

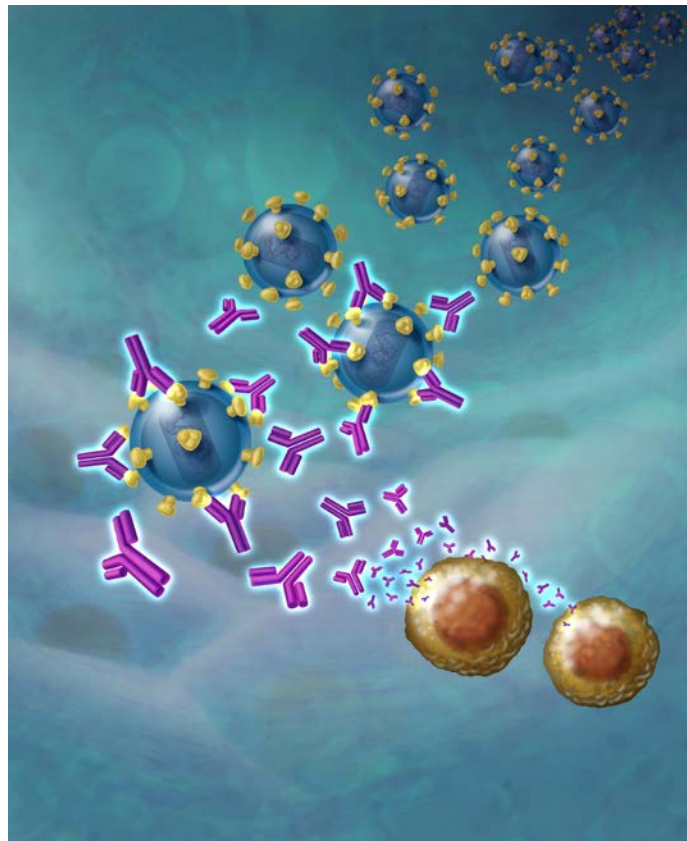
The University of Chicago



COMMITTEE ON IMMUNOLOGY

WEBSITE: immunology.uchicago.edu

Student Handbook 2018 – 2019



Sensitivity to viral infections is often linked to the host's inability to produce neutralizing antibodies in a timely and persistent manner. Non-classical Major Histocompatibility Complex class II (MHC-II)-like molecule, H2-O, is a negative regulator of the immune response and animals with non-functional alleles of the *H2-Ob* gene are capable of producing retrovirus-neutralizing antibodies. Neutralizing antibodies (magenta) are used as high-precision weapons to stop the march of the enemy troops (the viruses) by binding to their surface glycoproteins (in yellow), thus blocking their replication cycle.

Image from the cover of *Immunity* 2017, Vol 47, p310-322 (study from Dr. Golovkina lab).

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ACADEMIC CALENDAR
2018 – 2019



AUTUMN 2018

<i>Date</i>	<i>Event/Deadline</i>
Sep. 2-9	Quantitative Approaches Bootcamp (at MBL)
Sep. 24-28	Orientation
Sep. 24	Registration
Oct. 1	Quarter Begins
Nov. 22-23	Thanksgiving
Dec. 15	Quarter Ends

WINTER 2019

<i>Date</i>	<i>Event/Deadline</i>
Jan. 7	Quarter Begins
Jan. 21	Martin Luther King, Jr. Day
Mar. 23	Quarter Ends

SPRING 2019

<i>Date</i>	<i>Event/Deadline</i>
Apr. 1	Quarter Begins
May 27	Memorial Day
Jun. 15	Quarter Ends
Jun. 15	Convocation

SUMMER 2019

<i>Date</i>	<i>Event/Deadline</i>
Jun. 24	Quarter Begins
Jul. 4	Independence Day
Aug. 31	Quarter Ends

(Calendar subject to change)

UChicago Calendar: uchicago.edu/academics/calendar

**BSD DIVISIONAL ADDRESS LIST
OFFICE OF GRADUATE AND POSTDOCTORAL AFFAIRS**

Name	Location	Phone
Kenneth S. Polonsky <i>BSD Dean</i>	AMB W604	2-9306
Victoria Prince <i>Dean and Director, Graduate Affairs Professor, Department of Organismal Biology & Anatomy</i>	BSLC 104	4-2100
Nancy Schwartz <i>Dean and Director, Postdoctoral Affairs Co-Director, Graduate Affairs Professor, Department of Pediatrics</i>	BSLC 104	2-5890
Diane Hall <i>Associate Dean, Office of Graduate and Postdoctoral Affairs</i>	BSLC 104	2-5853
Melissa Lindberg <i>Graduate Student Affairs Administrator,</i>	BSLC 104	2-3905
Tracie DeMack <i>Training Grant Oversight Manager</i>	BSLC 104	4-2091
Michele O'Neil <i>Training Grant Administrator Office of Graduate and Postdoctoral Affairs</i>	BSLC 104	4-9936
Katie Barkley <i>Recruitment, Outreach and Communications</i>	BSLC 104	4-3092
Ryan Crisp <i>Admissions and Database Administrator</i>	BSLC 104	4-2105

Office of the President, The University of Chicago:
president.uchicago.edu/directory/kenneth-s-polonsky

Office of Graduate & Postdoctoral Affairs Website:
<https://biosciences.uchicago.edu/>

COMMITTEE ON IMMUNOLOGY FACULTY

Phone exchanges 773-702- or 773-753- or 773-834- or 773-795-

Professor	Office	Lab	E-mail address
Erin Adams, Ph.D.	4-9816	4-9816	ejadams@uchicago.edu
Marisa Alegre, M.D., Ph.D.	4-4317	4-4510	malegre@uchicago.edu
John Alverdy, MD	2-4876	n/a	jalverdy@surgery.bsd.uchicago.edu
Albert Bendelac, M.D., Ph.D.	4-8646	2-9196	abendela@bsd.uchicago.edu
Eugene Chang, M.D.	2-6458	2-2283	echang@medicine.bsd.uchicago.edu
Alexander Chervonsky, M.D., Ph.D.	2-1371	4-1073	achervon@bsd.uchicago.edu
Anita Chong, Ph.D.	2-5521	2-5518	achong@surgery.bsd.uchicago.edu
Marcus Clark, M.D.	2-0202	2-2753	mclark@medicine.bsd.uchicago.edu
Kenneth Cohen, M.D.	2-4043	2-2937	kcohen@medicine.bsd.uchicago.edu
Jill de Jong, Ph.D.	2-2646	2-3453	jdejong@uchicago.edu
Aaron Dinner, Ph.D.	2-2330	2-7232	dinner@uchicago.edu
Aaron Esser-Kahn, Ph.D.	4-4569		aesserkahn@uchicago.edu
Daria Esterhazy, Ph.D.	2-0402	5-1917	desterhazy@uchicago.edu
Michaela Gack, Ph.D.	4-5272	n/a	mgack@uchicago.edu
Thomas Gajewski, M.D., Ph.D.	2-4601	2-1271	tgajewsk@medicine.bsd.uchicago.edu
Yoav Gilad, Ph.D.	2-8507	n/a	gilad@uchicago.edu
Tatyana Golovkina, Ph.D.	4-7988	4-4396	tgolovki@bsd.uchicago.edu
Fotini Gounari, Ph.D.	2-3912	4-6723	fgounari@medicine.bsd.uchicago.edu
Chuan He, Ph.D.	2-5061	n/a	chuanhe@uchicago.edu
Haochu Huang, M.D.	4-4482	4-4481	hhuang@bsd.uchicago.edu
Jun Huang, Ph.D.	4-2351	2-3218	huangjun@uchicago.edu
Jeffrey Hubbell, Ph.D.	2-0585	n/a	jhubbell@uchicago.edu
Seungmin Hwang, Ph.D.	4-5905	4-5969	shwang@bsd.uchicago.edu
Bana Jabri, M.D., Ph.D.	4-8670	4-1252	bjabri@bsd.uchicago.edu
Barbara Kee, Ph.D.	2-4349	4-7914	bkee@bsd.uchicago.edu
Justin Kline, M.D.	2-5550	4-8507	jkline@medicine.bsd.uchicago.edu
Vinay Kumar, M.D.	2-0647	4-7896	vkumar@bsd.uchicago.edu
Rima McLeod, M.D.	4-4130	4-4120	rmcleod@uchicago.edu
Cathryn Nagler, Ph.D.	2-6317	4-7921	cnagler@bsd.uchicago.edu
Glenn Randall, Ph.D.	2-5673	2-5766	grandall@bsd.uchicago.edu
Anthony Reder, Ph.D.	2-6204	2-8489	areder@neurology.bsd.uchicago.edu
Raymond Roos, M.D.	2-5659	4-9089	rroos@neurology.bsd.uchicago.edu
Peter Savage, Ph.D.	4-7553	4-7554	psavage@bsd.uchicago.edu

Continued

Phone exchanges 773-702- or 773-753- or 773-834- or 773-795-

Professor	Office	Lab	E-mail address
Olaf Schneewind, M.D., PhD.	4-9060	n/a	oschnee@bsd.uchicago.edu
Hans Schreiber, M.D., Ph.D.	2-9204	2-9214	hszz@uchicago.edu
Anne Sperling, Ph.D.	4-1211	4-1313	asperlin@medicine.bsd.uchicago.edu
Melody Swartz, PhD	2-0452	n/a	melodyswartz@uchicago.edu
Philip Verhoef, M.D., Ph.D.	4-5079		pverhoef@uchicago.edu
Martin Weigert, Ph.D.	2-2719	4-0674	mweigert@bsd.uchicago.edu
Patrick Wilson, Ph.D.	2-9009	4-4418	pwilson1@medicine.bsd.uchicago.edu

COMMITTEE ON IMMUNOLOGY STUDENTS

Name	Lab	Year Entered	E-mail address
Augusta Broughton	N/A	2018	abroughton@uchicago.edu
Rebecca Abraham	Clark	ISTP	abrahamr@uchicago.edu
Jennifer Allocco	Alegre	2017	allocco@uchicago.edu
Yuta Asano	Clark	2013	yuta@uchicago.edu
Hailey Brown	Hwang	2015	haileybrown@uchicago.edu
Jeffrey Bunker	Bendelac	ISTP	jeffbunker@uchicago.edu
Alexandra Cabanov	Gajewski	2016	acabanov@uchicago.edu
Dan Camacho	Sperling	ISTP	dcamacho@uchicago.edu
Ben Casterline	Bubeck Wardenburg	ISTP	bcasterline@uchicago.edu
Jaime Chao	Savage	2014	jchao1225@uchicago.edu
Kyle Cron	Gajewski	2013	krcron@uchicago.edu
Emily Cullum	Golovkina	ISTP	ecullum@uchicago.edu
Haley Dugan	Wilson	2016	duganh@uchicago.edu
Ryan Duncombe	Adams	2014	rduncombe@uchicago.edu
Zachary Earley	Jabri	2015	zearley@uchicago.edu
Steven Erickson	Bendelac	2014	sae@uchicago.edu
Blake Flood	Gajewski	ISTP	blakeflood@uchicago.edu
Matt Funsten	Chervonsky	2016	mfunsten@uchicago.edu
Zander Galluppi	N/A	2017	agalluppi@uchicago.edu
Dana Gilmore	Savage	2013	dcgilmore@uchicago.edu
Emily Higgs	Gajewski	GDDTP	emilyhiggs@uchicago.edu
Philip Cody He	He	GDDTP	pcodyhe@uchicago.edu
Maile Hollinger	Sperling	2017	hollingermk@uchicago.edu
Chanie Howard	Sperling	2014	chanie@uchicago.edu
Phillip Hsu	He	ISTP	hsup@uchicago.edu
Darshan (Shan) Kasal	Bendelac	2015	shankasal@uchicago.edu
Robert (Bobby) Keskey	N/A	2018	rkeskey@uchicago.edu
Sangman Kim	Jabri	2010	sangman@uchicago.edu
Dave Klawon	Savage	2016	klawondej@uchicago.edu
Stephanie Konecki	McNerney	2016	konecki@uchicago.edu

Elaine Kouame	Jabri	2016	ekouame@uchicago.edu
Linda Lan	Wilson	2016	lindalan@uchicago.edu
Victoria Lee	Savage	ISTP	victorialee@uchicago.edu
Kevin Lei	Alegre	2012	leik@uchicago.edu
Brendan MacNabb	Kline	2015	bwm@uchicago.edu
Christine McIntosh	Alegre	GDDTP	cmcintosh@uchicago.edu
Tiffany Marchell	Hubbell	2015	tmarchell@uchicago.edu
Toufic Mayassi	Jabri	2012	stilltoufic@uchicago.edu
Christine Miller	Savage	ISTP	chmiller@uchicago.edu
Karlynn Neu	Wilson	2011	karlynn@uchicago.edu
Kelly O'Grady	N/A	2017	keograd@uchicago.edu
Michael Okoreeh	Clark	GDDTP	Mokor002@uchicago.edu
Geoffrey Parriott	N/A	2018	gparriott@uchicago.edu
Donald Rodriguez	Savage	ISTP	dmrodriguez@uchicago.edu
Kishan Sangani	Jabri	ISTP	ksangani@uchicago.edu
Martin Sepulveda	Alegre	2017	msepulveda@uchicago.edu
Dustin Shaw	Wilson/Jabri	ISTP	dgshaw@uchicago.edu
Christopher Stamper	Wilson	2014	stamper@uchicago.edu
Andrew Tremain	Hubbell	2014	actremain@uchicago.edu
Jordan Voisine	Jabri	2017	jvoisine@uchicago.edu
Young me Yoon	N/A	2018	yoony@uchicago.edu

COMMITTEE ON IMMUNOLOGY ADMINISTRATION

Chairperson *Alexander Chervonsky, M.D., Ph.D.*
Office phone: 773-702-1371
Fax: 773-834-5251
E-mail: achervon@bsd.uchicago.edu

**Biomedical Sciences
Director of Graduate Education** *Lisa Abston-Leftridge, Ph.D.*
labstonlefridge@bsd.uchicago.edu
Office Phone: 773-834-3899
Fax: 773-702-6864
BSLC R013

Graduate Education Administrator *Natasha Beals*
nbeals@bsd.uchicago.edu
Office phone: 773-702-1857
Fax: 773-702-6864
BSLC R013A

Graduate Education Administrator *Laura Negrete*
lnegrete@bsd.uchicago.edu
Office phone: 773-702-3940
Fax: 773-702-6864
BSLC R013A

Biomedical Sciences Cluster: biomedsciences.uchicago.edu

COMMITTEE ON IMMUNOLOGY SUBCOMMITTEES

Program Committee

Erin Adams
Marisa Alegre
Albert Bendelac
Sasha Chervonsky (Chair)
Seungmin Hwang
Bana Jabri
Barbara Kee
Pete Savage
Fotini Gounari
Patrick Wilson
Student, Ryan Duncombe
Student, Steven Erickson

IMTG Steering Committee

Albert Bendelac (Chair)
Sasha Chervonsky
Barbara Kee
Hans Schreiber
Pete Savage

Faculty Chalk Talk

Sasha Chervonsky

Journal Club

Albert Bendelac

Work-In-Progress

Fotini Gounari

Student Mentoring Committee

Marisa Alegre
Albert Bendelac
Sasha Chervonsky
Seungmin Hwang
Barbara Kee
Pete Savage
Patrick Wilson
Erin Adams
Fotini Gounari

Admissions Committee

Albert Bendelac
Sasha Chervonsky (Chair)
Seungmin Hwang
Barbara Kee
Pete Savage

Faculty and Resources Committee

Sasha Chervonsky (Chair)
Marcus Clark
Gene Chang
Tom Gajewski
Anne Sperling
Martin Weigert

Membership Committee

Erin Adams
Marisa Alegre
Albert Bendelac
Sasha Chervonsky

Barbara Kee (Chair)

Pete Savage

Seminars

Justin Kline
Haochu Huang
Seungmin Hwang
Pete Savage
Bana Jabri
Anne Sperling

COMMITTEE ON IMMUNOLOGY

GUIDELINES FOR Ph.D. PROGRAM

CORE CURRICULUM

Each student will be required to take nine* formal graded courses, complete two teaching assistantships, one course in Scientific Integrity and the Ethical Conduct of Research and two laboratory rotations. The nine graded courses include three required immunology courses (“the Programmatic Core in Immunology”) and five elective courses to be chosen from the basic sciences and various other fields as outlined below. Immunology Journal Club/Seminar series are mandatory and count as a credit. It is suggested, but not required, that the five elective courses include three basic sciences courses. All rotations must be approved by the Chair and elective courses must be approved by a Faculty of the Program Committee (the designated “Faculty Advisor”). After successful defense of a thesis proposal by the end of the second year, the student will be formally admitted to PhD candidacy.

*Note: students in the MD/PhD track can get credit for three graded medical school courses to count as electives upon case by case examination and approval by the Program Committee.

Only letter graded classes will be applied towards the nine required classes. Classes that are taken on a Pass/Fail basis cannot count as one of the nine required classes. It is expected that, by the end of the first year, six or seven of the nine courses will be completed. Thus students should be enrolled in 2-3 courses per quarter. For those students who anticipate the coursework to occupy the majority of their time, completing the coursework in a satisfactory manner may require delaying research rotations until the winter of the first year, although rotations are encouraged to begin as soon as possible.

First Year Student Advisors: Each first year student will meet with a group of faculty that will serve as their mentoring committee. Meetings will occur on a quarterly basis to ensure students are on track in their courses and/or rotations, and to provide input on course selection. Students may also meet one-on-one with members of their mentoring committee at any time.

To remain in good standing students must maintain a B average in all graded, formal courses, and receive a B or better in COI courses. Each quarter, the Program Committee will review the transcripts of the students. Any C's must be balanced by an A by the end of the student's second year.

REQUIRED COI COURSES

The required COI courses consist of the Programmatic Core in Immunology. This core includes a sequence of three immunology courses in Autumn (Host Pathogen Interactions, one credit), Winter (Advanced Immunology 1, one credit) and Spring (Advanced Immunology 2, one credit) of the first year, as well as a weekly Journal

Club/Seminar Series over the first two years (Experimental Immunology, one credit). Total: four credits.

IMMU 31200 Host Pathogen Interactions

This course explores the basic principles of host defense against pathogens, including evolutionary aspects of innate and adaptive immunity and immune evasion strategies. Specific examples of viral and bacterial interactions with their hosts are studied in depth. A review of immunological mechanisms involved in specific cases is incorporated in the course. *Chervonsky*. Autumn.

IMMU 31500 Advanced Immunology 1

This course explores the basic principles of the Immune System, including Tolerance, the Development and Differentiation of Lymphocyte Subsets, the Regulation of the Class of Immune Responses, Memory, Cell Homing and Migration, Cell-Cell Interactions, Antigen Presentation and Recognition. *Bendelac*. Winter.

IMMU 32000 Advanced Immunology 2

This class will explore the molecular and biochemical mechanisms by which lymphocytes develop and are activated in response to antigen. This will include the signal transduction pathways and transcriptional networks involved in these processes, as well as the molecular mechanisms underlying the generation of receptor diversity. *Kee*. Spring.

IMMU 40200 Experimental Immunology

This course centers around the Immunology Journal Club and the Immunology Seminar Series and has two purposes. The first is to provide background knowledge for the seminar given each week by an outside speaker or a member of the Committee on Immunology. The second is to allow the students an opportunity to develop skills in analyzing the literature with students at the same stage of training. First and second year students are required to participate in this course. The two-year course counts towards one credit, *Hwang, Kline*. Autumn, Winter, Spring.

ELECTIVE COURSES

IMMU 30266 Molecular Immunology

This course is available every year and is also considered a basic biochemistry course. Molecular Immunology examines the structural principles of immune recognition by antigen receptors of the innate and adaptive immune systems, the discrimination between self and non-self and the molecular fundamentals of cell stimulation and signaling. Primary literature is integrated with lectures on commonly used biochemical, structural and immunological techniques. *Adams*. Spring. (This course will be offered next in Spring 2019).

IMMU 30810 Directed Readings in Cancer Immunology

This course is a literature-based course covering classical and contemporary topics in cancer immunology and immunotherapy. Each week will begin with a 20-minute introduction to a given topic by a course director or TA. For the remainder of a given week, 3 – 4 students will each lead a discussion of one primary research paper, running

approximately 30 – 45 minutes per paper. *Savage and Kline*. Spring. (This course will be offered again in Spring 2020).

IMMU 35500 Selected Topics in Immunology

This course involves an in depth analysis of a particular topic in Immunology, which will vary from year to year. Emphasis will be placed on development of critical thought in evaluation of scientific literature and the course may conclude with the writing of grant proposals and their review in a student-led study section. Recent courses have included: (1) Animal models and clinical issues in transplantation, (2) Airway inflammation and cancer, and (3) Autoimmunity. *Alegre, Sperling*. Spring. (This course will be offered next in Spring 2019).

Additional basic science and specialized courses offered by other programs may be taken as electives to widen conceptual training. There is general flexibility in the curriculum, however, including in the required immunology courses, in order to accommodate the particular needs of students coming from or going into frontier areas such as microbiology, genomics, computational biology, chemistry, for example. Below is a non-exhaustive list of electives.

Autumn Quarter

- BCMB 30400: Proteins 1: Protein Fundamentals
- BCMB 32300: Structure and Function of Membrane Proteins
- GENE 31400: Genetic Analysis of Model Organisms
- HGEN 47000: Human Genetics
- MGCB 31600: Cell Biology 1
- MOMN 36500: Molecular Nutrition I
- MPMM 57500: Cell Growth, Injury, Repair and Death

Winter Quarter

- MGCB 31200: Molecular Biology 1
- CABI 30900: Cancer Biology 2: Molecular Mechanisms of Cancer
- MGCB 31700: Cell Biology 2
- MICR 34000: Bacterial Pathogenesis
- MPMM 30600: Signal Transduction and Disease

Spring Quarter

- MGCB 31300: Molecular Biology 2
- IMMU 30266: Mucosal Immunology
- IMMU 47300: Genomics and Systems Biology
- MICR 34600: Introduction to Virology
- MPMM 30800: Defense Mechanisms

Students are encouraged, but not required, to take three courses in basic science areas such as Biochemistry, Cell Biology, Genetics or Molecular Biology, as described below.

BASIC SCIENCE CORE CURRICULUM

Biochemistry

Protein Fundamentals (BCMB 30400). The course covers the physical-chemical phenomena that define protein structure and function. Topics include: the principles of protein folding, molecular motion and molecular recognition; protein evolution, design and engineering; enzyme catalysis; regulation of protein function and molecular machines; proteomics and systems biology. Workshop on X-ray Crystallography: The workshop is an addendum to Protein Fundamentals and is required for all BCMB students. This one week workshop will provide students with an intensive introduction to protein structure determination by x-ray crystallography. In addition to lectures, an extensive laboratory component will give students the opportunity to carry out protein crystallization, data collection (at Argonne), structure determination, refinement, model building and validation. (e.g. BCMB 30100, which may be taken concurrently). *Koide, Keenan, Autumn.*

Structure and Function of Membrane Proteins (BCMB 32300). This course will be an in depth assessment of the structure and function of biological membranes. In addition to lectures, directed discussions of papers from the literature will be used. The main topics of the courses are: (1) Energetic and thermodynamic principles associated with membrane formation, stability and solute transport (2) membrane protein structure, (3) lipid-protein interactions, (4) bioenergetics and transmembrane transport mechanisms, and (5) specific examples of membrane protein systems and their function (channels, transporters, pumps, receptors). Emphasis will be placed on biophysical approaches in these areas. The primary literature will be the main source of reading. *Perozo. Autumn.*

Genetics and Systems Approaches

Genetic Analysis of Model Organisms (HGEN 31400). Fundamental principles of genetics discussed in the context of current approaches to mapping and functional characterization of genes. The relative strengths and weaknesses of leading model organisms are emphasized via problem-solving and critical reading of original literature. *Bishop, Moskowitz, Ferguson, Malamy. Autumn.*

Human Genetics 1: Human Genetics (HGEN 47000). This course covers classical and modern approaches to studying cytogenic, Mendelian, and complex diseases. Topics include chromosome biology, single gene and complex disease, non-Mendelian inheritance, cancer genetics, human population genetics, and genomics. The format includes lectures and student presentations. *Ober, Waggoner, Nobrega. Autumn.*

Genomics and Systems Biology (IMMU/CABI/HGEN 47300). This lecture course explores the technologies that enable high-throughput collection of genomic-scale data, including sequencing, genotyping, gene expression profiling, assays of copy number variation, protein expression and protein-protein interaction. We also cover study design and statistical analysis of large data sets, as well as how data from different sources can be used to understand regulatory networks (i.e., systems). Statistical tools introduced include linear models, likelihood-based inference, supervised and unsupervised learning techniques, methods for assessing quality of data, hidden Markov models, and

controlling for false discovery rates in large data sets. Readings are drawn from the primary literature. *Gilad*. Spring

Molecular Biology

Molecular Biology 1 (MGCB 31200). Nucleic acid structure and DNA topology; methodology; nucleic-acid protein interactions; mechanisms and regulation of transcription in eubacteria, and of replication in eubacteria and eukaryotes; mechanisms of genome and plasmid segregation in eubacteria. *Rothman-Denes, Bishop*. Winter

Molecular Biology 2 (MGCB 31300). The content of this course covers the mechanisms and regulation of eukaryotic gene expression at the transcriptional and post-transcriptional levels. Our goal is to explore research frontiers and evolving methodologies. Rather than focusing on the elemental aspects of a topic, the lectures and discussions highlight the most significant recent developments, their implications and future directions. *Staley, Ruthenburg*. Spring.

Cell Biology

Cell Biology 1 (MGCB 31600). Eukaryotic protein traffic and related topics, including molecular motors and cytoskeletal dynamics, organelle architecture and biogenesis, protein translocation and sorting, compartmentalization in the secretory pathway, endocytosis and exocytosis, and mechanisms and regulation of membrane fusion. *Turkewitz, Glick*. Autumn.

Cell Biology 2 (MGCB 31700). This course covers the mechanisms with which cells execute fundamental behaviors. Topics include signal transduction, cell cycle progression, cell growth, cell death, cancer biology, cytoskeletal polymers and motors, cell motility, cytoskeletal diseases, and cell polarity. Each lecture will conclude with a dissection of primary literature with input from the students. Students will write and present two short research proposals, providing excellent preparation for preliminary exams. Cell Bio I 31600 is not a prerequisite. *Glutzer, Kovar*. Winter

Statistics

Biostatistical Methods (STAT 22700). This course is designed to provide students with tools for analyzing categorical, count, and time-to-event data frequently encountered in medicine, public health, and related biological and social sciences. This course emphasizes application of the methodology rather than statistical theory (e.g., recognition of the appropriate methods; interpretation and presentation of results). Methods covered include contingency table analysis, Kaplan-Meier survival analysis, Cox proportional-hazards survival analysis, logistic regression, and Poisson regression. *Cao*. Winter

Statistics Methods and Applications (STAT 22000). Statistics 22000 provides an introduction to how statisticians think about describing data, data collection and research design, probability and randomness, and inference from a sample to a population. This course would only be appropriate for students with too little background to take STAT 24300. Fall, Winter, and Spring.

Statistical Theory and Methodology I, II (STAT 24300-24500). Principles and techniques of statistics, with emphasis on the analysis of experimental data. First quarter: Discrete and continuous probability distributions, transformation of random variables; principles of inference including Bayesian inference, maximum likelihood estimation, hypothesis testing, likelihood-ratio tests, multinomial distributions and chi-square tests. Second quarter: Multivariate normal distributions and transformations, Poisson processes, data analysis, t-tests, confidence intervals, analysis of variance and regression analysis. Autumn, Winter.

Human Genetics 3: Introductory Statistical Genetics. (HGEN 47100). This course focuses on genetic models for complex human disorders and quantitative traits. Topics covered also include linkage and linkage disequilibrium mapping genetic models for complex traits, and the explicit and implicit assumptions of such models. *Novembre.* Winter.

Introduction to Scientific Computing for Biologists. (ECEV 32000). The course will cover basic concepts in computing for an audience of biology graduate students. The students will receive basic training in the use of version control systems, databases and regular expressions. They will learn how to program in python and R and how to use R to produce publication-grade figures for their manuscripts, and how to typeset scientific manuscripts and theses using LaTeX. All the examples and exercises will be biologically motivated and will make use of real data. The approach will be hands-on, with lecturing followed by exercises in class. *Allesina.* Winter.

Statistical Inference and Stochastic Models for Computational Biologists (HGEN course; number forthcoming). Covers key principles in probability and statistics that are used to model and understand biological data. There will be a strong emphasis on stochastic processes and inference in complex hierarchical statistical models. Topics will vary but the typical content would include: Likelihood-based and Bayesian inference Poisson processes, Markov models, Hidden Markov models, Gaussian Processes, Brownian motion, Birth-death processes, the Coalescent, Graphical models, Markov processes on trees and graphs, Markov Chain Monte Carlo.
Prereq: STAT 244 or equivalent and comfort with programming, or consent of instructor. *Novembre, Stephens,* Winter.

Reading Classes

Faculty are encouraged to offer reading courses in specialized topics. Informal reading classes with one or more student(s) and pass/fail grades can be established at any time at the discretion of the individual faculty. However, these classes CANNOT count for one of the nine required classes needed to fulfill the Ph.D. degree. For a readings class to fulfill one of the required courses it must meet the following criteria:

1. There must be more than one student enrolled in the class and the class must be open to other students in the COI, with permission of the faculty.
2. The course and its syllabus must be preapproved by the Program committee and the course will be assigned a unique class number and title.
3. Students must receive a quality (letter) grade for the class.
4. The class must require some written assignments (typically a term paper or grant proposal at the end of the class).

SUMMARY OF SCHEDULE AND REQUIREMENTS

First year. Note that in the fall, winter and spring quarters of the first year, a student must take at least one elective course and/or one rotation in addition to the required Immunology Course + Experimental Immunology + attend AllStars. An example of a typical first year schedule is below:

Autumn Quarter

- Host Pathogen Interactions
- IMMU 40200 Experimental Immunology
- Basic Science Course
- Research Rotation (not encouraged, but possible)

Winter Quarter

- IMMU 31500 Advanced Immunology 1
- IMMU 40200 Experimental Immunology
- Basic Science Course
- Research Rotation

Spring Quarter

- IMMU 32000 Advanced Immunology 2
- IMMU 40200 Experimental Immunology
- BDSG 55000 Scientific Integrity and the Ethical Conduct of Research
- Basic Science or Elective(s)
- Research Rotation

Summer Quarter

- Research Rotation(s)
- Elective
- AAI Advanced Immunology Class

The American Association of Immunology offers a week-long advanced course in Immunology every summer. The Committee on Immunology sends all first year Immunology students to this class. This serves as a valuable review of material that was offered in the immunology classes and introduces some topics that were not. It also provides an opportunity for students to meet and interact with the renowned immunologists who participate in the teaching of this class each year.

- Oral preliminary exam

Second Year

Autumn Quarter

- IMMU 40200 Experimental Immunology
- Elective
- TAsip
- Thesis research

Winter Quarter

- IMMU 40200 Experimental Immunology
- Elective
- TAsip
- Thesis research

Spring Quarter

- IMMU 40200 Experimental Immunology
- TAs
- Thesis research
- Thesis proposal

Summer Second Year/Autumn Third Year.

- Thesis proposal
- Thesis committee meeting

REQUIRED COMMITTEE ON IMMUNOLOGY SEMINARS AND EVENTS

Immunology Seminar Series. Mondays from 4:00 - 5:00 p.m., BSLC 115 unless otherwise noted on seminar notice. Seminar notices with individual speaker and title will be emailed to committee members and should be posted in most individual laboratories and in the Immunology office (JFK 1st Floor). Graduate students will have lunch with the speaker at 12:00 Noon in GCIS W508. The Experimental Immunology TA makes the lunch arrangements. Graduate students are required to participate in the speaker luncheon. *(Contact person: Natasha Beals, 2-1857)*

Immunology Work-in-Progress Seminars. Every Wednesday from 4:00 - 5:00 p.m. in the Biological Sciences Learning Center, BSLC 008, unless otherwise noted on email notice. Informal seminars by Committee on Immunology graduate students and postdoctoral fellows who discuss the progress of their research projects. Refreshments are provided by the speaker. Abstracts must be submitted a week in advance to Chevette Young (cyoung1@uchicago.edu). *(Contact person: Natasha Beals, 2-1857)*

COI Journal Club. Fridays from 9:00 - 10:00 a.m. in the Gordon Center for Integrative Sciences Conference Room GCIS W301. Attendance at the journal club is extended to graduate students, postdocs and faculty members. Papers must be submitted a week in advance to Jill Voss (jvoss@uchicago.edu). *(Contact person: Jill Voss, 4-8632)*

All Stars. Tuesdays from 12:30 – 1:50 p.m. Faculty from the Biomedical Sciences Cluster give short presentations introducing their research programs in their lab. Attendance is required for 1st year students who should use this forum to select their rotations. Lunch is provided. The course runs Autumn and Winter Quarter. *(Contact person: Natasha Beals, 2-3940)*

Annual Retreat. Each year the Committee on Immunology hosts a scientific retreat. The venue for the retreat varies from year to year. All COI graduate students, postdocs, faculty and their associated labs are encouraged to participate in this weekend event. Free time for socializing and entertainment are built into the schedule. *(Contact person: Natasha Beals, 2-1857).*

LABORATORY ROTATIONS

It is expected that all graduate students seeking a Ph.D. through the COI will rotate through three and sometimes four laboratories (the absolute minimum is two

laboratories) before beginning their thesis work. These rotations should be completed by the beginning of the second year. The goals and functions of these rotations are summarized below:

- A. Rotations will consist of small research projects in different laboratories. The expectation of these rotations are that they will:
- 1) provide an opportunity for each student to become familiar with the conceptual and technical features characteristic of potential thesis laboratories
 - 2) broaden the research base of the student
 - 3) allow faculty members to evaluate the research strengths of potential graduate students. As such, students will be expected to spend enough time in the laboratory to accomplish these goals.
- B. Scheduling of the rotations will depend on the student's background, course work and experience. Students who enter the program with specific areas of research interest may wish to begin their rotations in the fall quarter, although it is not encouraged for students who have less research experience or a more limited background in Immunology. Students should complete 2-4 rotations over three quarters and the summer. In the process of rotation lab selection, students are encouraged to consult with the members of Mentoring Committee. Students must discuss rotation options with 5 faculty members and a signed form must be presented to the Chair before the end of the Fall quarter. Students must obtain an approval for the rotation from the Chair before it begins. Once rotation is approved, the student must inform the Cluster Office and complete the Rotation Form. The form must then be returned to the Cluster Office. The student must also register for the appropriate course (BSDG 40100) in order to get credit for the rotation.
- C. At the end of these rotations:
- 1) The student prepares a written rotation report to be given to the research mentor and the Cluster office. It is encouraged that the student be given the opportunity to present the results of their research rotation in the mentor's lab meeting. This lab meeting presentation can form the basis of the written summary and will provide valuable experience in oral presentations.
Rotation reports should include the following:
 1. Student Name
 2. Lab Mentor Name and the current quarter/year
 3. Why were the experiments attempted?
 4. Materials and methods.
 5. Description of experiments as if it were a paper so that someone can reproduce them.
 6. Conclusions.
 - 2) The faculty mentor will provide a written evaluation of the student and a grade for the student's performance in the rotation:
A+/-: reserved for truly exceptional rotations, where student's technical achievements and intellectual involvement in the project are

outstanding, within the top 10-20% of rotations.

B or B+: most rotations will receive this grade. This should represent the average rotation, where the students commitment, technical achievements and intellectual involvement in the project are good.

B-: reserved only for those rotations where a serious problem has been identified, either in the students commitment and effort, in their technical abilities, or in the ability to conceptualize the experimental approach or overall question.

C or lower: for students who do not participate in the rotation, either poor attendance or whose commitment is extremely poor.

The grades are for evaluation of the quality of student's work by the Program Committee and not normally given a credit. Evaluations and summaries, coupled with the course work, will be reviewed by the Program Committee throughout the first year of graduate school. By the beginning of the second year of graduate school, the students will be asked to choose a thesis advisor and proceed to formal research training.

TA REQUIREMENTS

Teaching skills are an important component of a successful academic career. The Divisional requirements mandate that each student complete two TAships. A student may TA in two undergraduate biology courses or two graduate level courses, or one undergrad and one graduate course. However, the two TAships must be in different classes. The Curriculum and Student Affairs Committee has selected courses which are expected to provide a good educational experience for the TA, and these are listed in the Teaching Opportunities publication issued by the BSD Dean of Students Office of Graduate Affairs annually. Responsibilities include leading discussion groups, writing problem sets, and running small group sessions. During Registration, the student MUST register for the TAship. At the end of each course, TA's are evaluated by the course director and the students. TA's will also evaluate themselves. All three evaluations must be returned to the BSD Office of Graduate Affairs (OGA) to receive credit for the TAship. Note: Students may not TA the same course twice in fulfillment of their Teaching Assistantship requirement.

Students who have no experience in teaching may register for a Teaching Assistant Training Course, offered every autumn quarter. This course may count as one of the two required teaching requirements. The TA course is led by two "Super TAs," who are students with extensive experience in teaching. Invited faculty speakers offer their insights on how to give a lecture and encourage class participation. Discussion sessions are led by students taking the course and cover a wide variety of teaching issues. Written assignments are also set. The course incorporates elements useful for all teaching assistants, such as a computer based learning tools like Chalkboard and PowerPoint. At the beginning of the course, students prepare short lectures, which they deliver to the rest of the class, followed by a critique of their presentation by their fellow students. These mini-lectures are videotaped and the student is required to replay and critique his or her own performance at leisure. Later in the course, students prepare a second, ten-minute talk, which is also videotaped and critiqued. Participants thus have the opportunity to assess how well they have incorporated the teaching techniques taught

during the course. Students also sit in and evaluate college or graduate courses during the quarter, especially those given by faculty who have won awards for excellence in teaching, to examine and learn from teaching styles.

PRELIMINARY EXAM AND THESIS PROPOSAL

Our goal as a faculty is to teach students how to critically evaluate data, integrate information, formulate specific hypotheses, and design experimental approaches to test these ideas.

First, students take an oral preliminary exam. The primary purpose of the exam is to test the students' ability to synthesize knowledge and concepts in immunology as well as related biomedical sciences. In addition to material covered in classes and in the AAI Advanced Immunology course, students work together during the weeks preceding this exam to enhance their own, and their classmates, understanding and conceptual grasp of important issues.

The student will later complete the Thesis Proposal, usually during the spring or summer of his/her second year. The written proposal is based on an NIH grant format and should describe the theoretical framework of the project and any relevant preliminary data that the student has accumulated. The experimental plan should outline a sequence of experiments to be performed, the potential outcomes of these experiments and the interpretation and plans based on the outcome of key experiments. The student will orally present and defend the proposal to their thesis committee.

A. Preliminary Exam

All first year Ph.D. students will be required to take an oral preliminary exam between July and September of their first year. Students have typically completed the following requirements:

- Programmatic Core in Immunology (Host Pathogen Interactions, Advanced 1, Advanced 2 and first year of Experimental Immunology).
- At least three elective courses.
- Two rotations
- Scientific Integrity and the Ethical Conduct of Research.
- Attendance to All Stars series.

Two days prior to the exam, each student will be assigned a recently published Research Article for oral presentation to a group of three to five COI faculty. Critical understanding of concepts, methods, experimental design and interpretation, and the ability to synthesize and integrate knowledge will be evaluated within and outside the immediate field of research represented in the exam paper.

The intent of the preliminary exam can be stated as follows:

1. The primary purpose is to encourage students to synthesize knowledge and concepts in immunology and develop critical thinking. You should view this as a good opportunity to bring together things you have learned in the last year and to fill gaps in knowledge before going on and specializing in a very narrow

- research project in your chosen area.
2. In the process of preparing for the exam, it is hoped that students will work with each other, and in the course of discussions of the various topics, the students will enhance their own and their classmates understanding and conceptual grasp of important issues.
 3. To identify weaknesses that can be corrected in the students' knowledge or understanding.
 4. In rare instances, to identify students who may not be suited for basic research as a career.

Preparation: Regular attendance to the Seminar Series, Journal Club and Work-In-Progress are an essential component of the preparation. Students should also review material covered in both immunology and basic science classes and in the AAI course in immunology. For topics that are not covered by formal course work, it is recommended that students first read/review a general immunology text (Janeway) to get a sense of the whole area, and then read recent reviews in the area. Good solid reviews of the field can be found in Annual Review of Immunology, Nature Reviews in Immunology, etc and lighter reviews that may highlight one scientist's view of the field and that are easy to read can be found in Trends in Immunology, Current Opinion in Immunology.

Format: A recent Research Paper will be handed out two days before the exam to prepare for oral presentation to an examining committee of 3-5 faculty members. Students are not allowed to discuss the paper with classmates or any other individuals. A usual format would be that the student initiates a chalk talk presentation, (no power-point presentations, no notes on the margins except notes simplifying figure legends are allowed) fielding questions from the exam faculty as they arise. Thus the research paper is a starting point for questions and discussion that may go well beyond the immediate field of research. Students will know the results of the exam by the end of the day.

Scheduling: The exam is typically scheduled in the beginning of August, but can be administered as late as the first week of September. Scheduling can be adjusted depending in part on the student preferences and on the availability of the examining committee. However, in practice, all students take the exam few days after they return from the AAI course.

Evaluation: The students will be examined by a committee which will include members of the Committee on Immunology and members of the Program Committee. Possible outcome of the exam are: high pass (exceptional understanding of immunology concepts and approaches); pass; conditional pass; or fail. If a student obtains a conditional pass or fails the exam, they will be allowed to retake some portion of/or the entire exam within 3 months. Based upon the student's performance, the examining committee will recommend one of the following:

A: Pass unconditionally.

B: Pass conditionally, with more extensive written answers to the question(s) required, or the presentation of a different article. Answers to questions must be submitted within two weeks. The student will then meet again with the Exam Committee to defend his/her answers or present the new article.

C: Pass conditionally, with further coursework, or comparable training

experience (e.g., course TA-ship), required in one or more areas. Performance in this requirement(s) will be monitored and evaluated by the Program Committee and, if poor, the student may be asked to re-perform the requirement(s).

D: Fail, with the recommendation that the student retake the examination within the quarter.

E: Fail, with the recommendation that the student leave the program (if this is a retake of the examination).

B. Thesis Proposal/Qualifying Exam

The student should submit the names of the potential committee members (see page 19 for Thesis Committee Composition) with a one page description of the intended research project to the Cluster Administrative Office for approval by the Program Committee. The student can then contact the individual faculty members and ask if they are willing to serve. Once a thesis committee is constituted, its composition can be changed only by petitioning the Program Committee. Such changes may be necessitated by differing circumstances, including a shift in experimental focus of the candidate or unavailability of a faculty member.

The student should write a thesis proposal for his/her first Committee meeting discussing the envisioned specific aims of the anticipated research project. The written proposal should be submitted to all the members of the thesis committee and the Cluster office at least one week before the first Committee meeting and should be modeled after an NIH grant application. Thus it should consist of Specific Aims (less than or equal to one page), Background and Significance (2-3 pages), Experimental Methods and a description of the experimental approaches (no more than 8 pages), and Literature Cited. The written thesis proposal does not require extensive preliminary results although, if available, they can be used. The written thesis proposal and its oral presentation will be evaluated for the student's ability to:

- Choose an important biological question and propose a specific hypothesis that can be tested experimentally (SPECIFIC AIMS)
- Summarize critically the current literature and describe the biological significance of the question being addressed (BACKGROUND AND SIGNIFICANCE)
- Describe any preliminary results obtained that impact on the relevance or feasibility of the approach (PRELIMINARY RESULTS) - Not all proposals will contain this section)
- Describe a series of experiments taking into account possible pitfalls and therefore alternative approaches (EXPERIMENTAL METHODS).

By the autumn of the third year, the student must form their thesis committee and submit their thesis proposal (see Divisional Policy appended). Once students complete the thesis proposal, annual thesis committee meetings must take place. These and subsequent thesis committee meetings should be scheduled by the student and inform the COI cluster administrators of the confirmed date, time and location of each meeting. In the event that circumstances (e.g. delayed choice of a thesis lab) indicate a different schedule and/or the students thesis committee is unable to meet prior to this time, the student must secure permission to postpone the exam from the Program Committee. All members of the student's thesis committee must be present for the

thesis proposal. The oral presentation, in which the student's purpose, goals and methods of the proposed thesis, as well as overall grasp of the field of immunology will be evaluated by the thesis committee. Students schedule their own meetings and must inform the COI and cluster administrators of the confirmed date, time and location of each meeting.

Students are entered into candidacy for a Ph.D. once they have presented their thesis proposal and have met all the course requirements of the program.

THESIS RESEARCH

After approval of the thesis proposal, students are required to meet with their thesis committee at least once a year. Meetings are meant to facilitate and monitor progress in the project and thus can be scheduled more frequently than once per year if faculty input is sought on particular problems or choices in research direction. It is to the distinct advantage of the student to assure that the committee meeting is scheduled in a timely fashion. It is an opportunity for the student to get input from five different faculty on their project. In addition, it is an invaluable opportunity for the student to get to know their committee members and vice versa, so that there are no surprises at the final thesis defense.

If at the end of six years in graduate residence the student has not petitioned for the right to prepare the dissertation, the student will be required to petition the Program Committee for the right to continue in the Program. The student will outline the reasons why progress toward degree completion has been delayed, and the Program Committee will evaluate the student in light of the petition and student performance throughout the entire graduate career, and in consultation with the student's dissertation committee. Approval from the Program Committee will allow the student to continue in the Program.

THESIS REQUIREMENTS

Statement of Purpose

The Committee on Immunology Graduate Program exists to provide graduate education in immunology. For students at the beginning of their graduate educational experience, coursework plays a major role in the educational process. For advanced students, the development of a thesis project and the conduct of original scientific research become the major focus of the educational experience. Upon completion of the laboratory research, the thesis project culminates in the development of a detailed discourse of the project in the form of a dissertation document. In recognition of this accomplishment, a student who has advanced to candidacy by completing his/her coursework and thesis proposal, and has completed a thesis project and dissertation document is awarded a doctorate of philosophy. In order to facilitate this process, the student receives guidance from two main sources - the mentor and the thesis committee. The overall goal of this process is to provide the student training in laboratory-based scientific inquiry to an extent that the student has all of the tools necessary to pursue a scientific career as an independent investigator.

Thesis Committee Composition

Toward the end of the first year of graduate school, the student will choose a research advisor. Within 12 months of this commitment, (*no later than the fall of the 3rd year of graduate school*), COI students must formulate and present their thesis proposals. For the typical student, this should be during the spring of their 2nd year. The thesis committee is formed after the student, in consultation with his or her mentor, submits a list of appropriate faculty to the Program Committee. The thesis committee is composed of *ad hoc* members selected by the students in consultation with their mentors. Members are generally selected to provide appropriate scientific expertise relevant to the

thesis project topic. Initially, a thesis committee of five faculty members is selected. The first member is the thesis project mentor. For students supported by the Immunology Training Grant, the faculty research/thesis advisor must be one of the Immunology Training Grant faculty trainers. The second member is selected from the faculty serving on the Committee on Immunology Program Committee. The third individual is selected from faculty serving on the Committee on Immunology. The fourth and fifth individuals of the committee can be selected from the Biological Sciences Division faculty at large. Faculty members from outside the institution are permissible, though they are considered additional to the minimum number of faculty members on the committee. The chair of the thesis committee (who is not the student's mentor) will be selected by the committee members during the first committee meeting.

Thesis Committee Responsibilities

The thesis committee acts as a representative for the student, the mentor, the graduate program, the graduate school, the University and the scientific community at large, and serves three main functions. First, the thesis committee plays an important role as an advisory body to the student. Committee members provide advice concerning the content and direction of the thesis project in addition to that provided by the student's mentor. Second, the thesis committee is given primary responsibility to act on behalf of the graduate program, graduate school and University to evaluate the quality of the student's progress toward completing this aspect of his/her degree requirement. In the end, the thesis committee is responsible for determining whether the thesis project and dissertation document are acceptable for the awarding of an advanced degree. Third, under unusual circumstances, the thesis committee may be asked by either party to moderate a dispute between student and mentor as it relates to the thesis project and fulfillment of the degree requirements.

The thesis committee must meet at least once each year, or more frequently as needed, to evaluate the student's progress. The student should write a research progress summary and give it to the committee members at least 1 week before the meeting. The report should be approximately 2-4 pages in length and contain a concise summary of progress, including previous aims and outcomes as well as future goals and a time line. At the end of this meeting the chair of the committee is asked to prepare a summary of the committee meeting minutes, noting areas of progress and promise, any problem or deficiency and if the student is in position to begin to write his/her dissertation.

The summary of the minutes is sent to all committee members and to the student as well as to the Administrative Director of Graduate Programs in The Biomedical Sciences Cluster. Approval to begin writing the dissertation should only be given if the committee is satisfied with the overall quality and completeness of the experimental work.

Students who wish to discuss additional issues, such as issues related to mentorship, should request a private meeting with their thesis committee chair. Students can also discuss these issues with the Chair of the COI at any time.

The thesis committee is also required to evaluate the dissertation document and participate in a final, private oral examination of the student after the public seminar, as outlined below.

Progress Review Criteria

The decision of when a thesis project is complete is entirely up to the discretion of the thesis committee. However, the following guidelines are offered. Given that the goal of this aspect of the student's education is to prepare him/her to function as an independent scientific investigator, the student should have demonstrated certain scholarly and research skills during his/her thesis project. The student should be comfortable with developing a testable scientific hypothesis based on the current knowledge in the field. The student should be proficient in experimental design and execution and have demonstrated the ability to perform definitive experiments in an independent manner. The student should have demonstrated an ability to accurately interpret experimental data from a variety of techniques and model systems, including an understanding of the limitations of each experiment and technique. The student should have also demonstrated an ability to build on experimental findings by developing new hypotheses and experiments to test them. All of this should, of course, be done under the guidance of the mentor who should take an active part in this aspect of the student's training.

It is expected that the thesis project should result in data that can be submitted for publication. Given that a strong publication record is important to obtain subsequent positions in biomedical career paths, it is anticipated that a student should have *at least* one first-author peer-reviewed publication as a result of his/her graduate school laboratory work. Indeed, the ability to prepare a manuscript for submission to a peer-reviewed journal is considered an important aspect of the educational training necessary for receiving an advanced degree in biomedical sciences. Therefore, it is expected that, whenever possible, each student has been the primary author of a manuscript submitted for publication as part of his/her work.

Dissertation Document

Each student is responsible for the preparation of a written detailed discourse describing his/her thesis project in the form of a dissertation. The dissertation is written upon completion of the majority of the experimental work and approval by the thesis committee. The preparation of the dissertation document should also be considered an educational experience in which the mentor and the student extensively discuss the format and contents of the document and the philosophy of the process, and review drafts of the document during its preparation. The format should follow the guidelines posted on the Ph.D. Dissertation Office Website <http://www.lib.uchicago.edu/e/phd/>. Once the mentor agrees that the document is well written and complete, the student can submit the dissertation to the other thesis committee members. The mentor should indicate his/her acceptance of the document by signing and dating the cover page. By signing the cover page, the mentor indicates that he/she and the student have reviewed the dissertation document and view it to be complete.

Once the dissertation has been submitted to the thesis committee, each member has two weeks to review the document and transmit any comments concerning major deficiencies to the student. The student is expected to prepare a revised version of the dissertation addressing these deficiencies (usually within a two week period). The revised

version of the dissertation document must be returned to the thesis committee members no later than one week before the oral defense date. The revisions that have been made should be highlighted in some way, either by the use of a different font or type style, or with vertical lines in the page margins.

It is recognized that each thesis project, and therefore each dissertation, will be different. As such, no specific requirements should be instituted for its length or content. However, the following guidelines are offered. The student is encouraged to review selected dissertations in the program office for examples of format, content and quality.

- a. The total length of the document should be 125 - 250 pages (including figures; excluding references), in order to provide the level of detail expected of a document of this nature.
- b. The Introduction should be 20 - 40 pages long. It should contain a focused description of the background to the thesis problem, not a comprehensive review of immunology.
- c. The Materials and Methods section should be 20 - 60 pages long. It should describe the details of ALL experiments used, even those that have been published elsewhere. This section should be able to serve as a useful laboratory resource for future generations of investigators in the research group.
- d. The Results section should be 60 - 100 pages long, including figures and tables. In general, the figures and tables should occupy 1/2 - 1 page each. Figures should be shown in the written thesis for all results mentioned as "data not shown" in publications by the student. Figures should be original or published by the author. Figures from review articles authored by others are not acceptable because of copyright restrictions, as the thesis dissertation is a public document. If published figures not generated by the student must be used, the student must obtain written permission from the publisher. The numbers of figures and tables relative to text in the Results section should be determined by the mentor and the student.
- e. The Discussion section should be 25 - 50 pages long. This section should be a scholarly discourse that puts the thesis work in the context of the relevant fields of immunology. Related work of others, and differences in experimental outcome or interpretation should be addressed. The student should clearly indicate what is new or unique about his/her work and how it contributes to the field. The quality of the Introduction and Discussion sections should be such that they could form the core of a review article good enough for publication in a peer-reviewed journal.

Some students may elect to prepare the Results Section as chapters that are directly from their submitted or published manuscripts. These chapters may contain the submitted/published introduction, results, and discussion. However, the Materials and Methods for published papers are generally not sufficient for a thesis, and thus a more thorough version should be included in the overall Materials and Methods section

(described in section c above) of the thesis instead of in the individual chapters. Furthermore, in addition to the Materials and Methods section, the student is still required to write an overall Introduction and Discussion as described in sections b and e above.

For information on University-wide requirements, please visit the Dissertation Office's website:

<http://www.lib.uchicago.edu/e/phd/>

Thesis Defense

The thesis defense is composed of two parts. The first part is a public presentation of the thesis project in which the student presents his/her work orally before an audience of peers and answers questions relevant to the project. The seminar should be prepared and rehearsed with the mentor's guidance. The student should avoid complicated slides and focus the presentation on objectives, approaches and interpretation of results. Acknowledgments should be limited to less than 5 minutes at the end of the presentation. The second part is a private defense by the student of both the thesis project and the dissertation document in front of the *ad hoc* thesis committee. Since this is the last opportunity the committee has to ensure the quality of our graduates, the private defense will continue until each member is satisfied with the student's performance or until the committee decides that the student has failed the defense examination. Even though the committee may feel comfortable that the student has passed the examination and will complete an acceptable dissertation document, no committee member should sign the completion form until he/she is completely satisfied with the revised version of the thesis document in hand.

Each student is responsible for scheduling his or her own Thesis Defense. Once the student has a date and time, he or she should notify the Cluster Office. A student can schedule a date for the defense at the time that the initial version of the dissertation document is submitted to all thesis committee members, to be set no earlier than four weeks after the reception of the dissertation by the committee members.

It should be noted that the thesis requirement is not considered fulfilled until the student has submitted the Dissertation electronically and received confirmation from the Dissertation Office that it is complete. Since the thesis requirement is necessary for the awarding of the Ph.D. degree, a student has not fulfilled the degree requirements until the thesis has been formally submitted. Individuals cannot be hired as postdoctoral fellows without satisfying all Ph.D. requirements.

As a courtesy, the student should provide members of his/her committee with a final bound copy of the thesis, unless the committee member indicates otherwise.

A few deadlines to keep in mind:

- a) You must apply to graduate by the first week of the quarter in which you plan to graduate.
- b) You must be registered and paying tuition during the quarter that your degree is awarded. Thus, if you miss the deadline for submission of the dissertation,

your graduation will be delayed until the following quarter and the University will charge tuition, even if you have left for another position.

- c) The deadline for submission of the approved thesis and all necessary documents is the Friday, 3 weeks before convocation for that quarter. The exact dates can be seen at the web site mentioned below.
- d) All Dissertations must be submitted electronically. Please visit this website for detailed instructions: lib.uchicago.edu/e/phd/.

Graduation

Once the student knows that he/she is ready to begin writing the dissertation and plans to graduate, the student should notify the Cluster Office immediately. The student will also need to register for the degree on cMore no later than the first week of the quarter in which he/she plans to graduate. This is a hard deadline and the Registrar's office will not grant an exception if it is missed.

The Dissertation Office (<http://www.lib.uchicago.edu/e/phd/>) is the best source of information regarding your thesis and the graduation process. Dissertations are submitted online through the ETD website, and you must sign up for an account through the dissertation office website. Classes reviewing the ETD site and the submission process are available the 2nd or 3rd week of each quarter – please sign up at <https://training.uchicago.edu>. The training is not a requirement but is only a half hour and will reduce stress later in the quarter. Once you register for graduation, the Dissertation Office will be in contact with you throughout the quarter in which graduation is expected regarding deadlines and requirements. The final submission of your dissertation on the ETD site is generally 4-5 weeks prior to the end of the quarter, but they will accept draft submissions prior to the deadline to ensure that all formatting issues are addressed. This is also a good service to utilize to ensure that the final submission goes smoothly, as the dissertation format is required to be identical to the university's uniform standards before being accepted as a final submission. It is good practice to give yourself at least 2 weeks between your defense and the final dissertation submission to make any changes required by your thesis committee (this puts the defense at least 7 weeks prior to the end of the quarter in which you are graduating).

After you notify the Cluster Office and register for graduation on cMore, you will need to schedule your defense date. If you are not able to schedule a room, the Cluster Office can assist you with this. The Cluster Office will send an announcement out once we receive all of your defense information.

All members of your committee must receive a copy of your thesis at least 1 week before your defense date and all members must be present during your defense. The Cluster Office will provide your student file to the chair of your committee with the official report of final exam that will be submitted to the Registrar's Office. The first part of your talk is open to the public. After your talk, your committee will discuss your thesis and have you make any changes that are needed. This discussion is not open to the public.

After your committee has signed off on your defense and any required changes to the thesis have been made, you should submit this on the ETD site. The Cluster Office will be notified when this is complete, and we will ensure that your program chair receives a

copy of the thesis to review and signs off on the Departmental Approval Form that is submitted to the Dissertation Office as final approval. This is the final step in completing the graduation requirements.

Information regarding convocation can be found here: convocation.uchicago.edu

SPECIAL GUIDELINES FOR MSTP AND MD/PhD STUDENTS

MSTP students

Students admitted upon matriculation into the combined degree Medical Scientist Training Program (MSTP) receive their degrees from the Interdisciplinary Scientist Training Program (ISTP). As part of the ISTP, students may choose to specialize in Immunology, and thereby become a de facto student of the COI graduate program. ISTP students who want to specialize in Immunology, should inform both the Associate Director of the MSTP for Curriculum and the Chair of the COI of their intention.

To complete the requirement of 9 graduate courses for a PhD, ISTP students specializing in Immunology will take 3 COI specialization courses and 2 electives, as well as the ISTP first year journal club. Three medical school courses will count toward the PhD. The elective courses must be approved by the ISTP curriculum committee and the chair of the COI. MSTP/ISTP students will participate in the COI Intro to Experimental Immunology journal club course for one year instead of two. They will attend during the GS2 year (the first year of thesis research).

MSTP/ISTP students are required to take the preliminary exam before they enter their thesis lab full time. For those who initiate their research component between the first and second year of Medical School, the prelim should be taken at the end of the first year. For MSTP/ISTP students who enter labs after their second year of medical school, the preliminary exam can be taken either after the first year or after the second year of medical school.

It is expected that MSTP students will complete two rotations and two TAs.

The thesis proposal should be presented after the student has been in the lab full-time for 2 quarters, ideally the end of the Winter quarter. Thereafter, thesis committee meetings should occur every 6 to 9 months as required by the ISTP program.

All other requirements are as described for PhD students including participation and presenting in COI Journal Club and Work in Progress.

MD/PhD students

Students who decide to pursue a PhD after matriculating into medical school (i.e. through the Pediatric Growth and Development Training Program) need to formally apply to the COI graduate program. They should be prepared to meet the deadlines associated with the annual PhD application and review process. Specific information for applying should be obtained from the Biomedical Sciences Cluster office. If these students are admitted to the program, they will meet with the Program Committee to work out a specific academic program to integrate them into the graduate program.

To complete the requirement of 9 graduate courses for a PhD, the COI will consider counting up to 3 Medical School courses as electives. However, these courses must be approved by the Program Committee and must be converted to a letter grade (from the

conventional P/F grades given in medical school).

MD/PhD students are required to take the preliminary exam before they enter their thesis lab full time. For those who initiate their research component between the first and second year of medical school, the prelim should be taken at the end of first year. For MD/PhD students who enter labs after their second year of medical school, the preliminary exam can be taken either after the first year or after the second year of medical school.

It is expected that MD/PhD students will complete two rotations and two TAs.

The thesis proposal should be presented after the student has been in the lab full time for about 3 - 4 quarters, either Spring/Summer of the second year in the combined program (for students who break after the first year of med school) or Spring/Summer of the third year for students who break after the second year of med school.

All other requirements are as described for PhD students.

REQUIREMENTS FOR THE MASTER OF SCIENCE DEGREE

The Committee on Immunology admits students to the graduate program who intend to acquire a PhD degree. Occasionally, students who do not meet the requirements for a PhD Degree may be granted instead a terminal Masters Degree. The requirements for this degree are as follows:

1. A student must have completed all of their course requirements (9 formal courses including Immunology Core Curriculum). At least a B average must have been achieved in formal courses. A/B or better must have been received in Committee on Immunology courses.
2. The student should have completed and received a B, or better on two laboratory rotations.
3. The student should have taken the Immunology Preliminary Exam and received a High Pass or Pass.
4. In either case, the student must petition the COI Program committee to become a candidate for a Masters Degree. This petition must include the student's CV, summary of courses taken, and a concise 1-2 page description of the thesis project. This petition, as well as the students overall record in graduate school will be evaluated by the Program committee and if passed, a thesis committee will be formulated and a date for defense chosen.
5. The student must orally defend their proposal or research and demonstrate competence in Immunology to receive a Masters Degree. For those students who already have completed their thesis proposal, their previously approved and assembled thesis committee will examine the student. For those students who have chosen to pursue a Masters degree without passing a thesis proposal, the oral defense of their research will be examined by a thesis committee chosen with consultation with the Program Committee.

REGISTRATION

General Information

About one week before the dates designated for registration, the Cluster Administrator will email the students informing them of the days and times when they should register.

First year students will meet with the Committee Chair and the Cluster Administrator to discuss procedures during Orientation Week.

Leave of Absence

During Scholastic and Research Residence a student may, if necessary, apply for a Leave of Absence from the PhD program to be approved by the Committee Chair. A Leave of Absence may only be taken for a maximum of 6 months.

Pro-Forma Registration

Students in Advanced Residence, whose dissertation research requires residence away from Chicago, may register pro-forma. It provides registration as a full-time student with reduced tuition. Pro-forma status establishes a good faith relationship between the student and the University. The following regulations apply:

- a) Pro-forma registration is approved for only one academic year at a time.
- b) Applications for pro-forma registration must be approved in writing by the Program Chair. The Chair's signature confirms that the student will be working at another institution 100+ miles away from the University of Chicago and that the work is recognized as essential to the dissertation. Students applying for pro-forma status must have been admitted into candidacy and have had dissertation topics approved. For students on the Graduate Residence Track, pro-forma status will normally begin only after completion of Scholastic Residence.
- c) An applicant for renewal of pro-forma status must show the Program Chair that good use has been made of the time already spent "on location" and that additional time is essential to completing the original task. Renewals of pro-forma status must be approved by the Dean of Students.
- d) A student on pro-forma status may not be gainfully employed for more than 19 hours per week.
- e) Pro-forma students may not use the facilities of the University or the time of its faculty, except for progress reports that may be required by the students' departments.
- f) A copy of the approved applications must be filed with the Registrar.
- g) The Registrar will certify that a pro-forma student is duly registered at the University to any agency requiring such certification.
- h) The fact that a registration is pro-forma will be noted on the student's academic record.
- i) Pro-forma registrations do not count toward satisfying a student's residence requirements toward a degree.
- j) Students must have satisfied all course requirements, including Scientific Ethics

and completed TAships.

FINANCIAL AID

All students registered in the PhD program are provided with adequate financial aid. **Financial aid is guaranteed to all incoming students, subject to satisfactory academic performance.** Support for subsequent years of study is subject to the student's satisfactory research progress, as determined by the faculty sponsor, the Committee, and the Division of Biological Sciences.

Sources of Support

Students receive tuition, payment of fees, plus a stipend. The various sources of support are:

- Training grants
- External fellowships
- University fellowships
- Research assistantships

Payment of Stipend Checks

University fellowships and NIH checks are paid in equal quarterly installments at the beginning of each quarter and cover the calendar year. Taxes are owed on, but not deducted from, these stipend checks (see section on "Taxes" below).

Advanced students are generally paid from their advisors' funds under the title "Research Assistant Type B" (RA-Type B). RA-Type B students are paid on a monthly basis on the last working day of each month. Taxes will be deducted from the RA-Type B checks.

University fellowships and NIH training grants pay for student health insurance, fees, and tuition without the student having to make separate payments.

Health Insurance and fees are included in RA-Type B monthly stipends. Students should complete a payroll deduction form so their student health insurance and fees are automatically deducted from their monthly check. Not completing a payroll deduction form will require the student to pay for these costs, upfront and in full, prior to the start of each quarter. The Cluster Office and Office of Graduate Affairs will be in contact with students who need to complete this form in advance of the deadline.

Quarterly stipends are paid on the first day of the quarter for that quarter. Monthly stipends are paid on the last working day of the month, after you have worked the entire month. *****When transitioning from quarterly to monthly, the last quarterly check (the one would be accustomed to budgeting for three months) must last four months. It is highly suggested that each month, while being paid quarterly, a small amount be set aside in a savings account to help during the transition month to monthly payroll.***** If this becomes a problem, see the section "Loans" below.

If you have any questions about your stipend checks, please contact Emily Traw.

Taxes

Graduate student quarterly stipends are taxable by the State of Illinois and the Federal governments. Though taxes are not taken out of these checks when they are paid out to the student, students on training grant or fellowship support must file taxes and calculate and pay estimated quarterly taxes. IRS form 520 provides information on determining what portion of your stipend is taxable and how and when to pay taxes you owe. The forms are available from the IRS. Regenstein Library also carries tax forms (Reserve room, First Floor), particularly after January 1. The forms can also be found on-line.

Loans

For information on the various types of loans that are available to graduate students, you should consult the Student Loan Administration Office (970 East 58th Street, Room 411, 702-6061 – sla.uchicago.edu). This office can provide short-term loans during temporary financial crises (for example, if a stipend check is delayed or if you are transferring from a fellowship to an assistantship). The office also has up-to-date information on federally-sponsored student loan plans. The Department email is: student-loans@uchicago.edu

Loan applications, for eligible students, are available at sla.uchicago.edu, and are processed through the Student Loan Administration Office.

Educational Supplies

First year students have a small annual allowance for books and supplies. Requests for supplies are handled by the Cluster Administrator or training grant administrator, depending on the student's source of funding. In general, costs of research supplies and equipment are covered by grants or contracts held by the faculty member in whose laboratory you are working.

Travel to Scientific Meetings

Attendance at scientific meetings is an important part of the educational process. Travel funds are normally available on training grants, and are distributed by the Training Grant Administrator. In general, funds are only given to students scheduled to present a paper or a poster at the meeting.

Should you wish to apply for such support, you should submit a formal request (with your advisor's approval) in writing to the grant administrator supplying the following information: purpose of meeting and relevance to the research; title, place and time of the meeting; (if applicable) title and authors of paper being presented; amount requested for travel, registration fees, food, and lodging.

There is a BSD Travel Award available to current students. Travel Awards are given twice a year, once in fall and once in spring, for travel within that calendar year. More information and the application can be found:

gradprograms.bsd.uchicago.edu/current_students/travel_awards.html

All travel reimbursements must be accompanied by a tax exempt form that you can get from the Cluster Office. This form must be signed by your PI or program chair and submitted with your travel expenses; if it is not, you will be required to pay taxes on your

travel reimbursement.

MISCELLANEOUS CAMPUS INFORMATION

Scientific Integrity and Ethical Conduct of Research

The University offers an annual course encompassing formal seminars by faculty lecturers in areas pertaining to proper handling/reporting of scientific data and ethical considerations in research. The University of Chicago requires that all predoctoral and postdoctoral trainees, clinical researchers, and junior faculty attend the program on the responsible conduct of research. Different aspects of scientific ethics are covered each week, each led by one-two faculty members. The format varies, including faculty presentations followed by group discussions, faculty presentations with question and answer periods within the presentation time, or case study discussion. The attendees are required to complete two written assignments based on video vignettes from AAAS and written case studies, and to make small-group presentations to the rest of the class.

Seminars

In addition to formal courses and seminars, there are many regularly scheduled research seminars that will help to keep students up-to-date on new developments in your field of research and related disciplines.

Students are required to attend their programs seminars, in addition to the Journal Club and Student Research Presentation, as well as any seminars funded by applicable training grants. First years shall also attend the weekly “All Stars” Course, which will allow Cluster faculty to present their research to the students. Schedules are provided by the Biomedical Sciences Cluster Office and can be found in a daily email called MyBSD: birenheide.com/uchicago/events/allevnts.php. Please sign up for the daily eBlast, as many Cluster Events are advertised this way: lists.uchicago.edu/web/info/mybsd. Other event notices will be sent to your UChicago email address.

Other seminar series or events of interest can be found posted around campus and via the MyBSD daily eBlast:

*If you have not receiving MyBSD emails, please visit this link:

pondside.uchicago.edu/~feder/myBSDHelp.htm

or

lists.uchicago.edu/web/info/mybsd

View all current event listings: birenheide.com/uchicago/events/allevnts.php

THE GORDON CENTER FOR INTEGRATIVE SCIENCE (GCIS)

This interdivisional research facility encompasses 420,000 square feet providing offices and laboratories for approximately 100 faculty (929 East 57th Street). The GCIS houses BSD departments including the Ben May Department for Cancer Research, the Department of Biochemistry and Molecular Biology, and the Howard Hughes Medical Institute. Physical Science Department (PSD) includes the Institute of Biophysical

Dynamics, the Materials Research Science and Engineering Center, the James Franck Institute and the Chemistry Department.

THE BIOLOGICAL SCIENCES LEARNING CENTER (BSLC) AND JULES KNAPP MEDICAL RESEARCH BUILDING (JFK)

The Biological Sciences Learning Center and Jules F. Knapp Medical Research Building is located at 924 East 57th Street, across from the GCIS Building Atrium Entrances. The Learning Center (south half of the building) provides classrooms for undergraduate, graduate, and medical programs. In addition the Office of Graduate and Postdoctoral Affairs (OGPA) and Office of Medical Education (OME) for the Division of Biological Sciences are located in the Learning Center. The Knapp Building (JFK - north half of the building) houses laboratories, research facilities and faculty offices in the areas of molecular cardiology, immunology, oncology, and neurobiology.

THE GWEN AND JULES KNAPP CENTER FOR BIOMEDICAL DISCOVERY BUILDING (KCBD)

The Gwen and Jules Knapp Center for Biomedical Discovery Building is located next to the BSLC & JFK Buildings (900 East 57th Street). The Center includes the Ludwig Center for Metastasis Research; Beverly Duchossois Cancer Laboratories; Kovler Diabetes Center; Institute for Genomics and Systems Biology; and researchers from the Department of Pediatrics; Department of Biochemistry and Molecular Biology; and Department of Medicine's Gastroenterology, Endocrinology, and Hematology/Oncology Sections.

LIBRARIES

The John Crerar Library, 5738 South Ellis Avenue, 702-7715, combines the University collections in biological sciences, medicine, and the physical sciences. Users with valid University of Chicago ID's or Library cards have access to all floors and stack areas during all library hours. Present your Chicago Card I.D. to the attendant at the front door. The library is adjacent to the Cummings Life Science Center and is connected by tunnels to Cummings, and the Medical Center.

The first floor of Crerar contains the major service units. The Circulation Desk (2-7409) is located to the left of the entrance atrium. Reserve materials for all science courses except math, computer science, and statistics are held at the Circulation Desk, as well as a permanent reserve collection of current medical textbooks and very heavily used science periodicals. The Science Reference Department (2-7715) is located to the right of the entrance atrium, together with the science microforms. The Library subscribes to an extensive collection of electronic journals and several online databases.

For library hours and other info: lib.uchicago.edu

Bursar's Office

The Bursar's Office, located in the University Bookstore Building, 970 E. 58th Street, 3rd Floor (Hours: Monday through Friday, 9:00 am to 4:00 pm).

Information can be found at: bursar.uchicago.edu

Main Phone Number	2-8000
Tuition Inquiries & Bursar Restrictions	2-7086

University Ticket Center

The University Ticket Center, located in the Reynolds Club, sells tickets to most campus events including Major Activities Board concerts, Rockefeller Chapel productions, Music Department concerts, and Summer Nights productions.

Student Care Center

Please refer to documentation distributed during University and Divisional orientation. The website is: healthcare.uchicago.edu

Computing Facilities

Academic and Public Computing runs computing facilities in Regenstein and Crerar libraries, as well as the USITE (Central Users' Site) at Harper Library (WB 310; 2-7894). The facilities provide access to a variety of computing equipment, including IBM PS/2, a variety of Macintosh and NeXT workstations, and they also supply manuals and documentation. Students may apply for personal computing accounts in the Academic and Public Computing Office (Culver Hall, 2-7167). The USITE provides information about microcomputing and other microcomputing sites on campus. While the computing facilities in Regenstein and Crerar are not staffed, telephone assistance is available by calling the USITE (2-7894) from telephones in the facilities.

Much of the communication between students and faculty alike is via email. It is imperative that all Program students establish email accounts and sign-on to those accounts regularly (at least once a day). Email accounts can be set up at the Academic and Public Computing office on the first floor of Culver Hall.

Photocopying

Photocopying machines are located in all libraries. The University of Chicago library contracts for basic copier services with Copico. Copico maintains a service desk on the first floor of the Regenstein Library, near the lobby phones. You may purchase a copy card from machines on the first floor of Regenstein, in Crerar, in Harper, or in the D'Angelo Law Library. You may also choose to add cash value to the magnetic strip on the back of your student ID card at any of the centers located around campus. This money can be used for photocopying or the purchase of snacks or drinks at machines located around campus and the food courts. In addition, Kinko's is located at 1319 East 57th Street 773-643-2424.

Lost and Found

The Office of the Registrar (Administration 103, 2-7891) serves as a collection point for items found in the University's academic buildings and quadrangles. For items found in the University Medical Center, the Office of Medical Center Security (Room AMB M-12, 2-1583 or Security Dispatch AMB M41, 2-6262) serves as the collection point.

TRANSPORTATION

Campus Bus

The Office of Transportation and Parking for Facilities Services coordinates with the Office

of Community Affairs and works closely with the Aldermen's offices, the City of Chicago, and the Chicago Transit Authority (CTA). The campus bus service is comprised the #170 Midway, #171 Hyde Park, #172 Kenwood routes.

For Transportation information, please visit:
safety-security.uchicago.edu/transportation

Students ride the #170, 171, and 172 free with a UCID. Regular CTA fares apply for the other bus routes. Passes can be purchased at the Chicago Card Office in the Regenstein Library, Room 100F, Monday-Friday, 8:30 am-5:00 pm or by visiting transitchicago.com or calling 1-888- YOUR-CTA.

The University also operates a free Evening Bus Service that covers the Hyde Park-Kenwood neighborhood. The buses operate on 30-minute schedules between 6:00 pm until about 1:00 am Sunday through Thursday, and until 2:00 am on Friday and Saturday. They depart from in front of the Regenstein Library and from the Main Quadrangle. The schedule changes during University breaks and Summer Quarter. Maps and other information can be found at:
safety-security.uchicago.edu/transportation

Route maps and schedules for all buses are available at the UC Office of Graduate Affairs, Reynolds Club Information Desk, University Bookstore, Regenstein Library Reference Desk, and Law School Reception Desk and online.

Ugo NightRide Shuttles

The NightRide Program is a shuttle service for the entire campus community on a fixed schedule along highly used routes. The goal is to provide safe, timely and reliable transportation during late-night hours to faculty, students and staff throughout campus and the surrounding area. The program operates from 5:00 p.m. to 4:00 a.m. on Sunday through Wednesday, and 5:00 p.m. to 6:00 a.m. on Thursday, Friday and Saturday.

This service will run approximately every 20-30 minutes throughout the evening. The routes are accessible within 1-2 blocks of nearly every campus building; all residence halls are a designated stop, and each route operates in a forward and reverse direction. A map of the routes can be found here on the Transportation website (http://safety-security.uchicago.edu/services/ugo_nightride_shuttles/) and the TransLoc system (<http://uchicago.transloc.com/>) allows for up-to-date tracking information.

Please forward any feedback of this program to nightride@lists.uchicago.edu.

Umbrella Service

Anyone within the University Police coverage area may request a police escort at any time if they feel uncomfortable with their surroundings. Call 773-702-8181 and give your location; the first available patrol car will be dispatched to accompany you as you walk to your destination. You may also call the University Police dispatcher at 123 from any campus phone.

Website: <http://uchicago.edu/safety/resources.shtml>

Parking

The Parking unit of Transportation & Parking Services is responsible for the development and execution of approved parking policies, administration of the parking system, collection of approved fees and the enforcement of parking regulations. You may obtain an assigned parking space on campus by paying a monthly fee. Assignments for campus lots are available at the Campus Parking Office, 2-8969, located at 5525 South Ellis Avenue.

Website: <http://safety-security.uchicago.edu/transportation/>

Email: parking@uchicago.edu

RECREATION ON AND NEAR CAMPUS

General Information

Facilities

The Reynolds Club, located at 5706 S. University Ave., is the University's primary student center and is often thought of as the hub of student life. The building offers a variety of dining options, as well as performance spaces and meeting rooms to be reserved for students free of charge.

Also located in the building:

The Reynolds Club is home to *Hutchinson Commons*, a food facility serving a plethora of food options, including pizza, Indian cuisine, sandwiches, sushi, and more. The building also houses two coffee shops: *The C-Shop*, where you can get milkshakes for \$1 on Wednesdays, and *Hallowed Grounds*, the student run coffee shop on the second floor.

Website for Coffee Shops: <http://studentactivities.uchicago.edu/reynolds-club>

The University *Barbershop*, located in the basement of the Reynolds Club has been known for its precise, quick haircuts at the hands of Silvestre and Mitch for 35 years. Stop by between 8am and 6pm to indulge in a quick trim.

Website for Barbershop: <http://studentactivities.uchicago.edu/reynolds-club>

WHPK, the University's legendary radio station, is located in the Bell Tower of the Reynolds Club. WHPK, "The Pride of the South Side", has been broadcasting to Hyde Park and the South Side of Chicago for over 50 years and is dedicated to playing non-mainstream music and providing a voice to the community and local politicians about local and global concerns. WHPK Website: whpk.org

University Theater, located on the 1st and 3rd floors of the Reynolds Club, is the oldest running College Theater program in the country. Since its inception in 1898 University Theater has been responsible for the production of over 3,000 productions ranging from main stages in our two theater spaces to site specific productions in Hutchinson Quad.

Website for University Theater: taps.uchicago.edu

Ida Noyes Hall, located at 1212 E. 59th Street, is an 82,000 square foot facility originally designed to be a women's gymnasium and social center at the University of Chicago. Over the years, the facility has undergone modest changes and has hosted many events, large and small, for the University community. The central goal of Ida Noyes Hall is to provide facilities and services to student organizations and university departments.

Ida Noyes Hall is also home to Career Advising and Planning Services (CAPS)*, which is located on the 2nd and 3rd floors of the building, the Maroon* (located in the Lower Level), and The Pub* (also located in the Lower Level). Each year, Ida Noyes Hall hosts a variety of RSO activities, department events, corporate recruiting sessions, parties, and special events.

The Ida Noyes gymnasium was converted into Max Palevsky Cinema* in 1987. Since that time, Doc Films has been screening movies every night of the academic year.

Websites:

Main Portal Website for Office of the Reynolds Club & Student Activities:
studentactivities.uchicago.edu

UChicagoGrad: grad.uchicago.edu

CAPS: careeradvancement.uchicago.edu

Maroon: maroon.uchicago.edu or chicagomaroon.com

The Pub: studentactivities.uchicago.edu/orcsas-pub

Doc Films: docfilms.uchicago.edu/dev/

Dining: dining.uchicago.edu

Your University of Chicago Connections

Quick Links List:	uchicago.edu/quicklinks
UChicago Home:	uchicago.edu
About UChicago:	uchicago.edu/about
UChicago Chronicle:	chronicle.uchicago.edu
Maroon Athletics:	athletics.uchicago.edu
The UChicago Maroon:	chicagomaroon.com
The University of Chicago Magazine:	mag.uchicago.edu
University News Service:	news.uchicago.edu

Chicago

Chicago is a fantastic city for music, theatre, and dining out. The Chicago Symphony, the Lyric Opera, Music of the Baroque, jazz, and blues clubs, the Goodman Theatre, and off-loop theatres are all excellent. Both inexpensive ethnic restaurants and expensive special-occasion restaurants abound.

Information on events in Chicago is plentiful, particularly on the internet (see below). One of the best sources is the monthly *Chicago Magazine*, available at most newsstands. *Chicago Magazine* rates restaurants, compiles a complete calendar for the coming month, and generally includes a feature or two on getting the most out of the city. The Friday and Sunday *Sun-Times* and *Tribune* have good sections on the week's events. In addition, the *Reader*, available free in the Reynolds Club, the Bookstore, and Regenstein Library (delivered Thursday night or Friday morning), has the best information on music, movies, dance and shows.

Chicago on the Web

City of Chicago: cityofchicago.org

Centerstage Chicago (music, food, bars, film, theater, etc.): chicago.com

Metra Train Schedules: metrarail.com

Festivals and Exhibits

Ravinia Music Festival - all summer long, a wide variety of music: ravinia.org

Chicago Symphony Orchestra, jazz, country and more in a beautiful outdoor park: cso.org

57th Street Art Fair - First weekend in June. 57th Street & Kimbark Avenue:

57thstreetartfair.org

Old Town Art Fair - Mid June. 1800 block of Orleans Street and Lincoln Park West and adjacent Menomonee, North Park and Wisconsin Streets: oldtowntriangle.com

Chicago Blues Festival – Typically held the 2nd weekend in June in Grant Park - Petrillo Music Shell. World famous blues sounds of "Sweet Home Chicago" as well as showcasing talent from coast to coast. Call the Mayor's Office of Special Events for more information, 312-744-3315 or visit: chicagofestivals.net/music/blues-2/blues

The Japan Festival - A month-long series of unique Japanese cultural and educational events, including contemporary theater and film, concerts and exhibits. Visit: japanfest-chicago.org

Chicago Gospel Festival - At Millennium Park in June. World's largest free outdoor gospel festival. Call the Mayor's Office of Special Events for more information, 312-744-3315 or visit: www.choosechicago.com/things-to-do/chicago-events/chicago-gospel-music-festival

Printer's Row Book Fair- On South Dearborn from Congress to Polk, in June. Old, new, rare, antique and special books are for sale by booksellers in historic Printer's Row. Food vendors from Burnham Park's restaurants. Sponsored by the Chicago Tribune, 312-222-3986 or visit: chicagotribune.com/entertainment/books/printersrowlitfest

Grant Park Concerts – June through August at Petrillo Music Shell. America's largest free Symphonic Music Festival featuring international soloists and conductors with the Grant Park Symphony Orchestra and Chorus. Call Grant Park Music Festival Offices for more info, 312-742-7638 or visit: grantparkmusicfestival.com

Taste of Chicago - Held the last week of June and first week of July in Grant Park. Over 75 restaurants participate; there are nightly concerts at Petrillo Music Shell and live broadcasts from major radio stations. Call the Mayor's Office of Special Events for more information, 312-744-3315 or visit: cityofchicago.org/city/en/depts/dca/supp_info/taste_of_chicago.html

Air and Water Show - Spectacular entertainment in the air and on the water at the North Avenue Beach in August. Sponsored by the Chicago Park District, 312-294-2200 or visit: cityofchicago.org/city/en/depts/dca/supp_info/chicago_air_and_watershow.html

Buckingham Fountain - The fountain runs from 8am to 11pm daily, typically from April to mid-October, depending on the weather. Every hour on the hour for 20 minutes the fountain produces a major water display. The center jet shoots 150feet in the air. At dusk, lights and music are added to the display. Located on Congress and Lake Shore Drive. History and fact can be found at: chicagoparkdistrict.com/parks/clarence-f-buckingham-memorial-fountain

Chicago Jazz Festival - Labor Day weekend in Grant Park. This event highlights Chicago's rich jazz tradition. Sponsored by the Mayor's Office of Special Events:

cityofchicago.org/city/en/depts/dca/supp_info/chicago_jazz_festival.html

Oktoberfest - Usually late in September on Lincoln Avenue. Bands from Heidelberg and Chicago entertain daily; traditional German food and beer is served under giant tents. Information is posted at: chicagoevents.com/event.cfm?eid=222

Chicago International Film Festival - The end of October at various Chicago theaters. This event features films from 40 countries. Online at chicagofilmfestival.com

Other Chicago Event and Location information: choosechicago.com

City Pass - Chicago CityPASS is a booklet of admission tickets to Chicago's 5 must-see attractions at 50% off the combined admission price: citypass.com/chicago/things-to-do-chicago

APPENDIX



Biological Sciences Division policy requirements for admission to candidacy to the Ph.D. and for the Ph.D. degree

1. Admission to candidacy for the degree of Ph.D. requires:
 - (a) Completion of Divisional Course requirements (nine courses, up to two of which may be substituted by graded laboratory rotations). A “B” average (GPA =3.0) must be maintained.
 - (b) Submission of a written thesis proposal and its defense to the satisfaction of the candidate’s thesis committee (note in some programs this defense also has a public component).
2. Admission to candidacy must occur, or be scheduled to occur, before the end of the student’s **ninth** quarter in residency (typically the Fall quarter of the 3rd year).
3. If admission to candidacy has not occurred by the end of the student’s ninth quarter then he/she will be unable to register at the beginning of the tenth quarter unless OGPA has approved a detailed plan from the program, student, and thesis advisor in which:
 - (a) The program adequately explains why candidacy has not yet been achieved.
 - (b) The student lays out a detailed plan for completion of the thesis proposal, with a timeline that does not extend beyond the end of their **eleventh** quarter in residency
 - (c) The thesis advisor provides a detailed plan, which includes frequency and nature of mentoring meetings, to assist the student in satisfactorily completing and defending the thesis proposal
4. Completion of the Ph.D. degree additionally requires:
 - (a) Completion of Divisional TA-ship requirements
 - (b) Completion of Divisional Ethics training requirements
 - (c) Completion of all graduate program-specific requirements.
 - (d) Submission and oral defense, to the satisfaction of the student’s thesis committee and graduate program, of an original dissertation