WESTERN MICHIGAN UNIVERSITY
DEPARTMENT OF MATHEMATICS

GRADUATE STUDENT HANDBOOK

(REVISED 8/01/15)
# GRADUATE STUDENT HANDBOOK

## Table of Contents

I. Facts about Western Michigan University and its Mathematics Department .................................. p. 4

II. Organization of the Department .................................................................................................. p. 6

III. Organization of Everett Tower and Rood Hall ......................................................................... p. 7
   - Departmental Classrooms
   - Departmental Offices
   - Graduate Assistant Offices
   - Faculty Offices

IV. Resources and Opportunities for all Graduate Students ............................................................. p. 9
   - University Computer Services
   - Waldo Library
   - Professional Society Memberships
   - Math Club and Math Honors Society

V. Graduate Student Appointments .................................................................................................. p. 10
   - University Fellowships
   - WMU Dissertation Completion Fellowships
   - Appointments Available in the Department
     - Graduate Teaching Assistantships
     - Doctoral Associateships
   - General Requirements
   - Renewal
   - Partial or One Semester Appointments
   - Summer I/Summer II Graduate Assistant Appointments

VI. Permanent Program of Study and Annual Review of Graduate Students ................................. p. 13
   - Planning Your Program
   - Program of Study
   - Annual Review
   - Annual Review of Masters Students
   - Annual Review of Students in a Doctoral Program

VII. Information for Graduate Students Who Hold an Assistantship, Associateship, .......... p. 16
   - Identification
   - Fees and Tuition
   - Housing
VIII. The Ph.D. Comprehensive Examination ........................................................... p. 17
  Purpose
  Examination Areas
  Examination Files
  Writing and Proctoring Exams
  Evaluation of the Exam

IX. Guidelines for the Directed Teaching Requirement for Doctoral Students .......... p. 18

X. The Doctoral Dissertation Process in the Department of Mathematics ...............p. 21

XI. Research Tools and Foreign Language Requirements for the Ph.D. Degree ..........p. 23
      in the Department of Mathematics

XII. Seminars and Colloquia .................................................................................p. 26
    Seminars
    The Department Colloquium
    MathClub Talks
    The TA Seminar

XIII. Suggestions for Teaching Assistants .............................................................p. 28
      Your First Day of Class
      Student Attendance
      Homework
      Testing Procedures
      Grades
      Disruptive Students and Cheating
      Unable to Teach
      Teaching Techniques
      Evaluation of Your Teaching

Appendix A: Doctorates Awarded in the Department of Mathematics and Statistics ....p. 36
       (later the Department of Mathematics), and in the Department of
       Statistics

Appendix B: Doctorates Awarded since 1969 .......................................................p. 39

Appendix C: 2014/15 Department of Mathematics Faculty .....................................p. 46
I. FACTS ABOUT WESTERN MICHIGAN UNIVERSITY
AND THE MATHEMATICS DEPARTMENT

Western Michigan University is a dynamic, student-centered research university with an enrollment of nearly 25,000. WMU is focused on delivering high-quality undergraduate instruction, advancing its growing graduate division and fostering significant research activities.

The Carnegie Foundation for the Advancement of Teaching places WMU among the 76 public institutions in the nation designated as research universities with high research activity. U.S. News & World Report’s annual ranking of American colleges and universities includes WMU as one of the nation’s top-100 public universities.

Undergraduate students at WMU may choose from 145 program offerings while graduate students may select from 71 master’s, one specialist and 30 doctoral programs. A number of programs at both the undergraduate and graduate levels have attained national recognition. Also enriching the quality of campus life are some 275 registered student organizations and a full array of NCAA Division IA intercollegiate athletic teams.

The University’s commitment to the discovery and dissemination of new knowledge and insight has resulted in initiatives that reward faculty and student research, scholarship and creative activity. In a typical year, WMU faculty and staff conduct $30 to $40 million in externally funded research on topics ranging from nuclear physics and specialized education to developing technology that enables more efficient flight and more environmentally friendly public transportation. Instructional programs are designed to increase students’ capacity for learning and service to society, as well as meet the needs of an increasingly diverse student population.

WMU is Michigan’s fourth largest higher education institution, attracting a diverse and culturally rich student body from across the United States and some 80 other countries. Its nearly 900 full-time faculty members have been trained at some of the world’s finest institutions and they bring to the University a global perspective that enhances the learning environment.

WMU’s campuses encompass more than 1,200 acres and 151 buildings. Its main campus, close to downtown Kalamazoo, features some of the finest instructional and performance facilities in the Midwest as well as residence halls equipped to house more than 5,700 students. The University’s College of Engineering and Applied Sciences and the Business Technology and Research Park are located three miles away on the Parkview Campus, while its nationally recognized College of Aviation is based at the W.K. Kellogg Airport in nearby Battle Creek. Among WMU’s newest instructional centers are the College of Health and Human Services building, the Chemistry Building, and Sangren Hall, each a state-of-the-art facility that houses specialized research labs, classrooms and lecture spaces, and faculty office space.

The University also has an off-campus study site in Kalamazoo and eight branch campuses around the state, all of which provide primarily graduate and professional education. Branch campuses are located in Battle Creek, Benton Harbor-St. Joseph, Grand Rapids, Lansing, Muskegon-Holland, South Haven and Traverse City.
Founded in 1903, WMU rapidly grew from a regional teachers college to an internationally regarded institution of higher education. What was once Western Michigan College became Western Michigan University in 1957, when the state designated it as the fourth public university in Michigan.

The Department of Mathematics is one of the twelve original departments of Western State Normal School. Its first chair was John P. Everett for whom Everett Tower is named. Paul Rood was the first chair of the Physics Department. The Department of Mathematics has three undergraduate majors: applied mathematics, general mathematics, and secondary mathematics education. There are four undergraduate minors: actuarial sciences, elementary and middle school teaching, secondary mathematics teaching, and general mathematics. The department has three master’s programs: applied and computational mathematics, mathematics, and mathematics education. There are two doctoral programs, one in mathematics and the other in K-12 mathematics education. Additionally within the doctoral program for mathematics there is a specialization for collegiate mathematics education. Our doctoral program was introduced in 1968 and is one of the oldest at WMU. There are approximately 140 undergraduate mathematics majors at WMU and 60 mathematics graduate students.

Our department is a small, friendly community with open and accessible professors. Our graduate students receive a considerable amount of individualized attention and encouragement from the faculty. Being a graduate student at WMU provides ample opportunities to gain experience in teaching, supervising undergraduate research, and interning with local firms. Our graduate experience provides a student with well-rounded career training.

Graduate students from Western Michigan University have been very successful in finding employment and are well prepared for a career in academia, business, and other institutions. A recent report by the Society for Industrial and Applied Mathematics (SIAM) indicates about 25% of math Ph.D.’s and 44% of master’s graduates have positions in either government or industry. Mathematicians are sought because of their ability to think analytically, deal with complexity, develop models, and formulate and solve problems. Mathematicians are employed by companies in engineering research, computer services, software, electronics, aerospace, transportation, insurance, financial services, chemistry, pharmaceuticals, and others. A list of all students who have received doctorates from the WMU Department of Mathematics and their initial or current employers is given in Appendix B.
II. ORGANIZATION OF THE DEPARTMENT

The Department Chair has the administrative responsibility for the department and is the official representative of the department to the university. The current Chair is Professor Steven W. Ziebarth.

The Chair is assisted by two Associate Chairs who jointly coordinate the work the Instruction Committee, one of six standing committees within the department. Work within the department is also guided by three elected faculty members who serve for three-year rotating terms on the Executive Committee. Ex officio members of the Executive Committee are Chairs of the Assessment, Curriculum, and Graduate Committees. A separate standing committee serves the department in determining Undergraduate Awards and Scholarships.

Although the majority of the policies and major decisions is made by the entire department, discussions and recommendations for administrative policies are usually initiated by the Executive Committee.

Policies of concern to the graduate and undergraduate programs are primarily initiated in the Curriculum Committee. The Instruction Committee is responsible for appointing and overseeing the teaching performance of teaching assistants and doctoral associates. Graduate students should refer all questions and matters of concern regarding their teaching duties and performance to their advisors or the Associate Chair for Instruction (presently, Professor Annegret Paul). The Graduate Committee is responsible for appointing and overseeing all parts of the academic performance of teaching assistants and doctoral associates. Graduate students should refer all questions and matters of concern regarding their academic standing and program progress to their advisors or the Chair of the Graduate Committee (presently, Professor John Martino). The Graduate Committee also handles all appeals associated academic issues that may arise between graduate students and mathematics department faculty.

The Assessment Committee collects and analyzes data on department programs in order to improve those programs.

The Undergraduate Awards and Scholarship Committee, as the name suggests, chooses undergraduate awards and scholarships. Graduate awards are determined jointly the Instruction Committee and the Graduate Committee.
III. ORGANIZATION OF EVERETT TOWER AND ROOD HALL

Departmental Classrooms

Departmental classrooms are generally located in Rood Hall. Occasionally 6620 Everett is used for graduate courses. Some classrooms in Sangren Hall, Schneider Hall, Knauss Hall, Brown Hall, and Wood Hall are also used.

Departmental Offices

The Departmental offices are located in the central portion of the third floor of Everett Tower. These include the main office (3319) where part of the secretarial staff is located. The student help are in 3319 Everett. The administrative assistants to the chair are Ms. Sue Simons (3318 Everett) and Mr. Steve Culver (3322 Everett). Mr. Culver works with the Associate Chairs in drawing up teaching assignments each term. The Graduate Secretary is Ms. Rebecca Powers (3325 Everett). The Office Assistant is Ms. Cathie Wilson (3317 Everett). The director of the department’s developmental mathematics program (Math 1090, 1100, and 1110) is Dr. Kirsty Eisenhart (3326 Everett).

Faculty, Teaching Assistant, Doctoral Associate, Instructor, and Part-time Instructor mailboxes are in the main departmental office (3319). This office is typically open Monday through Friday from 8 am to noon, and from 1 pm to 5 pm. Offices are closed when the University is closed and students should consult the official Western Michigan University calendar for dates of closure each semester. However, administrative offices are typically open when classes are not in session (e.g., exam weeks, certain semester break weeks, etc.).

Graduate Assistant Offices

Offices for graduate assistants are on the 3rd, 4th, 5th, and 6th floors of Everett Tower and several offices in Rood Hall. Mailboxes for Mathematics Teaching Assistants are located in Room 3319, Everett Tower.

Keys to your offices are obtained from the Graduate Secretary, 3325 Everett Tower, or at Orientation. Also, you will be issued a PASSKEY that will open the classrooms, the kitchen on the 6th floor, and conference and seminar rooms. The department’s policy on telephone use will be covered during the orientation. Generally, Graduate Assistants do not have phones in their offices. There is a phone in 3319 Everett, which you will need permission to use for long distance calls. This is reserved only for returning calls to your students. Phones for local calls are located in the 5th-floor printer room (5515 Everett) and in the 6th-floor printer room (6612 Everett). Campus calls are made by dialing 7 and the last four digits of a campus phone number. Local calls require first dialing 9, then the entire 7-digit number. The telephones in the computer rooms cannot be used for long-distance calls, and off-campus calls should be kept to a minimum since the Department is charged for each such call.
A scholarly atmosphere should be maintained in your offices. This is your place of employment where you may on occasion meet with colleagues, your professors, and your students. According to the department policy, when you are meeting with a student in your office, the office door should be wide open. Furthermore, you should avoid any behavior that might be construed as unprofessional or harassing. Smoking is prohibited in all classrooms, offices, and buildings on the entire WMU campus.

Graduate Assistants are paid every two weeks. You can choose to receive your pay on a pay card, issued by Payroll Services, or by direct-deposit into your bank account. No paper checks are printed. Problems or questions concerning payroll should be referred to Mrs. Rebecca Powers or Ms. Sue Simons.

Textbooks and course outlines for the courses you teach can be obtained from Ms. Cathie Wilson. It is very important that you follow course outlines in consultation with your supervising professor. You must attend all meetings for your area (the course that you are teaching). Part of the evaluation on your contract renewal is dependent on your attendance of these meetings.

**Faculty Offices**

Faculty offices are on floors 3 through 6 of Everett Tower. There are conference rooms on some floors. They can be reserved for giving a make-up test or for a review session, etc. The conference rooms should not be used for studying. The Alavi Commons Room on the 6th floor is the location of most seminars and colloquia.
IV. RESOURCES AND OPPORTUNITIES FOR ALL GRADUATE STUDENTS

Waldo Library

Western Michigan University maintains a large collection of mathematical research literature. Extensive holdings allow for direct access to original sources. Ongoing acquisitions and subscriptions (over 200 major world-wide mathematical journals) keep the collection up to date. This collection is housed in Waldo Library. The library also provides extensive electronic resources, such as data bases for journal articles. Interlibrary loans are offered as well. Several online search engines are available to access research materials through the WMU library system.

University Computer Services

University Computer Services is located in the building connected to Waldo Library. It has large computer lab and a walk-in technical support desk. The Department has several workstations for advanced graduate work and research as well as computers in the Arts and Sciences Computer Lab for faculty and student use (both undergraduate and graduate). Additional information regarding these facilities will be made available at the orientation. The Arts and Sciences Computer Lab is located in Rood Hall, schedules will be placed in your mailboxes.

Professional Society Memberships

Graduate students are eligible for free membership in SIAM (Society for Industrial and Applied Mathematics). Membership in such an organization provides a window to the field of mathematics outside WMU. Additional benefits include discounts on books and deeply discounted or free subscriptions to journals. For further information and a link to the application form go to http://www.siam.org/students/memberships.php

Math Club and Math Honors Society

The MathClub organizes a variety of events including a weekly brown bag lunch, mathematical talks aimed at students, and social gatherings. Events are free and open to all. A schedule can be found at http://www.wmich.edu/mathclub/calendar.html. Students are encouraged to give talks accessible to undergraduate and graduate mathematics students. (Current Graduate Advisors for MathClub are Professor Niloufer Mackey and Professor Steven Ziebarth)

The Department is also home to the Michigan Epsilon Chapter of Pi Mu Epsilon, a national honorary mathematics society. You can check if you are eligible for membership at http://www.wmich.edu/mathclub/pmeeligibility.html. Applications are solicited twice per year during the fall and spring semesters. An induction ceremony and banquet follow each selection of successful applicants.
V. GRADUATE STUDENT APPOINTMENTS

University Fellowships

University Fellowships are available from the Graduate College for outstanding students beginning a Master's degree program. Application forms, transcripts and letters of recommendation must be submitted to The Graduate College by 15 February. Students in mathematics and statistics applying for a University Fellowship are also encouraged to apply for one or more of the other appointments described below. Additional information on University Fellowships and other funding opportunities can be found at the following website: http://www.wmich.edu/grad/funding.html.

WMU Dissertation Completion Fellowships

A limited number of Dissertation Fellowships are available, in open competition and on the basis of superior scholarly achievement. Recipients are provided with service-free stipends for one year to assist them in completing their dissertation. There is no service obligation with a dissertation fellowship. To be eligible, an applicant must be a doctoral candidate who can demonstrate superior academic achievement, and have a record of timely and steady progress toward degree completion. Applicants must have completed all requirements for the degree except the dissertation, and must have an accepted dissertation proposal. Selection criteria will include a superior academic record (scholarly excellence is the most important criterion in selecting fellowship recipients), a dissertation proposal which holds the promise of contributing to the body of knowledge and literature in the discipline, and a realistic expectation that the dissertation will be completed within the time period of the fellowship. For more details, consult the Graduate College website: http://www.wmich.edu/grad/funding.html.

Appointments Available in the Department

The following appointments are available on a competitive basis for students in the Department of Mathematics. Applications may be made for more than one of the following. However, a student may hold only one appointment or equivalent, at a time. Occasionally an appointment is divided between two or more students.

Graduate Teaching Assistantships are available from the Department of Mathematics. For new graduate teaching assistantships the application forms, transcripts and letters of recommendation should be submitted to the Department of Mathematics by February 15. Applications submitted after that date will be considered only if there are openings. A student holding an assistantship is required to perform 20 hours of service per week in the department and enroll in at least six-credit hours per semester. The assistantship will pay the full tuition, not including enrollment fees. No summer credit is offered or required with this appointment.
**Doctoral Associateships** are offered to some outstanding doctoral students admitted to doctoral programs (the number is limited by college and department funding allocations). A student holding an associateship is required to perform 20 hours of service per week in the department. Enrollment of at least six credits per semester and three credits in the summer (typically, during the Summer I session) is required. The associateship will pay the full tuition, not including enrollment fees. The recommendation and appointment for these associateships is made by the Department of Mathematics.

The **Erdős Memorial Scholarships of Graduate Study** may be offered to graduate teaching assistants and doctoral associates, based on merit. The scholarship consists of $4000 for an academic year, to be added to the usual graduate support. The department reviews applicants based on their undergraduate performance, and their performance at WMU (for returning students), both as a student and as a teaching assistant. Some scholarships are reserved for new graduate students. The scholarship is awarded for one academic year. Due to the limited number of scholarships available, a student should not expect to continue receiving the scholarship during the following year.

**General Requirements**

The general requirements of a graduate student who holds an appointment from the Department of Mathematics (Graduate Assistantship or Associateship) are as follows:

a. The student must be admitted to one of the graduate programs in the Department of Mathematics. Exceptions may occasionally be made, but only with the approval of the Graduate Committee and the Chairperson of the Department of Mathematics.

b. The student must complete at least 6-credit hours of acceptable course work in his/her program each semester, and (if holding an associateship), three hours in the summer. The student needs prior permission from the Graduate Committee for taking more than 3 courses per semester.

c. The student must maintain at least a 3.0 grade point average in all coursework. Failure to meet this criterion results in automatic academic probation until grades in subsequent coursework are sufficient to raise the GPA above this threshold. Two successive semesters on academic probation will result in revocation of the appointment.

d. The student with a graduate assistantship, associateship or a fellowship must perform satisfactorily in the assigned teaching and other responsibilities.

e. The student shall not engage in regular outside employment during the term of the appointment. Any temporary or occasional outside employment (either on campus or off campus) must be approved by the Chair of the Department.
Renewal

A graduate student who has received an appointment from the Department of Mathematics or has received a University Fellowship may normally expect to receive continued support to the conclusion of his/her program (see (c) below). A renewal appointment will normally be given the student provided the following conditions are met.

a. The student remains in a graduate program in the Department of Mathematics. A student who switches programs inside the department, will typically receive continued support, provided that the other conditions are met.

b. The student has satisfactorily fulfilled the General Requirements outlined above. For the purpose of requirement b, above, an Audit or Withdrawal does not count toward the required 6 hours of credit per semester. An Incomplete will count only after it has been removed and replaced by a grade. Exceptions may only be made with the approval of the Department Chairperson.

c. The student will not normally be supported for more than a total of two years for Master’s level programs, or for more than a total of five years for all programs leading to a Doctoral degree.

One Semester Appointments

One-semester appointments may be made if appropriate. Normally a student with a one-semester appointment will be expected to fulfill all of the requirements specified for students with whole year appointments.

Summer I /Summer II Graduate Student Appointments

Graduate Assistants who have held an academic year appointment and have not yet completed their program may be offered a Summer I or Summer II session teaching appointment, based on availability of such positions. Priority will be given to Doctoral Associates. Considerations for these appointments are: academic progress at WMU, faculty recommendations, and whether the student has accepted an assistantship for the following year.

In all cases, satisfactory past teaching performance and adequate progress towards finishing the graduate program are both necessary requirements.

Final decisions about summer appointments will be made by the Chairperson of the department, taking into account program needs, as well as student financial needs whenever necessary and appropriate.
VI. PERMANENT PROGRAM OF STUDY AND ANNUAL REVIEW OF GRADUATE STUDENTS

Planning Your Program

Before signing up for classes, you must meet with your academic advisor to (at least informally) plan your program. Although the advisor is the expert on what is required for the completion of your chosen degree, most of the information is readily available in the online graduate catalog. You will be able to make better decisions and avoid mistakes if you know as much as possible about the rules, requirements, and policies associated with the degree you seek. An important thing to know is that there are two main sets of rules to pay attention to: the departmental degree policy, and university policy.

To view the department requirements, go to the graduate catalog, and find your particular degree program under “Departments and Programs” on the bar at the left side of the page.

To view the university policy, look at the section “Academic Policies,” in the graduate catalog, in particular the subsection “Graduation Requirements,” which includes information such as the number and level (5000+ or 6000+) of credits required, as well as information about required grades. For example, for graduate study, no course with a grade below “C” will be counted towards the degree (however, it will count towards your grade point average).

One valuable resource for planning your program is the “Six-Year Plan”, which is a tentative schedule of all courses numbered 4000 and above. It can be found under “Academics” and under “Advising” on the Department Web Page. Many of the required course sequences are offered only every other year, so it is important to consult this plan from the start and revisit it often as you work through your program in the event that scheduled offerings may change for some reason.

If you are a student in one of the Ph.D. programs, it is recommended that you plan your program in such a way that you can finish all three comprehensive exams by the end of your third year at the latest.

Program of Study

Early in your program you, with your advisor, must complete and submit to the Department Graduate Secretary a Permanent Program of Study. Forms are available online or from the Graduate Secretary. Students in one of the masters programs must file this form by the end of the second semester, doctoral students by the end of the fourth semester of their program. If changes to the Program of Study are necessary at a later point in time, the document may be updated and resubmitted. The Graduate Secretary submits these forms to the Registrar and, after you apply for graduation, the graduation auditor will use this document to check whether all requirements for the degree have been met.
Annual Review of Graduate Students

In order to assist you in the timely completion of your program of study, and to advise you of your progress, the department Graduate Committee conducts an annual review of all graduate students (in both the masters programs and the programs leading to a doctoral degree), during the spring semester. In particular, the Graduate Committee will look at whether you are maintaining the required GPA, and whether you are making timely and satisfactory progress in all aspects of your program. For students in one of the masters programs, this mainly involves progress in course work. For students in one of the programs leading to a doctoral degree, this includes progress in course work, the comprehensive exams, directed teaching, the proposal defense, research tools, and dissertation research. Any professional development activities will be credited as progress as well.

Both you and your advisor are asked to independently complete the annual review form then meet to discuss them. It is your responsibility to schedule an appointment with your advisor to discuss the forms. At the conclusion of this meeting, both forms must be signed by you and your advisor, and submitted to the Graduate Secretary by February 1, along with an up-to-date Program of Study. The forms are available from the Department Graduate Secretary, or from the department web page.

The Graduate Committee will then use the forms to make a recommendation regarding your progress. You and your advisor will be informed of the outcome by March 15.

There are three possible outcomes of the review. The committee may recommend the following regarding your enrollment:

1. Continuation
2. Continuation with Reservations
3. Dismissal

If the recommendation is “continuation with reservations,” you must then meet with your advisor to discuss strategies to address the reservations, and to compose a (written or electronic) response to the Graduate Committee. This response must be submitted to the Graduate Committee by March 31. The committee’s report, along with your response, will be added to your file. At the next annual review, you must show adequate progress toward addressing the documented deficiencies, or face dismissal from the program.

Unsatisfactory progress resulting in program dismissal at the graduate level means that you are not eligible to continue as a student at the University unless you apply to and are accepted into another program.

If you disagree with the outcome of the review, you may submit an appeal within one week of receiving the notification. This appeal must be submitted to the Graduate Committee, either in writing, or electronically. The Graduate Committee will then meet to consider your appeal, and make a decision; to either make changes, or to uphold the original decision. You will be
informed of this decision within two weeks of the appeal, and the decision is final except for those that recommend program dismissal. In cases where the decision by the Graduate Committee after the appeal is still for program dismissal, you have the right to appeal that decision beyond the Mathematics Department per the policy provided in the University Graduate Catalog. You will find the policy by clicking on “Academic Policies,” then choosing “Course Grade and Program Dismissal Appeals” under “Student Rights and Responsibilities.”

Please be aware that the Graduate Committee may also use these reviews to help with decisions on the awarding or continuation of graduate assistantships, doctoral associateships, and scholarships.
VII. INFORMATION FOR GRADUATE STUDENTS WHO HOLD AN ASSISTANTSHIP, ASSOCIATESHIP, OR FELLOWSHIP

All rights and privileges granted to graduate assistants are also granted to students possessing a fellowship. Some additional benefits are listed below.

**Identification**
All graduate students receive photo ID cards. These cards may be obtained in the Bernhard Center at the Student ID Office. Once the card has been registered with the Office Coordinator, you may use the card for after-hour access to your office building.

**Tuition and Fees**
Graduate Assistants receive tuition remission as part of the offer of appointment. For masters degree students, this pays for up to eight credit hours per semester and three credit hours per summer session during each term of appointment. Doctoral students receive tuition remission for up to nine credit hours per semester, plus three credit hours per summer session. As a graduate assistant, you are responsible for all fees incurred during each semester or summer session.

**Housing**
Graduate Assistant housing is available in residence halls or married student apartments. More information is available from the Housing Office [http://www.wmich.edu/students/housing.html](http://www.wmich.edu/students/housing.html) (Spindler Hall phone (269) 387-7101; Married Housing phone (269) 387-2175).

**Library**
Graduate Assistants have the same privileges and responsibilities as faculty members in the use of the library facilities. Further information is available at the Waldo Library.

**Parking**
The university provides free Graduate Assistant parking permits that may be obtained at the Parking Services office with a copy of your offer letter and a photo ID. Married housing parking is not considered campus parking.

**Keys**
In addition to your office key(s) and classroom key(s) you will need to register your WMU ID with the Office Coordinator so that the ID can be used for after-hours access to your office building. This will prove useful if you wish to enter the building early, late, or on weekends and on holidays. Most of the keys will be handed out during orientation.
VIII. THE PH.D. COMPREHENSIVE EXAMINATIONS

Purpose

The purpose of the Ph.D. Comprehensive Examinations is to evaluate the student's ability and understanding in three core content areas distinctive to each program, and to help determine whether the student should proceed to the dissertation research stage. (Note: the comprehensive examinations are also typically called “qualifying exams,” or known within the WMU Mathematics Department as “prelims.”)

Because of the different content focus of the two doctoral programs within the Department of Mathematics, each program follows its own format for administering its comprehensive examinations. The doctoral candidate is expected to be familiar with and follow the rules for completing the comprehensive exams specified within his or her respective program.

Examination Areas

Mathematics
A student in Algebra, Analysis, or Topology must take comprehensive examinations in each of these areas. A student planning to do a dissertation in any other area of mathematics may, with approval of the advisor and the Graduate Committee, replace one of the exams with one in the student’s specialty.

Mathematics Education
A student must pass each of three Departmental Comprehensive Examinations in Mathematics Education with no more than one marginal pass. The three competency areas for this program are 1) K-12 curriculum, 2) the psychology of learning mathematics, and 3) mathematics education research (see section X.B.2 below for further details about the format for each exam).

Procedure

The student is expected to register for any courses (or course sequences) required for a Comprehensive Exam the first time they are offered subsequent to the student's admission to the doctoral program. A student must take each Comprehensive Examination the first time it is offered following his/her completion of the required coursework in that field. In order to delay an examination a student must appeal to the Graduate Committee. If the student fails an examination or receives a marginal pass, he/she is permitted to retake the examination in that area at a time designated by the Content Area Committee that writes the exam. A student may not take any Comprehensive Examination more than twice. A second failure in any area, or two marginal passes in any two areas results in dismissal from the doctoral program. Appeals may be made to the Graduate Committee.

A student not enrolled in the Ph.D. program may, with approval of the Graduate Committee, take any Comprehensive Exam he or she desires. However, it is emphasized that the limit of two failures in any one area or two marginal passes in any two areas applies without regard to
acceptance into a Ph.D. Program. Thus, for example, if a student fails the Algebra
Comprehensive Exam before being accepted into the program, and fails again after acceptance
into the program, he or she will be dismissed. Appeals may be made to the Graduate Committee.

Writing and Proctoring Exams

The appropriate Content Area Committee writes and proctors the examination in that content
area, and decides on the date and time for administration of the exam. The amount of time
allowed for an exam is at least three hours and is set by the Content Area Committee. The
examinations will be at a level of difficulty and of such length that a well-prepared student can
successfully complete the exam in the time set by the Content Area Committee. The student is
advised to talk to a member of the appropriate Content Area Committee to find out about the
committee’s policies, and the existence of a syllabus or samples for the exam.

Evaluation of the Exam.

The evaluation of the exam performance in each area will be done by the appropriate Content
Area Committee that composed the exam (usually three to four faculty members).

The overall evaluation on each exam will be either Pass or Fail (or Marginal Pass for exams in
Mathematics Education). The student will be informed of the outcome in a written letter from the
Content Area Committee and the graduate secretary (usually within two weeks of administration
of the exam). Copies of the evaluation letter will be sent to the student and to the student's
advisor. The exams will not be returned to the student, but each student is encouraged to see and
discuss her/his results with a member of the Content Area Committee.
Acquiring experiences in teaching is an important part of the preparation of doctoral students. A required component of each doctoral program within the department of mathematics is directed teaching in which the candidate becomes the instructor of record for an undergraduate mathematics or mathematics education course (a 2000-level course or above). The purpose of this requirement is to give the graduate student a structured experience at teaching a course within a university environment where many graduates will ultimately become employed after graduation. Because this requirement involves both programmatic and overall department considerations in terms of scheduling and staffing of courses, the following guidelines are intended to help deal with issues related to this program component.

The Associate Chairs of the Department must be informed of the intention to have a doctoral student fulfill his or her directed teaching requirement at least 9 months in advance of the intended semester. Both of the Chairs, the Graduate Committee, and the students main program advisor will use program progress information to alert the student and relevant faculty in terms of when this program component is pending. The decision of how and when to fulfill this requirement should be a topic of discussion during the annual review of graduate students and become a topic of more focused conversation as that time draws near. When the doctoral student is ready to undertake directed teaching, the advisor, in consultation with the Associate Chairs, will assign an experienced faculty member and an appropriate sophomore or junior level course for the doctoral student to teach as the instructor of record. The student/director team is to be formed a minimum of 9 months prior to the semester/session in which the course is to run so that adequate lead-time is available for both scheduling concerns and proper planning. In the Mathematics Education Doctoral Program a semester of “shadow” teaching is required prior to the semester of directed teaching.

Well before the first class meeting, the student and the director are to discuss the plan of activities involved with the course. This will include decisions regarding the formal first-day handouts and a completed syllabus that lists the policies under which the course is to be run, such as: the course objectives, grading policy, incomplete grade policy, make-up exam policy, office hours, course outline and assignments. A final discussion of these completed documents should be conducted during the week prior to the start of the class. For other course components, the student should discuss well in advance with the director issues regarding the tests to be given, the grading of them, and how to give useful feedback to the students. It is expected that the student/director team will have conversations about course assessments and their effectiveness at regularly scheduled times as the course proceeds. The final grades in the course will be assigned by the graduate student (as the instructor of record) in consultation with the course director.

The director must periodically visit the classroom to supervise and assess the activities. A minimum of three visits during the semester/session is recommended; each visit is to be followed by a consultation between the student and the director regarding the observation.

The student must inform students in the course he or she is teaching about the availability of the university-approved on-line student evaluation forms. All students should be encouraged to
complete the course evaluations to provide feedback regarding the course and its instruction. The director will go through these evaluations and prepare summaries as soon as the final grades are posted and the evaluations are available.

After posting the final grades, the student and the director should meet at least one more time for a final evaluation to review the work done in the course, consider the report on the analysis of student evaluations, and to discuss the successes or any failures related to the course. After this meeting, the director is to submit to the Chair of the Instruction Committee the completed Directed Teaching Form, with a copy to the student. At his/her option, the student may also submit to the Chair of the Graduate Committee a summary of the experience of directed teaching and offer any suggestions for improvement. The summary and Directed Teaching Form will be included in the student’s graduate file.

The director should encourage participation by doctoral students in faculty discussions on college mathematics teaching and curricula, and bring to their attention suitable opportunities and activities of this nature. The director may also recommend appropriate seminars and/or teaching workshops.

X. THE DOCTORAL DISSERTATION PROCESS
Purpose

The purpose of the dissertation is to evaluate the student's ability to conduct original research based on the knowledge gained through coursework, other experiences, and interactions with faculty.

The procedures for the Ph.D. in Mathematics and those for the Ph.D. in Mathematics Education are somewhat different and are described in the graduate catalog for Western Michigan University. Any changes are only official if they are in the graduate catalog.

A. The procedures for the PhD in Mathematics are as follows:

1. Shortly after a student successfully completes most (or, ideally, all) basic course requirements and all three Comprehensive Examinations, the student chooses a dissertation advisor among the graduate faculty in mathematics. Once the faculty member agrees to act as the student’s dissertation advisor, the student commonly discusses possible directions for research with this advisor, does background reading on the subject, and, with the aid of the advisor, develops questions for possible study.

2. Once possible research questions have been chosen, and some preliminary results have been obtained, the student will, in consultation with the dissertation advisor, form a dissertation committee. The dissertation committee will consist of the dissertation advisor who will be the committee chair, a second reader, at least one more faculty member, and an outside reader, i.e., a faculty member from outside the department, and often from outside the university. The dissertation committee must consist of graduate faculty only, and be approved by the Department Chair, the Dean of the College of Arts and Sciences, and the Dean of the Graduate College. If the outside reader is not part of our graduate faculty, he or she must be separately approved. For this purpose, a current CV for the proposed outside reader must be submitted to the graduate secretary.

3. After the dissertation committee has been chosen and approved, and the student has a complete proposal for his or her dissertation project, the student and the committee will jointly determine a date and time for the proposal defense when a majority of the committee members can be present physically or through distance media. For the proposal defense, the student gives a public presentation of the proposed research and answers questions about the proposal. After the presentation, the dissertation committee will meet with the student to discuss the proposal further, and to make a final decision on acceptance of the proposal. The proposal defense should be scheduled at least one year before the final dissertation defense and graduation. On approval, a Doctoral Dissertation Proposal Approval form must be completed, along with a Doctoral Candidacy form.

4. When enough results have been obtained that the dissertation is almost complete, and the student has completed all other requirements for the Ph.D., the student and the dissertation committee will jointly determine a date and time for the dissertation defense. A dissertation
defense should only be scheduled at a time when at least four committee members (including the advisor) can be present. A defense cannot be held unless three committee members (including the advisor) are present, either physically or through distance media. If a committee member is not present at the defense, then this member must have submitted a positive report to the chair of the committee at the time of the defense.

5. The student shall prepare an abstract and complete the form required to schedule the oral defense, submitting these to The Graduate College at least two weeks prior to the defense.

6. The Chair and Second Reader of the dissertation committee submit written reports on the dissertation to the Chair of the Graduate Committee, certifying that the work constitutes acceptable research for a Ph.D. dissertation. Receipt of these reports will precede the defense by at least five working days, and preferably at least ten working days. A defense will not be scheduled unless all program requirements have been satisfied.

7. For the defense, the candidate will give a public lecture on the dissertation. Following this presentation, a period of time will be allowed for questions to the candidate from those in attendance. After a brief break, the candidate will be examined on the dissertation and related topics by the committee and any other faculty members. At the conclusion of this examination, the candidate will be excused while the committee determines the acceptability of the dissertation and defense. Unanimous approval of the committee is required for both the dissertation and the defense. The presence of a committee member via long-distance communication is acceptable at the defense, particularly in the case of an outside reader.

8. The student is then responsible for completing any alterations recommended by the committee, the timeline for completing them, and the subsequent forms needed by the university and the Graduate College. Following the approval of the dissertation by the committee, two copies of the dissertation are submitted, together with the forms signed by the Committee, to The Graduate College for final approval. The student is responsible for doing this by the deadline established each semester by The Graduate College. The dissertation advisor will supervise these final steps of the process.

B. The procedures for the PhD in Mathematics Education are as follows:

1. Upon admission a student will, within the first year of enrollment, work with a two-member advisory team to design a Plan of Study for completing the Ph.D. At this time, any course requirements already satisfied through prior master’s level work will be determined by the advisory team and approved by the Graduate Committee. After a tentative Plan of Study has been designed, one of the advisory committee members will be assigned to serve as the student’s primary advisor for program matters leading up to the formulation of a dissertation proposal. The Plan of Study may be reviewed and adjusted as necessary throughout the program.

2. A student will schedule comprehensive examinations in consultation with the program advisor. The examinations in curriculum and in psychology will each be at least three-hour
written examinations. (Some accommodations may be made for ESL graduate students.) The examination in research and design will be a take-home examination written over a period of one week. When deemed necessary, this take-home exam will be followed by a one-hour oral defense conducted within two weeks of submitting the take-home and conducted by at least two graduate faculty in mathematics education. If a student fails a comprehensive examination, the student must retake the examination within a year of the first attempt. A student who fails a comprehensive examination twice or earns more than one marginal pass will be dismissed from the program at the end of the semester when the exam was taken.

3. By the time a student has passed comprehensive examinations in both curriculum and instruction and in psychological foundations, the student will take reading courses from a potential dissertation advisor with the goal of developing a proposal for dissertation research. Depending upon the nature of the proposed research, the student may be required to conduct a pilot study.

4. Once the student has passed all three comprehensive exams and shown competency in the three required research tools, the student will, in consultation with a chosen dissertation advisor, form a dissertation committee. The chosen dissertation advisor will become the student’s program advisor. The dissertation committee shall consist of the dissertation advisor, a second reader, at least one other faculty member, and an outside reader (that is a member from outside the department). When the student has a complete proposal for their dissertation project, the student and the dissertation committee will jointly determine a date and time for the proposal defense such that a majority of the committee members are present physically or through distance media. During the proposal defense, the student will give a public presentation of the proposed dissertation research and answer questions on the proposal. After the presentation, the dissertation committee will meet with the student to discuss the proposal further with a final decision on the acceptance of the proposal. A student will be allowed to take MATH 7300 credits only after a dissertation committee has been formed and the dissertation proposal is accepted by all of its members.

5. Once the student has completed a dissertation and all other requirements for the Ph.D., the student and the dissertation committee will jointly determine a date and time for the dissertation defense such that a majority of the committee members are present physically or through distance media.

6. The student shall prepare an abstract and complete the form required to schedule the oral defense, submitting these to The Graduate College at least two weeks prior to the defense.

7. During the dissertation defense, the student will give a public presentation of the dissertation followed by a question period open to the public. After this presentation, the dissertation committee will meet with the student to discuss the dissertation further. The dissertation committee will then meet in private to make a final decision on the acceptance of the dissertation and defense. Finally, the committee will meet with the student to determine the outcome of the dissertation defense. All committee members must agree on acceptance for the dissertation to be complete.
8. The student is then responsible for completing any alterations recommended by the committee, the timeline for completing them, and the subsequent forms needed by the university and the Graduate College. Following the approval of the dissertation by the committee, two copies of the dissertation are submitted, together with the forms signed by the Committee, to The Graduate College, for final approval. The student is responsible for doing this by the deadline established each semester by The Graduate College. The dissertation advisor will supervise these final steps of the process.

C. “Stopping the Clock” for graduate degree programs.

1. A student who encounters issues that will affect his or her ability to successfully complete continuous work in their program of study may request a leave of absence for up to two semesters and two sessions. Reasons for leave of absence include bereavement, illness, caregiving, maternity, paternity, and call to active duty. Such a leave of absence “stops the clock” for the requested amount of time associated with the respective program. If such a situation occurs, the student needs to inform the Graduate Committee and contact the Graduate College in order to process the required forms needed to complete the process.
XI. RESEARCH TOOL AND FOREIGN LANGUAGE REQUIREMENT FOR THE PH.D. DEGREE IN THE DEPARTMENT OF MATHEMATICS

Each doctoral student is required to attain competency in two or three research tools depending on the specific program (see below). For students concentrating in mathematics, these may be two foreign languages selected from French, German, or Russian. Depending on the student's program, one of the above foreign languages may be replaced by demonstrated competence in computer usage as a research tool (as described below). Students in collegiate mathematics education or in mathematics education may meet the research tool requirements by demonstrating competence in technological tools, and in educational research methods.

A. The research tool requirement in a foreign language may ordinarily be satisfied in one of three ways:

Option 1. The student may enroll in French or German 5000 and complete the course with a grade of “B” or better.

Option 2. Those students with a previous knowledge of one of the approved foreign languages may take a proficiency examination administered by the Modern and Classical Language Department, or by a member of the Mathematics Department.

Option 3. A student may pass the Graduate Foreign Language Test administered by the Education Testing Service of Princeton, New Jersey.

Remark: Since the French and German 5000 courses are not offered every year, those students planning to use Option 1 need to plan their programs so as to insure the completion of the requirement.

B. The computer usage requirement can be satisfied by completing 3 hours of MATH 6880 with a grade of “B” or better.

C. For the Mathematics Education Ph.D. Program only, the educational research tool requirement may be met by completing EMR 6480, and one of STAT 6620, PSY 6640, or EMR 6450, each with a grade of “B” or better. Advisors in mathematics education may approve a suitable substitute, as needed.

D. For the technology tools requirement, students must complete a form specifying how proficiency in the required tools has been acquired. These are computer tools for quantitative and qualitative research, as well as for student learning. One way to become proficient in these tools is through completing suitable modules of Math 6880.
XII. SEMINARS AND COLLOQUIA

Purpose

Like many departments at WMU and other universities, venues are provided to engage with scholars and colleagues who are prominent in their particular field of study. Seminars and colloquia in the Mathematics Department serve this same purpose and allow undergraduate and graduate students, as well as the general public, excellent opportunities to hear and interact with active mathematicians and others who use mathematics in their fields of expertise. Such opportunities provide a chance for graduate students to begin to become part of the mathematics or mathematics education community, to gather ideas about possible research or dissertation directions, and to introduce themselves to future colleagues. It is expected that graduate students in particular make a regular habit of attending seminars and colloquia to enhance their graduate experience in the department.

Seminars

Each student is strongly encouraged to enroll in at least one seminar each academic year.

Seminars are offered regularly in Applied Mathematics, Graph Theory, Algebra, Topology, and Analysis. The subject matter usually varies from term to term, depending on the interest of the participants. Seminars normally meet once a week and consist of informal lectures and discussions.

Some seminars cover research topics in specialized areas and are within the reach of only a few students. However, others are at a lower level and provide an opportunity to discuss ideas in mathematics not normally covered in classes, or to explore standard concepts more fully.

Seminars are usually initiated by faculty members, but a group of students interested in a particular topic can ask a professor to direct an appropriate seminar.

The Department Colloquium

In addition to the seminars offered, the department maintains an active colloquium program throughout the year whereby scholars are invited to visit the Department and present a lecture. Occasionally faculty members in our department present lectures as well. The topics vary widely over many areas of mathematics and mathematics education. Some lectures involve recent research in specialized areas, while others are more general and expository in nature. Usually the lectures are held in the Alavi Commons Room (6th floor of Everett Tower) on Thursdays at 4:10 p.m. and are preceded by an informal gathering with refreshments. These colloquia provide an opportunity for all faculty and graduate students to extend their understanding into unfamiliar areas. They also provide an opportunity for faculty and graduate students to become better acquainted.

Graduate students are expected to attend colloquium lectures frequently and meet the speaker as well as the faculty and fellow graduate students. A good colloquium talk should
be accessible to graduate students, at least for the first 15 minutes or so. However, not every speaker knows how to give such a talk. Consequently, you may not be able to follow many of the details of such a talk (many of the faculty will admit to the same problem), but don't be discouraged. It is still possible to pick up general ideas and viewpoints from the lectures, and the stimulation and interest that can be generated by an inspiring lecturer is invaluable.

Math Club Talks and Math Honors Society

In addition to seminars and colloquia as opportunities to hear and interact with speakers, the MathClub organizes a variety of events including a weekly brown bag lunch, mathematical talks aimed at students, and social gatherings. Although one or two talks are given by faculty at MathClub events each semester, students are encouraged to give talks accessible to undergraduate and graduate mathematics students and the schedule is typically devoted to these speakers. Events are free and open to all. A schedule can be found at http://www.wmich.edu/mathclub/calendar.html. Induction ceremonies into PME each fall and spring semester also include a guest faculty speaker.

The TA Seminar

During the Fall and Spring semesters, faculty in the department organize a TA Seminar. This seminar meets about every two weeks (six or seven times a term) and focuses on a variety of topics related to the teaching and learning of mathematics; examples of topics are technology use to promote learning, lecture styles, assessment, or tutoring techniques. You may request that certain topics you are interested in be addressed. Teaching assistants in their first two years of their teaching appointment at Western are required to attend and actively participate in the TA seminar; more experienced TAs are strongly encouraged to attend. Research Assistants who are supported through external funding are exempt from this requirement until they begin to receive support through a regular department teaching assistantship. (Students should be aware that this could happen at any point within a student’s program and they should work closely with their research advisor to prepare for such funding changes.)
XIII. SUGGESTIONS FOR TEACHING ASSISTANTS

Good teaching is more than accidental; you have to work at it. Being a good and effective teacher requires careful planning and a continuous evaluation of the techniques used, as well as the results obtained. It should be an exciting and challenging experience for both the teacher and the student. Effective teaching must be every teacher's goal. It is the purpose of this section to offer suggestions and provide guidelines to help you achieve this goal.

Your first day of class

Your first class period you should be designed so that students see that the course will be interesting, and that the material to be studied is worthwhile. You are required to hand out a syllabus with pertinent information (such as that listed below) or refer students to the appropriate web address where this information is listed. (Check with your supervisor or course coordinator concerning the details of the information.)

1. Name, number and section of the course.
2. Days, hour and meeting room of the course.
3. Textbook and author(s), and how much of the textbook material is to be covered.
4. Your name, office location, the Main Office phone (387-4510) and home phone (optional). Establish office hours as soon as possible and be sure to include "other hours by appointment". Some of these office hours will be in the tutor lab.
5. Class policy for establishing grades, testing procedures, homework, make-up exams, late assignments, and attendance.
6. The syllabus must also contain a WMU statement pertaining to accommodations for students with disabilities. Those statements are sent annually to faculty with updated information from the Provost’s office.

Printing and Photocopying

The office staff will make photocopies of any material you may need for your class if you have it prepared and handed in 24 HOURS in advance of the time you will need it. In order to avoid waste, consider posting online materials that students might simply refer to online rather than needing a printout (for example, you may choose to post your syllabus on line, rather than handing out copies for each student). Clearly quizzes and exams will need to be copied. [You may not use printers to print classroom sets of materials, as this is quite expensive.] To have copies made, submit the original copy to the Math Office and complete the photocopying information form. The office staff will photocopy and collate the material for you.

Student Attendance

Regular attendance plays an important role in student success. Many students are tempted to stop attending class, especially if the initial material looks familiar to them. It is critical that the work in class goes beyond what students would get from simply reading the textbook and doing the
exercises within. Therefore, consider using tasks/problems that you create rather than only doing problems from the textbook, so that students are encouraged to attend to be exposed to problems they would not likely see elsewhere. Other options include making attendance worth a small percentage of the final grade. Frequent quizzes can also strongly encourage the students to come to class regularly, especially if some of the quizzes are unannounced. Giving quizzes (or taking attendance) at the beginning of class, rather than later, also encourages punctuality.

Homework

It is fundamental to the understanding of mathematics (especially at the beginning level) that students are assigned and expected to do a reasonable amount of homework. The importance of the assignment - the working of problems and exercises - cannot be overemphasized. Daily assignments should be given. Students should understand that they must spend time each day reviewing classroom notes and doing homework assignments if they plan to be successful in your course. Daily work in mathematics assures that students will be prepared for the lectures and will be able to participate in class discussions and other activities.

You should not collect homework unless you plan to do something with it. Grading selected problems, for example, can be very helpful to the student. For an unusually challenging problem, you may wish to hand out a solution, but only after the students have had time to arrive at a solution of their own. Another possible approach is to have a few students share solutions to the assigned problems, so that different approaches may be discussed in whatever detail is required for understanding. Students can then consider whether all of the solutions are correct or not, whether the solution processes seem legitimate and logical, and identify similarities and differences among the solution processes. This will allow you to encourage students to develop problem solving skills related to determining whether more than one correct answer is reasonable for any given problem, determining whether more than one strategy is reasonable, and identifying common mathematical structures among strategies and debating levels of efficiency. Sharing student solutions can be done by having students copy their work on the board, or by having them write out their solutions on index cards to be placed on the document camera. The later allows students work to be anonymous, which can make the analysis of common misconceptions or errors less personal.

Be sure to be clear about whether or not homework will be counted as a formal part of students' grades. If homework is not counted as part of students’ grades, its importance can be stressed by frequent sharing and analysis of their work. Also, the rewards for doing homework should become adequately clear through exams that build off of and extend that work.

Testing Procedures

It is important to provide students with frequent evaluation and feedback on their work. This encourages students to “keep up” rather than to try to “catch up” at the end of the semester - an impossible task in mathematics. Frequent evaluation of achievement helps assure students that their efforts are satisfactory, or alerts the student to the necessity for more effort on her/his part. Make sure to check with the course coordinator about the number of exams that will be administered for your course.
Short quizzes (if you or the course coordinator decide to use them) should emphasize the material that immediately precedes them. A short quiz might cover a week's worth of material. An hour-long exam usually covers a longer time period and is more comprehensive. In any case, the student should be well informed as to the nature of the test or quiz and their importance as an assessment tool.

It is always wise and necessary to proctor your exams. This will make it possible to interpret the questions, if necessary, and it will assure that each and every student will be doing his or her own work. Most students are anxious to do their own work and resent any attempts by the immediate neighbors to copy material they have not spent sufficient time to master on their own. Spread out the students in the room as much as possible. Careful proctoring requires that the teacher not remain in one place during the whole hour. [See below section on cheating.]

Your exam should be a learning experience for the students, as well as a means of evaluating their performance. However, while questions should require some original thinking, you need to remember that only a limited amount of this type of performance can be expected in one short hour. Exams should be carefully prepared as to length - neither too long nor too short. If you can write out complete solutions to the exam materials in about 1/4 to 1/3 of the allowed time, your exam is probably of about the right length. A good exam not only determines success or failure but also determines the difference between excellent and acceptable. Vary the questions as to difficulty using for your first question a fairly easy item, which you expect most students to answer acceptably. This will give the student some confidence and help him/her reduce any test anxiety. Encourage the students to start with those questions for which they feel they have sufficient understanding to present a satisfactory solution. Remember that success breeds success.

Require your students to be present at all exams. It is difficult to give fair make-up exams. In addition, it is extra work to write make-up exams. This is a problem that you will have to face, however. If you give several exams, then you might announce that there will be no make-up exams, but will discard the lowest exam score in determining the final grade. And in the case of a student missing an exam, this would be the one that is automatically dropped. Another option is to ignore the missed exam, but double-count items on the final exam dealing with that material. You should check with your supervisor concerning this policy, and be sure to advise the students clearly of the rules.

All exams and quizzes should be typed and readable. The goals of the problems should also be clear. One way to check clarity of a text or quiz you have created yourself is to actually take it yourself. Each exam that you give must be shown to your teaching supervisor before it is finalized.

Exams should be graded promptly so that scores may be discussed with your supervisor before returning them to the class. When correcting the exams, you should give reasonable partial credit. Perhaps the majority of the credit should be given if the student clearly understands the concepts. A student should not be penalized severely for an arithmetic mistake (assuming the
problem is not simply arithmetic). Point out any mistakes made by the student, with explanations if possible, rather than just writing down the number of points (s)he has received or lost. Consider handing out solution sheets after the exams (and make-up exams) have been completed. In addition to finding out the correct solution and which mistakes they have made, the students will learn how a solution should be written up in a clear and logical way.

**Grades**

Unless a student is auditing your course (in which case the grade assigned is VS), you will have to assign a grade to each of your students.

All inquiries for incomplete grades must be discussed with your teaching supervisor. Incomplete grades may be given to a student when illness, necessary absence, or other reasons beyond the student’s control prevent completion of course requirements by the end of the semester or session. This grade may not be given as a substitute for a failing grade. When a student applies for an Incomplete Grade, the instructor completes an online form (accessible at gowmu).

Your grading policy should be clearly explained in the syllabus, and thus each of your students should have a fairly good idea of how (s)he is doing from the scores you have given on the tests, quizzes, and possibly the homework. The assigning of final grades is often a difficult task. You will get to know some of your students and will want them to receive good grades. However, the grade you award a student will indicate how well the material has been mastered and whether the student should continue in the sequence. It is Department policy not to allow a student to continue to the next course in a sequence if a DC, D, or E has been assigned. This policy also applies whenever a given course is a prerequisite to further mathematics courses. After you have decided on final grades for your students, you should discuss these with your teaching supervisor.

You should tell your students as early as possible how you plan to grade so that they will know what they must achieve to receive a certain grade.

**Disruptive Students and Cheating**

You should do everything you can to set a tone of respect and collegiality in your classes by first showing the utmost respect yourself to your students. It is also helpful to take the time throughout the semester to have “tone setting” conversations with your students. These can be brief, but should highlight the positive behaviors students are exhibiting in class and how these have made a positively impact on their learning. For example, a student who might be struggling with a problem could raise their hand and say, “I am frustrated, because I know this answer is wrong but I don’t know why.” You could then let the student explain what they have done thus far and why they know their solution is incorrect and ask the rest of the class to discuss the solution and help resolve the student’s issue. At the end of that discussion, you could briefly address tone setting and say, “I just want to thank so and so for being willing to share what was frustrating him even though he did not have a correct solution. I think the time we spent trying
to resolve the issue really helped us to think more deeply about this problem and understand it better.”

Without this kind of positive tone setting, occasionally you may have to deal with students who are behaving inappropriately. This may consist of disruptive or obnoxious behavior. The Student Code of Conduct (posted, e.g., on the web page of the Office of Student Conduct, OSC) gives clear explanations of what constitutes disruptive behavior.

You do not need to tolerate inappropriate or disruptive behavior in your classroom, or in your office. If the problem is minor, ask the student to talk to you after class, and inform him/her then that his/her behavior is not acceptable. If the inappropriate behavior rises to the level where you feel it has to be stopped immediately (for your safety or that of your students, or because you are unable to conduct your class properly), ask the student to leave the classroom. If the student does not comply, call the campus police (387-5555) to have the student removed. In each case, you should talk to your teaching supervisor after each incident occurs. Together, you should then decide whether to charge the student with inappropriate behavior.

You may also have to deal occasionally with some form of academic dishonesty (cheating). The Faculty Senate suggests including a paragraph on academic dishonesty in the syllabus. If you assemble your own syllabus, you should follow that recommendation. Also, include as many of your policies as possible in this document, such as cell phone use, calculator use, laptop use, how much collaboration is acceptable for homework or projects, etc.

If you suspect a student or students of academic dishonesty, an academic dishonesty charge form (available on the OSC’s web site) should be filled out and submitted to the OSC, with as much detail and supporting evidence as possible included or attached. You should talk to your course supervisor before going forward with such a charge; he or she will probably be the person to bring the charges. The OSC will then contact the student(s), and there is a clearly outlined process for dealing with such cases.

For in-class exams or quizzes, careful proctoring goes a long way towards preventing academic integrity issues. However, if you catch a student cheating during an exam, do not confront him/her right then. Do not take an exam from a student because you suspect him/her of cheating, or impose penalties for cheating, unless you have charged the student through the OSC, and the student has been found responsible. You may ask the student to hand over a crib sheet, or a cell phone during an exam, or to change seats. If the student does not comply, let it go, and charge him/her afterwards.

Unable to Teach

Should you be unable to teach a class due to an illness or some other reason, you should follow instructions given to you by the course supervisor. If you are teaching your own class, you should immediately contact the Department secretary to see if arrangements can be made to cover your class. As a rule, we only cancel class as a last resort. So, please provide as much advance notice to the course supervisor or the Department secretary as you can.
Teaching Techniques

Everyone's style of teaching is unique, and no one can tell another person how to teach. However, no matter how good a teacher is, there is always room for improvement. Please keep in mind that it is already clear that you, the instructor, know more about the class material than your students. Therefore, it is unnecessary to establish your superiority over your students. If your students feel that you respect them, they will enjoy coming to class and ask questions more freely and frequently. Students should not be criticized for asking "dumb" questions.

In terms of some basics, you should consider your use of the board when teaching. You should plan ahead for this by actually writing in your lesson plan what you anticipate writing on the board during class, when you should be able to remove any information you have placed on the board, and what parts you plan to leave up for the entire class. You should always think about ease of reading what is on the board and make an effort to maintain oral communication while writing on the board.

With regard to more complex issues related to teaching, it is the case that there are many different approaches one may use to engage students. Whether you are teaching through demonstration (lecture), questioning and answering (interactive lecture), or small group work followed by whole class discussion, there are a few things that many good teachers seem to have in common, and you should keep these in mind.

1. **Pose good questions for students to consider.** This will engage students differently in the material than having students only be spectators, watching you do work on the board. These questions should provoke thinking by not being ones that can simply be answered with a yes or no or by filling in the blank, and have some potential for debate or discussion. Planning these types of questions before teaching and considering when they should be posed is essential for using this approach effectively. You may want to watch a short clip of an interactive lecture of this type by Deborah Ball, Dean of the College of Education at the University of Michigan, at the following web address: [http://www.youtube.com/watch?v=pPhCmvpPorU](http://www.youtube.com/watch?v=pPhCmvpPorU). She provides simple tips on how to encourage students to participate in this format and reasons for doing so.

2. **Encourage students to ask questions.** If questions are encouraged, students will be held more accountable for listening carefully to what happens in class and to determine themselves what they do and do not understand. On occasion, a student will tell you that he/she is “completely lost” and may not be able to pose a question. In this case, you can try to find some starting point that the student does understand and then perhaps engage the class in sharing a few important ideas that could help the student gain more clarity.

3. **Engage students in analyzing the thinking of their peers.** Focus on student thinking by utilizing their work, strategies, and reasoning during discussions of material. One important goal is to allow sharing of both correct and incorrect thinking during class discussions. Asking the class to analyze erroneous thinking can be a productive way to encourage students to identify common misconceptions so they know what to avoid and why. Related to this is encouraging students to share ideas or claims that they are unsure about for their
classmates to consider. A simple example that occurred in an algebra class here on campus was when students were analyzing the relationship between measurements of temperature in Fahrenheit and Celsius. One student noticed that when you have 0^\circ Celsius and use the equation \( F = \frac{9}{5}C + 32 \), \( F = 32 \). She then made a claim that for every degree increase in Celsius, you would get a 32-degree increase in Fahrenheit. While the instructor could have easily stepped in and explained why this was not true, encouraging classmates to provide arguments to disprove this claim was beneficial as it required them to think more about the meaning of the coefficient in the equation and ways to articulate the actual relationship modeled in that equation.

**Evaluation of your teaching**

Each teaching assistant will be assigned a teaching supervisor, as well as a teaching mentor, for each semester and session that is taught. In some cases, the supervisor and the mentor will be the same person. If you are teaching a discussion section, the teaching supervisor will be the instructor for the large lecture. If you are teaching a lecture course, then the supervisor will typically be the course coordinator for this course. For courses in the Developmental Mathematics Program (Math 1090, Math 1100, and Math 1110), the supervisor is the director of the program, Dr. Kirsty Eisenhart. You should consult your supervisor regarding the manner in which the class is to be conducted along with questions about homework, exams, grading and other issues related to the day-to-day operation of the course.

Your teaching mentor is a faculty member from the Mathematics Department. Teaching mentors are assigned each semester mainly based on schedules, so it is likely you will have a different mentor each semester. The teaching mentor will visit your class at least once during the semester and produce a report that gives his/her evaluation of your teaching. You should contact this mentor and introduce yourself soon after he or she is assigned to you, and discuss how the classroom observation will be conducted. After the classroom observation, you should meet with the mentor to discuss your teaching, to talk about your strengths as well as those aspects that need improvement. If you have any problems or concerns about your teaching, both your mentor and your course supervisor are good people to talk to.

Every session or semester your students will also evaluate your teaching using an online evaluation form that contains general questions generated by the Instructor and Course Evaluation System (ICES). You may be able to add questions from among a collection offered by ICES if you are the instructor of record. If this is the case, you will receive an email from ICES asking you to approve your evaluation form or add questions. This must be done under the deadlines provided in the email from ICES. If you are teaching a discussion section, it is likely that the course supervisor will make those decisions. In any case, the purpose of these evaluations is to determine areas that may require some additional work and improvement on your part.

The Department has been very fortunate to have a large number of very good teachers among its graduate teaching assistants, and we hope to continue this record. Occasionally, a graduate
assistant's teaching is so outstanding that the Department gives special recognition to him or her. The Charles H. Butler Excellence in Teaching Award exists for this purpose. This is one of several awards given annually by the department to recognize graduate students for excellence in teaching, academics, research, and service. Appendix A lists all awardees for the various awards presented since 1999. All awardees are invited to participate in the Awards Day Ceremony and Banquet held each April and are honored as a guest of the Department. In addition, some awards carry with them an automatic eligibility for honors at the college and university levels,
## APPENDIX A

### GRADUATE AWARDS

IN THE DEPARTMENT OF MATHEMATICS SINCE 1999

<table>
<thead>
<tr>
<th>Year</th>
<th>Robert C. Seber Memorial Award (Masters in Math Ed)</th>
<th>Charles Butler – Excellence in Teaching</th>
<th>All-University Graduate Student Effective Teaching Award</th>
<th>Department Graduate Service Award</th>
<th>Yousef Alavi Doctoral Student Award</th>
<th>All-University Dept. Graduate Research Scholar Award</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>Kirsty Eisenhart</td>
<td>Sheila Eisenhauer</td>
<td></td>
<td></td>
<td>David Erwin</td>
<td>Linda Eroh</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amy Stone</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asheber Abebe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Joe Fox</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thayma Darby</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>Daniela Hernandez</td>
<td>Jon Hodge</td>
<td></td>
<td></td>
<td>Angela Root</td>
<td>Rebecca Walker</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>Kevin Guzzo</td>
<td>Laila Poisson</td>
<td>Lynn Breyfogle</td>
<td>Vince Castellani</td>
<td>Asheber Abebe</td>
<td>Lynn Breyfogle</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>Serena Kershner, Robert Nisen</td>
<td>Ralucca Gera</td>
<td>Joe Fox</td>
<td>John Daniels, Kirsty Eisenhart</td>
<td>Jon Hodge</td>
<td>Jon Hodge, Varaporn Saenpholphat</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>Ellen Eisele</td>
<td>Nesrin Cengiz</td>
<td>Ralucca Gera</td>
<td>Michael Blake</td>
<td></td>
<td>Ralucca Gera</td>
</tr>
<tr>
<td>2004</td>
<td>Tamara Ashby</td>
<td>Henry Escuadro</td>
<td>Nesrin Cengiz</td>
<td>Michelle Isenhou</td>
<td>Marcia Weinhold</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Joe Fox</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>Rachel Kuipers</td>
<td>Futaba Okamoto</td>
<td></td>
<td>John Hecht</td>
<td>Joe Hopkins</td>
<td>Ovidiu Furdui</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ludwig Kuzma</td>
<td></td>
<td></td>
<td></td>
<td>Shari Stockero</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Brad Young</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Julie Houck</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Robert C. Seber Memorial Award (Masters in Math Ed)</td>
<td>Charles Butler – Excellence in Teaching</td>
<td>All-University Graduate Student Effective Teaching Award</td>
<td>Department Graduate Service Award</td>
<td>Yousef Alavi Doctoral Student Award</td>
<td>All-University Dept. Graduate Research Scholar Award</td>
</tr>
<tr>
<td>------</td>
<td>-----------------------------------------------------</td>
<td>----------------------------------------</td>
<td>-------------------------------------------------------</td>
<td>---------------------------------</td>
<td>-----------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>2007</td>
<td>Anna Kruizenga, Jonathan Engelman</td>
<td>Joseph Hopkins, David Arnold, Violeta Kovacev- Nikolic</td>
<td>Jason Trowbridge</td>
<td>Nesrin Cengiz</td>
<td>Futaba Okamoto</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>Nicole Lanie</td>
<td>Janice Hiner</td>
<td>Dana Cox</td>
<td>Ben Phillips</td>
<td>Dana Cox</td>
<td>Sandra Madden</td>
</tr>
<tr>
<td>2009</td>
<td>Hillary Smitts</td>
<td>Ben Phillips</td>
<td>Julie Houck</td>
<td>Anirban Dutta</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>Ben Freeburn, Maria Poppen</td>
<td>Meaghan Heires, Rebecca Jones, Vasilije Perovic</td>
<td>Ryan Jones</td>
<td>David Arnold</td>
<td>Nichole Fonger</td>
<td>Kyle Kolasinski</td>
</tr>
<tr>
<td>2011</td>
<td>James Kratky</td>
<td>Alper Bulut, Kyle Kolasinski, Krystin Smaka</td>
<td>Nicole Fonger</td>
<td>A.J. Edson</td>
<td>Kyle Kolasinski</td>
<td>Ryan Jones</td>
</tr>
<tr>
<td>2012</td>
<td>Napthalin Atanga</td>
<td>Feng-Chiu Tsai-Goss, Daniel Sievewright</td>
<td>Brian Phinezy</td>
<td>Vasilije Perovic</td>
<td>Robert Kipka</td>
<td>Nicole Fonger</td>
</tr>
<tr>
<td>2013</td>
<td>Sara Dix</td>
<td>Eric Andrews, Sara Main</td>
<td>Sara Main</td>
<td>Alden J. Edson</td>
<td>Daniel Sievewright</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>Isai Almeida</td>
<td>Timothy Clark, Jennifer O’Brien, Elliot Laforge, Anthony Wilburn</td>
<td>Stephen Devereaux</td>
<td>Richard Hollister</td>
<td>James Schwass</td>
<td>Daniel Johnston</td>
</tr>
<tr>
<td>2016</td>
<td>Matthew Schnaare</td>
<td>Christopher Servant</td>
<td>Alexis Byers</td>
<td>Timothy Clark, Laars Helenius, Richard Hollister, Joshua Tymkew</td>
<td>Elliot LaForge</td>
<td>Zhenming Bi*, Timothy Clark, Elizabeth Fraser, Mehdi Vazifedan, *All University Award</td>
</tr>
</tbody>
</table>
Charles H. Butler Excellence in Teaching Award

Presented annually to graduate teaching assistants in recognition of excellence in teaching over an extended period. Professor Butler, a former Chair of the Department, was a faculty member from 1937 to 1965.

Department Graduate Service Award

Presented annually to a graduate student in recognition of extraordinary dedication and outstanding service to the Department of Mathematics.

All University Department Graduate Research Scholar Award

Presented annually to a doctoral student in recognition of scholarly productivity.

Robert C. Seber Memorial Award

Awarded annually to advanced students in the Masters of Arts in Mathematics Education Program for outstanding scholarship. Professor Seber joined the Department in 1956 and served as Professor of Mathematics Education for 22 years.

All University Graduate Student Teaching Effectiveness Award

Presented to a graduate student in recognition of significant contributions to the teaching mission of the University.

Yousef Alavi Doctoral Student Award

Presented to an outstanding doctoral student in mathematics or statistics in recognition of excellence in the student’s field of study, covering graduate studies, doctoral examinations, and research activities including the doctoral dissertation. Professor Alavi, a faculty member from 1958 - 1997, chaired the Department from 1989 -1992. Devoted to all aspects of the graduate program, he served for many years as the Chair of the Graduate Committee and as the Graduate Programs Coordinator, helping develop various Masters and Doctoral Programs.
## APPENDIX B

### DOCTORATES AWARDED

**IN THE DEPARTMENT OF MATHEMATICS AND STATISTICS**

<table>
<thead>
<tr>
<th>#</th>
<th>Doctorate Position</th>
<th>Dissertation Title</th>
<th>Advisor; Commencement Date</th>
</tr>
</thead>
</table>
| 1 | Kenneth L. Pothoven  
University of South Florida | Characterizations of Some Functors of Categories of Banach Spaces | Kung-Wei Yang  
December 1969 |
| 2 | John A. Mitchem  
San Jose State University | On External Partitions of Graphs | Gary Chartrand  
April 1970 |
| 3 | Wayne W. Bishop  
California State University, Los Angeles | A Theory of Multiplicity for Multiplicative Filtrations | John W. Petro  
April 1971 |
| 4 | Maurice L. Eggan  
Trinity University, San Antonio, Texas | Discrete Approximations to Continuous Optimal Control Problems | Arthur W. J. Stoddart  
April 1972 |
| 5 | Pascal D. Mubinga  
Returned to Zaire | Convergence Bounds in Optimization | Arthur W. J. Stoddart  
April 1972 |
| 6 | Alan A. Bishop  
Completion of Lattices with Semicomplementation | Erik A. Schreiner  
August 1972 |
| 7 | Timothy B. Carroll  
Eastern Michigan University | Severance Classes and Multiplicative Arithmetic Functions | Anthony A. Gioia  
April 1973 |
| 8 | Donald W. VanderJagt  
Grand Valley State University | Local Connectivity in Graphs | Gary Chartrand  
April 1973 |
| 9 | Krishnamachari S. Nadathur  
Bishop Herber College, India (retired) | Linear Operators Between Nonarchimedian Banach Spaces | Kung-Wei Yang  
August 1973 |
| 10 | James E. Williamson  
University of Dubuque | On Hamiltonian-Connected Graphs | Gary Chartrand  
August 1973 |
| 11 | Kenneth G. Hummell  
Eureka Company | The Automorphism Group of the Wreath Product of Finite Groups | Joseph T. Buckley  
August 1974 |
| 12 | Linda M. Lesniak  
Drew University | On the Theory of Hamiltonian Graphs | Gary Chartrand  
August 1974 |
| 13 | John A. Roberts  
University of Louisville | Indegrees, Outdegrees, and the Hamiltonian Theme | Gary Chartrand  
August 1975 |
| 14 | Saul Stahl  
University of Kansas | Self-Dual Embeddings of Graphs | Arthur T. White  
August 1975 |
| 15 | Kenneth P. Johnson  
Grand Valley State University | Symmetric Maps of S3 onto a Homotopy 3-sphere | Alden H. Wright  
August 1975 |
| 16 | Brian L. Garman  
University of Tampa | Cayley Graph Imbeddings and the Associated Block Designs | Arthur T. White  
August 1976 |
| 17 | James M. Benedict  
Augusta State University, Georgia | On Ramsey Numbers Defined by Factorizations of Regular Complete Multi-partite Graphs | Gary Chartrand  
August 1976 |
| 18 | H. Joseph Straight  
SUNY, College at Fredonia | Partitions of the Vertex Set or Edge Set of a Graph | Don L. Lick  
August 1977 |
| 19 | Jerome J. Przybyski  
Elmira College, New York | On a System of Nonlinear Ordinary Differential Equations with an Irregular Type Singularity: A Degenerate Case | Philip Hsieh  
August 1978 |
| 20 | Nancy J. Boynton  
SUNY, College at Fredonia | Markovian Multiserver Queuing Systems with Servers in Series | A. Bruce Clarke  
April 1979 |
<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>University/Institution</th>
<th>Title of Thesis/Work</th>
<th>Advisor</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Ronald J. Gould</td>
<td>Emory University</td>
<td>Traceability in Graphs</td>
<td>Gary Chartrand</td>
<td>August 1979</td>
</tr>
<tr>
<td>22</td>
<td>David Burns</td>
<td>Ferris State University</td>
<td>Uniform Factorization in Graphs</td>
<td>Shashi F. Kapoor</td>
<td>December 1979</td>
</tr>
<tr>
<td>23</td>
<td>John Frederick Fink</td>
<td>Univ. of Michigan – Dearborn</td>
<td>Random Factors and Isofactors in Graphs</td>
<td>Gary Chartrand</td>
<td>August 1982</td>
</tr>
<tr>
<td>25</td>
<td>Sergio Ruiz</td>
<td>Deceased</td>
<td>On Isomorphic Decompositions of a Graph</td>
<td>Gary Chartrand</td>
<td>December 1983</td>
</tr>
<tr>
<td>26</td>
<td>John G. Gimble</td>
<td>Univ. of Alaska Fairbanks</td>
<td>The Chromatic and Cochromatic Number of a Graph</td>
<td>Linda M. Lesniak</td>
<td>April 1984</td>
</tr>
<tr>
<td>27</td>
<td>John M. Rahn</td>
<td>Western Michigan University</td>
<td>On the Genus of a Blockchromatic Number</td>
<td>Arthur T. White</td>
<td>August 1984</td>
</tr>
<tr>
<td>28</td>
<td>Hung Bin Zhou</td>
<td>Intermagnetics General Corp.</td>
<td>On Common Subgraphs</td>
<td>Gary Chartrand</td>
<td>December 1985</td>
</tr>
<tr>
<td>29</td>
<td>John A. Kapenga</td>
<td>Western Michigan University</td>
<td>Jacobi Moments in Applied Mathematics and Computer Science</td>
<td>Philip Hsieh</td>
<td>August 1986</td>
</tr>
<tr>
<td>30</td>
<td>Ortrud R. Ollermann</td>
<td>University of Winnipeg</td>
<td>Generalized Connectivity in Graphs</td>
<td>Gary Chartrand</td>
<td>August 1986</td>
</tr>
<tr>
<td>31</td>
<td>Farhad Shahrakhi</td>
<td>University of North Texas</td>
<td>Design and Analysis of Efficient Routing Algorithms</td>
<td>Donald W. Matula</td>
<td>December 1986</td>
</tr>
<tr>
<td>32</td>
<td>Thomas J. Vidmar</td>
<td>Pharmacia and Upjohn</td>
<td>Design and Analysis of Drug Combination Experiments</td>
<td>Joseph W. McKean</td>
<td>April 1986</td>
</tr>
<tr>
<td>33</td>
<td>James Buddy Davis</td>
<td>Radford University</td>
<td>Robust Rank Analysis for Multivariate Linear Models</td>
<td>Joseph W. McKean</td>
<td>April 1987</td>
</tr>
<tr>
<td>34</td>
<td>Zhuguo Mo</td>
<td>Returned to China</td>
<td>Graph and Directed Graph Augmentation Problems</td>
<td>Kenneth L. Williams</td>
<td>June 1988</td>
</tr>
<tr>
<td>35</td>
<td>Garry L. Johns</td>
<td>Saginaw Valley State Univ.</td>
<td>Generalized Distance in Graphs</td>
<td>Gary Chartrand</td>
<td>August 1988</td>
</tr>
<tr>
<td>36</td>
<td>Paresh J. Malde</td>
<td></td>
<td>Chromatic Partitions</td>
<td>Allen J. Schwenk</td>
<td>December 1988</td>
</tr>
<tr>
<td>37</td>
<td>Charlene E. Beckmann</td>
<td>Grand Valley State University</td>
<td>The Effect of Computer Graphics Use on Student Understanding of Calculus Concepts</td>
<td>Dwayne E. Channell</td>
<td>April 1989</td>
</tr>
<tr>
<td>38</td>
<td>Karen S. Holbert</td>
<td>Grand Valley State University</td>
<td>Specified Subgraphs and Subgraph-defined Parameters in Graphs</td>
<td>Gary Chartrand</td>
<td>April 1989</td>
</tr>
<tr>
<td>39</td>
<td>Lee D. Witt</td>
<td>Davenport College</td>
<td>Coefficients of Multiple Determination Based on Rank Estimates</td>
<td>Joseph W. McKean</td>
<td>April 1989</td>
</tr>
<tr>
<td>40</td>
<td>Grzegorz Kubicki</td>
<td>University of Louisville</td>
<td>Greatest Commons Subgraphs</td>
<td>Gary Chartrand</td>
<td>August 1989</td>
</tr>
<tr>
<td>41</td>
<td>Eva Kubicki</td>
<td>University of Louisville</td>
<td>The Chromatic Sum and Efficient Tree Algorithms</td>
<td>Allen J. Schwenk</td>
<td>August 1989</td>
</tr>
<tr>
<td>42</td>
<td>Sudhakar H. Rao</td>
<td>Schering-Plough Research Institute, Kenilworth, NJ</td>
<td>Measures of Partial Association Based on Rank Estimates</td>
<td>Gerald L. Sievers</td>
<td>August 1989</td>
</tr>
<tr>
<td>43</td>
<td>Robert G. Rieper</td>
<td></td>
<td>The Enumeration of Graph Imbeddings</td>
<td>Arthur T. White</td>
<td>August 1990</td>
</tr>
<tr>
<td>44</td>
<td>Sonlin Tian</td>
<td>Central Missouri State Univ.</td>
<td>On Distance in Graphs and Digraphs</td>
<td>Gary Chartrand</td>
<td>August 1990</td>
</tr>
<tr>
<td>45</td>
<td>Bruce P. Mull</td>
<td>Lake Michigan College</td>
<td>Enumerating the Orientable 2-Cell Imbeddings of Complete n-Partite Graphs</td>
<td>Arthur T. White</td>
<td>August 1990</td>
</tr>
<tr>
<td>No.</td>
<td>Name</td>
<td>University, Location</td>
<td>Title</td>
<td>Advisor</td>
<td>Date</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------</td>
<td>-----------------------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>------------</td>
</tr>
<tr>
<td>46</td>
<td>Thomas B. Sprague</td>
<td>Cornerstone University</td>
<td>Shape Preserving Piecewise Cubic Interpolation</td>
<td>Dennis D. Pence</td>
<td>August 1990</td>
</tr>
<tr>
<td>47</td>
<td>Jamal H. Nouh</td>
<td>Birzeit University, West Bank</td>
<td>Improving Network Reliability</td>
<td>Alfred J. Boals</td>
<td>December 1990</td>
</tr>
<tr>
<td>48</td>
<td>Ghidewon Abay Asmeron</td>
<td>Virginia Commonwealth Univ.</td>
<td>Graph Products and Covering Graph Imbeddings</td>
<td>Arthur T. White</td>
<td>December 1990</td>
</tr>
<tr>
<td>49</td>
<td>Héctor Hevia</td>
<td>Universidad Católica de Valparaíso, Chile</td>
<td>A Representation of Chemical Reactions by Labeled Graphs</td>
<td>Gary Chartrand</td>
<td>June 1991</td>
</tr>
<tr>
<td>50</td>
<td>Elzbieta B. Jarrett</td>
<td>Modesto Junior College</td>
<td>Transformations of Graphs and Digraphs</td>
<td>Gary Chartrand</td>
<td>June 1991</td>
</tr>
<tr>
<td>52</td>
<td>Hung-Ir Li</td>
<td>Eli Lilly Company</td>
<td>On Rank Procedures for the Logistic Model</td>
<td>Joseph W. McKean</td>
<td>December 1991</td>
</tr>
<tr>
<td>53</td>
<td>Jiuziang Liu</td>
<td>Eastern Michigan University</td>
<td>Maximal and Maximum Independent Sets in Graphs</td>
<td>Yousef Alavi</td>
<td>June 1992</td>
</tr>
<tr>
<td>54</td>
<td>Hang Chen</td>
<td>Central Missouri State Univ.</td>
<td>Common Moment Sets of Complementary Graphs</td>
<td>Allen J. Schwenk</td>
<td>June 1992</td>
</tr>
<tr>
<td>55</td>
<td>Himli Yahya</td>
<td></td>
<td>A Progressive Disease Model for Doubly-censored Bivariate Survival Data that Accommodate Covariate Information</td>
<td>Daniel Mihalko</td>
<td>August 1992</td>
</tr>
<tr>
<td>56</td>
<td>Kimberly Tucker Perry</td>
<td>Pharmacia and Upjohn</td>
<td>A Critical Examination of the Use of Preliminary Tests in Two-sample Tests of Location</td>
<td>Michael R. Stoline</td>
<td>August 1992</td>
</tr>
<tr>
<td>57</td>
<td>Ignatious E. Vakalis</td>
<td>Capitol University</td>
<td>Multivariate Quadrature on MIMD Machines with Shared or Distributed Memory</td>
<td>Elise DeDoncker</td>
<td>August 1992</td>
</tr>
<tr>
<td>58</td>
<td>Sherry Dixon</td>
<td>National Center for Lead-Safe Housing</td>
<td>Rank Based Procedures in the Heteroscedastic Linear Model</td>
<td>Joseph W. McKean</td>
<td>December 1993</td>
</tr>
<tr>
<td>59</td>
<td>Steven Winters</td>
<td>Univ. of Wisconsin-Oshkosh</td>
<td>Distances Associated with Subgraphs and Subdigraphs</td>
<td>Gary Chartrand</td>
<td>June 1993</td>
</tr>
<tr>
<td>60</td>
<td>Brian A. Keller</td>
<td>Iowa State University</td>
<td>Symbol Sense and Its Development in Two Computer Algebra System Environments</td>
<td>Christian R. Hirsch</td>
<td>August 1993</td>
</tr>
<tr>
<td>61</td>
<td>Ian Campbell Walters, Jr.</td>
<td>D'Youville College</td>
<td>Isospectral Graphs and the Expander Coefficient</td>
<td>Allen J. Schwenk</td>
<td>June 1994</td>
</tr>
<tr>
<td>62</td>
<td>Stavros Costa Pouloukas</td>
<td>Cyprus College, Cyprus</td>
<td>Comparisons of Several Medians in a Lognormal K-sample Context Where Some Date may be Left-censored</td>
<td>Michael Stoline</td>
<td>August 1994</td>
</tr>
<tr>
<td>63</td>
<td>Reza Rashidi</td>
<td>MCI, Tysons Corner, VA</td>
<td>The Theory and Applications of Stratified</td>
<td>Naveed Sherwani</td>
<td>December 1994</td>
</tr>
<tr>
<td>64</td>
<td>Fan Cong</td>
<td>Ford Motor Company</td>
<td>Semi-Strongly Regular Graphs and Generalized Cages</td>
<td>Allen J. Schwenk</td>
<td>April 1995</td>
</tr>
<tr>
<td>65</td>
<td>Feipeng Xie</td>
<td>Blue Cross &amp; Blue Shield of Massachusetts</td>
<td>Asymptotic Diagonalizations of a Linear Ordinary Differential System</td>
<td>Philip Hsieh</td>
<td>April 1995</td>
</tr>
<tr>
<td>67</td>
<td>Quan Yue</td>
<td>State Farm Insurance</td>
<td>Efficient Dominating Sets in Oriented Trees</td>
<td>Allen J. Schwenk</td>
<td>June 1995</td>
</tr>
<tr>
<td>Page</td>
<td>Name and Affiliation</td>
<td>Title</td>
<td>Advisor</td>
<td>Date</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>----------------------</td>
<td>-------</td>
<td>---------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>68</td>
<td>Kelly Lynne Schultz</td>
<td>Step Domination in Graphs</td>
<td>Gary Chartrand</td>
<td>June 1995</td>
<td></td>
</tr>
<tr>
<td>69</td>
<td>Heather Gavlas</td>
<td>A Graph Theoretic Study of the Similarity of Discrete Structures</td>
<td>Gary Chartrand</td>
<td>June 1996</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>Michelle Schultz</td>
<td>Random Cayley Maps</td>
<td>Arthur T. White</td>
<td>June 1996</td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>Allen Emerson</td>
<td>Gender Discourse in Small Learning Groups of College-level Developmental Mathematics Students</td>
<td>Christine Browning</td>
<td>December 1996</td>
<td></td>
</tr>
<tr>
<td>73</td>
<td>Robert Vandell</td>
<td>Integrity of Digraphs</td>
<td>Lowell W. Beineke</td>
<td>December 1996</td>
<td></td>
</tr>
<tr>
<td>74</td>
<td>Jeffrey Terpstra</td>
<td>A Robust Estimate for an Autoregressive Time Series</td>
<td>Joseph W. McKean</td>
<td>April 1997</td>
<td></td>
</tr>
<tr>
<td>76</td>
<td>Lisa Hansen</td>
<td>Domination in Digraphs</td>
<td>Gary Chartrand</td>
<td>June 1997</td>
<td></td>
</tr>
<tr>
<td>77</td>
<td>James Kett</td>
<td>A Portrait of Assessment in Reformed Mathematics Classrooms</td>
<td>Christian R. Hirsch</td>
<td>December 1997</td>
<td></td>
</tr>
<tr>
<td>78</td>
<td>Richard Low</td>
<td>Units in Integral Group Rings for Direct Products</td>
<td>Joseph T. Buckley</td>
<td>June 1998</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Myeong Joon Ann</td>
<td>Perturbed Hamiltonian System of Two Parameters with Several Turning Points</td>
<td>Philip Hsieh</td>
<td>June 1998</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>Melanie King Wahlberg</td>
<td>The Effects of Writing Assignments on Second-semester Calculus Students: Understanding Sense</td>
<td>Christine Browning</td>
<td>June 1998</td>
<td></td>
</tr>
<tr>
<td>82</td>
<td>Pam Crawford</td>
<td>Fostering Reflective Thinking in First Semester Calculus Classes</td>
<td>Christian R. Hirsch</td>
<td>June 1998</td>
<td></td>
</tr>
<tr>
<td>84</td>
<td>Rebecca Walker</td>
<td>Students’ Conceptions of Mathematics and the Transition from Standards-based Reform Curriculum to College Mathematics</td>
<td>Christine Browning</td>
<td>December 1999</td>
<td></td>
</tr>
<tr>
<td>85</td>
<td>David Coffley</td>
<td>An Investigation Into Relationships Between Alternative Assessment and Pre-Service Elementary Teachers’ Beliefs About Mathematics</td>
<td>Christine Browning</td>
<td>June 2000</td>
<td></td>
</tr>
<tr>
<td>86</td>
<td>Linda Eroh</td>
<td>Rainbow Ramsey Numbers</td>
<td>Allen Schwenk</td>
<td>June 2000</td>
<td></td>
</tr>
<tr>
<td>87</td>
<td>David Zeitler</td>
<td>Empirical Spectral Analysis of Random Number Generators</td>
<td>Joseph McKeen</td>
<td>June 2001</td>
<td></td>
</tr>
<tr>
<td>88</td>
<td>Boyd Jay Hanson</td>
<td>A Comparison of Methods for Detection of Qualitative Interaction in Multicenter Trials</td>
<td>Michael R. Stoline</td>
<td>March 2001</td>
<td></td>
</tr>
</tbody>
</table>
| 89 | Mary Lynn Breyfogle  
Bucknell University | Changing Mathematical Discourse: A Case of a Secondary School Mathematics Teacher | Laura Van Zoest  
July 2001 |
| 90 | David J. Erwin  
Trinity College | Cost Domination in Graphs | Gary Chartrand  
April 2001 |
| 91 | Peter Atwood  
Cornerstone University | Learning to Construct Proofs in a First Course on Mathematical Proofs | Christian R. Hirsch  
July 2001 |
| 92 | Jonathon K. Hodge  
Grand Valley State University | Separable Preference Orders | Allen J. Schwenk  
2002 |
| 93 | Varaporn Saenpholphat  
Srinakharinwirot University | Resolvability in Graphs | Ping Zhang  
April 2002 |
| 94 | Paula T. Smith  
Cornerstone University | Local Symmetries of Symmetrical Cayley Maps | John Martino  
April 2002 |
| 95 | Marcia L. Weller Weinhold  
Purdue University-Calumet | How Teachers Construct an Understanding of “Appropriate Use” of Graphing Calculators in the Context of Collegial Inquiry | Christian R. Hirsch  
July 2003 |
| 96 | Kirsty Eisenhart  
Western Michigan University | Multiobjective Optimal Control Problems with Endpoint and State Constraints | Qiji (Jim) Zhu  
March 2003 |
| 97 | Jihwa Noh  
University of Northern Iowa | An Investigation of Secondary Teachers’ Knowledge of Rate of Change in the Context of Teaching a Standards-Based Curriculum | Kate Kline and Steven W. Ziebarth  
July 2004 |
| 98 | Kathryn G. Shafer  
Bethel College | Two High School Teachers’ Initial Use of Geometer’s Sketchpad: Issues of Implementation | Tabitha Mingus  
November 2004 |
| 99 | Paritwitaana Pacheenburawana  
Thummasat University | The Global Optimality Conditions in Mathematical Programming and Optimal Control | Yuri S. Ledyaev  
December 2004 |
| 100 | Raluca Gera  
Naval Postgraduate School | Stratification and Domination in Graphs and Digraphs | Ping Zhang  
November 2004 |
| 101 | Archara Chaiyakarn  
Thummasat University | Structure Preserving Algorithms for Computing the Symplectic Singular Value Decomposition | Niloufer Mackey  
November 2004 |
| 102 | Joseph Fox  
Salem State College | Nilpotent Orbits on Infinitesimal Symmetric Spaces | Terrell L. Hodge  
March 2006 |
| 103 | Sheri Stockero  
Michigan Technological Institute | The Effect of Using Video Cases of Mathematics on Preservice Teachers’ Development of a Reflective Stance Towards Teaching | Laura Van Zoest  
June 2006 |
| 104 | Henry Escuadro  
Juniata College | Detectable Colorings of Graphs | Ping Zhang  
January 2006 |
| 105 | Futaba Okamoto  
University of Wisconsin – La Crosse | Measures of Traversability in Graphs | Ping Zhang  
April, 2007 |
| 106 | Ovidiu Furdui  
University of Toledo | The Fock Space and Related Bergman Type Integral Operators | John Srdjan Petrovic  
June 2007 |
| 107 | Nesrin Cengiz  
University of Michigan – Dearborn | What Allows Teachers to Extend Student Thinking During Whole Group Discussions? | Theresa J. Grant and Kate Kline  
August 2007 |
| 108 | Dana Cox  
Miami of Ohio University | Understanding Similarity: Bridging Numeric and Geometric Strategies for Proportional Thinking | Steven W. Ziebarth and Jane-Jane Lo  
June 2008 |
<table>
<thead>
<tr>
<th>Student ID</th>
<th>Name</th>
<th>Affiliation</th>
<th>Title</th>
<th>Chair</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>109</td>
<td>Sandra Madden</td>
<td>University of Massachusetts, Amherst</td>
<td>High School Mathematics Teachers’ Evolving Understanding of Comparing Distributions</td>
<td>Christian R. Hirsch</td>
<td>August 2008</td>
</tr>
<tr>
<td>110</td>
<td>Anirban Dutta Letse, LLC</td>
<td></td>
<td>Option Pricing and Stable Trading Strategies in the Presence of Information Asymmetry</td>
<td>Qiji J. Zhu, Chair</td>
<td>April 2010</td>
</tr>
<tr>
<td>111</td>
<td>Allan Bickle</td>
<td>Dordt College</td>
<td>The K-Core of a Graph</td>
<td>Allen Schwenk</td>
<td>December 2010</td>
</tr>
<tr>
<td>112</td>
<td>Kyle Kolasinski</td>
<td>U.S. Department of Defense</td>
<td>Hamiltonicity and Connectivity in Distance-Colored Graphs</td>
<td>Ping Zhang</td>
<td>June 2011</td>
</tr>
<tr>
<td>113</td>
<td>Ryan Jones</td>
<td>Grand Rapids Community College</td>
<td>Modular and Graceful Edge Colorings</td>
<td>Ping Zhang</td>
<td>June 2011</td>
</tr>
<tr>
<td>114</td>
<td>Karen Fonkert</td>
<td>Charleston Southern University</td>
<td>Patterns of Interaction and Mathematical Thinking of High School Students in Classroom Environments that Include Use of Java-Based, Curriculum-Embedded Software</td>
<td>Steven W. Ziebarth</td>
<td>April 2012</td>
</tr>
<tr>
<td>115</td>
<td>Bryan Phinezy</td>
<td>Epic Systems</td>
<td>Variations on a Graph Coloring Theme</td>
<td>Ping Zhang</td>
<td>June 2012</td>
</tr>
<tr>
<td>116</td>
<td>Nicole Fonger</td>
<td>University of Wisconsin-Madison</td>
<td>Characterizing and Supporting Change in Algebra Students’ Representational Fluency in CAS/Paper-and-Pencil Environment</td>
<td>Jon Davis</td>
<td>August 2012</td>
</tr>
<tr>
<td>117</td>
<td>Jianwei Lin</td>
<td>Putian University (China)</td>
<td>The Domination Number of $K_a\square K_b\square K_c$</td>
<td>Allen Schwenk</td>
<td>August 2012</td>
</tr>
<tr>
<td>118</td>
<td>Benjamin Phillips</td>
<td>University of Michigan-Dearborn</td>
<td>Boolean and Profinite Loops</td>
<td>Clifton E. Ealy, Jr.</td>
<td>December 2012</td>
</tr>
<tr>
<td>119</td>
<td>Daniel S. Sievewright</td>
<td>Kalamazoo College</td>
<td>Weighted Shifts of Finite Multiplicity</td>
<td>John Srdjan Petrovic</td>
<td>April 2013</td>
</tr>
<tr>
<td>120</td>
<td>Julienne Houck</td>
<td></td>
<td>A Pattern in the Lusternik-Schnirelmann Category of Rational Spaces</td>
<td>Jeffrey Strom</td>
<td>August 2013</td>
</tr>
<tr>
<td>121</td>
<td>David Arnold</td>
<td></td>
<td>Classifying Spaces of Symmetric Groups and Wreath Products</td>
<td>John Martino</td>
<td>December 2013</td>
</tr>
<tr>
<td>122</td>
<td>Naphthalin Achubang Atanga</td>
<td>Western Michigan University/MOST Project</td>
<td>Elementary School Teachers’ Use of Curricular Resources for Lesson Design and Enactment</td>
<td>Ok-Kyeeong Kim</td>
<td>April 2014</td>
</tr>
<tr>
<td>123</td>
<td>Eric Andrews</td>
<td>University of Alaska-Anchorage</td>
<td>On Eulerian Irregularity and Decompositions in Graphs</td>
<td>Ping Zhang</td>
<td>June 2014</td>
</tr>
<tr>
<td>124</td>
<td>Alper Bulut</td>
<td>Kuwait University</td>
<td>Lie Loops Associated with GL(H), H a Separable Infinite Dimensional Hilbert Space</td>
<td>Clifton E. Ealy, Jr.</td>
<td>June 2014</td>
</tr>
<tr>
<td>125</td>
<td>Alden Jack Edson</td>
<td>Michigan State University</td>
<td>A Deeply Digital Instructional Unit on Binomial Distributions and Statistical Inference: A Design Experiment</td>
<td>Christian Hirsch and</td>
<td>June 2014</td>
</tr>
<tr>
<td>126</td>
<td>Joshua Goss</td>
<td>University of New Haven</td>
<td>A Method for Assessing and Describing the Informal Inferential Reasoning of Middle School Students</td>
<td>Christine Browning</td>
<td>June 2014</td>
</tr>
<tr>
<td>127</td>
<td>Robert Kipka</td>
<td>Queen’s University</td>
<td>Mathematical Methods of Analysis for Control and Dynamic Optimization Problems on Manifolds</td>
<td>Yuri S. Ledyaev</td>
<td>June 2014</td>
</tr>
<tr>
<td>128</td>
<td>Dustin O. Smith</td>
<td>Murray State University</td>
<td>Eliciting Elementary School Students’ Informal Inferential Reasoning through Storytelling</td>
<td>Kate Kline</td>
<td>August 2014</td>
</tr>
</tbody>
</table>
| 129 | Chira Lumduanhom  
     Srinakharinwirot University | Modular Monochromatic Colorings  
     Spectra and Frames in Graphs | Ping Zhang  
     December 2014 |
| 130 | Vasilije Perovic  
     University of Rhode Island | Spectrally Equivalent Matrix  
     Polynomials: Non-Standard Bases and  
     Preservation of Structure | D. Steven Mackey  
     May 2015 |
| 131 | James P. Schwass | Phantom Maps, Decomposability, and  
     Spaces Meeting Particular Finiteness  
     Conditions | Jeffrey Strom  
     May 2015 |
| 132 | Daniel P. Johnston  
     University of Montana | Edge Colorings of Graphs and Their  
     Applications | Ping Zhang  
     June 2015 |
| 133 | Christina Zumbrun  
     Trine University | Secondary Mathematics Teachers’  
     Attitudes and Beliefs Toward Statistics:  
     Developing an Initial Profile | Christine Browning and  
     Steven Ziebarth  
     June 2015 |
| 134 | Timothy L. Clark | Resolving Classes and Resolvable Spaces  
     in Rational Homotopy Theory | Jeffrey Strom  
     June 2016 |
| 135 | Elliot LaForge | Chromatic Connectivity of Graphs | Ping Zhang  
     June 2016 |
APPENDIX C

2015/16 DEPARTMENT OF MATHEMATICS FACULTY

(degree attained and field of specialty; * denotes Graduate Faculty)

Steven W. Ziebarth,* Chair
Ph.D. University of Iowa
Mathematics Education

Christine Browning *
Ph.D. Ohio State University
Mathematics Education

Patrick Bennett*
Ph.D. Carnegie Mellon University
Algorithms, Combinatorics, and Optimization

Jon Davis *
Ph.D. University of Minnesota
Mathematics Education

Andrzej Dudek*
Ph.D. Emory University
Combinatorics

Clifton E. Ealy, Jr. *
Ph.D. University of Chicago
Group Theory and Combinatorics

Gene Freudenburg*
Ph.D. Washington University in St. Louis
Affine Algebraic Geometry

Theresa Grant *
Ph.D. University of Delaware
Mathematics Education

Christian Hirsch *
Ph.D. University of Iowa
Mathematics Education
(retired December 2014)

Terrell Hodge *
Ph.D. University of Virginia
Algebra/Group Theory

Ok-Kyeong Kim *
Ph.D. University of Missouri
Mathematics Education

Kate Kline *
Ed.D. University of Michigan
Mathematics Education

Melinda Koelling *
Ph.D. University of Michigan
Differential Equations, Computational Neuroscience

Yuri Ledyaev *
Ph.D. Moscow Institute; Dr.Sc. Steklov Institute
Differential Equations

Marianna Levin *
Ph.D. University of California, Berkeley
Science and Mathematics Education

Jane-Jane Lo *
Ph.D. Florida State University
Mathematics Education

D. Steven Mackey *
Ph.D. University of Manchester, U.K.
Numerical Linear Algebra, Structured Matrices and matrix Polynomials

Niloufer Mackey *
Ph.D. State Univ. of New York at Buffalo
Numerical Linear Algebra, Matrix Analysis

John Martino *
Ph.D. Northwestern University
Algebra and Topology

Tabitha Mingus *
Ph.D. University of Northern Colorado
Collegiate Mathematics Education

Annegret Paul *
Ph.D. University of Maryland
Algebra/Group Theory

Dennis D. Pence *
Ph.D. Purdue University
Numerical Analysis

John Petrovic *
Ph.D. University of Michigan
Functional Analysis
David Richter *
Ph.D. University of Minnesota
Mathematical Physics, Geometry

Allen J. Schwenk *
Ph.D. University of Michigan
Graph Theory

Jeffrey Strom *
Ph.D. University of Wisconsin
Algebraic Topology

Jay S. Treiman *
Ph.D. University of Washington
Optimization

Laura Van Zoest *
Ph.D. Illinois State University
Mathematics Education

Jay Wood *
Ph.D. University of California, Berkley
Differential Geometry

Ping Zhang *
Ph.D. Michigan State University
Combinatorics

Qiji Zhu *
Ph.D. Northeastern University
Analysis