunity for our Ph.D. candidates to present an organized and formal summary of their research to the public, and to give MIP students an opportunity to learn and ask questions about their fellow students' research in a formal seminar setting. Each student seminar session is one hour long, with two students presenting 20 min talks followed by a 10 min question and answer period. This seminar series is planned and organized by the fourth year MIP students.

ACADEMICS

Academic Advice

Each pre-candidate (PIBS, MIP, MSTP) student meets with the Graduate Program Chair at least twice a year, before the Fall and Winter Terms, to discuss course work, lab rotations, student seminars, preparations for the Preliminary Exam and overall performance. These meetings facilitate initial course selection as well as smooth and efficient transition into the MIP Program and into candidacy for the Ph.D. The flexibility and individualized nature of MIP training allows some overlap with courses required by other PIBS programs. At least once a year, the MIP Graduate Program Chair meets with all MIP students who have achieved candidacy to review research progress, dissertation committee reports, and to discuss overall progress, career preparation and any issues students wish to speak about.

Course Selection

Courses are selected for each student in consultation with the MIP Graduate Chair. To provide each MIP student with common background, we require coursework in the areas of cell physiology and signaling (fall), and systems and integrative physiology (winter). Elective courses in a variety of areas are chosen according to each student's interests and research specialization. Through PIBS, all students do at least three to four 8-week research rotations, receive important training in the responsible conduct of research, and participate in PIBS

seminar. Before candidacy, each student enrolls for a minimum of 9 credits (formal coursework plus research credits) in both Fall and Winter terms. After candidacy, each student enrolls for a minimum of 8 research credits in both Fall and Winter terms until completion of degree requirements. Students should consult the MIP Graduate Coordinator or Director with questions.

Required Courses [more complete listing/description of MIP courses in Appendix 4]
Students interested in MIP are encouraged to take as many requirements as is feasible in the first year to allow more time for focused research and course selection in the second year.

PIBS Courses:

- PIBS 503 – Research Responsibility and Ethics
- PIBS 504 – Research Rigor and Reproducibility
- PIBS 600 – Laboratory Rotations (minimum of three, 4 is typical) (PIBS only)
- PIBS 800 – PIBS seminar series

Required Physiology Courses

- PHYSIOL 576 – (Cellular Physiol I) Signal Transduction
- PHYSIOL 577 – (Cellular Physiol II) Membrane and Cell Physiology
- PHYSIOL 510 – Principles of Systems and Integrative Physiology
- PHYSIOL 606 – Student Seminar – Current Topics in Physiology (first year)

Electives

PhD students in MIP must complete at least six credit hours of elective coursework (minimum 2 credit hours each with exception of the Neuroscience 611-616 series). Preapproved electives are listed below. Additional electives can be substituted with approval of the graduate committee. To petition the committee, please send the course syllabus with a brief justification/rationale for why it is a good fit to your educational program to the graduate program director. Almost all petitions are approved. Note, after prelims, students may only register for four credit hours per semester on top of the 8hr of dissertation research.

End Summer

- NEUROSCI 510 – Lecture only for Molecular Neuroscience Lab

Fall

- PHARMACOL 502 – Into to Scientific Communications
- PHYSIOL 591 – Advanced Topics in Signal Transduction
- HUMGEN 541 – Molecular Genetics
- CDB 530 – Cell Biology
- CDB 581 – Developmental Genetics
- BIOCHEM 550 - Macromolecular Structure and Function
- BIOINF 527 – Intro to Bioinformatics and Computational Biology
- BIOSTAT 501 – Intro to Biostatistics
- MATH/BIOINF 463 – Math Modeling in Biology
- *NEUROSCI 611, 612, 613 – Neuropharmacology, Neural Development, Circuits and Computational Neuroscience

Winter

- PHYSIOL 555 – Method and Logic in Biomedical Science
- PHYSIOL 520 – Computational Systems Biology in Physiology
- PHYSIOL 541 – Mammalian Reproductive Endocrinology
- BIOCHEM 673 – Kinetics and Mechanism
- BIOINF 525 – Foundations of Bioinformatics and System Biology
- NEUROSCI 570/571 – Human Neuroanatomy and Human Neuroanatomy Lab
- *NEUROSCI 614, 615, 616 – Sensory Systems, Neurobiology of Rhythms & Sleep, Neuropathology
- KINESLGY 545 – Metabolic Responses to Exercise

*For Neuroscience electives, completion of two from the six available modules (see both Fall and Winter Term) will count as one elective. More than one pair of modules may be taken.

Students entering through MSTP. MSTP students have already taken courses as part of their medical curriculum that meet many of the MIP course requirements indicated above, and they already have conducted laboratory rotations. Thus, the course requirements are reduced accordingly. Those courses that remain a requirement are as follows.

- PIBS 503 – Research Responsibility and Ethics
- PHYSIOL 606 – Student Seminar (2 semesters)
- BIOCHEM 552 – Biochem MD Scientist
- TWO ELECTIVES
- GSI teaching requirement

Research Responsibility and Ethics (PIBS 503)

PIBS 503 is offered every Fall term. Students sign up for 1hr discussions in each of 8 topics mandated by the National Institutes of Health as well as have a one-on-one discussion with their research mentor.

Laboratory Rotations (PIBS 600)

Students begin their research immediately upon entering the program and complete at least three and typically four 8-week laboratory research rotations. Students interested in MIP must complete at least one rotation with an MIP faculty member. Rotations last a half term and will begin in Summer for students choosing to begin 1 July or at the start of the Fall term for students starting in the fall. Rotations are arranged with permission of the mentors. Students receive academic credit by enrolling in PIBS 600 for a number of hours arrived at in consultation with the mentor and Graduate Program Chair. Rotations should be completed during the first 10 months of enrollment, leading to the selection of a dissertation mentor.

New students are urged to become acquainted with research interests of the MIP faculty. These are detailed on the MIP and PIBS websites. Students also learn about MIP faculty research in private discussions, public seminars, research presentations, student presentations in PHYSIOL 606, and in literature surveys.

MIP Student Seminar (PHYSIOL 606)

The MIP Student Seminar (aka Current Topics in Physiology) is held in both Fall and Winter terms. These meetings help to bring the Program together each week. The goals of the Student Seminar are to improve critical thinking, to help identify and solidify a research focus, to obtain experience in developing presentations in PowerPoint, and to develop and practice skills in public speaking in a non-threatening and informal setting. This course gives students the opportunity to present data, critique the scientific literature, and develop the ability to provide constructive criticism to their peers. Students present a critical review of a topic from the current scientific literature or from their own research once each term. Elements of research ethics, as well as research rigor and reproducibility, are also discussed.

Graduate student instructor (GSI)

All MIP students are required to participate as a graduate student instructor (GSI) for one term. Since teaching and effective presentations of research are vital components of a career in biomedical science, all students are mentored in methods of teaching. Graduate students run weekly conference sections for an undergraduate physiology course (PHYSIOL 201). This involves explaining challenging concepts, answering questions, and developing and reviewing practice exams. Beth Rust serves as the MIP faculty Teaching Coordinator. Students receive evaluation and feedback from Dr. Rust and from an additional MIP faculty member. GSIs are also evaluated by the undergraduate students within their section. Students are expected to attend lectures, prepare material to present in review sessions, and participate in exams. The

GSI teaching requirement should be completed in the winter term of the second year and must be fulfilled prior to completion of the degree.

Additional teaching opportunities. Students wishing to gain additional teaching experiences are encouraged to consider completing the [University of Michigan Graduate Teaching Certificate](#) (see page 22). Dr. Beth Rust has mentored numerous students through this program and MIP faculty are highly supportive of career development activities. Additional teaching opportunities have included leading small group discussions to medical students, teaching several lectures or entire sections in various courses, being a teaching assistant in courses in MIP or other departments, teaching in a summer lecture series for undergraduates working in MIP labs, teaching entire courses at the University of Michigan or other local institutions such as Washtenaw Community College. Students wishing to obtain such opportunities should speak to their mentors, faculty who direct courses and the Graduate Chair.

Sample 1st year curriculum schedule for students who begin with a primary interest in MIP

(suggested elective in *italics*)

Year 1 Fall		Year 1 Winter	
PIBS 503	Responsible conduct research	PIBS 600	Research rotations
PIBS 600	Research rotations	PIBS 800	PIBS seminar series
PIBS 800	PIBS seminar series	Physiol 510	Systems/Integrat Physiol
Physiol 576	Signal Transduction	Physiol 606	Student Seminar
Physiol 577	Membrane & Cell Physiol	PIBS 504	Rigor and Reproducibility
Physiol 606	Student Seminar	XXXX	<i>Elective</i>
XXXX	<i>Elective</i>		

Common electives for students with general physiology interest

Fall

CDB 530 Cell Biology
CDB 581 Developmental Genetics
HUMGEN 541 Molecular Genetics

Winter

PHYSIOL 520 Computational Systems Biology in Physiology
PHYSIOL 555 Method and Logic in Biomedical Science

Common electives for students with neurophysiology interest

Fall

NEUROSCI 611 Neuropharmacology (1st 5 weeks of term)
NEUROSCI 612 Neural Development (2nd 5 weeks of term)
NEUROSCI 613 Circuits and Computational Neuroscience (3rd 5 weeks of term)

Winter

NEUROSCI 614 Sensory Systems (1st 5 weeks of term)
NEUROSCI 615 Neurobiology of Rhythms & Sleep (2nd 5 weeks of term)
NEUROSCI 616 Neuropathology (3rd 5 weeks of term)

Common electives for students with systems biology interest

Fall

HUMGEN 541 Molecular Genetics

Winter

PHYSIOL 520 Computational Systems Biology in Physiology
PHYSIOL 555 Method and Logic in Biomedical Science

Common electives taken after completion of prelims

Fall

BIOSTAT 501 – Intro to Biostatistics

Preliminary exams for most students will be complete by the end of August of the 1st year (see below for details on the exam)

In the 2nd year, students will choose one semester in which to serve as a Graduate Student Instructor (GSI), continue research (Physiol 995 Candidate Research or for students joining labs 1 July Physiol 990 plus prelim) and take additional elective courses (up to 4 credits/term) that the student is interested in.

Academic Standards

MIP graduate students are required to satisfy the standards of academic performance established by the Rackham School of Graduate Studies. Students should consult the Rackham Graduate Student Handbook to become familiar with those standards. Rackham standards include maintaining an overall average grade of B. In addition, *the MIP Graduate Program has established the following policy regarding academic standards: students must obtain a grade of B or better in courses required by the MIP Graduate Program.* Obtaining a grade lower than B will require remedial action as determined by the course director and/or the Graduate Committee. Required courses are specified earlier in this Handbook.

Rackham Continuous Enrollment Policy

Beginning with the Fall Term 2010, Ph.D. students will register for each fall and winter semester from matriculation to degree completion, unless on an approved Leave of Absence or with Extramural Study status. Students who do not register will be presumed to have withdrawn and enrollment will be discontinued. <https://rackham.umich.edu/academic-policies/>
Michele Boggs can assist with enrollment questions.

Vacation Policy

Following the University's holiday schedule and NIH regulations, students will receive two weeks of vacation per year in addition to the designated holiday closures of the medical school. To arrange vacation time, all students must receive permission from their advisor. Students need to contact the Graduate Program Coordinator if they will be on vacation for longer than 10 business (M-F) days. Approval is automatic as long as the mentor has given permission. The judgment and flexibility of the mentor can be exercised. Circumstances such as family death, illness, or other crisis events will be handled on a case-by-case basis.

PRELIMINARY EXAM POLICIES

Approved by Department of Physiology Faculty January 10, 2002

Timeline revised by the Graduate Committee September 9, 2002

Further revisions: Dec 2003, Feb 2005, Mar 2006, Dec 2006, June 2009, August 2012, July 2014, December 2016

Purpose

The Preliminary Examination (Prelim) must be passed before a student achieves candidacy for the Ph.D. degree.

Objectives of the Prelim in MIP:

- To evaluate a student's knowledge of physiology in the student's general area of interest and to test the student's ability to integrate this knowledge with other areas of physiology;
- To evaluate the student's capacity to think creatively and communicate effectively in both oral and written presentations.
- To provide students with a unique learning experience in written and oral communication and to foster development and expression of scientific creativity.
- To jump-start student-mentor interaction on a possible dissertation project

Timing

- Prelim exam will occur within 4 calendar months of joining the lab. To facilitate this, the following deadlines have been set.
- 4 weeks after joining: Identify, committee chair and members, and set date for exam.
- 8 weeks after joining: Submit draft of aims page to chair
- 14 weeks after joining: Submit proposal

Proposal must be submitted to committee at least 10 calendar days prior to the scheduled Oral Defense.

MSTP students must complete prelims by April 15th of their first graduate year in MIP.

Process

Prelim Committee. The student establishes a Prelim Committee consisting of at least three faculty members:

- Chair; member of the MIP graduate committee in the past five years
- One MIP faculty member
- One faculty member from any Rackham PhD-granting biomedical sciences program (including MIP)

The student's mentor or co-mentor cannot be a member of the Prelim Committee.

Research Proposal and Oral Defense. The student writes a research proposal following the guidelines of the specific aims and research strategy sections of an [NIH predoctoral NRSA fellowship](#). Its scope and area should be suitable for a Ph.D. thesis. The selected topic may represent the student's planned Ph.D. thesis research, although there are restrictions as to the specific focus of the proposal to ensure originality of the student.

Research proposals must be built on a scientific rationale. They must address hypothesis-based questions and show a logical progression from preliminary data (from the literature, the lab or the student's own work) to hypothesis generation, to approach for testing the hypothesis, expected results and interpretation, limitations and alternatives. Implicit in this sequence is understanding of the controls required, and of likely modifications to approach and generation of new hypotheses that may be needed as new data shift the understanding of the question. Experiments may be either laboratory-based ("wet") or modeling studies that generate testable hypotheses ("dry"). Regardless of the primary experimental approaches planned, all physiology students are expected to have a conceptual understanding of the types of experiments needed to test predictions made. Students are expected to address elements of rigor and reproducibility required in the approach section of an NIH style proposal including sample sizes, control of

genetic or environmental background, consideration of sex as a biological variable, and appropriate statistics. Note preliminary data do not have to have been generated by the student but may be used with attribution from other sources.

The oral defense consists of a research seminar based on the written proposal that is presented by the student to the Prelim Committee. The presentation should be planned to last 40-45 minutes. During the presentation, the Prelim Committee will ask questions that address the student's general knowledge of physiology, including molecular and integrative aspects, using the research proposal as a point of departure. The committee also evaluates the quality of the written proposal and the quality of the oral presentation.

Outcome. After evaluating the students written proposal, oral presentation and ability to answer the committees questions, the Prelim Committee then determines the overall outcome: Pass, Conditional Pass (which requires remedial action), or Fail. A failing grade implies that the student will no longer be able to continue with the program. A student that receives a failing grade may submit an appeal to the Graduate Committee for permission to retake the exam as outlined in the dismissal policy.

Input from Mentors on Prelim Proposals

The student should exercise originality and independence in preparing the research proposal. Traditionally, the “culture” of the MIP graduate program is for faculty to be available and helpful to our students. Although proposed experiments and designs should originate with the student, each student is encouraged to seek critical input from the student’s mentor, committee members, other faculty and students. It is **appropriate** for the mentor to work with the student on the specific aims page. Mentors providing guidance in areas of hypothesis formation and testing, suitability of potential approaches and specific techniques, and identification of strengths and weaknesses are all **appropriate**. It is **appropriate** for others to comment on the rationale and justification of the hypothesis, the clarity of the writing, as well as the feasibility of the proposed experimental design, techniques and interpretation of the results.

It is **not appropriate** for a student to copy or include specific aims and experiments that are part of a grant proposal developed previously by the mentor. It is **not appropriate** for the mentor to attend practice oral presentations.

Our hope is that each student will develop a research proposal that is suitable to submit for extramural funding. After completion of the preliminary examination, mentors should actively engage their students to refine the proposal for submission and use it to as an important teaching tool for their academic and career development.

Before the exam, the mentor provides the committee chair with a brief (typically 1 paragraph) written summary of the student’s progress and the mentor’s involvement in the development of the proposal.

THIRD YEAR SEMINAR

During the third year, MIP graduate students will present a research seminar to the department during the normal Wednesday 4pm time period. This gives the student the opportunity to share their research progress with the department, and also to receive valuable feedback on both the path of their research and their presentation skills.

CANDIDATE STUDENT THESIS RESEARCH EXPECTATIONS AND MONITORING PROGRESS

Selection of a Dissertation Mentor

Each student selects a dissertation mentor from the MIP faculty to guide his or her dissertation research. As soon as possible after completion of laboratory rotations, the student should inform PIBS and the MIP Graduate Chair of the student's choice of mentor. The selection of the dissertation mentor should occur by the end of the first academic year of study. Selection of the mentor is one of the most important decisions a graduate student must make. Students and mentors should have common interests, and students should be knowledgeable and comfortable with the mentoring style and overall atmosphere of the laboratory. *The mentor must have a faculty appointment in MIP* and must agree to the mentoring relationship. In very special circumstances, a student in MIP may petition the Graduate Committee to select a mentor who does not have an MIP faculty appointment. Such requests must be fully justified, and the student must select a co-mentor who has a faculty appointment in MIP and who agrees to work closely with the student as the student progresses toward the Ph.D. degree. The Graduate Committee must approve these arrangements.

Students and mentors are highly encouraged to have a formal meeting at the time the student is choosing the lab to discuss the expectations of both the mentor and the student for the student-mentor relationship. To facilitate this discussion students and mentors are encouraged to utilize a Mentoring Agreement questionnaire which is provided in the appendix. Alternatively, the student/mentor are encouraged to attend a MORE (Mentoring Others Results in Excellence) Mentoring Plan workshop which is provided four times a year by Rackham in both the fall and winter semesters. The MORE website also has examples of mentoring agreements (<https://rackham.umich.edu/faculty-and-staff/resources-for-directors/mentoring/>).

Dissertation Research

The dissertation research should make an original and significant contribution to the student's field of research. The overall scope of the work will vary depending on the research area but it should be of sufficient quality, depth and originality to be published in peer reviewed scientific journals. The dissertation committee together with the student and mentor determine when the research is of sufficient quality and quantity to be appropriate for the Ph.D. dissertation.

Dissertation Committee

It is the responsibility of the student to set up a dissertation committee and organize meetings every 6mo. This committee will monitor progress and help the student in several ways: 1) Develop a research program suitable for obtaining the Ph.D. degree. 2) Provide guidance during the course of the research and offer suggestions for future directions. 3) Ensure that the quality and quantity of research is suitable for obtaining the Ph.D. 4) Help the student and mentor determine when sufficient research has been completed to prepare the dissertation. The committee should be formed and meet within six months of passing the Preliminary Exam.

Forming the committee. The committee must be formally established with Rackham prior to the first meeting. The Graduate Program Administrator (Michele Boggs) will enter members into the online system and the Graduate Program Director will approve the committee. Students are encouraged to discuss membership with their mentor and the Director before entering the information. Rules for committee membership are set by Rackham and can be viewed here <http://www.rackham.umich.edu/current-students/dissertation/committees> and committee members must be officially submitted to Rackham at least 6 months prior to the defense for approval (although recommended to be completed as soon as you form the committee).

Role of the mentor and the committee. Mentoring styles vary tremendously amongst faculty and depending on the student, but a few general comments may be helpful. The Ph.D. research may

be considered a collaboration between the student and mentor. It is appropriate for the mentor to provide substantial input and advice regarding development of the research plan, interpretation of results, and determination of next steps. Although this is a collaborative effort, the student should be the driving force. The committee should provide oversight and feedback, and should help the student and mentor in development and subsequent modification of the overall research plan. The committee should not force the student and mentor to conduct specific experiments; rather it should serve in an advisory capacity, and ultimately pass judgment as to whether the research and written dissertation are sufficient for the Ph.D. The student is encouraged to seek input from individual committee members outside the scheduled committee meetings.

Committee meetings. The first meeting must be held within six months of passing Prelims. The student should prepare a short written proposal, which should describe a potential line of dissertation research. This need not be a formal proposal in NIH style (as was prepared for Prelims) but it should contain at least one hypothesis and set of specific aims, sufficient background and preliminary data to justify the work, and a general outline of the experimental plan to accomplish the aims. Although the format and length will vary depending on the student and the project, 2 or 3 pages should generally be sufficient. The proposal should be distributed to the committee one week before the meeting to allow time for committee members to digest the information. The student should begin the meeting with an oral presentation (30-40min) describing the proposal and pertinent research conducted thus far. This is followed by discussion and suggestions from committee members, and ultimately committee members expressing their view as to whether the proposed research would be sufficient for obtaining the Ph.D. The committee report status form should be completed by the student and mentor and submitted to Michele Boggs.

Subsequent committee meetings must be held every six months for students to remain in good standing in the program. The Academic Standing Policy details are provided in Appendix 1. The goal of these meetings is for the student to present recent progress and for the committee to provide input to the student and mentor as to whether satisfactory progress is being made, if the student is on course, and ultimately to help the student and mentor decide when sufficient research has been conducted for writing the Ph.D. dissertation. Committee meetings should be strongly focused on accomplishments from the previous six months and goals for the following six months. They should last roughly one hour and only rarely continue as long as 90 minutes. Dissertation committee meetings must include a time where the mentor is asked to step out of the room briefly for a discussion of the student-mentor relationship and any concerns of the student. One committee member will serve as liaison. If there are no concerns, the liaison will reconvene the meeting. If concerns are raised, the committee members and the student will discuss how to relay the concerns to the mentor, either by the student or the liaison or the entire committee including a recommended plan of action. Students are encouraged meet with any committee member to discuss scientific approaches and strategy, and/or mentoring concerns as they arise, outside of the dissertation meetings.

Any serious concerns related to professional faculty conduct or poor mentorship should be communicated confidentially by the student or committee to either the graduate program director or the department chair.

Research Report: At least five days prior to the thesis committee meeting, the student will submit to all members of the thesis committee a succinct written summary of their accomplishments since the last committee meeting, including significant experimental findings, results and/or difficulties with an experimental approach, and the status of any publications. The research report should also include a brief (up to 3 pages) description of plans for experiments in the coming six months. For meetings held during the spring of the student's fourth year and thereafter, a timeline (see below) must be submitted with the Status Report and reviewed by the advisory committee. Keep your status reports! The text and figures in the research reports will be valuable sources of information when writing your Ph.D. thesis.

Progress Report: The Progress Report, which must be submitted electronically after the completion of the committee meeting, includes a research report (completed by the student) and a completed report form (see Appendix 5). The mentor must fill this form out at the end of the meeting and include written comments. If the committee meeting goes well, no additional information is required. If the committee identifies one or more areas of weakness, the mentor should include a brief summary of those concerns on the report form. Progress Reports must be submitted twice per year, with the deadlines of June 1 and December 1 pertaining to meetings within the previous six-month period. Reports may be turned in at any point during the year. Students are encouraged not to schedule their committee meetings near the deadlines but instead to spread them over the period. Students that have difficulty assembling a quorum before the deadline may contact the Graduate Director for advice.

Timeline: The thesis committee should help ensure that the student is continuing to make timely progress toward the degree. By the spring meeting of the fourth year of enrollment, the student, mentor and thesis advisory committee members must evaluate the student's progress and future plans for completion of the Ph.D. Before the meeting, the student, in consultation with the mentor, should prepare a timeline that lists graduation requirements and estimated dates of completion, if possible. The timeline, which must be included with the Status Report Form, is intended to represent the best estimates at the time it is written. The timeline should be revised and updated each subsequent status report meeting.

Permission to defend the Ph.D. dissertation: By granting "permission to defend," the student's thesis committee acknowledges that all key experiments have been completed and that a thesis outline was presented and reviewed that described a sufficient body of work to merit a Ph.D. if the dissertation and defense are satisfactorily completed. The student, in consultation with the mentor, must present a detailed outline of the thesis to the committee at least one week before the meeting. The outline should present sufficient detail to judge the completeness of the experimental work with a clear indication of which portions of the experimental work are finished and which remain to be completed. The committee expects that the student will complete all requirements and defend the thesis before the next status report deadline (i.e., within the next six months), and a timeline for completion of the written thesis and the oral defense should be set at the time permission to write is granted. If the oral defense is not held within 6 months, committee members must be notified and must agree to an extension. Otherwise, a normal committee meeting must be held, and permission to write must be discussed again.

Graduation Requirements. In addition to the Rackham requirements, the expectation is that the student will have at least one published, peer-reviewed manuscript detailing her/his original research as first author or co-first author (a literature review alone does not satisfy this requirement). The dissertation committee, with permission of the program director, is given the authority to waive this rule if the situation requires it. It is expected that students be allowed permission to write when manuscripts have been submitted or have received initial, favorable reviews.

WRITING AND DEFENDING YOUR DISSERTATION

Dissertation Preparation, Deadlines and Resources

The final step in obtaining the Ph.D. is writing the dissertation, defending it in front of the dissertation committee, and revising it as specified by the committee. Students must adhere to specified formats and timelines in preparing and defending the dissertation. They should understand these policies before writing the dissertation. Deadline details are provided in the Rackham Student Handbook and the Dissertation Handbook, which is available online at <https://rackham.umich.edu/navigating-your-degree/#phd>

Students may phone the Office of Academic Records and Dissertations with specific questions (734-763-0171).

According to Rackham policy, students are expected to complete all requirements for the degree within five years of achieving candidacy, but no more than seven years from the date of first enrollment in their Rackham doctoral program. Students may request an extension for extenuating circumstances such as pregnancy, childbirth, dependent care, medical problems, etc. Further details are provided in the Rackham Academic Policies website.

<https://rackham.umich.edu/academic-policies/>

The oral defense begins with the student presenting a seminar describing the dissertation research. The seminar is presented to the dissertation committee as well as MIP faculty, and it is open to students and other interested parties within and outside the University. This is followed by a question-and-answer session of all in attendance and then by another session of questioning before the committee. Committee members then vote on the outcome and indicate revisions to be made before the dissertation is acceptable in its final form. The mentor, who generally is chair of the dissertation committee, is present for the entire oral defense.

Students must be enrolled during the term of their oral defense. They should be aware that Rackham has strict deadlines for the last date in each term by which students must meet all degree requirements without registering for a new term, which requires payment of additional tuition. These deadlines and degree conferral dates for each term can be found at <https://www.rackham.umich.edu/current-students/policies/doctoral/phd-students/doctoral-degree-deadlines>. Commencement exercises are held twice each year, at the end of the fall and winter terms. Students' attendance at their graduation exercise is optional.

Electronic Submission of Dissertation

Beginning with the 2012-13 academic year, all dissertations will be submitted electronically to Rackham during the post-defense meeting. The final digital copy will be the copy of record. To submit your dissertation, you will access the Rackham dissertation online submission website. You will be asked to provide bibliographic keywords, or tags, that describe the content of your dissertation, including subject, concepts, theory and methods. These will help others to find and retrieve your dissertation. You will copy your abstract to the website and upload a PDF of the final digital copy of your dissertation. The staff of Rackham's Academic Records and Dissertations will review your submission and may require you to make final changes before the submission is approved. No further changes will be allowed once the dissertation is approved and submitted. Rackham will hold your dissertation until your degree is conferred (which happens three times a year in April, August, and December). After your degree is conferred, Rackham will forward your dissertation as the copy of record to [Deep Blue](#), the permanent digital repository of the University Library. Beyond the electronic submission to Rackham, students may wish to bind a copy for their records or for their mentor. Neither MIP nor the Graduate Program is able to provide costs for copying and binding.

Steps for Completing Doctoral Requirements

The Rackham Graduate School has prepared a useful guide titled Dissertation Timeline.

<https://rackham.umich.edu/navigating-your-degree/dissertation-timeline>

STUDENT PROGRESS AND CAREER DEVELOPMENT

Student Progress – CV and NIH-Style Biosketch Requirement

Each MIP student is required to prepare a CV (Curriculum Vitae). (Note, this does not include first year PIBS students with an interest in MIP.) These materials are to be updated at least once a year and submitted as part of the student's annual review. This document serves as an indicator of student progress and will help establish whether a student is developing a portfolio suitable for specific career trajectories. In addition, developing and updating the CV is a valuable learning experience in itself, and the information contained in them is useful to the graduate program in preparing reports, providing data for programmatic evaluation and training grant

applications. An example for the format of a CV and biosketch is provided in this Handbook as Appendix 3.

Career Development

From the beginning of their graduate program of study, students should be considering career options and how best to position themselves for different career trajectories once their graduate work is completed. For example, students interested in teaching ought to seek teaching opportunities beyond the MIP GSI teaching requirement (see previous section, Teaching) and they should consider obtaining a University of Michigan Graduate Teaching Certificate (see next section). Students interested in public policy should look into the new Rackham certificate program on Science Technology and Public Policy (see next section). Students interested in career opportunities in clinical translational research should take the PIBS 507/508 course and look into new training initiatives at the University in translational research (see next section). Students interested in research careers should work with their mentors and others to develop networking skills for identifying laboratories and fellowship opportunities for postdoctoral training and subsequent employment. All students are encouraged to pursue opportunities for developing their public speaking skills through oral presentations at scientific meetings, presenting at local symposia, and participating in journal clubs. PIBS also offers a course in formal scientific presentation called PIBS 721 Professional Research Presentation which is available to students who have achieved candidacy, the mentor and Graduate Chair are valuable resources for consultation related to career development, and the MIP Graduate Program has helped to facilitate periodic presentations on various career options (special seminars, visiting speakers in Physiology 606, fall Research Forum, etc.). In addition, career-counseling resources are available at the University; students are encouraged to consult the following web sites and links:

<https://careercenter.umich.edu>

<https://rackham.umich.edu/rackham-life/>

CERTIFICATE PROGRAMS AND TRANSLATIONAL RESEARCH

Several graduate certificate programs in areas outside the biomedical curriculum as well as opportunities for translational research are available for students who have an interest in using their training in physiology to follow a non-traditional career path. These may be pursued simultaneously with graduate programs that lead to the Ph.D. A brief description of four certificate programs that have been of interest to MIP students, and an overview of the new UM initiative for training in translational research, are provided below. Further details about the program can be obtained from the web sites indicated.

Science, Technology, and Society Certificate Program

The STS Graduate Certificate Program is designed for students already enrolled in a graduate degree program at the University of Michigan. This 15-credit certificate program helps students to: 1) understand the social dynamics of science, technology, and medicine; 2) explore these dynamics across world societies and cultures; 3) develop a sensitivity to issues of gender, race, and class in science technology, and medicine; 4) employ STS approaches as scholars or practitioners (e.g., engineers or scientists).

Science, Technology and Public Policy Certificate Program

The Graduate Certificate Program in Science, Technology, and Public Policy (STPP) is designed for students already enrolled in a graduate degree program at the University of Michigan and can be combined with a Master's or a doctoral degree in any field. Applications are welcomed from students in both LS&A departments and the professional schools. The certificate requires 15 credit hours of course work, including electives designed to teach students: 1) how science and technology are influenced by politics and policy; 2) the role of science and technology in the policymaking process; 3) methods and tools for science and technology policy analysis; 4) the

political and policy landscape of specific science and technology areas such as biotechnology, information and communication technology, and energy policy.

University of Michigan Graduate Teaching Certificate

This program offers graduate students an opportunity to document professional development as college-level instructors and prepare for the faculty job search. The U-M Graduate Teacher Certificate documents one's professional development in five areas:

1. orientation to college-level teaching and learning
2. exposure to new teaching strategies through seminars and courses
3. experience as a Graduate Student Instructor, including a consultation on teaching
4. mentorship on teaching from a faculty member
5. preparation of a teaching philosophy statement

Participants who complete all program requirements receive a U-M Graduate Teacher Certificate. The Certificate does not appear on official U-M transcripts but may be included on one's curriculum vitae.

Translational Research Education Certificate

The Translational Research Education Certificate (TREC) is designed for doctoral students in basic research programs as a complement to their graduate studies. The program provides students with an overview of the principles of translational research and will help prepare them to become the next generation of translational researchers performing bench to bedside investigations in multidisciplinary, collaborative research settings. Students enroll in specialized courses in translational research, gain the expertise of a co-mentor who is a clinical/translational researcher, and take advantage of an optional clinical or health outcomes research experience. Students seeking admission to the program are required to discuss the option with their PhD mentor and identify a faculty member to work with who is engaged in clinical/translational or health outcomes research. The certificate is awarded by the Rackham School of Graduate Studies with faculty lead Donna Shewach, PhD

In addition, The University of Michigan recently received a Clinical and Translational Sciences Award (CTSA) as part of a national initiative to encourage interdisciplinary research and development of therapies that improve human health. This grant builds on previous NIH investments to expand programs and services in clinical research infrastructure and education. The program places the University of Michigan with 23 other academic medical centers around the country that are members of a national CTSA consortium. Its mission is to transform how clinical and translational research is conducted, ultimately enabling researchers to provide new treatments more efficiently and quickly. The grant is under the umbrella of the Michigan Institute for Clinical and Health Research (MICHR). A variety of training opportunities are already in place for undergraduate, graduate and postdoctoral students. For example, a PIBS course has been established to provide learning experiences in translational research: Introduction to Translational Research (PIBS 507/508). In addition, the Master of Science in Clinical Research gives doctoral students in medicine, dentistry, nursing and pharmacy the basics of clinical research, and it provides students the option of various research experiences. The program implements novel, flexible institutional clinical research training and provides efficient entry of students into clinical research careers. Interested students can obtain more information at: <https://www.michr.umich.edu/rdc/2015/9/18/master-of-science-in-clinical-research>

ENTREPRENEURSHIP

There are many opportunities for training and experience in research entrepreneurship including the above translational research certificate, as well as workshops and seminars provided by MICHR and the training program. PIBS 550 and 750 is a new set of courses on Biomedical Innovation and Entrepreneurship that combine both lecture and workshop focused on biomedical commercialization. MILEad (<http://www.milead.org>) is a non-profit group of postdoctoral fellows, PhD and MBA students that provide consulting for clients seeking to commercialize a new research product and discovery and can provide experience in biomedical research consulting

and commercialization. The Zell Luri Institute (<http://zli.umich.edu/>) is the world's leading academic resource for entrepreneurs and student innovators. They have numerous educational opportunities and also grants and access to venture capital for students interested in commercializing a discovery, an idea, or trying to start a business.

STUDENT AWARDS

Graduate Education Fund Travel Awards

MIP has established an endowment fund to help support career development and training opportunities for MIP PhD Graduate students. Currently, the fund is supporting several travel grants to MIP students each year who are attending and presenting research at scientific conferences or travelling to conferences for career development opportunities. To request travel support for the Graduate Education Fund, typically students should first apply for a Rackham Travel Award and then submit a copy of the student's Rackham application to the graduate program director requesting additional support. The Rackham Travel Award information is here: <http://www.rackham.umich.edu/funding/conference-travel-grant>

MIP Graduate Student Awards

Each year, MIP recognizes student accomplishments in four areas considered to be highly important in graduate education and professional growth: academic achievement, teaching, research and service. The Graduate Program has established student awards in these areas, each in the name of a distinguished faculty member of this Department at the University of Michigan. Full lists of [awardees](#) are on the MIP web site

Bean Award for Academic Excellence. Professor John Bean was one of our first graduate students and he obtained his doctorate in 1930. Dr. Bean went on to have a long and successful career in the Physiology Department at Michigan, reaching the rank of professor in 1944. This award was made possible by Dr. Bean and is given to the second year MIP student who has attained the best academic record during the pre-candidate years. A \$250 honorarium accompanies this award.

Recipients (past 5 years):

2021	Jessica Maung
2020	Elizabeth Dean
2019	Nicholas Glynos
2018	Alivia Wu
2017	Joseph Starrett

Vander Teaching Award. This award was established in recognition of Professor Arthur Vander, a former member of the departmental faculty and widely known as an outstanding teacher, mentor and scholar. It is awarded each year to an MIP student in recognition of outstanding teaching in the Physiology 201 course, as determined by student evaluations and comments of faculty observers. A \$250 honorarium accompanies this award.

Recipients (past 5 years):

2021	Ryan Neff
2020	Amanda Gibson
2019	Jonathan Herrera
2018	Kristy Holme and Lindy Jensen
2017	Devika Bagchi

Davenport Research Award. This award was established in 2005 in the name of Horace W. Davenport who was internationally recognized for his research and scholarship on gastric physiology, the gastric mucosal barrier, and ulcerative diseases of the stomach. He was also an outstanding teacher, historical scholar, author of textbooks and mentor. He is recognized for

helping to establish the high profile recognition of the Department of Physiology at the University of Michigan. This award recognizes outstanding research performed by an MIP student or a student supported by the Systems and Integrative Biology Training Grant. Recipients are determined by relevance, quality and presentation of their work as judged from research publications, a scientific abstract describing the work and its relevance, and a platform talk at the Fall Research Forum. A Honorariums for the Davenport Award are \$500 to the Davenport Award winner and \$100 to each finalist.

Recipients (past 5 years):

2021	Hannah Bell
2020	Hyo Sub Choi
2019	Andrew Schwartz
2018	David Bushart
2017	Daniel Triner

Williams Service Award. This award was established in the name of Professor John Williams who served as Chair of the Department from 1987 to 2008. This award recognizes outstanding student participation and service to MIP, the University, and science on a broad scale. Service and development of a sense of community are highly important to professional growth and MIP provides opportunities for students to gain experience in this arena. An honorarium of \$250 accompanies this award.

Recipients (past 5 years):

2021	Lindy Jensen
2020	Brenda Cisneros-Larios
2019	Kristy Holme
2018	Ally Cara and Liz Ronan
2017	Devika Bagchi

MIP ACTIVITIES

The MIP Graduate Program and Department, and the Systems and Integrative Biology Training Grant, sponsor a wide variety of activities. These not only enhance professional development and promote leadership skills, they also provide opportunities for recreation and informal social interactions among students, faculty and staff. They are an important aspect of the overall MIP experience. The specific activities vary each year; those listed below are the activities last year

SEEK Science Education and Engagement for Kids.

SEEK is an MIP student-led outreach program. The goal is to give our students the chance to help bridge the gap in science education by providing hands-on learning for kids in local high-need, low-resource schools lacking a science curriculum. SEEK grew out of the belief that it is our responsibility to help provide all kids with the access to opportunities that will empower them to reach for their dreams. There are levels of volunteering in the program

1. Curriculum Team – developing and implementing a year-long curriculum for Eastbrook school which currently has no science curriculum. The lessons will be taught by graduate students, 1.5 hours once every two weeks to over 100 students
2. Backyard Brains Team – Support from the Office of Health Equity and Inclusion allowed SEEK to purchase five Backyard Brains mobile neuroscience labs. These labs will be developed and taught on off-weeks in the year-long curriculum
3. Physiology Fun Day Event – Two single day events per year focused on exposing 3rd and 4th graders to the various organ systems with active learning experiments and activities

MIP Monthly Pub Nights

Roughly monthly, MIP students, faculty and postdocs are invited to gather at a local pub at the end of the day. These gatherings encourage social interactions and unstructured scientific and academic discussions in an informal and relaxed atmosphere.

MIP Sports Teams (all year)

MIP students organize an MIP sports team (the “Phizz”) for various intramural sports: softball, volleyball, broomball, mini-soccer and wallyball (several new sports teams will be organized in the current year). All students are welcomed and encouraged to participate in a team and to organize an MIP sports team. Everybody has fun, no matter what the skill level.

Student Luncheons

MIP hosts student lunches for a number of different occasions. These include: meetings with the Chair of the Department or Graduate Chair to discuss policy and developments or to budget the use of the Graduate Program discretionary fund; to plan MIP recruiting activities for graduate student applicants; to discuss and select student-hosted seminar speakers and the keynote speaker for the Fall Research Forum. In addition, when the speaker for the MIP seminar series is from outside of the University, he or she is invited to have lunch with the students. The MIP Graduate Program expects students to make every effort to attend these lunches as it provides opportunity to interact with speakers as well as for the visitors to learn more about the Department and Graduate Program. In addition, students are invited to have lunch with faculty recruits during their visits to MIP; this allows the candidate to gain appreciation for the quality and vitality of the MIP Graduate Program and for students to voice their views on the candidate.

Fall Welcome (Sep)

Early in September, MIP holds an assembly to introduce the 2nd year students matriculating from PIBS as well as the new recruits entering PIBS who are interested in MIP, new faculty members, master’s students and others who are new to MIP. Three MIP awards are presented (Bean Award for Academic Excellence, Vander Teaching Award, Williams Service Award) and other achievements of MIP students are recognized.

Fall Picnic (Sep/Oct)

Second-year students, together with the Graduate Program Coordinator, organize the annual MIP departmental picnic, usually held at one of the local Metro Parks on a weekend in late September. All faculty, students, staff, families and guests are invited. The Department provides some food and beverages and everyone is asked to bring a dish to pass. The annual faculty versus student softball game is the highlight of this event.

Spring Research Forum (March, April)

This event is held in March or April each year. It is sponsored by the MIP Graduate Program and the Systems and Integrative Biology Training Grant. Planning begins in the previous academic year when the students nominate and select a keynote speaker. Generally, a student in the 3rd year or above coordinates this event with the assistance of the Graduate Program Coordinator and the Graduate Chair. The student host is responsible for extending an invitation to the keynote speaker, organizing the visit, arranging faculty interviews, and escorting the visitor while in town. Other graduate students are generally invited to attend a dinner and to have breakfast with the speaker, and all graduate students attend a lunch with the speaker. Selected 10-min presentations are given by finalists for the Davenport Research Award (winner announced at the session of the keynote address). All students are strongly encouraged to participate in the poster session, but graduate students currently or previously funded by the Systems and Integrative Biology Training Grant are required to submit an abstract and present their research.

Holiday Party (Dec)

The Department hosts a holiday party for all faculty, students and staff (and their families and guests) in December. This event is coordinated by the office staff. Students and faculty frequently provide ‘entertainment’.

Recruiting Weekends (Jan, Feb)

Recruitment of incoming students to MIP is coordinated by PIBS. PIBS offers two recruiting weekends one in January and one in February. MIP faculty and students on the Graduate

Committee serve on the PIBS Admissions Committee, and MIP students host applicants invited during the recruiting weekend. All MIP students are heavily involved in recruiting weekend; this is highly important in helping our visitors to capture the spirit of MIP. Events of this weekend currently include a welcome dinner on Thursday evening with the visitors and their host student, one-on-one interviews with MIP faculty members, a Friday luncheon attended by all students in the Graduate Program, and a dinner reception Friday evening followed by a social outing organized by MIP graduate students. Saturday morning includes a combination brunch/faculty poster session/open house and from here the recruits leave for the airport.

Spring BBQ (May, Jun)

This is an informal gathering in a relaxed setting (currently the back yard of the Graduate Chair) at the end of the academic year to enjoy each other's company and to recognize the accomplishments of MIP students. The BBQ is held in the late spring, and includes the undergraduate summer research fellows.

Whirlyball

Whirlyball is best described as a combination of basketball, lacrosse, and bumper cars. The best thing about this game is that everyone is equally bad at it, which is why MIP students enjoy playing it at least twice a year—once during the recruiting weekend with PIBS applicants interested in MIP, and another time with students, post-docs, and friends of the Physiology department. Whirlyball has proven to be a favorite activity of MIP students and a memorable activity for our recruits.

Canoeing/Kayaking

In the past MIP graduate students have put together a two-hour canoe trip down the Huron River. It has been a great success with minor splashing and an occasional canoe capsizing. We now plan to make it an annual event at the end of spring or beginning of summer.

SUMMARY OF REQUIREMENTS OF THE MIP PROGRAM

1. Successful completion of coursework as indicated in the section on Coursework, Grading, and Academic Standing, and Doctoral Degrees as specified in the Rackham Student Handbook of Policies and Procedures.
2. Obtaining a minimum grade of B in MIP required courses and an overall grade average of B.
3. Complete PIBS 503, Research Responsibility and Ethics and all required “refresher” courses on the responsible conduct of research
4. Participation in at least two semesters of the MIP Student Seminar (PHYSIOL 606).
5. Serve as a GSI for at least one term to gain teaching experience.
6. Completion of at least two research rotations.
7. Successful completion of the Preliminary Examination.
8. Timely meetings of the dissertation committee (twice per year).
9. Preparation of a CV and NIH-style biosketch, updated yearly.
10. Presentation of dissertation work in progress during the third-year seminar.
11. Successful completion of a research project and preparation and defense of a dissertation.

RESPONSIBILITIES OF STUDENTS FOR THEIR PROGRESS

1. Ensure that course work satisfies the requirements of both the MIP Graduate Program and the Rackham School of Graduate Studies.
2. Maintain the academic standards set by the MIP Graduate Program and Rackham.
3. Ensure that the prelim committee is formed and the exam taken in timely fashion.
4. Ensure that the thesis advisor and dissertation committee are chosen in a timely manner and according to the guidelines set forth in this Handbook.
5. Schedule dissertation committee meetings twice per year.
6. Work together with mentor to apply for fellowship support.
7. Make timely progress toward completion of the Ph.D. and give careful and timely consideration to further career goals (postdocs, jobs, etc.).

MIP students also participate in policy decisions as part of the Graduate Committee, engage in recruiting new students, volunteer for various Program-related functions, and participate in a wide variety of MIP-sponsored activities as described earlier in this Handbook.

Appendices

1. Policies for Maintaining Academic Standing, Dismissal and Requesting Leave
2. List of MIP Alumni and Current/Recent Positions
3. Example of CV and NIH Biosketch Format
4. Mentor Agreement Form
5. Dissertation Committee Report Form
6. List and Description of MIP Courses

Appendix 1. Policies for maintaining academic standing, dismissal policy and requesting leave.

Academic Standards for Pre-Candidate Students

MIP graduate students are required to satisfy the standards of academic performance established by the Rackham School of Graduate Studies and additional requirements set by the department. Students should consult the Rackham Academic Policies (<https://rackham.umich.edu/academic-policies/>) to become familiar with those standards. Rackham standards include maintaining an overall average grade of B. In addition, the MIP Graduate Program has established the following policy regarding academic standards: students must obtain a grade of B or better in courses required by the MIP PhD Graduate Program. Obtaining a grade lower than B in required courses will require remedial action as determined by the course director and/or the Graduate Committee. Elective courses contribute to the overall average grade and must meet the academic standards of the Rackham School of Graduate Studies where grades of D or E cannot be used to fulfill degree requirements. MIP required courses are specified earlier in this Handbook.

Precandidate students also must pass their preliminary examination as outlined in this handbook according to the timeline stated. As stated in the preliminary exam guidelines, a failing grade will result in the student being dismissed from the program. A student that receives a failing grade may petition the Graduate Committee for permission to retake the exam and a timeline for the retake will be set by the Graduate Committee. There is no probationary period for students who receive a failing grade.

Academic Standards for Candidate Students

After candidacy, progress toward degree is monitored by the advisor, the dissertation committee and the graduate program director. To maintain good academic standing, students are expected to meet the graduate program expectations for committee meetings, submitting progress reports and annual review as outlined in this handbook as well as be responsive to communications and information requests from the program. Students are also expected to meet the professional work expectations of the mentor, as head of the research laboratory, as well as any additional expectations that are required by their source of funding.

Probation and Dismissal Policy

If a student's GPA falls below 3.0 on a 4.0 scale at the end of the term, the Graduate School will place a notation of unsatisfactory academic standing on the academic record. In addition, if a student fails to meet the MIP Graduate Program requirements for Academic Standing, the MIP graduate program will notify both the student, in writing, and Rackham that the student is in unsatisfactory academic standing. A student with unsatisfactory academic standing may not advance to candidacy and will not be awarded a degree or graduate certificate and may change programs and transfer credits only with permission of the admitting program.

If the advisor or program chair recommends the student be placed on probation, which is required before a dismissal decision, the following steps will be taken

1. The graduate chair, the advisor and at least one other member of the graduate committee will review the student's standing and decide as a committee whether or not to place the student on probation, the corrective actions needed, and the length of the probationary period needed for the corrective actions to return to good standing.
2. The probationary period will extend for a minimum of two months and typically up until the end of the next term, with Spring/Summer half terms together equating to one Fall or Winter term. If the probationary begins within the last two months of the term, it will continue into the next term until the minimum of two months is achieved and to the time specified.

3. The student and Rackham OARD will be notified before the probationary period begins in writing including the reasons for probation, the start and end dates of the probationary period, the corrective actions and conditions for returning to good standing and the options for appeal.
4. The student's funding will be maintained during the probationary period.

At the end of probationary period, and upon the recommendation of the graduate chair and the consent of the Graduate School, a student may either be returned to good academic standing or dismissed from the program. The decision to dismiss will be made by a committee that includes the graduate program director, the advisor and one graduate committee member. The graduate chair will notify Rackham OARD of the recommendation for dismissal.

Options to Appeal Academic Probation or Dismissal: Students who wish to appeal may request, in writing, a review of the probation or dismissal decision. The appeal committee will include two faculty members of the MIP graduate program, and the department chair or associate chair. Students may use the Graduate School's Academic Dispute Resolution Policy (<https://rackham.umich.edu/policy/section9/>) process only for procedural issues of fair and equal treatment under the policy of the program, and not to appeal the academic reasons for the decision.

Students who fail to meet standards of academic or professional integrity or who have been found responsible for violations of other University standards of conduct may be dismissed in accordance with separate procedures described in Rackham Academic and Professional Integrity Policy (section 11).

Requested Leave from the Ph.D. Program

The graduate program will work with the student and her/his mentor to discuss options for a leave of absence. An explicit plan for re-entry is required upon requesting a leave of absence, which should outline the status of the student upon re-entry (candidate, etc.) as well as the expectations for continued involvement in the program. Leaves must be approved by the mentor, MIP graduate director, and Rackham. Applications for leave are completed online at <https://rackham.umich.edu/policy/section2/#2-2-2>. A student on probation can also request for a leave of absence and this leave will stop the clock on the stated probationary period.

**Appendix 2: List of MIP (formerly Physiology) alumni since 1975
and current or recent positions (partial update September 2021)**

Year	Name	Chair or Co-Chair	Most recent known position
2021	Judy Baek	Pennathur	MSTP Program, Medical Student, Univ of Michigan
2021	Lindy Jensen	Yamashita/PI etcher	Pursuing job opportunities in California
2021	Wenyng Liang	Chen	Research Lab Specialist Inter, Univ of Michigan
2021	Steven Romanelli	MacDougald	Senior Consultant, TRINITY
2021	Huilun Wang	Chen	Postdoctoral Fellow, Univ of Michigan
2021	Ian Gonzalez	Olson/Myers	Postdoctoral Fellow, Univ of Michigan
2021	Kelly Young	Wang	MSTP Program, Medical Student, Univ of Michigan
2021	Cara Ally	Elias	Postdoctoral Fellow, UCLA
2020	Jacob Johnson	Pletcher	Pursuing job opportunities in consulting
2020	Jeanine Ruggeri	Crawford	Bioanalytical Scientist, Discovery Genomics
2020	Allison Kowalsky	Lee/Schnell	Postdoctoral Fellow, Astrazeneca/University of Michigan
2020	Chayarndorn Phumsatitpong	Moenter	Postdoctoral Fellow, UC Berkley
2020	Megan Hoffman	Crawford	Postdoctoral Fellow, Dana Farber Cancer Institute
2020	Natalie Warsinger-Pepe	Yamashita/PI etcher	Postdoctoral Fellow, UCSD
2020	Devika Bagchi	MacDougald	MSTP Program, Medical Student, University of Michigan
2020	Jon Dean	Mashour/Borjigin	Postdoctoral Fellow, UCSD
2019	Kevin Swift	Poe/Moenter	Postdoctoral Fellow, Walter Reed National Military Medical Center
2019	Haocheng Lu	Chen	Postdoctoral Fellow, University of Michigan
2019	Andrew Schwartz	Shah	Postdoctoral Fellow, Novartis
2019	Matthew Taylor	Rainey	Postdoctoral Fellow, Abbott
2019	Amelia Glazier	Day/Michele	Postdoctoral Fellow, University of Ulm
2019	Surojit Sural	Hsu	Postdoctoral Fellow, Columbia University
2019	Eden Dulka	Moenter	Postdoctoral Fellow, University of Michigan
2018	Tami Stevenson	Lawrence	Medical Writer, Cello Health
2018	Tova Berg	Moenter	Resident, University of Michigan
2018	Keita Uchida	Lopatin	Postdoctoral Fellow, University of Pennsylvania
2018	Daniel Triner	Shah	Resident, University of Michigan
2018	Fangyun Tian	Borjigin	Postdoctoral Fellow, Harvard Medical School
2018	David Bushart	Shakkotai	Medical Student, Ohio State University School of Medicine
2018	Caroline Adams	Moenter	Resident, St. Mary Mercy Hospital
2018	Luhong Wang	Moenter	Postdoctoral Fellow, Harvard Medical School
2017	Margot Emont	Wu	Postdoctoral Fellow, Harvard Medical School
2017	Xi Chen	Valdivia	Postdoctoral Fellow, University of Michigan
2017	Francisco Alvarado	Valdivia	Associate Scientist, University of Wisconsin
2017	Joanne Garbincius	Michele	Postdoctoral Fellow, Temple University
2017	Chanisa Thonusin	Burant	Lecturer, Chiang Mai University
2017	Kris Sugg	Mendias	Plastic Surgeon, St. Joseph Mercy Hospital
2017	Jon Gumucio	Mendias	Scientist, Clover Therapeutics
2016	Amy Sutton	Olson/Myers	Neuroscientist, National Institute of Health
2016	Mark Bolinger	Antonetti	Doctoral Student, Indiana University School of Business
2016	Zachary Harvanek	Pletcher	Psychiatry Resident, Yale – New Haven Hospital

2016	Gail Gifford	Samuelson	Senior Technology Manager, The Fred Hutchinson Cancer Research Center
2015	Kristen Ruka	Moenter	Science Podcast Communication, Self-Employed
2015	Margaret Allison	Myers	Clinical Fellow, Massachusetts General Hospital
2015	Jun Young Hong	Hershenson	Assistant Professor, Yonsei University
2015	Abigail Renoux	Sutton	Senior Scientist II, Vigil Neuroscience
2015	Maeran Uhm	Saltiel	Unknown
2015	Amy Baek	Pinsky	Research Assistant Professor, University of Illinois
2015	Katherine Overmyer	Burant	Associate Director of Laboratory for Biomolecular Mass Spectrometry, Morgridge Institute for Research
2014	Carulli, Alexis	Samuelson	Assistant Professor, Colorado University
2014	O'Connell, Ryan	Anumonwo	Global Marketing, Abbott
2014	McDade, Joel	Michele	Business Development Manager, Codex DNA
2013	Anyanwu, Anuli Caroline	Pinsky/ Hershenson	Data Science Portfolio Management, Janssen Pharmaceutical
2013	Wright, Jordan	Arvan	Endocrinologist, Vanderbilt University
2013	Chiang, Wei-Chung	Hsu	Assistant Professor, National Yang-Ming University
2013	Campbell, Matthew	Michele	Acting Instructor, University of Washington
2013	Campbell, Katherine	Jalife	Research Investigator, University of Michigan
2013	Mackrell, James	Cartee	Advisor, Portfolio Strategy and Next Generation Research, Eli Lilly & Co., Indiana
2013	Hou, Luqia	Jalife	Senior Scientist II, Merck
2012	Doche, Michael	Carter-Su	Research Scientist, Lawrence Ellison Institute, USC
2012	Chkourko, Halina	Delmar/Martens	Lead Medical Writer, Takeda Pharmaceuticals
2012	Mowers, Jonathan	Saltiel	Pathology Medical Resident, University of Michigan
2012	Sequea, Donel	Cartee	Physician, Virginia Mason Medical Center
2012	Xiong, Tingting	Saltiel	House Officer, University of Michigan
2012	Piggott, Beverly	Xu	Assistant Professor, University of Montana
2011	Gumerson, Jessica	Michele	Biologist, NIH, MD
2011	Barnabei, Matthew	Metzger	R&D Manager, Qorvo, Inc.
2011	Al Menhali, Asma	Samuelson	Assistant Professor, United Arab Emirates University
2010	Wang, Qiong	Hershenson	Publications Manager, Bristol-Myers Squibb
2010	Buller, Carolyn	Brosius	Senior Invention Development and Collaboration Specialist, NIDDK
2010	Louis, Gwen	Myers	Principal Medical Writer, PRA Health Sciences
2010	VanDussen, Kelli	Samuelson	Assistant Professor, Cincinnati Children's Hospital
2010	Nagarkar, Deepti	Hershenson	Scientific Manager, Genentech, South San Francisco, California
2009	Villanueva, Eneida	Myers	Medical Science Liaison, Bristol Myers Squibb
2009	Palpant, Nathan	Metzger Westfall	Lab Head, The University of Queensland
2009	Salazar, Jay	Brooks	Unknown
2009	Robertson, Scott	Myers	Physician, Cleveland Clinic
2009	Morris, David	Rui	Research Application Scientist, BD Biosciences
2009	Leshan, Rebecca	Myers	Director of Banbury Center, Cold Harbor Springs Laboratory
2009	Usher, Michael	Mortensen	Assistant Professor, University of Minnesota
2009	Hyman, Matthew	Pinsky	Assistant Professor, Philadelphia VA Medical Center
2009	Vesely, Eileen	Brosius	Unknown
2008	Oakley, Amy	Karsch	Lecturer III, Univ. Michigan

2008	VanDort, Christa	Lydic	Assistant Professor of Anaesthesia, Harvard Medical School
2008	Merrins, Matthew	Stuenkel	Assistant Prof., Univ. of Wisconsin-Madison
2008	Gurda, Gregory	Williams	Staff Pathologist, Gundersen Health System
2008	Guo, Lili	Williams	Scientist, Janssen Biotechnology
2007	Panama, Brian	Lopatin	Research Scientist, Cytocybernetics
2007	Chen, Xiao-Wei	Saltiel	Assistant Professor, Peking University
2007	Mendias, Chris	Faulkner	Rehabilitation Clinician Scientist, Fyzical Therapy & Balance Centers
2007	Davis, Jennifer	Metzger	Associate Professor, University of Washington
2007	Ivaschenko, Christine	Mortensen	Director of Scientific Projects, Novo Nordisk
2007	Newcomb, Dawn	Hershenson	Assistant Professor of Medicine, Vanderbilt Univ
2006	Kang, SoNa	MacDougald	Assistant Professor, Univ of California, Berkeley
2006	Swain, Jason	Smith	Corporate Laboratory Director, Colorado Center for Reproductive Medicine
2006	Acevedo, Nicole	Smith	Founder and CEO, Elavo Mundi Solutions, LLC
2006	Cha, Hyuk (Brian)	MacDougald	Staff Physician, IHA Dermatology
2005	Gummow Brian	Hammer	Partner, Haley Guiliano LLP
2005	Lockhart, Nicole	Brooks	Program Director, Division of Genomics and Society, National Institute of Health
2005	Winnay, Jonathon	Hammer	Senior Scientist, Sana Biotechnology Inc.
2005	Bi, Yan	Williams	Assistant Professor of Medicine, SAC Mayo Clinic Florida
2005	Bennett, Christina	MacDougald	Assistant Director (Publisher), American Chemical Society
2004	Breen, Kellie	Karsch	Associate Professor, UCSD
2004	Armstrong, Siobhan	Stuenkel	Science Writer, Self Employed
2003	Consolino, Christina	Brooks	Freelance Editor and Proofreader, Self Employed
2003	Loberg, Robert	Brosius	Vice President, Disease Area Lifecycle Leader, Roche Sequencing Solutions
2003	Chen, Xuequn	Williams	Associate Professor, Wayne State University
2002	DelloRusso, Christiana	Brooks	Strategic Advisor, Self-Employed
2002	Hinkle, Karen	Samuelson	Associate Provost for Research and Chief Research Officer, Norwich Univ.
2002	Chitale, Kanchan	Webb	Assistant Prof., Univ. Washington
2002	Calderon(Welch), Marlene	Faulkner	Plastic Surgeon, AM Skin Health and Plastic Surgery
2001	Ross, Sarah	MacDougald	Associate Professor, Univ Pittsburgh
2001	Erickson, Robin	MacDougald	Pediatric Nephrologist, Auckland DHB
2001	Sun, Daqing (Derek)	Briggs, Schnermann	Unknown
2001	Beswick, Richard	Webb	Cottage Health, Vice President of Research and Chief Research Officer
2000	Wishart, Matthew	Williams	Director, MEDPrep Post Bac Program University of Michigan
2000	Bucholtz, David	Karsch	Pastor, Bethel United Church of Christ
2000	Michele, Daniel	Metzger	Interim Chair and Professor., Univ. Michigan
1999	Rust, Elizabeth McLaurine	Metzger/Samuelson	Lecturer IV, Univ. Michigan
1999	Battaglia, Deborah	Karsch	Emergency Medicine, Penn State Health Milton S. Hershey Medical Center
1999	Bowen (Shauver), Jennifer	Keyes	Not professionally employed
1999	Smith, Stephen	Dawson	Director at Essen Biosciences, Cleveland, OH
1999	Johns, Douglas	Webb	Clinical Director, Merck & Co
1998	Lacourse, Karen	Samuelson	Senior Patent Agent, CRISPR Therapeutics
1998	Rui, Langyou	Carter-Su	Professor, Univ. Michigan

1997	Hunter, Kam	Faulkner	Family Medicine, Banner Good Samaritan Medical Center Family Practice Center, Associate Professor of Family Medicine, Univ of Arizona College of Medicine
1996	Morgan, Caurnel	Karsch	Research Sci, Cal. St. Univ San Marcos
1996	King, Anthony	Carter-Su	Research Assistant Professor, Department of Psychiatry, University of Michigan
1996	Leon, Lisa	Kluger	U.S. Army Research Inst Environ Med
1996	Guo, Yijin	Yamada	Unknown
1996	Lieberman, Patricia	Karsch	Not professionally employed
1995	MacPherson, Peter	Faulkner	Research Lab Specialist Senior , Univ. Michigan
1995	Jin, Jong-Shaw	D'Alecy	Associate Professor Pathology, National Defense Medical Center
1995	Lin, Yu-Fung	MacDonald	unknown
1995	Harris, Samantha	Dawson	Associate Professor, University of Arizona
1995	Sarkar, Rajabrata	Webb	Assistant Prof. Surgery, Univ. California
1994	Martin, Bradley	D'Alecy	U-M MTRAC for Life Sciences Commercialization Program Director, Univ Michigan
1994	Mayfield, Kimberly	D'Alecy	General Manager, Construction Solutions Corp., New Mexico
1994	Yang, Jun	Williams	Staff Physician, Physical Med Rehab, VA MedCtr
1994	Kulkarni, Nitin	D'Alecy	Unknown
1994	Liao, Jinfang	Kluger	Senior Research Sci., Molecular Devices Corp.
1993	Huber, Thomas	D'Alecy	Vice Chairman and Prof, Dept of Surgery, Univ of Florida College of Medicine
1993	Lu, Li	Logsdon	Unknown
1993	Chen, Min	Briggs	Staff Sci, Metabolic Disease Branch, NIDDK
1992	Wang, Xueyan	Carter-Su	Principal Scientist, NGM Biopharmaceuticals, S. San Francisco, CA
1992	Todd (Turla), Karyn	Schnermann	Associate Prof Natural Sci, Friends Univ Kansas
1992	Post, Marc	Dawson	Unknown
1991	Wood, Ruth	Karsch	Associate Prof, Cell & Neurobiology, Univ S Cal
1991	Constantino, C.	Keyes	Physician
1991	Chou, Stella	Kostyo	Unknown
1991	Moenter, Suzanne	Karsch	Professor, Univ. Michigan
1991	Schielke, Gerald	Moises	Retired-Research Investigator, Univ. Michigan
1990	Woodfill, Celia	Karsch	Centers for Disease Control
1990	Dong, Cun-Jain	McReynolds	Pharmaceutical Co., Allergan
1990	LeMay, Lin	Kluger	Unknown
1990	Chien, Chen-Yoa	Terry	Unknown
1989	Lamb, Fred	Webb	Associate Prof. Pediatrics, Univ. Iowa
1989	Long Sieber, Nancy	Kluger	Lecturer, Harvard School Public Health
1989	LeMay, Daniel	D'Alecy	Unknown
1989	Ryan, Steven	Moises	Unknown
1988	Wayne, Nancy	Karsch	Vice Chancellor and Prof., UCLA
1988	Turla (Harrison), Mila	Webb	Training consultant/facilitator.
1988	Venglarik, Charles	Dawson	Unknown
1988	Natale, JoAnne	D'Alecy	Assistant Prof Neuroscience, Georgetown
1986	Kaynard, Alan	Karsch	Gastroenterologist in Portland, Oregon
1986	Thorson, Jayne	Keyes	Asst. Dean, Faculty Affairs, U. Mich.
1986	Wiltbank, Milo	Keyes	Professor, Univ. Wisconsin
1986	Tang, Ming-Jer	Tannen	Unknown
1986	Scales, Wendy	Kluger	Unknown
1985	Lundy, Edward	D'Alecy	Practicing Physician, Lancaster General Hospital, PA
1985	Harker, Christian	Kluger	President, Cayuse (Software company)
1985	Tatro, Jeffrey	Schwartz	Assoc. Prof., Tufts Univ .

1985	Combs, David	D'Alecy	Curator, Exhibition Designer & Deputy Director Education, California Sci. Center
1985	McCully, Kevin	Faulkner	Professor, Kinesiology, Univ. Georgia
1984	Shier, David	Malvin	Instructor, Washtenaw Comm. Coll.
1984	Segal, Steve	Faulkner	Professor Medical Pharmacology & Physiology, University of Missouri, School of Medicine
1984	Olster, Deborah	Karsch	NSF Social, Behavioral & Economic Sciences
1984	Lukasiewicz, Peter	McReynolds	Professor, Ophthalmology&Visual Sci Washington Univ. St. Louis
1984	Koch, John	Jacquez	Unknown
1984	Huang, Bing-Shuan	Malvin	Unknown
1984	Germann, William	Dawson	Deceased
1983	Cannon, Joseph	Kluger	Assoc Dean Research & Prof, Med Coll Georgia
1983	Sorkin, Linda	Casey	Professor, Anesthesiology, Univ Calif, San Diego
1983	Tocco(Bradley),Rosalie	Kluger	Instructor, Anesthesiology, Univ. Michigan
1983	VanWylen, David	D'Alecy	Prof & Assoc Dean Nat Sci &Math., St. Olaf Coll
1983	Eiger, Steven	Kluger/ D'Alecy	Associate Prof., Cell Biology & Neuroscience, Montana St. Univ.
1982	Beasley, Debbie	Malvin	Assoc. Res. Prof., Tufts Univ.
1982	Ciske, Paul	Faulkner	Personal fitness trainer
1982	Keiser, Joan	Vander	Global Research Head, Pfizer Cardiova
1982	Messina, Joseph	Kostyo	Associate. Prof., Univ Alabama, Birm
1981	Corwin, Elizabeth	Malvin	Was teaching at U.New Mexico
1981	Manfridi, John	D'Alecy	Director Biotec, Myriad Pharmaceuticals, Utah
1981	Pierce, Eric	Mouw	Unknown
1980	DeWitt, Donald	Jochim	Chair Biology Dept, Bergen Co Academy, NJ
1980	Schoonmaker, Judith	Karsch	High school teacher
1980	Wood, John	Davenport	Associate Prof. Molecular & Integrative Physiology, Univ Kansas
1980	Katz, Steven	Malvin	Associate Prof. Physiology, Univ Minnesota
1979	Gorman, Mark	Sparks	Res. Associate Prof, Univ. Washington
1979	Pearce, William	D'Alecy	Professor, Physiology, Loma Linda Univ
1979	Park, Chun Sik	Malvin	Unknown
1979	Miller, A. William	Abbrecht	Unknown
1978	Victery, Winona	Vander	Retired- US EPA
1978	Brooks, Virginia	Malvin	Professor, Oregon Health Sci. Univ.
1978	Fisher, Steven	Malvin	High school teacher
1978	Murray, Robert	Malvin	Pharmaceutical Co, Merck
1978	Mitchel, Susan	Ranck	Professor Biology, Onondaga Community Coll; Develop interactive learning software
1978	Snabes, Michael	Karsch	Assoc. Director, Pharmacia
1978	Matteson, Robert	Jacquez	Unknown
1977	Mangelsen, Eric	Bohr	Deceased
1977	Vaughn, Linda	Kluger	Professor & Chair, Physiology, Marquette Univ.
1977	Phair, Robert	Sparks	Chief Science Officer, Integrative BiInformatics Inc.
1977	Moore, Ruth	Karsch	Research Director, St. John Med. Ctr.
1977	Coté, Claude	Jacquez	Professor, Laval Univ, Canada
1977	Smith, Jacquelyn	Mouw	Professor and Chair, Physiology, Midwestern Univ, Illinois
1976	Murray, Paul	Sparks	Endowed Chair & Director, Ctr. Anesthesiology Research
1976	Perlman, Ido	Alpern	Professor Physiology, Rappaport Faculty Medicine, Haifa, Israel
1976	Shanahan, Michael	Jacquez	Professor Physiology, S. Illinois Univ
1976	Berecek, Kathleen	Bohr	Professor, Physiology & Biophysics, Univ. Alabama

1976	Bernheim, Harry	Kluger	Professor & Chair, Biology, Tufts Univ.
1976	Morrow, Thomas	Casey	Associate Prof. Physiology, Univ Michigan-Retired
1975	Northrup, Thomas	Malvin	Scripps Research Inst
1975	Johnson, Michael	Malvin	Professor, Physiology, W. Virginia Univ. Dean, Oman Medical College, Oman
1975	Heigenhauser, George	Faulkner	Professor, Medicine, McMaster Univ
1975	Miller, Josephine	Keyes	AFLAC
1975	Zeleznik, Anthony	Vander	Professor Physiology, Univ. Pittsburgh
1975	Belloni, Francis	Sparks	Professor Physiology, Dean Graduate Sch, N.Y. Medical College, Valhalla

Appendix 3. Example of CV and NIH biographical sketch

Curriculum Vitae

Note:

• *This is presented as an example of one potential CV format; there are multiple possible formats. There may be other categories that are appropriate to you, but the ones below should cover most students/postdocs. Some key things are: 1) Keep the format simple. 2) Include things that would be pertinent to individuals evaluating your overall academic preparation and professional development and achievement. 3) Exclude things that are relatively minor in the big picture of things (like giving presentations in Physiol 606) or not relevant the above (like being an Eagle Scout). Avoid padding; this will be transparent and look bad.*

Curriculum Vitae

PERSONAL DATA:

Name

Professional address

Email

Phone #

EDUCATION:

Date, undergrad degree, major and institution for each degree

Date, graduate degree, major and institution, mentor for each degree

POSTDOCTORAL TRAINING:

Date, institution, mentor for each postdoctoral experience

ACADEMIC APPOINTMENTS: This category will not apply to most students or postdocs, but it could, and the following format is a good way to list the appointments in chronological sequence.

Dates, position title, department, institution for each appointment

SERVICE AND SCIENTIFIC ACTIVITIES:

Being a 'good citizen' and demonstrating a sense of community is important to most potential employers. Include professional activities such as membership on MIP Graduate Committee, MIP student representative faculty meetings, membership on Rackham or other University

committees, membership in committees of scientific societies, organizer/coordinator of journal clubs, etc.

FELLOWSHIP OR GRANT SUPPORT:

Fellowships include training grant within the University and ones awarded specifically to you from outside agencies such as AHA, NIH, NSF, etc. Grants could include travel grants, dissertation grants, or anything related to research or teaching.

HONORS AND AWARDS:

Include MIP awards, University or Medical School awards, awards from scientific societies, and any other special recognition awarded to you as an individual or member of a small group.

MEMBERSHIPS AND OFFICES IN PROFESSIONAL SOCIETIES:

It is a good idea to become a student member of one or more national professional societies activity in the scientific community in a broader sense (i.e., beyond the University).

TEACHING ACTIVITIES:

This is especially important for students who wish to pursue a career in teaching. You want to develop a portfolio of your teaching activities. Include courses in which you did classroom teaching, tutoring, mentoring of undergraduates, etc.

BIBLIOGRAPHY: This is the area that documents your research accomplishments. List the following categories under separate headings. The main things are publications and abstracts of presentations (if abstracts are published be sure to provide the reference citation). If there are no book chapters or invited talks, simply omit those categories from the listing.

SEPARATE GROUPINGS FOR THE FOLLOWING

Publications in Scientific Journals

Abstracts

Books, Chapters in Books, Editing

Invited Lectures and Presentation

APPLICANT BIOGRAPHICAL SKETCH—Instructions

Use only for individual predoctoral and postdoctoral fellowships, dissertation research grants (R36), and Research Supplements to Promote Diversity in Health-Related Research (Admin Suppl). DO NOT EXCEED FIVE PAGES.

NAME OF APPLICANT:

eRA COMMONS USER NAME (credential, e.g., agency login):

POSITION TITLE:

EDUCATION/TRAINING *(Most applicants will begin with baccalaureate or other initial professional education, such as nursing. Include postdoctoral training and residency training if applicable. High school students should list their current institution and associated information. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	START DATE MM/YYYY	END DATE <i>(or expected end date)</i> MM/YYYY	FIELD OF STUDY

NOTE: The Biographical Sketch may not exceed five pages. Follow the formats and instructions below.

A. Personal Statement

Briefly describe why you are well-suited to receive the award for which you are applying. The relevant factors may include aspects of your training; your previous experimental work on this specific topic or related topics; your technical expertise; your collaborators or scientific environment; and your past performance in this or related fields (you may mention specific contributions to science that are not included in Section C). Also, you may identify up to four peer-reviewed publications that specifically highlight your experience and qualifications for this project. If you wish to explain impediments to your past productivity, you may include a description of factors such as family care responsibilities, illness, disability, and active duty military service.

- **R36 Applicants (PD/PI) Only:**

In addition to the information outlined above, include a description of your career goals and intended career trajectory, as well as your interest in the specific areas of research designated in the FOA.

- **Diversity Supplement Candidates Only:**

In addition to the information outlined above, include a description of your general scientific achievements and/or interests, as well as your specific research objectives and career goals. Indicate any source(s) of current funding.

B. Positions and Honors

List in chronological order all non-degree training, including postdoctoral research training, all employment after college, and any military service. High school students and undergraduates may include any previous positions. Clinicians should include information on internship, residency and specialty board certification (actual and anticipated with dates) in addition to other information requested. This information is used in the reviewing the application and in determining the stipend level for Postdoctoral Fellowships. State the Activity/Occupation and include start/end dates, field, name of institution/company, and the name of your supervisor/employer. If you are not currently located at the applicant organization, include your projected position at the applicant organization as well.

ACTIVITY/ OCCUPATION	START DATE (mm/yy)	END DATE (mm/yy)	FIELD	INSTITUTION/ COMPANY	SUPERVISOR/ EMPLOYER

Academic and Professional Honors

List any academic and professional honors that would reflect upon your potential for a research career and qualifications. Include all scholarships, traineeships, fellowships, and development awards. Indicate sources of awards, dates, and grant or award numbers. List current memberships in professional societies, if applicable.

C. Contributions to Science (for predoctoral students and more advanced candidates only; high school students, undergraduates, and postbaccalaureates should skip this section)

Considering your level of experience, briefly describe your most significant contributions to science. While all applicants may describe up to five contributions, graduate students and postdoctorates are encouraged to consider highlighting two or three they consider most significant. These may include research papers, abstracts, book chapters, reviews, as well as non-publication research products, such as materials, methods, models, or protocols. For each contribution, indicate the historical background that frames the scientific problem; the central finding(s); the relevance of the finding(s) to science, technology, or public health; and your specific role in the described work. For each contribution, you may reference up to four peer-reviewed publications or other non-publication research products (can list audio or video products; patents; data and research materials; databases; educational aids or curricula; instruments or equipment; models; protocols; and software or netware) that are relevant to the described contribution. The description of each contribution should be no longer than one half page including figures and citations. Please also provide a URL to a full list of your published work as found in a publicly available digital database such as SciENcv or My Bibliography, which are maintained by the US National Library of Medicine. Manuscripts listed as “pending publication” or “in preparation” should be included and identified. Indicate if you previously used another name that is reflected in any of the citations.

D. Scholastic Performance

Predocctoral applicants: Using the chart provided, list by institution and year all undergraduate and graduate courses with grades. In addition, in the space following the chart, explain any marking system if other than 1-100, A, B, C, D, F, or 0-4.0 if applicable. Show levels required for a passing grade.

Postdoctoral applicants: Using the chart provided, list by institution and year all undergraduate courses and graduate scientific and/or professional courses germane to the training sought under this award with grades. In the space following the chart, explain any marking system if other than 1-100, A, B, C, D, F, or 0-4.0 if applicable. Show levels required for a passing grade.

YEAR	SCIENCE COURSE TITLE	GRADE	YEAR	OTHER COURSE TITLE	GRADE

Appendix 4 Mentor Agreement Form

Mentoring Agreement between MIP PhD Student and Mentor: Expectations and Objectives

This document represents an agreement reached between the graduate student and the faculty mentor/advisor(s) regarding the structure of the working relationship during the student's dissertation research. The mentoring agreement should be developed collaboratively and revisited on an annual basis.

1. Regular one-on-one meetings. We plan to meet: (e.g. weekly on Wednesday, 1st and 3rd Thursday of the month, as needed but at least monthly, Is an agenda or report required?, etc.)

2. Preferred method of communication (email, cell, text, etc.) and hours when it is appropriate to contact each other.

3. Discuss your upcoming academic milestones and how you plan to achieve them (upcoming milestones below are for first year students joining MIP).
 - Preliminary Exam

 - MIP Teaching Requirement

4. Short term and long term goals.
Student:

Mentor:

5. Student's role on project: (describe the student's primary area(s) of responsibility)

6. Mentor's expectations of the student (time in lab, engagement in the literature, fellowship or training grant applications, technical skills to be mastered, mentoring of other personnel, attendance at other seminar series)

7. Please discuss lab vacation request policies and how to request time for career development. The MIP vacation policy is in the handbook.

8. Support student will need from the mentor (is frequency of mentor meetings appropriate, areas for skill development, help towards networking, fellowship submissions)

9. Professional meeting(s) that the student may be able to attend with approximate target dates. What is expected to be able to attend meetings?

10. Other areas: (list here any other areas of understanding between the student and mentor regarding working relationship during the student's tenure. This might include unusual arrangements regarding use of computer equipment, space, or other resources; are they allowed to share reagents/protocols with other labs with/without asking)

Mentor (s)
(print name and sign)

Student
(print name and sign)

Return the signed agreement to Michele Boggs (mboggs@umich.edu) and she will contact the mentor to discuss the funding arrangements for the student after the first year and reimburse you for your lunch.

Mentor Commitment to MIP Program activities. The following activities are important ways faculty can contribute to the graduate program. Mentors please indicate your willingness to participate in:

- | | | |
|--|--------|-------|
| 1. MIP Graduate Committee (if asked) | Yes___ | No___ |
| 2. Attend MIP candidate Seminars (Tues at noon) | Yes___ | No___ |
| 3. Serve on MIP Prelim Committees | Yes___ | No___ |
| 4. Attend MIP Annual Symposium | Yes___ | No___ |
| 5. Interview students in recruiting weekend | Yes___ | No___ |
| 6. Volunteer to present at recruiting weekend (Data Blitz) | Yes___ | No___ |

Appendix 5. Dissertation Committee Form

MIP Dissertation committee meeting summary

Student Name: _____
 Meeting Date: _____

ID#: _____
 Matriculation (year): _____

	Yes	No		Yes	No
Is the progress report written clearly?			Is the student taking responsibility for the project?		
Is the student taking part in career development activities?					
Was the oral presentation clear?			TIMELINE (4+year)	Included in status report?	
Was the experimental plan agreed to?				Discussed at meeting?	
Was progress satisfactory?				Agreed by committee?	
The student and mentor are reminded to update and discuss the student's Individual Development Plan.					
For permission to defend – All of the below must be answered yes					
Are all essential experiments complete and the results known for key experiments?					
Will the student graduate before the next report deadline (i.e., within the next 6 months)?					
Is the thesis outline complete and does it constitute a sufficient body of work for a Ph.D.?					
Has a primary first-author original research paper (not a review) based on the trainees' work been accepted or received positive reviews indicating likely acceptance?					
Was permission to defend granted?					

Please comment on the student's actual progress compared to goals stated at the last committee meeting. Include any changes to student research plans, mentoring concerns, and brief explanations.

Please provide 3-4 goals for the next 6-month period (both research and career development). Also list any changes to mentoring plans or student/mentor communication that were recommended.

If any mentoring concerns or student performance concerns were raised that are unresolved, please communicate the information to the graduate program chair (dmichele@umich.edu) or departmental chair (schnells@umich.edu) by email or request a follow up meeting with either of them to discuss.

Required Signatures

Advisor: (Print) _____ (Sign/Date) _____
 Student: (Print) _____ (Sign/Date) _____

Committee Members

(Print) _____ (Sign/Date) _____
 (Print) _____ (Sign/Date) _____
 (Print) _____ (Sign/Date) _____
 (Print) _____ (Sign/Date) _____
 (Print) _____ (Sign/Date) _____

Program Director: (Print) _____ (Sign/Date) _____

Appendix 6. List and Description of MIP Courses

The courses listed below are the Physiology courses from the full PIBS curriculum guide, a complete version of which can be found [here](#).

Fall Term Only

REQUIRED

Course Number	Course Title	Term	Number Credits	Meeting Time
PHYSIOL 576	Signal Transduction	F	1	MWF; 10:00-11:00 am

Course content:

An overview of hormone and neurotransmitter receptors as well as the cellular effectors that are regulated by receptor activation. Oncogene products as signal transducers and the interaction of the known signaling pathways will be covered. The various techniques used to study signal transduction as well as important experimental strategies employing these techniques will also be presented. This course is module I of Cellular Physiology (PHYSIOL 576, 577).

Prerequisites: None

Course Directors: Drs. Christen Carter-Su and Lei Yin

REQUIRED

Course Number	Course Title	Term	Number Credits	Meeting Time
PHYSIOL 577	Membrane and Cell Physiology	F	2	MWF; 10:00-11:00 am

Course content:

Membrane and Cell Physiology specifically focuses on the molecular, structural and functional properties of membranes and of their relationship to cell physiology. Topics include membrane structure and trafficking, water and solute transport across membranes/cells, mechanisms of ion channel gating and conduction, the basis of membrane/cell electrical excitability, propagation of electrical signals through cell networks, and the activation and dynamics of calcium signaling. This course is module II of Cellular Physiology (PHYSIOL 576, 577).

Prerequisites: None

Course Director: Dr. Anatoli Lopatin

ELECTIVE

Course Number	Course Title	Term	Number Credits	Meeting Time
PHYSIOL 591	Special Topics in Signal Transduction	F	2	TU; 2:00-4:00 pm

Course content:

Special Topics in Signal Transduction is a literature based discussion course that will cover both seminal discoveries in signal transduction as well as recent advances in the field. For each topic, the instructor will provide an overview. In addition, two to three research papers will be discussed each week. This is an upper level graduate course. Jointly sponsored by the Biochemistry, Physiology and Pharmacology Departments and is cross-listed as BCHM 591 and PHARM 591.

Prerequisites: Course work in biochemistry and signal transduction or permission of the course director

Course Director: Dr. Jun Hee Lee

Both Fall and Winter Term

REQUIRED

Course Number	Course Title	Term	Number Credits	Meeting Time
PHYSIOL 606	Current Topics in Physiology (Student Seminar)	FA WI	1	M; 4:00-5:00 pm M; 4:00-5:00 pm

Course content:

The goal of the Student Seminar is to improve the critical thinking and public speaking of graduate students in Molecular and Integrative Physiology. This course will provide students with the opportunity to present data, critique the scientific literature, and develop the ability to provide constructive criticism to their peers. Students present a critical review of a topic from the current scientific literature or from their own research once each term. Second year Physiology graduate students are required to enroll, first year PIBS students interested in a degree in Molecular and Integrative Physiology are invited to register or audit the course. The Physiology Graduate Student Representatives in consultation with the Physiology Graduate Chair coordinate the program, establish ground-rules and organize the schedule for each term. The Seminar is graded pass/fail on the basis of participation and presentations.

Prerequisites: None

Course Director: Dr. Sue Moenter

ELECTIVE

Course Number	Course Title	Term	Number Credits	Meeting Time
PHYSIOL 699	Directed Readings	F,W	varies	Arranged

Course content:

Student and faculty member select a topic of interest for literature review and one-to-one discussion.

Prerequisites: None

Course Directors: Physiology Faculty

Winter Term Only

REQUIRED

Course Number	Course Title	Term	Number Credits	Meeting Time
PHYSIOL 510	Systems & Integrative Physiology	W	4.5	MWF 9:00AM - 10:30 AM

Course content:

This course addresses major principles of how the various physiological systems of the body function, both individually and as an integrated unit. This course is divided into three modules: Neural and Endocrine Communication; Cardiovascular, Respiratory and Renal Physiology; Gastrointestinal and Metabolic Physiology (512, 513 and 514, respectively; all MIP students are required to take all three modules and should register for 510). The class format consists of lectures, student/faculty discussions of primary research literature, and independent group projects covering aspects of physiology as well as developing other core skills such as presentation.

Prerequisites: None

Course Directors: Drs. Sue Moenter, Dan Michele, Yatrik Shah

ELECTIVE

Course Number	Course Title	Term	Number Credits	Meeting Time
PHYSIOL 520	Computational Systems Biology in Physiology	W	2	T 9-10 AM TH 9-11 AM

Course content:

This course is an introduction to dynamic modeling in physiology for both experimental and theoretical inclined students. We use selected physiological systems to introduce concepts in computational systems biology. This is done through the use of increasingly more complex cellular functions modeled with scientific software. Backgrounds in mathematics are not required. This course is cross-listed with BIOINF 520.

Prerequisites: None

Course Director: Dr. Dan Beard

ELECTIVE

Course Number	Course Title	Term	Number Credits	Meeting Time
PHYSIOL 541	Mammalian Reproductive Physiology	W	4	TTH; 1:30-3:00 pm

Course content:

A study of the reproductive hormones, which are responsible for the regulation of the female and male reproductive systems. Topics include: the properties and mechanisms of action of pituitary gonadotropic and sex steroid hormones, the anatomy and endocrine regulation of the ovary and testis and of the male and female reproductive tracts, mechanisms of fertilization and implantation, contraception, and the endocrinology of pregnancy.

Prerequisites: Human Physiology (PHYSIOL 201) recommended.

Course Director: Dr. Carol Elias

ELECTIVE

Course Number	Course Title	Term	Number Credits	Meeting Time
PHYSIOL 555	Method and Logic in Biomedical Science	W	3	MWF; 11:00-12:00pm

Course content:

The course will focus on developing skills for logical experimental design and analysis of data to rigorously test hypotheses in the biomedical sciences. Students will apply principles of logic to reading and evaluating the literature to discuss experimental approaches and appropriate conclusions. Capstone project will involve development of an NIH-style specific aim. There are no conventional tests in this class.

Prerequisites: Molecular Genetics (HUMGEN 541) recommended; Signal Transduction (PHYSIOL 576) recommended.

Course Directors: Drs. Scott Pletcher and David Antonetti