



MCDB&G
Molecular, Cellular, Developmental Biology and Genetics

Graduate Program Handbook - 2006

THE UNIVERSITY OF MINNESOTA

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The information in this handbook and other University catalogs, publications, or announcements is subject to change without notice. University offices can provide current information about possible changes. The information in this handbook is available in other formats upon request.

STUDENT ACADEMIC CONDUCT

Every student is expected to act responsibly and honestly in all aspects of his/her graduate education. These responsibilities extend to both course work and laboratory research. Misconduct such as failing to work independently in examinations or falsifying research data is not acceptable in any academic community.

Egregious misconduct is considered sufficient grounds for the assignment of a failing grade in a course or dismissal from the graduate program. Several examples of academic misconduct are given below:

- *Copying answers from another student's examination paper during a closed book examination.*
- *Consulting lecture notes, the textbook, or a summary of important notes to oneself (a crib sheet) while writing a closed-book examination.*
- *Copying answers from another student's examination paper for a take-home examination.*
- *Collaborating with other students in the course of developing answers to take-home examinations through discussion of the exam questions and their answers.*
- *Permitting someone else to read and/or copy your answers to a take-home examination in order that they might better understand the question.*
- *Submitting a paper written wholly or in part by someone else to meet course requirements for a term paper or other technical writing.*
- *Failing to adequately reference sources of information or ideas used in the preparation of a term paper or other technical writing.*
- *Submitting fabricated data in place of experimentally determined results in a laboratory experiment.*
- *Selectively modifying data points so that experimental results more closely approximate the expected result.*
- *Selectively reporting only one set of data from a collection of equally valid sets of data in order to support a favored hypothesis.*

MCDB&G FACULTY AND THEIR RESEARCH 2006

Faculty	Research Description	Departmental Affiliation
Vivian Bardwell	Transcriptional regulation in cancer and sex determination	GCD
Timothy Behrens	Molecular basis of human autoimmune diseases	Medicine
Judith Berman	Yeast telomeres, chromatin and cell cycle; Candida albicans morphogenesis, cell cycle and genome organization	GCD
Susan Berry	Growth hormone responsive gene expression	GCD/Pediatrics
Robert Brambl	Function of chaperone proteins and regulation of gene expression	Plant Biology
Robert Brooker	Molecular biology of the lactose permease	GCD
Lihsia Chen	Cell adhesion, signal transduction, cytoskeleton, and C. elegans	GCD
Duncan Clarke	Yeast Cell Cycle Control.	GCD
Kathleen Conklin	Virally- and non-virally-induced tumors	GCD
Sean Conner	Clathrin-mediated endocytosis; mammalian intracellular membrane trafficking	GCD
Dana Davis	Candida albicans genetics and pathogenesis	Microbiology
Stephen Ekker	Embryonic patterning; zebrafish; Xenopus; transposons; gene discovery	GCD
Robert Elde	Opioid receptors	Neuroscience
Michael Farrar	Signal transduction and lymphocyte development	Lab Med.Pathology
Stuart Goldstein	Cell motility, especially flagellar beating	GCD
William Gray	Molecular basis of auxin-regulated growth and development; ubiquitin-mediated proteolysis	Plant Biology
Perry Hackett	Gene expression in zebrafish, transposon, human gene therapy	GCD
David Hamilton	The sperm plasma membrane	GCD
Thomas Hays	Cytoskeletal-based motility and the functions of cytoplasmic dynein	GCD
Robert Herman	Developmental genetics of C. elegans	GCD
Betsy Hirsch	Chromosome abnormalities	GCD/Lab Med.Path
Kristin Hogquist	Molecular mechanism of cell-fate determination in T cells	Lab Med.Pathology
Victoria Iwanij	Characterization of the glucagon receptor	GCD
Stephen Jameson	Development and regulation of "killer" T lymphocytes	Lab Med.Pathology
Ross Johnson	Cell communication mediated by gap junctions, assembly mechanisms and role in embryonic development	GCD
Nobuaki Kikyo	Chromatin remodeling during nuclear reprogramming	Medicine
Richard King	Genetic regulation of melanin pigmentation	GCD/Medicine
David Kirkpatrick	Recombination initiation and DNA repair during meiosis	GCD
Deanna Koepf	Cell cycle regulation, Ubiquitination and proteolysis, Genetic mechanisms of tumorigenesis and Nucleocytoplasmic trafficking	GCD
Micheal Koob	Research Interests: Neurogenetics, animal models of ataxia, RNA sense/antisense gene regulation	Lab Med. Pathology
Ryoko Kuriyama	Cell division and cell-cycle control in animal cells	GCD
Lorene Lanier	Axon guidance and growth cone motility	Neuroscience
David Largaespada	Identification and understanding of genes involved in myeloid leukemia development	GCD
Paul Lefebvre	Flagellar protein assembly in Chlamydomonas	Plant Biology
Bonnie LeRoy	Genetic Counseling	GCD
Paul Letourneau	Regulation of nerve growth cone migration	Neuroscience
Richard Linck	Molecular assembly and function of the microtubule cytoskeleton	GCD
Dennis Livingston	Preservation of genetic information	BMBB
Paul Magee	Analysis of the genome of Candida albicans	GCD

Louis Mansky	Cell and molecular biology of HIV and HTLV	Diagnostic/Biol.Sci.
Cary Mariash	Nutritional regulation of gene expression	Medicine
Paul C. Marker	Molecular control of prostate morphogenesis and cancer progression	GCD
M. David Marks	Control of cell fate and differentiation in plants	Plant Biology
James McCarthy	Molecular basis of cell adhesion	Lab Med.Pathology
R. Scott McIvor	Genes introduced into hematopoietic cells in vivo	GCD
Linda McLoon	Extraocular muscles in health and disease	Ophthalmology
Steven McLoon	Specificity in developing neuronal connections	Neuroscience
Matthew Mescher	Requirements for activating T lymphocytes	Lab Med.Pathology
Jeffrey Miller	Wnt signal transduction; cell-cell signaling; vertebrate development; cell fate determination; morphogenesis	GCD
Kathy Moser	Genetic and molecular analyses of human autoimmune diseases	Medicine
Hiroshi Nakato	Molecular and genetic analysis of Drosophila development	GCD
Thomas Neufeld	Developmental control of growth and cell proliferation in Drosophila	GCD
Michael O'Connor	Cell-cell interactions in growth, differentiation, and development	GCD
Neil Olszewski	Molecular genetics of plant hormone action and plant viruses	Plant Biology
Harry Orr	Molecular genetics of brain development and neurodegeneration	Lab Med.Pathology
Ronald Phillips	Plant molecular genetics	Ag & Plant Gen.
Mary Porter	Regulation of dynein-based motility	GCD
Laura Ranum	Molecular genetics of neurodegenerative diseases	GCD
Ann Rougvie	Developmental timing in <i>C. elegans</i>	GCD
Anton Sanderfoot	Cell biological and genetic analysis of vesicle trafficking in <i>Arabidopsis</i>	Plant Biology
Lisa Schimmenti	Development of ocular birth defects, hearing loss and autism	Pediatrics
Janet Schottel	mRNA stability, plant-pathogen interactions, immobilized cells	BMBB
Scott Selleck	Regulation of growth factor signaling, Proteoglycans in morphogen function, nervous system development, and drug discovery.	GCD/Pediatrics
Jocelyn Shaw	<i>C. elegans</i> embryonic development	GCD
Naoko Shima	Control of chromosome stability and its relationship to cancer	GCD
Yoji Shimizu	Lymphocyte & tumor cell adhesion, migration and signal transduction	Lab Med.Pathology
Carolyn Silflow	The microtubule component of the cytoskeleton	Plant Biology
Michael Simmons	Transposable genetic elements in <i>Drosophila</i>	GCD
Jeffrey Simon	Animal development; control of gene expression; chromatin mechanisms	GCD
Amy Skubitz	Role of the basement membrane protein laminin in cancer	Lab Med.Pathology
Nikunj Somia	Retrovirus biology, gene therapy and gene discovery	GCD
Robert Sorenson	Cell biology of insulin secretion and cell division in islets of Langerhans	GCD
Clifford Steer	Liver regeneration; hepatic gene expression; gene therapy	GCD/Medicine
Margaret Titus	Molecular genetic analysis of unconventional myosin function	GCD
Howard Towle	Nutritional and hormonal regulation of hepatic gene expression	BMBB
Brian Van Ness	Molecular immunology	GCD
Catherine Verfaillie	Stem cell biology and plasticity: control by soluble and adhesion signals, gene expression	Medicine
Kenneth Vernick	Malaria-mosquito interactions	Microbiology
Chester Whitley	Gene therapy; human genetics; genetic diseases; lentivirus vectors	Pediatrics
Susan Wick	The cytoskeleton in plant cell growth	Plant Biology

Robin Wright	Cell biology, with emphasis on regulation of organelle biogenesis	GCD
David Zarkower	Molecular genetics of sex determination and gene regulation	GCD

ADMINISTRATION AND MANAGEMENT OF THE MCDB&G PROGRAM

While graduate programs are officially distinct from departments, in practice programs rely on departments for financial assistance, office staffing and space. Our program works closely with the Department of Genetics, Cell Biology and Development. This department is located in 6-160 Jackson Hall, 321 Church St. SE, Minneapolis Campus. The program's staff administrator, Sue Knoblauch, and the program files are located in 5-116 Molecular and Cellular Biology Building, 420 Washington Avenue SE, Minneapolis, MN 55455, phone 612-624-7470, email smk@umn.edu

GOVERNANCE

The **Director of Graduate Studies (DGS)** is responsible for all aspects of the Program; appoints the members of the Program's various committees; represents the Program to the University administration; is nominated and elected by the faculty members of the Program; serves for a four year term.

COMMITTEE STRUCTURE

The **Steering Committee** is chaired by the DGS and composed of the representatives of each of the other committees and a student representative. The committee meets at least once a semester to review the business of each committee and to deal with any special issues that arise. Meetings are open to all faculty.

The **Admissions Committee**: recommends standards for admission to the Program; reviews applications and recommends applicants for admission; establishes a regular dialogue with desirable students. **Chair of committee serves on MCSB Coordinating Committee.**

The **Recruitment Committee**: writes and designs the brochure for the Program; evaluates and initiates changes to the program website; organizes and runs recruiting visits for prospective students; organizes an outreach program to local colleges to promote the Program through seminars and reciprocal visits. Program faculty and a student representative serve on the committee. **Chair of committee serves on MCSB Coordinating Committee.**

The **Curriculum Committee**: recommends the curriculum and course requirements for students in the Program; recruits faculty members to teach courses as appropriate; encourages needed changes in the content of existing courses.

The **Faculty Review Committee**: recommends criteria for initial appointment and reappointment to the faculty of the Program; reviews new applications for appointment to the Program faculty; reviews annually applications for reappointment to the Program faculty.

The **Student Review Committee**: recommends the format for major examinations in the Program; prepares, administers and grades the written preliminary examination; reviews the progress annually of each student in the Program.

MCDB&G Graduate Student Association (MCDB&G GSA)

Goals of GSA

1. Build a strong student support network of new and older students.
2. Keep students informed about our graduate program changes.
3. Keep in touch with each other, and eat free food!

Student Leadership Structure

1. President and Vice President-2 Year Term
 - a. Each year 1 person is voted in to serve a two year term, the first year they will act as Vice President, the second year they will become the President while a new VP will be voted in.
 - b. Responsibilities:

- i. Organize MCDB&G GSA 1-2 meetings per semester
 1. Attend all GSA meetings
 2. Communicate with DGS' Questions, problems, etc.
 - ii. Serve as Head of Student Recruitment Committee
 - iii. Serve on MCDB&G Executive Committee and report info back to GSA
 - iv. Serve on MCB Coordinating Committee
 2. Student Representatives from each class -- 1-2 volunteers per class
 - a. Responsibilities
 - i. Bring class mates questions/concerns to MCDG&G GSA
 - ii. Attend all MCDB&G GSA meetings
 - iii. Serve on committees (if desired) report back to MCDB&G GSA
 3. Committees Students Serve On
 - a. Student Invited Speaker:
 - b. TA Liaison Committee
 - c. Retreat Committee
 - d. COGs (Council of Graduate students)
 - e. Picnic committee

GRADUATE FACULTY RESPONSIBILITIES

- Direct an active research program
- Advise and support graduate students
- Annually evaluate students
- Provide for lab rotations
- Serve on student and graduate program committees
 - Participate in Admissions activities
- Participate in Recruitment activities
- Student Advisory Committees
- Graduate Program Committees
- Teach one Current Topics course every five years that is open to MCDB&G students.

GRADUATE STUDENT RESPONSIBILITIES

- Actively pursue thesis research with adequate and timely progress
- Course work: complete core courses and electives, maintain minimum GPA of 2.8, maintain active registration
- Participate in the Student Research Seminar Series and one regular Departmental Seminar Series
- Participate in one regular Journal Club Series
- Teaching, see degree requirements below.
- Examinations, required by the Graduate School and designed by the Program, see degree requirements below.
- File required Graduate School forms in a timely manner
- Annual report of activities

MUTUAL RESPONSIBILITIES IN GRADUATE EDUCATION AT THE UNIVERSITY OF MINNESOTA

Approved by the Graduate School Executive Committee 5/28/97; Amended 11/28/00

Preamble

A major purpose of graduate education at the University of Minnesota is to instill in each student an understanding of and capacity for scholarship, independent judgment, academic rigor, and intellectual honesty. Graduate education is an opportunity for the student to develop into a professional scholar. Graduate research and teaching assistantships offer an "apprenticeship" experience in the academic profession as well as financial support. It is the joint responsibility of faculty and graduate students to work together to foster these ends

through relationships that encourage freedom of inquiry, demonstrate personal and professional integrity, and foster mutual respect. This shared responsibility with faculty extends to all of the endeavors of graduate students, as students, employees, and members of the larger academic community.

High quality graduate education depends on the professional and ethical conduct of the participants. Faculty and graduate students have complementary responsibilities in the maintenance of academic standards and the creation of high quality graduate programs. Excellence in graduate education is achieved when both faculty and students are highly motivated, possess the academic and professional backgrounds necessary to perform at the highest level, and are sincere in their desire to see each other succeed.

The following principles illustrate what students should expect from their programs and what programs should expect from their students, to help achieve this excellence.

Principle 1: Information About Policies and Procedures

The Graduate School and graduate programs are responsible for providing students and prospective students with access to information about their graduate program, areas of specialization, degree requirements, and average time to completion of degrees. Graduate programs are responsible for providing access to information about graduate student financial support in the program, such as the prospects for fellowships, assistantships or other financial support and the proportion of students receiving financial support. In addition, graduate programs should provide students and applicants with information about career experiences of graduates of the program. All such information should be presented in a format that does not violate the privacy of individual students. Programs are encouraged to provide relevant information in their handbooks, websites or other readily accessible formats.

Students are responsible for keeping themselves informed about current policies of their program and the Graduate School that affect graduate students. Students and alumni also have a responsibility to respond to program inquiries about their career development.

Principle 2: Communication About Academic Status

The Graduate School and graduate programs are responsible for providing students with information about their individual academic status: who in the Graduate School and in their graduate program is responsible for communicating to them about admission issues and progress through the degree program, how the communication will take place, and the possibility for appeal to a third party for assistance in resolving disputed issues.

Students are responsible for communicating with the Graduate School and their graduate program about changes in their circumstances that affect their status and progress toward the degree.

Principle 3: Research Contributions

Individual faculty as research directors are responsible for providing students with appropriate recognition for their contributions at conferences, in professional publications, or in applications for patents. It is the faculty member's responsibility to clarify the principles for determining authorship and recognition at the beginning of any project.

Students are responsible for discussing their expectations regarding acknowledgment of research contributions or intellectual property rights with the appropriate person(s) in the research team, preferably early in the project.

Principle 4: University Governance

Departments and graduate programs are responsible for defining specific opportunities for student participation on committees as they deem appropriate. The University recognizes that graduate students make important contributions to governance and decision making at the program, department, college, Graduate School and University level; specific roles for participation are defined at each level by the relevant governing bodies.

Students are responsible for participating in University governance and decision making that enrich the campus community.

Principle 5: Respectful Employment Conditions

University faculty and staff are responsible for assuring that graduate students are able to conduct their work, as students or students/employees, in a manner consistent with professional conduct and integrity, free of intimidation or coercion. Students who are employees also have the protection of all University employment

policies and laws. Graduate programs are responsible for providing clear communication to students about the possibility for appeal to a third party for assistance in resolving disputed issues.

Students are responsible for reporting unprofessional conduct to the appropriate body or person, as defined in the academic or employment grievance policy; they should be able to do so without fear of reprisal. Students are responsible for acting in a respectful and fair manner toward other students, faculty, or staff in the conduct of their academic work or work they may do in connection with an assistantship.

Principle 6: Conditions of Employment

The University (through its departments, research projects or other employing units) is responsible for providing to prospective graduate assistants a written offer of financial support before a response to the offer is required. Such communication must indicate their salary and the terms and conditions of their appointment, including the general nature of the work they will be performing, duration of employment, and whether and how this employment is tied to their academic progress. The details of specific teaching or research assignments may need to await later written clarification.

Students are responsible for accepting the conditions of employment only if they believe they are qualified and able to complete the tasks assigned. Students have a responsibility for communicating in writing any changes in their circumstances that affect their ability to fulfill the terms and conditions of their employment.

Principle 7: Safe Work Environment

Supervisors are responsible for providing a safe working environment for graduate students, and for developing and publicizing safety policies and training programs to achieve that goal.

Graduate students are responsible for helping to maintain a safe working environment, for adhering to safety policies, for participating in training programs and for reporting safety violations to the proper authority.

Principle 8: Responsible Conduct of Research

Students are responsible for carrying out their research in a responsible manner.

The faculty and Graduate School are responsible for ensuring that students receive training and guidance in the responsible conduct of research as appropriate for each field.

Other University Documents

http://www.grad.umn.edu/faculty-staff/governance/Policies/mutual_responsibilities.html

These documents may provide information and guidance relevant to the graduate education experience.

- Board of Regents, **Code of Conduct**, adopted 7/12/96
- Board of Regents, **Academic Freedom and Responsibility** adopted 9/8/95
- Graduate Assistant Office, **Handbook for Graduate Assistants**
- University Senate, minutes, April 19, 1990 **Student Conduct Code**
<http://www.sja.umn.edu/conduct.html>

ADVISING

PhD and MD/PhD and MS in MCDB&G

Advising can be obtained from your advisor, or the Director of Graduate Studies (DGS), Jocelyn Shaw, 4-108 MCB, Minneapolis campus, telephone; 612-625-1912; email; shawx005@umn.edu or Tom Neufeld, Associate DGS 5-245E Moos, Minneapolis campus, telephone; 612-625-5158; email; neufe003@umn.edu or

General advising, including registration, graduate school policy and procedure, is available from Sue Knoblauch at smk@umn.edu or 612-624-7470. She is located in 5-116 MCB.

MS or PhD/JD Joint Program

Students will be advised by the DGS in MCDB&G and Professor Susan Wolf of the Law School.

E-mail Address: wolfx009@umn.edu. Office Address: Law School, N145 Mondale Hall, 229 19th Av S, Minneapolis, MN 55455. Campus Mail: Law School-Instruction, Room 285 Mondale Hall, 7911, 229 19th Ave S, Minneapolis, MN 55455. Office Phone: 612-625-3406. Fax: 612-625-2011

Information about the Graduate School and Graduate School Policies

General Information: http://www.grad.umn.edu/current_students/

Graduate School Handbook: http://www.grad.umn.edu/current_students/handbook/index.html

Graduate School Catalog: <http://www.catalogs.umn.edu/grad/index.html>

ANNUAL STUDENT EVALUATION

Students are evaluated on an ongoing basis to insure to the maximum degree possible that uniform academic standards are applied to all graduate students, to assist in monitoring progress of students, to identify students whose academic progress is unsatisfactory, and to make recommendations concerning continuation or provision of financial support and/or change of degree objective.

Each graduate student is required to have one evaluation meeting each year with his/her faculty advisor and the faculty on his/her advisory committee to discuss academic and research progress and plans. It is strongly recommend that this meeting be done after the student research presentation (Mondays 12-1 pm). The program has reserved the seminar room from 1:00 to 1:30 pm on Mondays to facilitate the scheduling of this meeting. Forms for this evaluation will be emailed to the student and advisor prior to the student research presentation.

The Advisory/Examining Committee

The student in consultation with his/her advisor and with approval of the DGS and Graduate School will select five faculty members to serve on this committee, not including the advisor. All five members must hold a graduate faculty appointment in the graduate school. Three of the faculty members must be current members of the MCDB&G graduate faculty. Two faculty members must hold an appointment in another graduate program related to the student's area of interest, although these two might also be members of the MCDB&G faculty. Two of the five-committee members must have their primary academic appointment in a department other than that in which the student's advisor is based. The recommendation of committee members should be presented by the student and advisor to the DGS with a brief justification for each proposed member relative to the student's research interests. The DGS can approve the recommendations or request changes. After the student has passed the oral preliminary exam, one committee member may be dropped. The final committee must have three members (including the advisor) from MCDB&G and two members from other graduate program(s).

At least one week before advisory committee meetings the student will distribute a brief description of the research undertaken and research proposed for the next year (about 2 pages) and an unofficial academic transcript. The student should also be prepared to give a brief presentation of his/her research to the committee if the meeting is not held after the research seminar. **Within a week after the meeting, the student's advisor will prepare a written report of the conclusions of the committee meeting, which will be signed by the student and the advisor. This review should cover all aspects of a student's academic activities, which bear on his/her degree objective.**

The report will be submitted to the DGS for review and inclusion in the student's file. If problems are detected in academic or research progress, the student or any committee member may call for additional advisory committee meetings.

REGISTRATION REQUIREMENTS

Maintaining Active Status

ALL Graduate School students will be required to register in the Graduate School every fall and spring term in order to maintain active status.

Maintaining active status is critical and is required in order to participate in the University community as a Graduate School student. This includes registering for coursework, taking examinations, submitting milestone forms, or filing for graduation. Students not registered every fall and spring term as described above are considered to have withdrawn; their Graduate School records are deactivated. Those who wish to resume graduate work must request readmission to the Graduate School (and if readmitted, must register) to reactivate their status.

Grad 999 - a zero-credit, zero-fee, non-graded registration option - is now an option for those Graduate School students who must register solely to meet the Graduate School's registration requirement. Students should check with the DGS for eligibility.

Confer with your adviser and/or DGS to determine what you should register for each term. You should consider the following in addition to any criteria outlined by your adviser and/or DGS:

As a PhD student, once the required 24 thesis credits are completed (usually at the end of Spring Semester in the third year), you will register for one credit of a special full time equivalent (FTE) of MCDG 8444 to maintain full-time status. Typically students who have completed their thesis credits will register for 1 credit in all three semesters (Summer, Spring and Fall). As a Plan A (thesis) M.S. student, once the 10 thesis credits are completed, you may register for one credit of MCDG 8333 to maintain full-time status. Please refer to *MCDB&G Policy Regarding Registration for 24 Thesis Credits and Registration for MCDG 8444 after Completion of the 24 Thesis Credits* on page 14 and http://www.grad.umn.edu/Current_Students/registration/FTE_procedures.html for further information regarding the full-time special registration status.

International students must register for 6 - 14 credits to maintain a full-time status. Once the 24 thesis credits are completed, international students must register for GCD 8444, a special one-credit course that is considered a full course load. International students may not drop below full-time status without first consulting with the DGS and filing an exception form with the International Student and Scholar Services.

Selection of grading options (A/F, S/N) must be made as part of the initial registration, and any changes in option must be made as a registration change within the first two weeks of the term. At least two thirds of the course credits included on the degree program form must be taken A-F.

Ph.D. CURRICULUM

The Ph.D. program is designed by the student and the advisor to meet individual interests and goals. Advanced courses in genetics, molecular biology, cell biology, developmental biology, and biochemistry are required, in addition to special courses, topical seminar courses, laboratory research rotations, thesis research, student research seminars, departmental seminars, and journal clubs.

In the second year, students typically take two or three elective courses (often Advanced Human Genetics, Selected Topics in Molecular Biology, or Selected Topics in Cell and Developmental Biology, though joint degree students may take Law courses instead). PhD students must complete at least 12 credits in a minor field or supporting area. At least two-thirds of the credits listed on a student's program degree form must be taken for A/F credit. Students also take a preliminary written examination that consists of a written original research proposal. Students must subsequently take a preliminary oral examination, which is loosely based on the written examination and covers material pertinent to the student's proposal as well as serving as a test of general knowledge based on their graduate coursework and their field of research.

During the second year, the student has typically embarked on his or her doctoral dissertation research, and during the third year has completed the required 24 thesis credits. A minimum of three years in the laboratory is expected

for completion of a dissertation. At the completion of the doctoral dissertation research and submission of a written dissertation, the student must present a public seminar and pass a final oral defense.

Second Year MCDB&G PhD Graduate Student Course List

Students must register for at least 6 credits but not more than 14 credits to be considered a full time active student during their 2nd year. Students registered for six or more credits in a semester must pay a student services fee.

YEAR TWO

Students must register for 6 – 14 credits in Fall and Spring Semester. Registration includes required courses and typically two 3 – 4 credit elective courses to be chosen in consultation with the advisor and/or DGS.

Fall Semester - Required courses

MCDG 8900 – Student Research Seminar (1 credit)

MCDG 8950 – Teaching Practicum (1 credit) (Register for this only if you have been assigned a TA position)

MCDG 8666 – Pre-thesis credits (use only if you need more credits to make the 6 credit minimum)

Elective course to fit research interests and goals

Optional Preparing Future Faculty (<http://www1.umn.edu/ohr/teachlearn/pff/>)

Grad 8101—Teaching in Higher Education (3 credits)

Electives Options (*one 3 or 4 credit course*) – note that this is a partial list

GCD 8171 - Literature Analysis (**note: 2 credits**)

GCD 8213/BioC 8213 – Selected Topics in Molecular Biology (4 credits)

GCD 8212 - Selected Topics in Cell & Developmental Biology – Stem Cell Biology (3 credits)

MICa 8001 – Integrated Topics (3 credits)

BIOC 5361 – Microbial Genomics and Bioinformatics (3 credits)

BIOC 5527 – Introduction to Modern Structural Biology (4 credits)

EEB 5033 - Population and Quantative Genetics (4 credits)

NSC 5561 - Systems Neuroscience

PBIO 5960 – Special Topics (sections vary – epigenetics – bioinformatics)

PubH 6450 - Biostatistics I (4 credits)

Stat 5021 - Statistical Analysis (4 credits)

CHEN 8995 – Systems Analysis of Biological Processes (register for proper section)

Spring Semester - Required courses

MCDG 8900 –Student Research Seminar (1 credit)

MCDG 8950 – Teaching Practicum (1 credit) (Register for this only if you have been assigned a TA position)

MCDG 8666 – Pre-thesis credits (use only if you need more credits to make the 6 credit minimum.)

Elective course to fit research interests and goals

Optional Preparing Future Faculty (<http://www1.umn.edu/ohr/teachlearn/pff/>)

Grad 8102—Practicum for Future Faculty (3 credits)

Elective Options (*one 3 or 4 credit course*)

GCD 8008 – Mammalian Gene Transfer and Expression (2 credits)

GCD 8073 – Adv. Human Genetics (3 credits)

BIOC 5309 – Biocatalysis and Biodegradation (3 credits)

BIOC 5353 –Microbial Biochemistry and Biotechnology: Small Molecules (3 credits, alternate years)

BioC 5352 - Microbial Biochemistry and Biotechnology: Proteins (3 credits, alternate years)

BIOC 5530 – Selected Topics in Molecular Biophysics (1-3 credits)

BIOC 5444 –Muscle (3 credits)

BIOC 8216 – Signal Transduction and Gene Expression (4 credits)

EEB 5221 – Molecular and Genomic Evolution (3 credits)

MICa 8003 – Immunity and Immunopathology (4 credits)

MICa 8004 – Cellular and Cancer Biology (4 credits)

MATH 5445 - Mathematical Analysis of Biological Networks (4 credits)

Seminars - GCD 8900

Genetics, Cell Biology and Development weekly seminars are scheduled on Thursdays at 12:00 p.m. Seminar notices will be distributed each semester to all students. **It is expected that each student will attend at least one seminar series on a regular basis, if not GCD, then a series in another department.**

Student Research Seminar - MCDG 8900

Second year students and beyond are expected to present a Student Research Seminar. Seminars are broadcasted on the St. Paul and East Bank campuses. All graduate students and graduate faculty are expected to attend each week. The aim of this seminar is to give each student an opportunity to present a formal seminar on their own research and also to give the student and faculty an opportunity to assess the student's progress towards completion of the thesis research. The advisory committee should attend the seminar and hold a committee meeting immediately or soon after the seminar to provide specific advice for completing the thesis research. Registration is via MCDG 8900 until thesis credits are taken.

Pre-Thesis Credits – MCDG 8666

In a response to the need for doctoral students who must be registered to satisfy requirements external to the Graduate School, but who have not yet passed their preliminary oral examinations, an additional registration category has been created. Doctoral students who have **not yet passed their preliminary oral examinations** may register for doctoral pre-thesis credits (MCDG 8666). For students in the MCDB&G Program, these credits are not to be used until the first-year lab rotations have been completed. MCDG 8666 will NOT be graded. These credits will not be used to meet doctoral thesis requirements or other Graduate School requirements.

Teaching experiences – MCDG 8950

All Ph.D. students will teach two semesters, not to include the first and last years. The teaching requirement is intended to ensure that all students in the program have, as part of their graduate training, experience as instructors at the university level. Students are able to express their preferences for different teaching assignments. These experiences should provide for professional growth. Credit for teaching experience is obtained through registration for 1 credit under the designator MCDG 8950, Teaching Practicum. JD/MS, MS in MCDB&G, and MD/PhD students will teach one semester. MS in genetic counseling and PhD/JD are not required to teach.

Preparing Future Faculty (PFF) – GRAD 8101 and GRAD 8102

Preparing Future Faculty (PFF) welcomes graduate and postdoctoral participants from all disciplines. PFF helps participants acquire information about the teaching and learning process and the faculty role at a variety of institutions of higher education; gain a realistic perspective on the skills required for success as a faculty member; examine their fit with a teaching career in higher education; work with a faculty mentor in a teaching opportunity at a local college or university; demonstrate, document, and reflect on their teaching skills; and market themselves for faculty or other professional positions.

To receive a letter of recognition and certificate of program participation from the Graduate School, participants must complete Grad 8101—Teaching in Higher Education and Grad 8102—Practicum for Future Faculty. Other credit courses on teaching and learning or the faculty role may be recognized by PFF as substitutes for Grad 8101 or Grad 8102.

PFF is a program of the Graduate School, administered through the Center for Teaching and Learning Services (CTLS) in the Office of Human Resources. For information on program enrollment, contact PFF at 612-625-3811 or pff@umn.edu, drop by CTLS in 120 Fraser Hall, or visit <http://www1.umn.edu/ohr/teachlearn/pff/>.

If you plan to take PFF you should take the first course in spring of your second year and the second course fall or spring of your third year.

Guidelines for MCDB&G Graduate Teaching Assistants

Teaching assistants play active roles in the instructional missions of the University. A TA appointment is designed to provide experience in teaching to graduate students in the MCDB&G Graduate Program.

MCDB&G TAs work under the supervision of faculty to provide them with assistance in teaching both undergraduate and graduate students. Responsibilities will vary according to the requirements of each course, but are generally expected to include:

Meeting with the course instructor

The TA and course instructor should meet before the beginning of the course (ideally one month ahead of time) to discuss the specific TA duties and expectations.

Assist faculty in the teaching of students in specific courses

Students who TA lecture courses will typically be expected to present at least one lecture. The course instructor will assist the TA by discussing and previewing with them with an overview of the material to be presented, the overall structure of the lecture as well as design and use of visual aids.

TAs for laboratory courses may assist the course director in the design and presentation of one or more laboratory sessions. The course instructor will assist the TA by discussing and previewing them with an overview of the material to be presented, the overall structure of the laboratory exercises as well as design and use of visual aids for the laboratory session introductory lecture.

TAs should seek a critique of their lecture from the course director as soon as possible after the lecture.

Supervision or instruction of lab classes, recitation sections, or review sessions.

TAs for lecture courses will hold weekly office hours where they will be available to answer questions about material presented in lecture. The TA will also lead a review of course material and answer questions during review sessions held regularly and/or prior to examinations.

TAs for laboratory courses will help to supervise students and answer questions during the course of laboratory exercises. They should be available to answer student questions after class, although they typically do not hold office hours.

Preparation of examinations or class assignments

TAs for lecture courses may be asked to assist the course instructor in either preparing, critiquing or reviewing in-class or take home examinations. Laboratory course TAs will typically assist the instructor in reviewing laboratory notebooks and in the design of one or more written assignments.

Grading of examinations and reports

TAs may be asked to aid in the grading of written examinations or laboratory reports. The course instructor should provide a detailed examination or answer key for the TA to use as a guide. The instructor should also be available to provide guidance when the TA has questions about grading an answer and should review the grading to ensure that student work is being evaluated appropriately.

Assist in the administration of the course

TAs may be asked to assist the course instructor in preparing some materials for the course, such as copying handouts, on a limited basis (such as when a handout is unexpectedly needed at the last minute). However, it should be noted that **TAs are not responsible for course copying**. The departmental offices have all of the necessary resources for course copying.

TAs may be asked to assist in recording grades and in preparing graphs and statistical analyses of student grades.

TAs may be asked to assist with preparing and updating class websites.

A note to all Non-native English speakers.

All nonnative English speaking students must demonstrate proficiency in spoken English appropriate to the demands of their teaching assistantship. This proficiency will be assessed by 1) the SPEAK test (Spoken

Proficiency in English Assessment Kit); or 2) the TSE (Test of Spoken English); or 3) an English Language Proficiency rating earned through coursework with the Center for Teaching and Learning Services. For further detailed information: <http://www1.umn.edu/ohr/teachlearn/nonnative/>.

The SPEAK test MUST be taken in the Spring semester of your first year. In order to qualify for teaching with no further English courses required you must receive a score of 55 or higher. **Please see the required course descriptions and registration for scores of 50 or less that require English classes at <http://www1.umn.edu/ohr/teachlearn/nonnative/>.**

Thesis Credits

MCDB&G Policy Regarding Registration for 24 Thesis Credits and Registration for 8444 after Completion of the 24 Thesis Credits

Students in the MCDB&G Ph.D. Program must meet two special registration requirements. By adhering to this policy, students will save their advisors over \$7,000 in student support dollars in a single year, from research grant funds.

The Graduate School requires students to register for 24 thesis credits, MCDG 8888 after passing the preliminary oral exam. **MCDB&G students must register for MCDG 8888 the semester immediately after passing the preliminary oral for 10-14 thesis credits and then 10-14 for the following semester (for a total of 24). Students are required to complete the required thesis credits quickly, within 2 semesters.** After completing 24 thesis credits, students are placed in a status that dramatically reduces their fringe benefit rate – effectively saving the advisor thousands of dollars per year, if the students are supported with research funds. Students may adjust the credits in these two semesters to accommodate any other courses they would like to take, remembering that additional course fees will be incurred if registered for more than 14 credits per semester, and that those additional fees would generally be the student's responsibility.

Students who have completed their 24 thesis credits, are then placed in a registration category that allows them to register for 1 credit. To maintain current student status and to hold a research assistantship, students must register for 1 credit.

As of Fall 2006, all students who have completed their 24 thesis credits will register for MCDG 8444 for one credit. We would like students to discontinue using MCDG 8888 to register for one credit.

When you register for 8444 you are required to complete the "Application for Full-time Status with One-credit Registration" form each Fall semester. Please check all three semesters on the form. Turn the form into Sue no later than the 2nd week of the semester.

You may download the form at http://www.grad.umn.edu/current_students/forms/doctoral.html and click on Application for Full-time Status with One-credit Registration at the bottom of the list.

You may register for courses beyond the 1 credit (including audits), but you will be responsible for any additional tuition and fees assessed. It is not possible to use federal grant funds to cover the costs of the additional credits, but it may be possible that your advisor can fund some additional credits with other funds, especially if this is related to your thesis work. In all cases, pursue this possibility with your advisor in advance of registering for the extra credit(s).

Ph.D. PROGRAM - STUDENT TIMELINE AND RESPONSIBILITIES

If you have any questions please contact Sue at smk@umn.edu or
Jocelyn Shaw at shawx005@umn.edu

Students are expected to maintain a GPA of at least 2.8.

ANNUALLY

Attend annual retreat and present a poster.

All students present a student research seminar.

Advisor and committee MUST be in attendance and MUST have annual review meeting afterward.

Annual review of student progress forms must be completed by student and advisor.

YEAR I Register for Fall and Spring Semesters ONLY

Spring Semester

1st year students choose permanent advisor.

YEAR II Register for Fall and Spring Semesters ONLY

Fall/Spring

Student completes 1st TA assignment of 2 required.

One elective course per semester completes required course work.

Spring Semester

Complete the Graduate School Degree Program Form.

Student must have committee chosen by March 1.

One-page outlines of written proposal and thesis research due January 15, 2007

Preliminary written exam is due by March 13, 2007.

Complete the Graduate School Preliminary Written Exam Form.

Complete the Graduate School Preliminary Oral Exam Scheduling Form at least one week before Prelim Oral exam.

YEAR III Register for Fall, Spring and Summer (only if 24 thesis credits are completed)

Student completes 2nd and final TA assignment.

Fall

Take preliminary oral exam by the end of the first week of fall semester

Register for 10-14 thesis credits (MCDG 8888) before the end of the second week of fall semester.

Spring

File the Graduate School Thesis Proposal Form.

Register for your remaining 10-14 thesis credits to bring to a total of 24 thesis credits.

YEAR IV and beyond Register for Fall, Spring and Summer Semesters

STUDENTS MUST REGISTER FALL, SPRING, AND SUMMER FOR 1 CREDIT OF MCDG 8444 UNTIL COMPLETION OF DEGREE.

Complete the 8444 application for full-time status with one credit registration form.

February

Doctoral Dissertation Nominations due to DGS. Students within 12-18 months of completion are eligible to apply.

GRADUATION YEAR

Student prepares for final oral exam. Request Graduation packet from the Graduate School. Complete the Reviewers Report from the Graduation packet.

Submit thesis to readers at least 2 weeks before final exam.

Complete the Graduate School Final Oral Exam Scheduling Form at least one week before Final Oral exam.

VACATION

Students have official University holidays off. Additional vacation time must be cleared with the student's advisor in advance and is expected to be no more than two weeks per year.

All the forms can be found online at: http://www.grad.umn.edu/current_students/forms/doctoral.html

Ph.D. PROGRAM EXAMINATIONS AND FORMS (see sample forms in the back of handbook)

Required Program GPA

The graduate program requires a GPA of at least 2.8, excluding journal clubs, seminars, thesis and research credits. No more than 1/3 course credits included on the degree program can be graded S/N.

Time Limit for Earning the Degree

MCDB&G students are expected to take their preliminary written exam in March of year two. The oral exam is taken prior to the start of Fall quarter of their third year. Graduate School rules state that students have 5 years to complete their degree after passing the oral examination; however, the MCDB&G program expects that students will complete their degree within 4 years of passing the oral, unless there are extenuating circumstances.

Failure to meet the GPA or timing requirements noted above may result in written warnings, loss of funding, and/or dismissal from the Molecular, Cellular, Developmental Biology and Genetics Graduate Program.

Examinations

Three examinations must be passed for a Ph.D. degree in MCDB&G:

- the written preliminary examination,
- the oral preliminary examination and
- the final oral examination with thesis defense.

These examinations will be administered and graded by the student's Advisory & Examination Committee.

Filing of Degree Program Form

The **Degree Program Form** needs to be filed with the Graduate School during your second year. It is available on the web at http://www.grad.umn.edu/current_students/forms/doctoral.html. This form, lists all the course work you have taken or will be taking, which includes 12 credits in other program courses and the 24 thesis credits. At least two-thirds of your credits must be A/F, only 1/3 can be S/N. It also designates for the Graduate School who will be on your oral preliminary exam committee. In consultation with your advisor, select your committee (see Examining Committee, below) and submit the program form to the DGS, with a current nonofficial transcript, for signature. The DGS will forward your degree program form to the Graduate School for approval.

Transfer of Credits for the Doctoral Degree—Students may request from the Graduate School the transfer of graduate level course credits by including the courses on the proposed degree program form. In all cases, official transcripts of the graded work must be attached to the degree program form, unless they have already been included in the student's Graduate School file. Transfer of graduate credit is not allowed for courses taken before the awarding of a baccalaureate degree. For additional regulations regarding course credits that can be transferred see: <http://www.catalogs.umn.edu/grad/gen/phd.html>

Generally, MCDB&G will only allow transfer of 4 credits towards the degree.

The Examining Committee

The student in consultation with his/her advisor and with approval of the DGS and Graduate School will select five faculty members to serve on this committee. The advisor will not be a member of the examining committee for the oral preliminary exam. Although the graduate school permits a 4-member committee, MCDB&G examining committees will be five members. All five members must hold a graduate faculty appointment in the graduate school. Three of the faculty members must be current members of the MCDB&G graduate faculty. The other two faculty members are to hold an appointment in another graduate program related to the student's area of interest, although these two might also be members of the MCDB&G faculty. *Two of the five-committee members must have their primary academic appointment in a department other than that in which the student's advisor is based.* The recommendation of committee members should be presented by the student and advisor to the DGS with a brief justification for each proposed member relative to the student's research interests. The DGS can approve the recommendations or request changes.

For a list of the faculty and their appointment level and departments please refer to the web page at http://www.grad.umn.edu/faculty_rosters.

Written Preliminary Examination

This exam is taken in the Spring semester of the second year. This exam is currently based on a research proposal and should include several components: background and significance, specific aims being addressed, and proposed experiments. This last section should describe how the results will be evaluated and interpreted. The proposal may not be based on the student's thesis research, although a topic related to the student's research is acceptable. (See page 38 for a more complete description of the written preliminary guidelines.)

Once the exam is taken and passed, the DGS is responsible for notifying the MCDB&G Program office of the exam results. Student should complete the **Preliminary Written Examination Report Form** signed by their advisor indicating the results of the exam and return it to Sue in 5-116 MCB for the DGS' signature. The form must be returned to the Graduate School at least one week before the preliminary oral exam.

Preliminary Oral Examination

Students must take the preliminary oral examination **no later than the first week of the semester following the passing of the written preliminary examination.** The student's advisor is not a member of the oral preliminary examining committee. The preliminary oral exam cannot be scheduled between end of first summer session and start of fall semester unless the members of the assigned committee can be assembled without substitution. It is up to the student in consultation with the committee members to find a suitable date for the examination and to reserve a room through the department office. You must schedule your preliminary oral exam with **the Graduate School at least one week in advance using the Doctoral Preliminary Oral Examination Scheduling form found at** http://www.grad.umn.edu/current_students/forms/doctoral.html. You must have an approved degree program form on file with the graduate school and have submitted the **Preliminary Written Examination Report Form** to the Graduate School. The Oral Examination Report form is sent to the chair of the exam committee. The form must be returned to the Graduate School by the day after the exam. Results may be pass, pass with reservations, or fail.

The preliminary oral exam may be taken a second time only with unanimous approval (vote) of the committee and the exam must be conducted by the same exam committee members.

The oral preliminary examination will start with a defense of the written preliminary proposal. However, the examination is intended to be open-ended and to examine the student's knowledge and problem solving skills, particularly in areas related to the proposal, the student's own research area and to course work that has been completed. In particular, members of the examining committee representing the minor or supporting program should evaluate the student for her/his breadth of knowledge. Rules for the outcome of the oral preliminary examination are provided by the Graduate School.

Thesis Credits

All Ph.D. students must complete a minimum of 24 credits of MCDG 8888 Thesis Credit: Doctoral. Doctoral students may not register for thesis credits until the semester after they have passed (includes "pass" and "pass with reservations") their preliminary oral examination.

Filing of Thesis Proposal Form

The Ph.D. Thesis Proposal Form should be filed with the Graduate School no later than one semester after passing the preliminary oral examination. You may obtain the Thesis Proposal form on the web at http://www.grad.umn.edu/current_students/forms/doctoral.html. This form specifies the graduate faculty who will serve as examiners for the final oral examining committee as well as your Thesis Title and provides a brief description of the research to be undertaken and the methods employed. This committee will usually be similar to the preliminary oral examination committee, except that the student's advisor is a member of this committee replacing one of the faculty members from the MCDB&G program. The committee must be approved by the DGS. **The advisor or co-advisor cannot be the chair of the committee.** This form also specifies **three members who will serve as reviewers of the thesis. Two reviewers, including the advisor, are selected from the major field. One reviewer must also be selected to represent the minor or supporting program. This person must have a graduate faculty appointment outside of the MCDB&G program (although he/she may also be on the MCDB&G graduate faculty.)** These members read the thesis draft and must sign the Thesis Reviewer's Report Form indicating that it is acceptable for defense at least one week prior to the scheduled date of the final oral examination.

Graduation Packet and Thesis Reviewer's Report Form

These forms may be obtained after thesis proposal is approved but at least one week prior to the Final Oral Exam. Available via the web at http://www.grad.umn.edu/current_students/forms/doctoral.html. Included in the packet are: Graduation instructions, Application for Degree form, Commencement Attendance Approval form, Microfilm Agreement, and Survey of Earned Doctorates and The Thesis Reviewer's Report form (will be issued at this time).

Commencement Attendance Information is available at:
http://www.grad.umn.edu/current_students/forms/doctoral.html

Final Oral Exam and Scheduling

At least 10 weeks must elapse between the prelim oral exam and final oral examination. It is up to the student in consultation with their committee to find an appropriate date and room for their final oral exam. Likewise, the student is expected to provide the reviewers a reasonable length of time to read his/her thesis. Graduate rules specify that all members of the committee must have at least two weeks to read the thesis. The student is responsible for returning the certified Thesis Reviewer's Report form to the Graduate School at least one week before final oral. The final exam must be scheduled with the Graduate School at least one week in advance via the scheduling form at http://www.grad.umn.edu/current_students/forms/doctoral.html. Please note the final exam clearance requirements on the final exam scheduling form.

This examination is primarily the thesis defense, although the questions and discussion may cover related areas as well. The first portion of all final oral examinations is a one-hour seminar given by the student covering the thesis research. This seminar must be publicly announced and all interested faculty and students are invited. Following a brief period of questions from the audience, the second portion of the examination will consist of additional questions to the candidate from the members of the examination committee. The second section of the examination is not open to the public.

Questions often arise about the role of the reviewers and the interpretation of the reviewers' actions prior to the oral examination. The reviewers determine whether the thesis is acceptable for defense. **If the thesis is judged to be not acceptable for defense, specific reasons will be communicated to the student in writing.** If acceptable, the reader has judged that the thesis is ready for oral defense - and only that. The reviewer may have reservations and after the oral examination may vote not to pass the candidate for the Ph.D. degree. However, this is rare and the annual student evaluations are designed to guard against such a possibility. Refer to the Graduate School Bulletin for more detailed information regarding the final oral exam. The Final Exam Report form will be forwarded to the chair of the exam committee, who returns the report form to the Graduate School; there can be no more than one dissenting vote for the student to pass the examination.

Submit **one** copy of the thesis abstract and **one** copy of the thesis (all signed by the advisor), the signed and passed Final Oral Examination Form, Microfilm Agreement Form and the Survey of Earned Doctorates by the last working day of the intended month of graduation. The application for degree must be submitted by the first working day of the month of intended graduation. Instructions for the preparation of the thesis, including format specifications and adviser's signature requirements, should be obtained from the Graduate School, 316 Johnston Hall or on the web at http://www.grad.umn.edu/current_students/forms/doctoral.html. **One additional bound copy of the thesis is required by the program. Submit to 5-116 MCB.**

MD/PHD PROGRAM

The PhD requirements for the MD/PhD are the same as those for students pursuing only the PhD, with one exception. That is that MD/PhD students are only currently required to fulfill one teaching assistant assignment. There are also some differences in timing for the written oral prelim exams. MD/PhD students should discuss these with the Director of Graduate Studies.

MS/JD OR PHD/JD PROGRAM

Please refer to the web site at <http://www.jointdegree.umn.edu/> for the most current information.

Students in the Joint Degree Program combine their Law and Science curricula by cross counting up to 12 Law School credits in their Graduate School program and up to 12 Graduate School credits in their Law School program.

MS/JD students must complete one teaching assistantship. PhD/JD students are not required to complete a teaching assistantship.

MS/JD in Molecular, Cellular, Developmental Biology & Genetics (MCDB&G)

Sample Plan

[Note: ** indicates credits that are expected to cross-count in the other unit, e.g., Law School credits expected to cross-count for Graduate School credit in MCDB&G.]

YEAR ONE:

MCDB&G coursework --

- Research Seminar (MCDG 8900; 1 MCDB&G credit each semester)
- 2 or 3 Laboratory rotations (approximately 7 – 10 weeks each) (MCDG 8994; 1 - 4 MCDB&G credit)
- optional Journal Club (MCDG 8910; 1 MCDB&G credit)
- Molecular Biology/Advanced Molecular Genetics (BioC 8002/GCD 8121; 3 MCDB&G credits)
- Advanced Genetics (GCD 8131; 3 MCDB&G credits)
- Cell Structure and Function (GCD 8151; 3 MCDB&G credits)
- Advanced Developmental Biology (GCD 8161; 3 MCDB&G credits)
- Ethics, Public Policy and Careers in Molecular and Cellular Biology (BioC 8401; 1 MCDB&G credit)
- Biochemistry (usually BioC 8001; 3 MCDB&G credits) highly recommended
and
- Joint Degree Proseminar (6875; 1 credit)

YEAR TWO:

Law School first-year curriculum (30 Law credits total)

- Civil Procedure (6006; 6 Law credits)
- Constitutional Law (6007; 6 Law credits)
- Contracts (6001; 4 Law credits)
- Criminal Law (6009; 3 Law credits)
- Legal Research and Writing (6003; 3 Law credits)
- Property (6004; 4 Law credits)
- Torts (6005; 4 Law credits)
and
- Research Seminar (MCDG 8900; 1 MCDB&G credit each semester)
- Joint Degree Proseminar (6875; 1 credit)

YEARS THREE & FOUR:

Law courses and other requirements (need 58 Law credits (minus those cross-counted above))--

- Professional Responsibility (6600; 3 Law credits)
- Second-year writing requirement (moot court (2 Law credits) or law review (3-6 Law credits))

- MCDB&G courses and other requirements--
- 2-3 electives, which may be Law courses**, or graduate courses that fit with research interests, such as
 - Literature Analysis (GCD 8171; 2 MCDB&G credits)**
 - Advanced Human Genetics (GCD 8073; 3 MCDB&G credits)**
 - Selected Topics in Molecular Biology (GCD 8213; 4 MCDB&G credits)
 - Selected Topics in Cell and Developmental Biology (GCD 8212; 3 MCDB&G credits)
 - Research Seminar (MCDG 8900; 1 MCDB&G credit each semester)
 - Plan B paper (satisfying the third-year writing requirement in the Law School)**
 - take final M.S. examination
- and
- Joint Degree Proseminar (6875; 1 credit)

PhD/JD in Molecular, Cellular, Developmental Biology & Genetics (MCDB&G)

Sample Plan

[Note: ** indicates credits that are expected to cross-count in the other unit, e.g., Law School credits expected to cross-count for Graduate School credit in MCDB&G.]

YEAR ONE:

Law School first-year curriculum (30 Law credits total)

- LAW 6006 Civil Procedure (6 credits)
- LAW 5007 Constitutional Law (6 credits)
- LAW 6001 Contracts (4 credits)
- LAW 6009 Criminal Law (3 credits)
- LAW 6003 Legal Research and Writing (3 credits)
- LAW 6004 Property (4 credits)
- LAW 6005 Torts (4 credits)
- LAW 6875 Joint Degree Proseminar (1 credit)

YEARS TWO & THREE:

MCDB&G requirements--

- Research Seminar (MCDG 8900; 1 MCDB&G credit each semester)
- 3 Laboratory rotations (approximately 7 weeks each) (MCDG 8994; 1 - 4 MCDB&G credits)
- optional Journal Club (MCDG 8910; 1 MCDB&G credit)
- Molecular Biology/Advanced Molecular Genetics (BioC 8002/GCD 8121; 3 MCDB&G credits)
- Advanced Genetics (GCD 8131; 3 MCDB&G credits)
- Cell Structure and Function (GCD 8151; 3 MCDB&G credits)
- Advanced Developmental Biology (GCD 8161; 3 MCDB&G credits)
- Ethics, Public Policy and Careers in Molecular and Cellular Biology (BioC 8401; 1 MCDB&G credit)
- Biochemistry (usually BioC 8001; 3 MCDB&G credits) highly recommended
- 3-4 electives, often:
 - Literature Analysis (GCD 8171; 2 credits)**
 - Advanced Human Genetics (GCD 8073; 3 MCDB&G credits)**
 - Selected Topics in Molecular Biology (GCD 8213; 4 MCDB&G credits)
 - Selected Topics in Cell and Developmental Biology (GCD 8212; 3 MCDB&G credits)
 - but may be Law courses**
- preliminary written and oral examinations
- dissertation research
- Joint Degree Proseminar (6875; 1 credit each year)

SUMMERS AFTER YEARS TWO & THREE:

Research (MCDB&G – MCDG 8994)

YEAR FOUR:

Law courses and other requirements remaining (need 58 Law credits (minus those cross-counted above))--

- Professional Responsibility (6600; 3 Law credits)
- Second-year writing requirement (moot court (2 Law credits) or law review (3-6 Law credits))

MCDB&G requirements--

- preliminary oral examination
- file dissertation title, register for 24 thesis credits, conduct dissertation research
- Research Seminar (GCD 8900; 1 MCDB&G credit each semester)
- Joint Degree Program Proseminar (6875; 1 credit)

SUMMER AFTER YEAR FOUR:

Research (MCDB&G - MCDG 8994)

YEARS FIVE & SIX, INCLUDING SUMMERS AFTER EACH:

Research (MCDB&G- MCDG 8994)

Research Seminar (GCD 8900; 1 MCDB&G credit each semester)

Joint Degree Program Proseminar (6875; 1 credit each year)

YEAR SEVEN:

Law and MCDB&G courses and other requirements--

- complete Law School courses
 - complete dissertation (satisfying the third-year writing requirement in the Law School)**
 - take final oral examination defending dissertation
 - Research Seminar (GCD 8900; 1 MCDB&G credit each semester)
- and
- Joint Degree Program Proseminar (6875; 1 credit each year)

MASTER OF SCIENCE PROGRAM in MCDB&G

The Graduate School has specific course credit requirements for the master's degree and the student must make the choice between a Plan A (with thesis) or Plan B (non-thesis) program. Master's candidates are required to take a final oral examination as outlined in the Graduate Bulletin.

The required program and Graduate School GPA is a 2.8 (excluding journal clubs, seminars, thesis and research credits). No more than 1/3 course credits included on the degree program can be graded S/N

Failure to meet the requirements noted above may result in written warnings, loss of funding, and/or dismissal from the Molecular, Cellular, Developmental Biology and Genetics Graduate Program.

The average time for receipt of degree is 2 years, the maximum time for award of the Master's Degree is 7 years (beginning with the earliest work included on the official degree program, including any transfer work)

Master's candidates not intending to seek a Ph.D. may wish to pursue a program with less emphasis on analytical and quantitative biology and greater emphasis on biological breadth. This may be true particularly where the student's goal is to pursue a teaching career requiring a broad background in biology.

Plan A (with thesis) Minimum course work:

- 14 semester credits in major field
- 6 semester credits in related field
- 10 Thesis Credits, at a minimum (MCDG 8777)
- 30 credits total**

Students are required to take an oral final exam as well as submitting a thesis document.

Plan B (non-thesis) Minimum course work:

- 14 semester credits in major field
- 6 semester credits in related field
- 10 semester course credits at the discretion of the student and advisor (Research credits can be used)
- 30 credits total**

Students are required to take an oral final exam as well as submitting a written report.

Teaching experiences

All MS students will teach one semester, not to include the first and last years. The teaching requirement is intended to ensure that all students in the program have, as part of their graduate training, experience as instructors at the university level. Students are able to express their preferences for different teaching assignments. These experiences should provide for professional growth. Credit for teaching experience is obtained through registration for 1 credit under the designator MCDG 8950, Teaching Practicum.

Registration Requirement for the Master's Degree—Master's degree students are required by the Graduate School to complete at least 60 percent of the coursework for their official degree programs (excluding thesis credits) as registered University of Minnesota Graduate School students; The MCDB&G program generally allows transfer of only 4 credits (see Transfer of Credits for the Master's Degree below).

Double Counting—Students may have a maximum of 8 credits in common between two master's-level degrees.

Transfer of Credits for the Master's Degree—Unless otherwise specified under a student's major in Degree Programs and Faculty, the following rules apply to transfer of credits.

With approval of the adviser, director of graduate studies in the major (and director of graduate studies in the minor, if the courses are for a designated minor), and Graduate School, the transfer of up to 4 credits from any combination of the following is permitted.

1. Other recognized graduate schools;

2. University of Minnesota coursework meeting specific registration criteria (see “Registration for Graduate Credit” in the current class schedule for registration instructions);
3. Registrations through other University of Minnesota units (e.g., College of Education and Human Development, Law School) in pursuit of graduate-level degrees that were not awarded;
4. Adult special, summer session, and College of Continuing Education registrations at the University of Minnesota before spring semester 2001.

In all cases, official transcripts of the work must be attached to the degree program form, unless they have already been included in the student’s Graduate School file.

Work to be transferred must be graduate level (postbaccalaureate) and have been taught by faculty authorized to teach graduate courses. It is the student’s responsibility to provide appropriate course documentation (e.g., course syllabi, faculty status information) supporting proposed transfer credits to the program.

In the case of a transfer from a non-U.S. institution, the credits must have been earned in a program judged by the Graduate School to be comparable to a graduate degree program in a graduate school of a regionally accredited institution in the United States.

Regarding the transfer of coursework from either a U.S. or non-U.S. institution, if conditions are placed on a student’s admission to exclude certain coursework from transfer to a Graduate School degree program, that coursework may not be transferred regardless of the level of the coursework or the status of the school or college in which it was earned.

Credits are transferred by including the courses in the proposed degree program. Credits not accepted as part of a student’s degree program cannot be transferred to the Graduate School transcript.

Courses taken before the awarding of a baccalaureate degree cannot be transferred.

Time Limit for Earning the Master’s Degree—All requirements for the master’s degree must be completed and the degree awarded within seven years. The seven-year period begins with the earliest coursework included on the official degree program form, including any transfer work. The graduate faculty in a specific program may set more stringent time requirements.

Students who are unable to complete the degree within the seven-year limit may petition the Graduate School for an extension of up to one additional year. Extensions beyond one year are considered only in the most extraordinary circumstances. To ensure timely consideration, petitions should be filed early in the term in which the time limit expires.

If a petition is approved, the student is notified of the expectations for progress and completion of the degree. If the petition is denied, the student is terminated from the graduate program.

Students who have been terminated under such circumstances may apply for readmission to the Graduate School; however, readmission under these circumstances is not assured. The faculty in the major field and the Graduate School set any readmission conditions on the student’s resumption of work toward the degree, such as registering for additional coursework, retaking written examinations, completing the degree within a specified time period, or other appropriate terms.

For more information about the master’s degree time limit and petitioning procedure, visit http://www.grad.umn.edu/current_students/forms/masters.html.

Plan A: Master’s Degree with Thesis

Plan A (with thesis) Minimum course work:

- 14 semester credits in major field
- 6 semester credits in related field
- 10 Thesis Credits, at a minimum (MCDG 8777)
- 30 credits total**

Students are required to take an oral final exam as well as submitting a M.S. thesis.

TYPICAL COURSEWORK PLAN A

First Year

Fall Semester

- BioC 8001 - Biochemistry: Structure, Catalysis and Metabolism (3 credits)
- BioC 8002 - Molecular Biology and Regulation of Biological Processes (3 credits)
- GCD 8151 - Cell Structure and Function (3 credits)
- MCDG 8900 - Student Research Seminar (1 credit)
- MCDG 8994 - Research (1 - 4 credits, as appropriate)

Spring Semester

- GCD 8131 - Advanced Genetics (3 credits)
- GCD 8161 - Advanced Developmental Biology (3 credits)
- BioC 8401 - Ethics, Public Policy and Careers in Molecular and Cellular Biology (1 credit)
- MCDG 8900 - Student Research Seminar (1 credits)
- MCDG 8910 - Journal Presentations (1 credit) - optional
- MCDG 8994 - Research (if appropriate)

Second Year

Fall Semester Required Courses

- MCDG 8900 - Student Research Seminar (1 credits)
- MCDG 8777 - Thesis Credits Master's (5 credits)
- MCDG 8950 - Teaching practicum (1 credit) Register for this the semester of your TA.

Fall Semester Elective Options (*one 3 or 4 credit course*)- note that this is only a partial list

- GCD 8171 - Literature Analysis (**note: 2 credits**)
- GCD 8213/BioC 8213 - Selected Topics in Molecular Biology (4 credits)
- GCD 8212 - Selected Topics in Cell & Developmental Biology - Stem Cell Biology (3 credits)
- MICa 8001 - Integrated Topics (3 credits)
- BIOC 5361 - Microbial Genomics and Bioinformatics (3 credits)
- BIOC 5527 - Introduction to Modern Structural Biology (4 credits)
- CHEN 8995 - Systems Analysis of Biological Processes (register for proper section)
- EEB 5033 - Population and Quantative Genetics (4 credits)
- NSC 5561 - Systems Neuroscience
- PBIO 5960 - Special Topics (sections vary - epigenetics - bioinformatics)
- PubH 6450 - Biostatistics I (4 credits)
- Stat 5021 - Statistical Analysis (4 credits)

Optional Preparing Future Faculty (<http://www1.umn.edu/ohr/teachlearn/pff/>)

Grad 8101—Teaching in Higher Education

Spring Semester Required courses

- MCDG 8900 - Student Research Seminar (1 credits)
- MCDG 8777 - Thesis Credits Master's (5 credits)
- (MCDG 8950 - Teaching practicum (1 credit) Register for this the semester of your TA.)

Optional Preparing Future Faculty (<http://www1.umn.edu/ohr/teachlearn/pff/>)

Grad 8102—Practicum for Future Faculty.

Spring Semester Elective Options (*one 3 or 4 credit course*) - this is a partial list

GCD 8008 – Mammalian Gene Transfer and Expression (2 credits)
GCD 8073 – Adv. Human Genetics (3 credits)
BIOC 5309 – Biocatalysis and Biodegradation (3 credits)
BIOC 5353 – Microbial Biochemistry and Biotechnology: Small Molecules (3 credits, alternate years)
BioC 5352 – Microbial Biochemistry and Biotechnology: Proteins (3 credits, alternate years)
BIOC 5530 – Selected Topics in Molecular Biophysics (1-3 credits)
BIOC 5444 – Muscle (3 credits)
BIOC 8216 – Signal Transduction and Gene Expression (4 credits)
EEB 5221 – Molecular and Genomic Evolution (3 credits)
MICa 8003 – Immunity and Immunopathology (4 credits)
MICa 8004 – Cellular and Cancer Biology (4 credits)
MATH 5445 – Mathematical Analysis of Biological Networks (4 credits)
NSC 8211 – Developmental Neuroscience

Rotations

Plan A students typically rotate in at least two laboratories and then select their advisor/lab.

Filing of Degree Program Form

File the Degree Program Form by the end of the second semester. You may obtain the **Degree Program form** via the web at http://www.grad.umn.edu/current_students/forms/masters.html. After consultation with and approval of advisor and DGS, submit the program form to MCDB&G Program office with a current nonofficial transcript. Plan A students include the proposed thesis title on the degree program form.

The Examining Committee

The student in consultation with his/her advisor and with approval of the DGS and Graduate School will select three faculty members to serve on this committee. All three members must hold a graduate faculty appointment in the graduate school. Two of the faculty members must be current members of the MCDB&G graduate faculty, one of whom is the student's advisor. The other faculty member is to hold an appointment in another graduate program related to the student's area of interest, although they might also be members of the MCDB&G faculty. One of the three committee members must have their primary academic appointment in a department other than that in which the student's advisor is based. The recommendation of committee members should be presented by the student and advisor to the DGS with a brief justification for each proposed member relative to the student's research interests. The DGS can approve the recommendations or request changes.

Thesis Reviewers

Notify reviewers at least two weeks prior to delivery of thesis; allow readers at least 2 weeks to read the thesis. The student is responsible for returning certified Thesis Reviewer's Report form to Graduate School in exchange for the Final Examination Report form.

Final Examination

The examination is coordinated by the chairperson of the committee. The student obtains the report form from the Graduate School. A majority vote of the three-member committee, all members present and voting, is required to pass the exam. In case of failure, unanimous committee consent is required to retake the final exam, and only one retake is allowed.

For a list of the faculty and their appointment level and departments please refer to the web page at http://www.grad.umn.edu/faculty_rosters/.

Graduation Packet, Thesis Reviewer's Report Form, and Final Examination Form

Pick up anytime after the degree program form is approved. This form is available at the Graduate School, 316 Johnston Hall and can be found at http://www.grad.umn.edu/current_students/forms/masters.html. It includes: Graduation instructions, Application for Degree form (submit by first working day of the intended month of graduation), Commencement Attendance Approval form, and Thesis Reviewer's Report Form. Remember to allow your committee at least 2 weeks to read the thesis. Submit the signed Thesis Reviewer's Report form to 316 Johnston Hall. The Final Examination Report Form will be given to you at that time. You must have the Final Exam Form before you report for the exam. Return the Final Examination Report form by the last working day of the intended month of graduation.

Preparation and Submission of the Thesis

Two copies of the thesis must be submitted to the Graduate School by the last working day of the intended month of graduation. Provide program with **one** copy of **bound or unbound** thesis. The student's adviser(s) must sign both copies of the thesis to confirm that they are complete and satisfactory in all respects and that all revisions required by the final examining committee have been made. Instructions for the preparation of the thesis, including format specifications and adviser's signature requirements, should be obtained from the Graduate School, 316 Johnston Hall, or online at http://www.grad.umn.edu/current_students/forms/masters.html.

Plan B: Master's Degree Without Thesis

Minimum course work:

14 semester credits in major field

6 semester credits in related field

10 semester course credits at discretion of student and adviser. (Research credits may be used.)

30 credits total

Final Oral Examination

Students are required to take an oral final exam as well as submitting a project document.

Teaching experiences

All MS students will teach one semester, not to include the first and last years. The teaching requirement is intended to ensure that all students in the program have, as part of their graduate training, experience as instructors at the university level. Students are able to express their preferences for different teaching assignments. These experiences should provide for professional growth. Credit for teaching experience is obtained through registration for 1 credit under the designator MCDG 8950, Teaching Practicum. See page 12 for guidelines.

TYPICAL COURSEWORK PLAN B

First Year

Fall Semester

BioC 8001 - Biochemistry: Structure, Catalysis and Metabolism (3 credits)

BioC8002 – Molecular Biology and Regulation of Biological Processes (3 credits)

GCD 8151 – Advanced Cell Biology (3 credits)MCDG 8900 – Student Research Seminar (1 credit)

MCDG 8994 – Research (1 credit)

Spring Semester

GCD 8131 – Advanced Genetics (3 credits)

GCD 8161 – Advanced Developmental Biology (3 credits)

BioC 8401 - Ethics, Public Policy and Careers in Molecular and Cellular Biology (1 credit)

MCDG 8900 – Student Research Seminar (1 credit)

MCDG 8910 – Journal Presentations (1 credit) - optional

MCDG 8994 – Research (1 credit)

Second Year

Fall Semester Required Courses

MCDG 8900 – Student Research Seminar (1 credit)

(MCDG 8950 – Teaching practicum (1 credit) Register for this the semester of your TA.)

Fall Semester Electives Options (*one 3 or 4 credit course*)- note that this is a partial list

GCD 8171 - Literature Analysis (**note: 2 credits**)

GCD 8213/BioC 8213 – Selected Topics in Molecular Biology (4 credits)

GCD 8212 - Selected Topics in Cell & Developmental Biology – Stem Cell Biology (3 credits)

MICa 8001 – Integrated Topics (3 credits)

BIOC 5361 – Microbial Genomics and Bioinformatics (3 credits)

BIOC 5527 – Introduction to Modern Structural Biology (4 credits)

CHEN 8995 – Systems Analysis of Biological Processes (register for proper section)

EEB 5033 - Population and Quantative Genetics (4 credits)

NSC 5561 - Systems Neuroscience

PBIO 5960 – Special Topics (sections vary – epigenetics – bioinformatics)

PubH 6450 - Biostatistics I (4 credits)
Stat 5021 - Statistical Analysis (4 credits)

Spring Semester

MCDG 8900 –Student Research Seminar (1 credit)
(MCDG 8950 – Teaching practicum (1 credit) Register for this the semester of your TA.)

Spring Semester Elective Options (*one 3 or 4 credit course*)

GCD 8008 – Mammalian Gene Transfer and Expression (2 credits)
GCD 8073 – Adv. Human Genetics (3 credits)
BIOC 5309 – Biocatalysis and Biodegradation (3 credits)
BIOC 5353 –Microbial Biochemistry and Biotechnology: Small Molecules (3 credits, alternate years)
BioC 5352 - Microbial Biochemistry and Biotechnology: Proteins (3 credits, alternate years)
BIOC 5530 – Selected Topics in Molecular Biophysics (1-3 credits)
BIOC 5444 –Muscle (3 credits)
BIOC 8216 – Signal Transduction and Gene Expression (4 credits)
EEB 5221 – Molecular and Genomic Evolution (3 credits)
MICa 8003 – Immunity and Immunopathology (4 credits)
MICa 8004 – Cellular and Cancer Biology (4 credits)
MATH 5445 - Mathematical Analysis of Biological Networks (4 credits)
NSC 8211 - Developmental Neuroscience

Rotations

Plan B students are required to do two or three rotations and then select their advisor/lab.

The course requirements for a Plan B (non-thesis) MS are identical to those for the PhD. MS students are required to complete at least 30 credits total. Plan B MS students do not have to conduct long-term research, but they are required to do laboratory rotations and research for at least 2 semesters, and to submit a 15-page paper outlining the research they conducted on their rotations, which constitutes their Plan B paper. A final examination is also required.

Project Completion

The Plan B project requirement can be satisfied in three ways:

1. By undertaking projects, of appropriate scope (independent of any courses) involving a minimum of 120 hours of effort. This is the recommended option for MCDB&G and involves two 10-week lab rotations and a final report of 15 pages.
2. By completing Plan B papers in three graduate courses in the master's program, each requiring approximately 40 hours of effort. The student will have the instructor certify that he/she has agreed to the paper and that it meets the standards of a Plan B paper.
3. By undertaking independent study courses, creditable to the master's program, devoted totally to the completion of Plan B project(s). A total of 120 hours of effort is the minimum requirement.

Filing of Degree Program Form

File the Degree Program Form by the end of the second semester. You may obtain the **Degree Program form** via the web at http://www.grad.umn.edu/current_students/forms/masters.html. After consultation with and approval of advisor and DGS, submit the program form to MCDB&G Program office with a current nonofficial transcript. Plan A students include the proposed thesis title on the degree program form.

The Examining Committee

The student in consultation with his/her advisor and with approval of the DGS and Graduate School will select three faculty members to serve on this committee. All three members must hold a graduate faculty appointment in the graduate school. Two of the faculty members must be current members of the MCDB&G graduate faculty, one of whom is the student's advisor. The other faculty member is to hold an appointment in another graduate program related to the student's area of interest, although they might also be members of the MCDB&G faculty. One of the three committee members must have their primary academic appointment in a department other than that in which the student's advisor is based. The recommendation of committee members should be presented by the student and advisor to the DGS with a brief justification for each proposed member relative to the student's research interests. The DGS can approve the recommendations or request changes.

Final Examination

The Examination is coordinated by the chairperson of committee. The student obtains the report form from the Graduate School after the Degree Program form has been approved. A majority vote of the three-member committee, all members present and voting, is required to pass the exam. In case of failure, unanimous committee consent required to retake final exam, and only one retake is allowed.

For a list of the faculty and their appointment level and departments please refer to the web page at http://www.grad.umn.edu/faculty_rosters/.

Graduation Packet and Final Exam Form

Pick up anytime after the Degree Program form is approved. This form is available at the Graduate School, 316 Johnston Hall and can be found at http://www.grad.umn.edu/current_students/forms/masters.html. It includes: Graduation instructions, Application for Degree form (submit by the first working day of intended month of graduation), Commencement Attendance Approval form, and Final Examination Report. Return the Final Examination Form to 316 Johnston by the last working day of the intended month of graduation.

FACILITIES

CBS Imaging Center, 23-35 Gortner Lab, 612-624-3454.

Research light microscope with cooled CCD video camera, Confocal laser microscope, Phosphorimager, densitometer Scanner, printers, and computers for image processing.

Advanced Biosciences Computing Center (ABCC), 247 Gortner Ave., 625-9284.

University-wide computer system for the study of biomolecular structure and for the design and analysis of recombinant DNA experiments.

Biomedical Image Processing Laboratory, 1-205 Nils Hasselmo Hall (NHH), 612-624-6607.

Computer facility for analyzing biological structure, capable of generating complex three-dimensional images, resolving structure with image enhancement and analyzing patterns in diverse images.

Electron Optical Facility, 495 Borlaug Hall, 612-625-8249.

Scanning electron microscopy, transmission electron microscopy and X-ray microanalysis.

Institute for Biological Process Technology, 240 Gortner Lab, 612-624-6774. Facilities for growing and monitoring large-volume cultures of prokaryotic, plant, and animal cells

Mass Spectrometry Facility, 43 Gortner Lab, 612-624-7715 or 612-625-2280.

Medical School Electron Microscopy Facility, 1-225/1-234 Nils Hasselmo Hall (NHH), 612-624-4652.

Access to state-of-the-art equipment for trained users at reasonable costs. Education in the preparation of specimens and training in the use of specialized equipment and microscopes. Full service electron microscopy (transmission or scanning) for pilot or long term studies.

MicroChemical Facility, 1-202 Nils Hasselmo Hall (NHH), 612-624-3177.

Fully automated, gas-phase protein sequenator with in-line HPLC amino acid analyzer, Oligonucleotide synthesizer, Peptide synthesizer, and HPLC purification systems.

GRADUATE SCHOOL

The Graduate School is housed in Johnston Hall on the Minneapolis campus. Directors of Graduate Study (DGS) serve in a liaison capacity with the Graduate School. These individuals coordinate the programs and can be of assistance to students in need of information on regulations and requirements at both the program and Graduate School level.

GRADUATE RECORDS

Each semester the Graduate School will distribute to the Director of Graduate Studies an operational record (internal transcript) for all students currently registered. The record contains course and grade information drawn from student records maintained by the Office of the Registrar.

The official transcript will include a complete record of a student's registrations after the end of the second week of classes each semester and grades or registration symbols assigned for those courses. Information on obtaining a transcript can be obtained at <http://onestop.umn.edu/onestop/grades.html>.

Degree Clearance, Graduation and Commencement Ceremonies

Graduate students may graduate monthly. By obtaining the Graduation packet and submitting the application for degree by the first working day of the month, the Graduate School will monitor completion of academic degree requirements, i.e., course work, final examination report forms, microfilming fees, theses, etc. If all requirements are completed by the last working day of the month, the degree will be awarded as of that day and recorded on both the transcript and diploma. If all requirements are not completed, graduation will be delayed at least until the next month. Please refer to these web pages for an explanation of the Graduate School forms, requirements and process at http://www.grad.umn.edu/Current_Students/degree_completion/index.html

There are two Commencement Ceremonies each year. January through June graduates may attend the May ceremony; July through December graduates may attend the December ceremony. If a student wishes to have his or her name appear in the Commencement Program distributed at the ceremony and/or attend the ceremony, they must complete the Commencement attendance form and have it signed by their advisor and the DGS by the deadlines. Diplomas will be prepared and sent to students as soon as possible after completion of the degree requirements (3-4 months). Information is available on the Graduate School web site at http://www.grad.umn.edu/current_students/degree_completion/commencement/index.html.

EMPLOYMENT TERMS AND CONDITIONS FOR UNIVERSITY OF MINNESOTA GRADUATE ASSISTANTS

Policy and Guideline information pertaining to graduate assistantship employment is available online (<http://www1.umn.edu/ohr/gae/>), from your hiring department, or from Graduate Assistant Employment. Please be aware you are responsible for knowing the policies and guidelines applicable to your appointment as a graduate assistant.

In addition to the terms and conditions set forth in your graduate assistant appointment letter, graduate assistantships are contingent upon admission to the Graduate School, current registration as a graduate student and satisfactory progress toward a Graduate School degree. In order to hold a graduate assistantship during fall or spring semester you are required to be registered for credit (audit registration only is not acceptable). For regular assistantships, 6 credits of registration are required; for Advanced Masters and Ph.D. Candidate positions, one credit is required. If personal circumstances require registration for fewer than six credits, you may apply for an exception. For details, see the above web site. Registration during May Intersession and summer term are not required to hold an assistantship.

Registration must be completed by the end of the second week of classes and maintained for the entire semester or your graduate assistantship will be terminated. Withdrawal from all credits will result in termination of your assistantship. If your assistantship is terminated, the hiring department has the option of converting your appointment to a non-student classification for the remainder of that semester only; however, benefits such as your graduate assistant health insurance plan and tuition benefits may be adversely affected.

Tuition benefits will be available to you if you meet eligibility requirements. These benefits are summarized on the following pages. Further details may be found online (<http://www1.umn.edu/ohr/gae/>).

You may enroll in the Graduate Assistant Health Insurance Plan if you meet eligibility requirements. If you are interested in this coverage, you must enroll through the Graduate Assistant Insurance Office located at N323 Boynton Health Service, (612)-624-0627 or email studins@bhs.umn.edu.

If you have F-1 or J-1 visa status, federal law prohibits the University from employing you more than 20 hours per week (50% time) during scheduled class periods and finals weeks. Exceptions exist if you have been authorized for 'practical or academic training'. Consult with the Office of International Student and Scholar Services over these matters.

FELLOWSHIPS

A number of graduate fellowships and awards based on academic and research merit are available to new and currently enrolled grad students through the Graduate School. Information may be obtained from the Graduate Fellowship Office, 314 Johnston Hall, 612-625-7579 or via the web at <http://www.grad.umn.edu/fellowships/>.

The Graduate School publishes a list of available fellowships each year at <http://www.grad.umn.edu/fellowships/>.

Privately-funded Fellowships

Several privately-funded fellowships are administered by the Graduate School. Please see the Graduate School fellowship website (listed above) for a current listing of available privately-funded fellowships. Application deadline is December 1.

Doctoral Dissertation Fellowships

Candidates must be nominated by the MCDB&G graduate program to an all-University Graduate School competition. Fellowships are awarded to students who expect to complete their thesis research within 18 months. The internal MCDB&G program deadline will be announced by email and is in February of each year.

Doctoral Dissertation Research Grant

Grants of up to \$2,500 are available to support dissertation research, such as domestic travel and expenses for fieldwork, postage, and photocopying. Deadlines: October 1 and March 1 (if deadline falls on a weekend, then the following Monday.)

Woman's Club of Minneapolis Fellowship

For graduate students with high scholarship and leadership ability. Special consideration will be given to students who are planning to remain in the Twin Cities metropolitan area. Must be a U.S. citizen. One award. Stipend: \$5,000 for the academic year. Deadline: December 1 (if deadline falls on a weekend, then the following Monday.)

Torske Klubben Fellowship for Minnesota Residents

This fellowship award has been established to support outstanding graduate students (master's or Ph.D.) currently enrolled in any field in the University of Minnesota Graduate School. Applicants must have outstanding academic achievement, excellent leadership potential, and an interest in or connection with Norway. Must be official state of Minnesota residents. The stipend is \$12,000 for the academic year, plus full tuition. Sponsored by the Torske Klubben of Minneapolis. Deadline: March 1 (if deadline falls on a weekend, then the following Monday.)

The Minnesota Medical Foundation administers several research awards each year. For a current list, see the **student honors and awards section** of their website, which can be accessed from <http://www.mmf.umn.edu/services/>, and scroll down to the research section. Applications are typically due in January.

Students may also submit applications for fellowships through agencies that are external to the University of Minnesota. There is a listing of several external fellowships at the Graduate School website. Students should consult with their advisors about submitting applications for highly competitive fellowships from the NIH, NSF, American Heart Association, etc. Submission of fellowship proposals to external agencies requires consultation with your advisor and with your advisor's departmental grants submission staff to co-ordinate the preparation and submission of proposals.

GRADUATE ASSISTANT INFORMATION

Health care

Graduate assistants with appointments of 25% or more are eligible to receive a health-care package. To obtain this coverage you must enroll at Boynton Health Service (625-8400). Once you are enrolled, your coverage will continue as long as your appointment remains at 25% or more. If you have coverage spring semester, you will be covered through the summer even if you are not working as a graduate assistant. If you leave your graduate assistant appointment before the end of the term, your graduate assistant health-care coverage will end. However, you have the option of purchasing continuing coverage at your own expense. For more information, contact the Graduate Assistant Medical Plan, N-323 Boynton Health Service, 612-624-0627 or email at studins@bhs.umn.edu or refer to their website for detailed information at <http://www.bhs.umn.edu/insurance/graduate/index.htm>.

All graduate assistants and students receiving financial aid through other appointments must be registered in each fall and spring semester during which they hold appointments. A hold will be placed on the records of a student who has accepted pay for graduate assistantship work and who has not registered for that semester, or who has canceled all valid registration for that semester. **Students must be enrolled for a minimum of 6 credits each semester during the academic year or until they have passed their preliminary oral exam and taken their 24 thesis credits, after which they may register for 1 credit of MCDG 8444 to maintain full-time status.**

Tuition and In-state Tuition Eligibility

Graduate assistants (GA) who hold at least a 25% time appointment (195 hours per semester) receive tuition benefits (tuition waivers) equal to twice the percentage of their appointment for the semester in which they hold the appointment. For example, those holding a 25% appointment will receive a 50% tuition benefit, while those with an appointment of 50% or more will receive a 100% tuition benefit. A 50% appointment is typical for PhD students. These benefits waive tuition only and do not cover the student services fee or course fees. Please review the important information on their web page at <http://www1.umn.edu/ohr/gae/>.

If a student holds a 25% time (or more) graduate assistantship, traineeship or fellowship for three academic semesters, the privilege of eligibility for in-state tuition is extended on a semester-for-semester basis up to a maximum of six semesters of use. This privilege applies to the student and to members of his/her immediate family.

Both resident and nonresident graduate students who hold current qualifying graduate appointments may choose to pay their tuition and student services fee by payroll deduction if they owe tuition and applicable fees in excess of \$150, and their total net earnings for the last four paychecks of the semester are equal to or greater than what is owed plus \$80.

The Graduate Assistants Employment (GAE) office, Office of Human Resources, 200 Donhowe Building, 319-15th Ave SE, Minneapolis, MN 55455, Phone: 612-624-7070 Fax: 612-625-9801, email: gaoinfo@umn.edu, web page: <http://www1.umn.edu/ohr/gae/>, certifies eligibility for resident tuition rates for both current and former graduate assistants and their families, as well as eligibility for payroll deduction of tuition and fees for those holding current appointments as graduate assistants. Certification for current students is part of the regular procedure for processing graduate assistant appointment documents, and will be coded directly into the computerized registration system. Immediate family members and students wishing to claim extended nonresident tuition credit must bring ID cards to the Graduate Assistants Employment office each semester for certification prior to going to the registration center.

TUITION BENEFITS

Waiver of Nonresident Portion of Tuition

Graduate Assistants who work a minimum of 25% time (10 hours per week) per semester and are properly registered are eligible to receive resident rate tuition during that semester. Resident rate tuition also applies to eligible students' immediate family members (spouse or registered same sex domestic partner, children, parents, or legal guardian or ward living in the household).

Maximum Benefits per Semester

A graduate assistant appointed 50% time (an average of 20 hours per week) for the full-semester payroll period (which begins before the start of classes and extends beyond finals week) typically receives a tuition benefit equivalent to the Graduate School's tuition band level (at resident rates). This benefit would cover 6-14 credits per semester. Those in the Advanced Masters or Ph.D. Candidate job classes receive a benefit equal to one credit of Graduate School tuition. Legal Project Assistants with Tuition Benefits receive the equivalent of Law School tuition. Medical Fellows must work 100% time for the full semester to receive the equivalent of the Graduate School's tuition band level.

Prorated Tuition Benefits

Graduate assistants appointed for less than 50% time or for less than the full semester payroll period will not receive the maximum tuition benefits. Their benefits are prorated according to the total number of hours worked over the 19.5 week payroll semester. Maximum benefits require appointments of at least 390 hours per semester (20 hours x 19.5 weeks). Appointments for fewer than 195 hours per semester (equivalent to a 25% appointment for the full term) do not qualify for any tuition benefit.

The tuition benefit percentage can be calculated by dividing total semester hours of employment by 390. A full-semester 25% appointment (195 hours) receives half of the Graduate School band tuition level. Full term appointments between 25% and 50% receive prorated tuition benefits, the percentage equivalent to double their appointment percentage (e.g., a 40% appointment receiving 80% tuition benefit).

Appointments Beginning After or Ending Before the Official Semester Appointment Dates

Appointments that begin after or end before the official semester appointment dates will be prorated according to total hours worked for the semester payroll period. The student will have the unearned portion of tuition benefits billed to them, at non-resident rates if applicable. If the shortened appointment falls below the 195-hour eligibility threshold (equivalent to a 25% time appointment for the full semester period), 100% of the tuition will be billed to the student, at non-resident rates if applicable.

Appointments Ending Due to Graduation

Effective Spring 2001, if an appointment ends early because of graduation, the student will receive the full tuition benefit awarded for that final term of employment as a graduate assistant. The benefit will not be prorated and charged back to the student.

Summer Tuition Benefits

Nine-month academic year assistantships carry no summer tuition benefit. Summer benefits are earned only from hours of assistantship employment during the 13 week summer period between spring and fall semesters. In order to provide comparable maximum benefits to those earned during an academic year semester, summer benefits accrue at a 50% faster rate; maximum benefits (typically, the Graduate School's tuition band level) are earned for 260 hours of summer employment (i.e. 20 hours x 13 weeks) and lesser hours are prorated according to that 260 hour norm. The minimum summer appointment threshold for tuition benefits is 65 hours. Benefits are higher for the 9574 job class, Summer Session Teaching Assistant, and are calculated differently. See the GAO website (<http://www1.umn.edu/ohr/gao>) for details.

Extended Waiver of Nonresident Portion of Tuition

Former graduate assistants, their immediate family members, and/or domestic partners are eligible to receive extended resident rate reductions if the graduate assistant has held at least 2 semesters of qualifying appointments (at least 25% time). This benefit is extended to graduate assistants who are no longer employed as graduate assistants for a maximum of 4 semesters, one term of extended benefit earned for each term of employment. Extended benefits must be used within 3 years of the last term of assistantship appointment.

Provisional Tuition Benefits

A department may place a graduate assistant on a provisional appointment (flexible hourly) whereby the assistant may receive a tuition benefit at the beginning of the semester based upon an estimation of the number of hours the assistant will work per week. The department shall submit the actual number of hours worked by the assistant at the end of the semester to Graduate Assistant Employment. Any hours worked in excess of the estimated number will result in a tuition benefit credit, if applicable. If fewer hours are worked than the estimated number, the student will be billed for the unearned portion of tuition benefits, at non-resident rates if applicable. If the total number of hours worked per semester falls below the 25% time minimum eligibility requirement (195 hours) in order to receive a tuition benefit, the student will be billed for the entire tuition benefit received, at non-resident rates if applicable.

RESOLUTION TO ISSUES

Resolution of grievances may be sought through the student's adviser, the Director of Graduate Studies, the Department heads, the Graduate School, and the University Senate Judicial Committee.

Grievance procedures relating to academic freedom and responsibility are governed by the University Senate statement on Academic Freedom and Responsibility of December 17, 1970, and the Revised Report of the University Appeals Committee on Academic Freedom and Responsibility of April 18, 1974. As a consequence of these policies each department or program has available a set of operating procedures to deal with both the formal and informal aspects of possible grievance matters. Each department or program has also established a standing committee on grievances to conduct hearings and make recommendations in those cases which reach the formal grievance stage.

In the event that the nature of the potential grievance precludes resolution, graduate students may wish to seek advice from the Graduate School dean's office. There is a Graduate School Grievance Committee, but its function is essentially limited to hearing appeals from department or program grievance committees.

Recent publications speaking to the issue of sexual harassment have attempted to avoid misunderstandings by faculty, students and staff on the definition of sexual harassment and set procedures for filing and/or resolving complaints. The rights and concerns of the complainant and the respondent must be fully assured. To get further information or advice about sexual harassment, contact the Office of Equal Opportunity and Affirmative Action on the Twin Cities campus (419 Morrill Hall, 612-624-9547).

An Office for Students with Disabilities is located in the McNamara Alumni Center at 200 Oak St. (612-626-1333). The Office protects the rights of disabled people and provides information, referral, advocacy, and accommodations such as sign language interpreters, readers, and academic assistance (<http://ds.umn.edu/index.html>).

The University Counseling and Consulting Services provide assistance to those students who wish to learn more about themselves as they develop in an educational setting. Counseling services include the areas of academic or educational decisions, vocational or career planning, personal or family problems, marital relationships, and other concerns. Assistance is offered to develop reading and study skills. They are located in 199 Coffey Hall (612-624-3323) and 109 Eddy Hall (612-624-3323) - <http://www.ucs.umn.edu/> in Mpls and for St. Paul.

Counseling and advisory services are provided for students and scholars from other countries by the Office of International Student and Scholar Services in 190 HHH Center on the Minneapolis West Bank campus (612-626-7100). This office provides assistance to those seeking information about visa regulations; federal, state and local regulations governing foreign nationals; financial aid requirements; English language requirements; and other educational, social and personal problems (<http://www.iss.umn.edu/>).

UNIVERSITY INVOLVMENT

The graduate students have created an organization to provide a forum for graduate students to discuss and make recommendations on matters related to graduate students. Student representation on program and Graduate School committees and at staff meetings is solicited through the Graduate Student Association (GSA).

The Council of Graduate Students (COGS) officially represents within the Graduate School all graduate students. In each program the graduate students may elect one representative to serve on the council. Through COGS these representatives are able to accomplish the following: (a) unite graduate student forces; (b) assimilate, coordinate and disseminate pertinent information; (c) provide student members for Graduate School and University committees; (d) deal with those problems and issues which affect graduate students. The COGS Newsletter, distributed to all graduate students, attempts to keep graduate students informed of Graduate School affairs. <http://www.cogs.umn.edu>.

Graduate students are encouraged to participate in a variety of scientific and research activities. A Women in Science group meets regularly. The group brings together faculty and students to discuss scientific problems and concerns relating to their status as women. For detailed information contact Kathryn Hanna (612-625-2788) in the CBS office. <http://www.chem.umn.edu/groups/musier-forsyth/links.html>

EQUAL OPPORTUNITY STATEMENT

The University of Minnesota is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.

In adhering to this policy, the University abides by the Minnesota Human Rights Act, Minnesota Statute Ch. 363, by the Federal Civil Rights Act, 42 U.S.C. 2000e; by the requirements of Title IX of the Education Amendments of 1972; by Sections 503 and 504 of the Rehabilitation Act of 1973; by the Americans with Disabilities Act of 1990; by Executive Order 11246, as amended; 38 U.S.C. 2012, the Vietnam Era Veterans Readjustment Assistance Act of 1972, as amended; and by other applicable statutes and regulations relating to equality of opportunity.

Inquiries regarding compliance may be directed to the Office of Equal Opportunity and Affirmative Action, 419 Morrill Hall, 100 Church Street S.E., University of Minnesota, Minneapolis, MN 55455, (612) 624-9547.

HELPFUL WEB ADDRESSES

- Computer labs: <http://www1.umn.edu/adcs/>
- Council of Graduate Students (COGS), 405 Johnston Hall, <http://www.cogs.umn.edu>
- Graduate Assistant Medical Plan, N-323 Boynton Health Service, 612-624-0627 or email: studins@bhs.umn.edu, <http://www.bhs.umn.edu/insurance/graduate/index.htm>
- Graduate Assistant Employment Office (GAE), 170 Donhowe Building, 612-624-7070 Fax: 612-625-9801, web at <http://www1.umn.edu/ohr/gae/>
- Graduate School Catalog: <http://www.catalogs.umn.edu/grad/index.html>
- Graduate School website: www.grad.umn.edu
- Graduate School Forms: http://www.grad.umn.edu/current_students/forms/index.html
- Graduate School Student Services: 316 Johnston Hall, 612-625-3490, http://www.grad.umn.edu/offices-contacts/student_services.html
- Health Service Boynton on St. Paul Campus, 109 Coffey Hall, 612-624-7700; on Minneapolis, 109 Eddy Hall, 612-624-0627, <http://www.bhs.umn.edu/>
- Housing: <http://www.umn.edu/housing/>

- International Student and Scholar Services, 190 Hubert H. Humphrey Center (HHH), 612-626-7100
www.iss.umn.edu
- Libraries: <http://www.lib.umn.edu/>
- MCDB&G Graduate Program: <http://cbs.umn.edu/mcdbg/>
- Office for Students with Disabilities, McNamara Alumni Center, 612-626-1333, <http://ds.umn.edu/index.html>
- Parking and Transportation Services Office, 511 Washington Avenue SE, at 612-626-7275 or on the web at <http://www1.umn.edu/pts/>.
Student contract lottery each semester at <http://www1.umn.edu/pts/studentcontracts.htm>
- Registration: <http://onestop.umn.edu/onestop/registration.html>
- Scholarships and Financial Aid, 210 Fraser Hall, 612-624-1665, <http://www.onestop.umn.edu/onestop/financialaid.html>
- Student Dispute Resolution Center. 211 Eddy Hall, U of MN, East Bank, (612) 624-7272, email us sos@umn.edu, <http://www1.umn.edu/sos/>. When trying to get help with problems at the 'U', students often find more questions than answers. If you're having trouble getting help with your complaints or questions, contact us. We're here to help.
- University Counseling and Consulting Services, <http://www.ucs.umn.edu/>. Located in 109 Eddy Hall on the Minneapolis Campus and 199 Coffey Hall. 612-624-3323. Counseling on personal, cultural and health issues; workshops on thesis writing, professional relationships and career issues.
- University Grievance Office, 662 Heller Hall (West Bank), E-mail: ugo@umn.edu, Tel: (612) 624-1030
University Grievance Office is to provide a fair, prompt and effective grievance process for eligible University employees. The purpose of the grievance process is to help the University achieve its educational mission by resolving employment disputes.

Revised MCDB&G Written & Oral Preliminary Examinations

August 27, 2004

The previous format for the Written & Oral Preliminary Examinations was to have the student write a 15-page research proposal based on their thesis project and then defend that at the Oral Examination. The project is to be the product of the student's own efforts and the student is not allowed to receive assistance from their advisor.

The benefit of this style of exam is that the students are forced to think about their thesis work in detail, however, many drawbacks have become apparent. Virtually all students are given (or strongly directed towards) their projects by their advisor and they do not really make the initial intellectual investment in identifying and developing an independent project, as is the intention of the examination. Also, the student is then prohibited from drawing on the expertise and guidance of their advisor and this becomes an awkward situation for both sides and it undercuts the ability of the advisor to provide guidance at a critical stage in the development of the project. When the time comes for the Oral Examination, it often ends up focusing on details of the thesis project and does not truly serve as a forum for testing the general knowledge of the student. Criticisms of the project itself are often muted as there is always the natural concern that they make be taken to be criticisms of the advisor. Again, this undermines the goals of the exam, which is to test the student's ability to pose and test hypotheses, test their general knowledge in the areas of Molecular Biology, Genetics, Cell Biology and Development, and assess the ability of the student to think on their feet.

MCDB&G Executive Committee has changed the format of the Written & Oral Preliminary Examinations with the objective of making it a better test of a student's ability to pose and test hypotheses as well as their general graduate-level knowledge in the core areas of MCDB&G.

Written Preliminary Examination

The general format of the Written Preliminary Examination will stay the same - a 15 page research proposal.

The major difference will be that the student may not write on their thesis topic or on any other topic that they have written on in the recent past (e.g their research proposal for GCD 8213, Select Topics in Molecular Biology). They may write on any other topic of their choosing within their field of research or another field of interest.

Students will submit a one-page outline of their thesis project (essentially, the specific aims of their project) along with an outline of their Written Preliminary Exam topic two months before the Written Examination is due. The Student Review Committee must approve of the topic for the Written within 48 hrs. The major criteria for approval will be that the Written topic falls within the areas represented by the MCDB&G faculty and that it not be a thinly disguised version of the student's thesis topic.

Examining Committee

Examining Committee will consist of five faculty members, as before, and the composition must be approved by the DGS. Two of these members must have a primary appointment outside of the advisor's home department and two must hold appointments in other Graduate programs. The advisor will not be an official member of the examining committee. The Student Review Committee or DGS will appoint a committee chair.

The Written Preliminary Examination will be read by three of the Examining Committee members.

Oral Preliminary Examination

All five committee members plus the advisor will be present. The advisor is to be a silent observer, not an active participant.

Each committee member will be provided with a copy of the final Written Preliminary Examination as well as a copy of the thesis outline.

The Oral Examination will start with a presentation of the Written Preliminary Examination proposal by the student. The committee will start with questions about the proposal. These will include specific questions about the proposed plan as well as more basic knowledge questions that would be relevant to both the proposal as well as likely thesis work. The Examining Committee may also ask the student questions about the likely thesis project.

Thesis Committee

Once the student has passed both their Written & Oral Preliminary Examination, the thesis committee will consist of five members, including the advisor. The Thesis Committee must be approved by the DGS. Two of the committee members must have primary appointments outside of the advisor's home department and two must hold appointments in other Graduate programs. It is anticipated that the five Thesis Committee members will be drawn from the Oral Examining Committee, but this is not required.

The Prelim Process – a step by step guide

1. Assemble the Advisory & Examination committee.

Examining Committee will consist of five faculty members, and the composition must be approved by the DGS. Two of these members must have a primary appointment outside of the advisor's home department and two must hold appointments in other Graduate programs. Three members must be appointed in MCDB&G. The advisor will not be an official member of the examining committee. (The advisor will be an official member of the final thesis defense committee.) The Student Review Committee or DGS will appoint a committee chair.

The Written Preliminary Examination will be read by three of the Examining Committee members.

You will receive a committee approval form electronically to fill out. Please email the form to the DGS and provide a brief justification for the selection of each member, by the end of June. The DGS will approve the committee or ask you to modify it. Modifications are usually requested to broaden the research expertise represented by the committee.

2. File the Degree Program Form.

This form lists all of the courses that you have taken or will take as well as your 24 thesis credits. Two-thirds of your course credits must be A/F; only 1/3 can be S/N. This form is, essentially, your contract with the Graduate School and the MCDB&G Program and indicates that you have or will meet the Program requirements by taking these courses. It also officially "registers" your committee with the Graduate School.

The form must be completed by the student, signed by the advisor and then submitted to the DGS along with a transcript. The DGS will sign it and then forward it to the Graduate School and a copy to the Program office.

This (and all other Graduate School forms) can be obtained from the Graduate School web site (http://www.grad.umn.edu/current_students/forms/index.html)

3. Decide on the proposal topic.

The student may not write on their thesis topic or on any other topic that they have written on in the recent past (e.g. their research proposal for GCD 8213, Select Topics in Molecular Biology). They may write on any other topic of their choosing within their field of research or another field of interest that is pertinent to MCDB&G.

Students will submit a one-page outline of their thesis project (essentially, the abstract and specific aims of their project) along with a one-page outline (abstract and specific aims) of their Written Preliminary Exam Proposal to the DGS. The deadline for submission of these two outlines is **January 15, 2007**. The Student Review Committee must approve (or disapprove) of the topic for the Written and will strive to return their decision to you within 48 hrs. The major criteria for approval will be that the Written topic falls within the areas represented by the MCDB&G faculty and that it not be a thinly disguised version of the student's thesis topic (More specific guidelines may be added.)

4. Prepare and submit the Written Examination.

The pages following this summary contain information regarding the format of the examination. The written examination must be submitted by **MARCH 14, 2007**.

The Written Preliminary Examination will be read and evaluated by three of the Examining Committee members.

5. The Student Review Committee informs the student and DGS of the results of the Preliminary Written Examination and the recommended course of action.

The DGS notifies the MCDB&G program office of the results.

6. Have your advisor complete and submit a Written Preliminary Examination Form to the DGS once the examination has been passed.

Once the Preliminary Written Examination has been passed you may proceed to schedule the Preliminary Oral examination.

7. Schedule the Preliminary Oral Examination with the Graduate School at least one week in advance of the exam.

The Preliminary Oral Exam must be taken within three months of passing the Written Oral Examination. Students are responsible for consulting with committee members about their availability and scheduling a room with the GCD office.

The Degree Program Form and the Written Preliminary Examination Form must be approved and on file with the Graduate School in order to take the Preliminary Oral Examination.

All five committee members plus the advisor will be present. The advisor is to be a silent observer, not an active participant.

Each committee member will be provided with a copy of the final Written Preliminary Examination as well as a copy of the thesis outline.

The Oral Examination will start with a presentation of the Written Preliminary Examination proposal by the student. The committee will start with questions about the proposal. These will include specific questions about the proposed plan as well as more basic knowledge questions that would be relevant to both the proposal as well as likely thesis work. The Examining Committee may also ask the student questions about the likely thesis project.

8. Submit the signed Preliminary Oral Examination Report form to the Graduate School within one working day of completion of the Prelim Oral exam.

The Preliminary Oral Examination Report form will be sent to the Chair of the Examining committee after the exam has been scheduled with the Graduate School. The committee will complete the form and the student will submit it to the Graduate School.

9. Submit the Thesis Proposal form the term after passing the Preliminary Oral Examination.

Once the student has passed both their Written & Oral Preliminary Examination, the thesis committee will consist of five members, including the advisor. **The Thesis Proposal form designates the Final Thesis Committee.** This Committee must be approved by the DGS. Two of the committee members must have primary appointments outside of the advisor's home department and two must hold appointments in other Graduate programs. It is anticipated that the five Thesis Committee members will be drawn from the Oral Examining Committee, but this is not required.

Detailed information about all of these steps can be found either on the Graduate School web site or you can contact the MCDB&G Program Office.

Written Preliminary Examination

Proposal Guidelines

The written preliminary examination will consist of an original research proposal.

This proposal should:

- Set forth an original hypothesis about an unsolved problem that you propose to investigate.

The student may not write on their thesis topic or on any other topic that they have written on in the recent past (e.g. their research proposal for GCD 8213, Select Topics in Molecular Biology). They may write on any other topic of their choosing within their field of research or another field of interest.

- Provide a critical review of relevant literature leading to a stated hypothesis.
- Include a statement regarding the significance of the problem.
- Describe a meaningful set of experimental designs to test the hypothesis.
- Include a discussion of anticipated results and alternate possibilities.

Students are encouraged to consider a wide range of techniques to evaluate the validity of the hypothesis. The total length of the proposal is limited to 15 pages double-spaced, 12-point type and 1-inch margins (excluding references). The limit includes figures. The following format should be used and recommended page lengths are indicated:

- Background and Significance (5 pages)
- Specific aims, including statement of hypothesis (1 page)
- Experiment Design (5 pages)
- Anticipated Results and Alternatives (2 pages)
- Summary and Future Directions (2 pages)
- References

Note: the page lengths in parentheses are meant as rough guidelines.

Rules to be followed when writing the proposal

Since this is an examination, the proposal must be of the student's own creation. The student may not use any research grant application written by his/her advisor or any ongoing project in the lab as the basis for the proposal. It is up to the student to choose the topic of the proposal. The scope should be sufficiently narrow so that it represents a 3-4 year project that can be completed by an individual, not a broad NIH grant to support 5-10 people. The student may not let anyone read her/his proposal prior to submission. The proposal will be delivered to the MCDB&G office by **MARCH 14, 2007**.

Grading of the Written Preliminary Examination.

The written preliminary examination will be graded by three faculty who are members of the student's Advisory and Examination Committee, excluding their advisor.

The written proposal will also be distributed to the student's advisor and to the faculty members on the student's preliminary oral examining committee who are not examiners. The student is strongly encouraged to solicit comments from these faculty prior to the preliminary oral examination.

The three graders will read and evaluate the examination. Each grader will indicate on the grade sheet one of the following outcomes:

- Pass – students passes the written examination.
- Pass with Revisions– the proposal must be corrected according to the committee recommendations before the student can pass the written examination.
- Fail – the proposal contains fundamental flaws or the proposal is poorly written. The student does not pass the written examination and will be given a second chance to write a new proposal.

The recommendations of each committee member will be forwarded to the DGS. The outcomes will be as follows:

- All 3 pass = pass
- 2 pass + 1 pass with revisions = pass
- 1 pass + 2 pass with revisions = pass with revision
- All 3 pass with revisions = pass with revision
- 1 pass + 1 pass with revisions + 1 fail = pass with revision
- 2 pass with revisions + 1 fail = pass with revision
- 2 or 3 fail = fail

If the outcome is pass the student must schedule her/his Preliminary Oral examination for a date within a period of 3 months and inform the DGS of this date. *The exam must also be scheduled with the graduate school. An approved degree program form and written examination form must also be on file with the Graduate School in order to schedule the preliminary oral exam. The exam must be scheduled with the graduate school at least one week in advance.*

If the outcome is Pass with Revisions the student will schedule individual meetings with all the examiners to discuss the concerns and suggestions of reviewers. The student will then revise the proposal and resubmit it within the time outlined by the examining committee.

If the outcome is Fail then the student will have 2 months to submit a new proposal, which will be graded by the same committee as described above.

If revised or resubmitted proposals are also unacceptable, the student will have failed the exam. In this case, the final action will be determined by the Program Steering Committee. The Steering Committee will review past class performance and comments from the faculty. The Steering Committee may:

- offer the student the opportunity to work towards an M. S. Degree
- Terminate the student from the program
- In rare cases, arrange for the student to take a third Written Preliminary Examination.