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This Graduate Handbook was designed to inform students of course and program requirements, the timetable for the selection of a faculty advisor and the formation of a guidance committee, procedures for comprehensive and dissertation defense examinations, graduation requirements, and policy for dismissal, as required by the MSU Graduate Students Rights and Responsibilities (<http://www.vps.msu.edu/SpLife/default.pdf>) document. The Handbook is given to all entering graduate students and will also be available through the Department of Biochemistry and Molecular Biology website (www.bch.msu.edu). Keep this handbook in a secure place, so that you can refer to it as needed throughout your training at MSU. The version of this handbook that was current at the time of your entry into the graduate programs of this department will be used as the basis for guiding your passage through to the completion of your training

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I. PROGRAM OVERVIEW

Biochemistry is the discipline that studies the chemistry of living matter. Molecular biology is the discipline that studies the mechanisms underlying the flow of genetic information, ranging from the one-dimensional sequence of nucleotides in DNA to the three-dimensional structures of proteins. In addition to defining the chemical and structural nature of the molecules of life, biochemists and molecular biologists seek to understand the processes involved in their formation and degradation and how these processes are regulated. Such knowledge is a prerequisite for understanding normal biological functions and for adapting or modifying them for useful purposes. It is also fundamental to understanding abnormal functions that underlie biochemical and genetic disorders, ultimately leading to their treatment. Thus, biochemistry and molecular biology are fields with significance and applications across the biological spectrum, from the microbial through the plant and animal kingdoms. The rapid pace of conceptual and methodological advances coupled with the potential significance of new discoveries in modern biochemistry and molecular biology fit well with the University's overarching goals of expanding knowledge and transforming lives.

The Department of Biochemistry and Molecular Biology is administered jointly by the Colleges of Natural Science, Human Medicine, and Osteopathic Medicine. Study for the Doctor of Philosophy or Master of Science degree with a major in biochemistry and molecular biology may be administered by any one of the three colleges referenced above. Study for the Doctor of Philosophy degree with a major in biochemistry and molecular biology—environmental toxicology is administered by the College of Natural Science. Areas of active research in the department are extensive and diverse. Such areas include plant biochemistry, computational biology, structural biology, eukaryotic and prokaryotic molecular biology, membrane biochemistry and signaling mechanisms, genomics, proteomics, intermediary metabolism and metabolic regulation, and mechanisms of enzyme catalysis. Opportunities are also available for joint programs or collaborative research in genetics, cell biology, microbiology, neuroscience, toxicology, biotechnology, microbial ecology, and plant sciences.

The major objectives of the graduate programs in biochemistry and molecular biology are to help students to develop their creative potential and to prepare them for careers in research and teaching in the biochemical sciences. Individual programs of study are designed to develop independent thought as well as broad knowledge and technical skills, through formal and informal courses, laboratory experience, seminars, individual study, and, foremost, through original research that forms the basis for the student's thesis or dissertation.

II. PROGRAM COMPONENTS/PLAN OPTIONS

The graduate programs of the Department of Biochemistry and Molecular Biology are designed to provide basic education in biochemistry and molecular biology as well as extensive training in research. This is accomplished through formal courses, seminars, individual study and, foremost, through the original research that forms the basis of the student's thesis or dissertation.

II.A. Elements of the Doctoral Training Program

The Ph.D. degree is the terminal degree for professional scientists who seek to design, execute, and direct independent research projects. The heart of the Ph.D. training program is an original and creative research project that forms the basis of the doctoral dissertation. The intermediate attainment of a master's degree is not required. Students normally take at least 13 credits of advanced biochemistry courses and electives during their first two years. The specific course of study is decided in consultation initially with the Graduate Program Director and later with a Guidance Committee composed of five faculty members and chaired by the thesis advisor.

During the first two semesters, students participate in ten-week rotations in two or three laboratories of interest before selecting a thesis advisor. The comprehensive examination for the Ph.D. degree is undertaken after the second year. For this exam, each student writes a research proposal and defends it before an examining committee. Thereafter, research progress is evaluated annually by the Guidance Committee. Usually at least five years are required to complete the requirements for the Ph.D. degree.

As an integral aspect of their training, doctoral students participate in the teaching activities of the department for at least one semester. Student participation in departmental affairs, including several standing or ad hoc committees, is encouraged. Weekly seminars sponsored by this and other departments provide opportunities to hear about current discoveries by leading scientists from around the nation and the world.

II.B. Elements of the Research-based Master's Degree Program

University guidelines provide for two types of M.S. degree programs: "Plan A, consisting of prescribed course work, research, thesis, and certifying examination," and "Plan B, consisting of prescribed course work, without a thesis, and with a certifying examination." However, the Department of Biochemistry generally offers only the Plan A M.S. (in exceptional circumstances, a Plan B M.S. degree program may be approved by the Graduate Programs Director and the Department Chairperson). Although the M.S. degree is not the terminal professional degree in this field, it does connote evidence of knowledge of the field and capability in performing biochemical and/or molecular biology research.

A minimum of 30 credits of graduate work including at least 16 course credits at the 800 and 900 levels is required for the M.S. degree. The course of study is determined by a Guidance Committee chaired by the thesis advisor. M.S. candidates are typically not supported by departmental assistantships, but may be supported by funds from research grants. At least two years are required to complete the requirements for the M.S. degree.

II.C. Graduate Students with Non-degree Status

Graduate non-degree status is seldom used and is generally neither encouraged nor required. Instead, a student wishing to take courses beyond the bachelor's degree without being enrolled in a graduate degree program should enroll through the Lifelong Education program (Unclassified status). Enrollment in the Lifelong Education program is also recommended for students who

need to make up deficiencies in order to qualify for admission to a graduate degree program. (Please note that if a student takes any graduate applicable courses through Lifelong Education, only a limited number can transfer into the program for fulfillment of degree requirements).

In rare circumstances, it may be necessary and appropriate for a student to be admitted to graduate non-degree status. For example, a student working toward a degree from another university may be temporarily placed at MSU on an international fellowship or as a consequence of a relocating faculty mentor. Such students should apply for admission as a non-degree student through the departmental Graduate Admissions Committee. A plan of study at MSU will be developed by the non-degree student in consultation with the Graduate Programs Director, preferably during the admissions process or immediately before the beginning of the semester of entry. The written description of the plan of study will be filed with the Graduate Programs Secretary, with copies to the student and to the Graduate Programs Director. A student will be admitted to non-degree status for one year. Renewal of this status for additional one-year periods must be requested by the student in writing for consideration by the Graduate Admissions Committee and a written response to the student by the Department Chairperson. A student with non-degree status who desires admission into one of our degree programs must apply through the departmental Graduate Admissions Committee, which will treat the request as a new application (see section III.A.1).

II.D. Interdisciplinary (dual-major) degree programs with other MSU departments

The following description of interdisciplinary, dual-major degree programs is consistent with the document approved by Physics & Astronomy and by Biochemistry & Molecular Biology Departments, 2000; provisionally approved by Chemistry, 2001; approved by Computer Science, 2004. These guidelines shall also be consistent with the University guidelines for dual major degree programs (see “Dual Major Doctoral Degrees” in the MSU Academic Programs Guide).

The interdisciplinary degree programs and the Program in Quantitative Biology and Modeling (see <http://biomodel.msu.edu>) are designed to promote more effective and synergistic interactions across the Computer Science/Physics/Math/Chemistry//Biology interfaces, and to train doctoral students as innovative scientists who can operate effectively at those interfaces. For each student, the program is centered on an interdisciplinary research project with a primary advisor in the student's major department and a secondary advisor in the second department.

II.D.1. Program Outline. Interdisciplinary (dual major) graduate degrees involve two departments (BMB or another biological science, and a physical, mathematical or computational science) with one being the student's primary affiliation (and home of the principal advisor), and the other a secondary affiliation (home of a secondary advisor or collaborator). The degree is called, for example, a Ph.D. in “Biochemistry & Molecular Biology and Physics”, when the primary affiliation for the Ph.D. is Biochemistry and Molecular Biology and the secondary affiliation is Physics.

Admission requirements to graduate school are those of the primary department. A student can be admitted as an interdisciplinary degree student with concurrence of the two departments, but currently it is typical that he/she is admitted into the primary program then arranges the secondary affiliation upon choice of a research project.

The student's coursework is split 60%:40% between the primary and secondary departments, with no more than 125% of the typical course load of a single Ph.D. degree being required for the interdisciplinary degree (see section IV.A.6 for further details). Obligations for teaching are met in the primary department.

The guidance committee shall comprise at least five faculty members, with three members of the primary department and two members from the secondary department. The

guidance committee practices and policies of the primary department will apply. When the Department of Biochemistry and Molecular Biology is the primary department, one of the three members will be the Departmental Representative appointed by the Graduate Programs Director (see section VII.A.1).

Comprehensive (preliminary) exams are also arranged according to the guidelines of the primary department, and must meet the standards of a guidance committee that includes members from both departments, as previously described. A project-based comprehensive exam like the one in Biochemistry and Molecular Biology is ideally suited for this (see section VIII).

If a student decides to leave the interdisciplinary degree program, he/she can revert to the requirements of his primary affiliation.

III. ADMISSION

III.A. Admission to the Doctoral Program

III.A.1. Most students are admitted to the Ph.D. program directly from the B.S. level without earning an M.S. degree, although applicants having an M.S. degree are also considered. In either case, admission is contingent upon approval by the departmental Graduate Admissions Committee. A description of the application process and the relevant forms are provided at the department website (www.bch.msu.edu).

III.A.2. In cases where an applicant's previous experience is deficient in a specific preparatory course, the applicant may be granted provisional admittance to the Ph.D. program. The specific courses to address the deficiency shall be defined in the letter of admission, and the deficiency shall be rectified within the first year of participation in the graduate program.

III.A.3. A student who obtains an M.S. degree from this Department may not enter the Doctoral program until his/her M.S. thesis is complete and accepted, and then only with the written recommendation of his/her Master's Guidance Committee, the Graduate Programs Director, the Graduate Admissions Committee, and final written approval by the Department Chairperson. Similar recommendations and approval are required for a student who enters our M.S. program but then aspires to the Ph.D. program without obtaining an M.S. degree. In either case, a request for transfer to the Ph.D. program must be submitted by the student in writing to the departmental Graduate Admissions Committee, which will treat the request as a new application (see III.A.1). The original graduate application should be updated with respect to transcripts, supporting letters, statement of purpose, and other materials described in the application instructions. Evaluation of the acceptability of the applicant to the doctoral program will be based in part on the availability of funds, the student's qualifications and potential compared with other current applicants, and the availability of a professor who will consent to be the research advisor.

III.B. Admission to the Master's Program

A student may enter the M.S. program by either of two routes:

III.B.1. by applying for admission to the M.S. program in the initial Graduate School application and subsequent approval by the departmental Graduate Admissions Committee.

III.B.2. by transferring from the Ph.D. program in this Department to the M.S. program. Such a transfer may be initiated by the student or may be recommended by his/her major professor, Guidance Committee, Comprehensive Examination Committee, or the Graduate Programs Director. A request for transfer should be communicated in writing by the student to the Graduate Programs Director. The written consent of the Graduate Programs Director is required for such a transfer.

IV. Ph.D. DEGREE REQUIREMENTS

IV.A. Course Program

IV.A.1. First-year enrollment. Students entering the doctoral program will be advised by the Graduate Programs Director in the selection of courses for the first year. Students are required to take BMB 801, 802, 803, 804, 829, and research laboratory rotations. Exceptions to these requirements may be made based on previous satisfactory performance in graduate-level courses of similar content; such exceptions are to be approved by the Graduate Programs Director. Students may also take selected graduate-level courses in areas such as chemistry, microbiology, physiology, and pharmacology, or elective advanced courses in biochemistry. Students with an entrance deficiency such as physical chemistry are expected to make up the deficiency in their first year by taking appropriate collateral courses in addition to the other required first-year courses.

IV.A.2. First-year credit load. Students are expected to enroll for 7 credits Fall semester, 6 credits for Spring semester, and 3 credits Summer semester.

IV.A.3. Laboratory rotation. The purpose of laboratory rotations is to give students an opportunity to experience the research environment in several different laboratories prior to selecting a major professor. This experience allows the student to become well-acquainted with the research focus of a particular laboratory, including the relevant scientific literature, specific project directions, and relevant experimental techniques. The rotations also help students and faculty gain an understanding of whether a fruitful training and mentoring relationship is likely to be established.

Laboratory rotation periods are approximately 10 weeks each. Students are usually required to participate in two laboratory rotation periods, and are strongly encouraged to engage in a third rotation. The rotation assignments will be made by the Graduate Programs Director in consultation with the students and faculty members. Each rotation must be in the laboratory of a different faculty member from this department or one of the cognate or dual-major degree departments or programs (including Microbiology and Molecular Genetics, Physiology, Pharmacology and Toxicology, Cell and Molecular Biology, Genetics, Physics and Astronomy, Chemistry, and Computer Science). Exceptions to these policies must have the approval of the Graduate Programs Director. Students are typically not required to enroll in BMB 888 (Laboratory Rotation). In rare circumstances (such as to meet a credit requirement) with approval of Graduate Program Director, students may enroll for two credits of BMB 888 for each rotation experience, and will receive a grade from each supervising professor.

Students on a half-time assistantship should plan on spending at least 20 hours per week on the rotation assignment. The specific activities in each rotation may vary among laboratories; these activities and expectations should be defined at the outset by the faculty member. These activities are likely to include reading background and project-specific scientific literature; design, execution and analysis of experiments; discussion of research project opportunities; interactions with other lab members; and presentation of the rotation project effort at a lab group meeting. The supervising faculty member will submit a written evaluation at the completion of each rotation period based on the student's effort and success in meeting the goals of the rotation. This evaluation will be sent to the Graduate Programs Director.

IV.A.4. Required seminar and ethics courses.

IV.A.4.a. Each student must enroll in a departmentally-approved course in scientific ethics (*e.g.*, NSC 830), preferably in their first or second year in the graduate program. This requirement may also be satisfied by participation in a series of workshops conducted by the Office of the Vice President for Research and Graduate Studies (see section XI.A).

IV.A.4.b. Enrollment in BMB 978 (seminar) is required annually from the second year onward (1 credit per year); a cumulative total of four credits in BMB 978 is required. Students completing their degree requirements in less than five years may enroll for BMB978 more than once in a given year.

IV.A.4.c. Students must enroll in at least two graduate seminar courses (BMB 960 or equivalent). This requirement applied to students entering in the fall 2005 and thereafter.

IV.A.4.d. Students must enroll in at least one semester of the BMB961 section entitled *Instructional Methods in Biochemistry & Molecular Biology* (see section IV.G).

IV.A.5. Elective courses. In addition to courses and credits required by the Department (*i.e.*, those listed above in section IV.A.4.), students in consultation with their Guidance Committees are expected to design a program that will give them thorough preparation in the area they have selected for study and in those disciplines which support their program. During the second and subsequent years of the program, students are expected to take advanced courses in biochemistry and molecular biology and related areas to gain insights into the broad aspects of the biological sciences as well as to acquire information of specific relevance to their own research areas. The Guidance Committee will approve the overall course program and determine requirements beyond the departmental minimum.

IV.A.6. Dual Major Degree Course Requirements. Consider the following as a sample template for an interdisciplinary Ph.D. program in which Biochemistry and Molecular Biology is either the primary or secondary department, and replace as needed by the relevant information for the departments of interest.

A typical course plan for a traditional Biochemistry and Molecular Biology Ph.D. student is BMB 801 (3 cr), 802 (3 cr), 803 (2 cr), 804 (3 cr), 829 (2 cr), 978 (1 cr, taken for 4 cr total), and NSC 830 (1 cr; or the equivalent workshop series; see IV.A.4.a), with additional courses as advised by the guidance committee to complement the student's research. The following interdisciplinary coursework requirements are based upon requiring no more than 125% of this 18-credit traditional plan and reflect the 60%:40% coursework ratio desired for interdisciplinary Ph.D. training.

IV.A.6.a. *When Biochemistry and Molecular Biology is the primary affiliation:* At least four graduate courses (excluding graduate seminars) will be taken in Biochemistry and Molecular Biology, usually at the 800 or 900 level, totaling 12 (or more) credits. Lab rotations are required although the number of rotations undertaken may be flexible especially if the student decides on a dual major program at the outset. Training in instructional methods will be required as for a traditional Biochemistry Ph.D. student. At least three courses (9 or more credits; excluding graduate seminars) will be taken in the secondary area, *e.g.*, Physics, with at least two of the courses at the graduate level.

IV.A.6.b. *When Biochemistry and Molecular Biology is the secondary affiliation:* At least three courses (9 or more credits; excluding graduate seminars) of Biochemistry and Molecular Biology coursework, with at least two of the courses at the graduate (800 or 900) level. Rotations and teaching responsibilities will be determined by the primary department.

IV.B. Minimum standards for retention. According to University regulations, a minimum cumulative grade point average required for graduation is 3.00 for graduate students. Dismissal from a degree program may be required of a student whose grade point average is below 3.00. A grade of at least 3.00 must be achieved in all required courses. The retention and remediation policies are described in further detail in section X.B.1.

IV.C. Enrollment for a minimum of 24 dissertation research credits (BMB 999) is required by the Graduate School.

IV.D. Each student must fulfill the residency and course requirements specified by the College in which (s)he is enrolled and as defined under the Graduate Education section of *Academic Programs* bulletin).

IV.E. Time limit. A Graduate School regulation specifies that all requirements must be completed within eight years from the time when a student begins the first class at MSU that appears on his or her doctoral program of study. A reasonable goal for Ph.D. students is five years beyond the B.S. degree (see section XIII.A.).

IV.F. Foreign students must demonstrate fluency in oral and written English as indicated by scores on the Test of English as a Foreign Language (TOEFL) of 550 (paper) or 213 (computer) and as demonstrated by satisfactory grades (≥ 3.0 including remediation) in courses, seminars and scientific writing.

IV.G. To train students in teaching methods in the field of biochemistry and molecular biology, participation in the teaching mission of the Department is required of all candidates, regardless of their source of financial support (see section XIII.D). This participation requires enrollment in a special section of BMB 961 entitled *Instructional Methods in Biochemistry & Molecular Biology*. This is typically completed in the second year, or in the third year in some circumstances. Participation in workshops for teaching assistants, offered by the University, is also encouraged especially for those students anticipating a career in academic science.

IV.H. A Doctoral Guidance Committee must be formed within 12 months after entering the doctoral program (see section VII.A) and an initial Guidance Committee meeting must be held within 15 months after entering the doctoral program (see section VII.A.2.a). Any request to delay formulating a Doctoral Guidance Committee or to delay holding an initial meeting because of extenuating circumstances must be approved by the Graduate Programs Director. In the absence of approval by the Graduate Programs Director, the department will request that the college place an academic hold on the student's enrollment. Releasing this hold will require written approval by the Graduate Programs Director.

IV.I. The comprehensive examination (see section VIII) must be taken no later than one month after the start of the third year. This exam (including any remedial action or authorized repeats) must be passed by the end of the first semester of the third year from the beginning of the graduate program (unless an extension is authorized by the Graduate Programs Director).

IV.J. Annual meeting with the Guidance Committee. By the end of each 12-month period following the comprehensive examination, the student must meet with his/her Guidance Committee for a review of his/her research and academic progress (see section X.A.2. and X.A.4). A written progress report, summarizing the year's research progress and future plans, must be submitted to the Guidance Committee members one week prior to each annual meeting. Any request to delay an annual meeting because of extenuating circumstances must be approved

by the Graduate Programs Director. In the absence of such approval, the department will request that the college place an academic hold on the student's enrollment.

IV.K. Competence in oral presentation. Development of skills in orally presenting and evaluating scientific information in an organized and critical fashion is a requirement for the Ph.D. degree. This requirement can be met in the following ways:

IV.K.1. Formal oral presentations in 900-level courses or their equivalent.

IV.K.2. Journal club or research presentations (attended by more than one laboratory group).

IV.K.3. Oral presentations or poster presentations at national or regional meetings. These must be evaluated in the Department by practice presentations prior to the off-campus meeting.

IV.K.4. A formal lecture or series of lectures in a biochemistry course (not laboratory presentations).

IV.K.5. Satisfactory completion of a course or workshop on public speaking. (Note that the comprehensive examination seminar, the dissertation seminar, and laboratory group research seminars do not meet the requirement.)

Four satisfactory presentations, obtained in at least two of the five approved areas, must be documented by the student before graduation. It is the responsibility of the student to obtain a written statement from a faculty member describing the setting for each oral presentation, and also indicating that the student was provided with feedback on his/her performance. Forms to facilitate the documentation of oral presentations are available from the Graduate Programs Secretary. The completed forms should be returned to the Graduate Programs Secretary for filing with the student's records as soon as possible after each oral presentation.

IV.L. Performance of independent research. The research component of the Ph.D. comprises the completion of a dissertation based on primary research, the presentation of a seminar describing the research efforts, and the oral defense of the dissertation, all in a manner judged to be satisfactory by the Guidance Committee (see section IX.A.). Copies of the dissertation bound in the standard form must be submitted to: (i) the major professor, and (ii) the Biochemistry and Molecular Biology Department through the Graduate Programs Secretary. See recent bound dissertations in the Biochemistry Computer Graphics Facility, Rm. 202 BCH, for the accepted style. The degree will not be certified by the Department until the bound copies of the dissertation have been received; see section IX.A.4. In addition, the candidate is expected to prepare a manuscript or manuscripts based on the dissertation research in a form suitable for publication in the research journals of the field.

IV.M. Such specific additional requirements as may be determined by the Guidance Committee.

IV.N. Failure to satisfy any of the above requirements IV.A-G, I (or sections X.B.1, 2) may result in termination of the student's participation in the doctoral program, as detailed in section X.B.6. If any of requirements IV.K-M (or section VI.B.3) is not satisfied, the Guidance Committee in consultation with the student, the major professor and the Graduate Programs Director will review the circumstances and attempt to design a remedy for the situation, as detailed in section X.B.6.

V. M.S. Degree Requirements

V.A. A minimum of 30 credits of graduate work is required, including at least 16 course credits at the 800 and 900 levels. The number of research credits (BMB 899) required varies, depending in part on the college in which the student is enrolled (see Graduate Studies bulletin) but must meet a minimum requirement of four credits and may not exceed 10 credits. Courses taken to make up entrance deficiencies and those with less than a 400 course number are collateral courses and cannot be included in the 30-credit total. A maximum of 8 course credits may be transferred from another institution (with a grade of 3.0 or higher in each course) if approved by the student's Guidance Committee and the Graduate School.

V.B. The course program must include BMB 801, 802, 803, and 829 or their equivalents taken elsewhere; equivalency is to be determined by the Graduate Programs Director. BMB 804 is strongly recommended. BMB 978 must be taken for one credit per year, from the second year onward, to a minimum of one credit and a maximum of three credits.

V.C. Each student must enroll in a departmentally-approved course in scientific ethics (*e.g.*, NSC 830) or must register for and complete a series of workshops conducted by the Office of the Vice President for Research and Graduate Studies (see section XI.A).

V.D. Foreign students must demonstrate fluency in oral and written English as indicated by scores on the Test of English as a Foreign Language (TOEFL) and as demonstrated by satisfactory performance in courses, seminars and scientific writing.

V.E. An annual meeting with the Guidance Committee chaired by the major professor is required to evaluate academic and research progress and performance. The first meeting between the student and Guidance Committee must occur within twelve months of entering the program. A written evaluation based on the meeting must be prepared and signed by the Guidance Committee members, signed by the student, and submitted to the Graduate Programs Secretary immediately following the meeting for inclusion in the student's file.

V.F. Residency requirements as specified by the College and the Graduate School must be fulfilled. Normally, about three years are needed for the successful completion of degree requirements. All requirements must be completed within six years.

V.G. Completion of a research-based thesis (*i.e.*, plan A) and its oral defense in a manner satisfactory to the Guidance Committee.

V.H. Submission of the unbound thesis to the University, and bound copies to the Department and to the major professor (see section IV.L).

VI. SELECTION OF THESIS/DISSERTATION ADVISOR

VI.A. General Considerations.

Any regular faculty member in the Department of Biochemistry and Molecular Biology may serve as the major professor (research mentor, thesis advisor). Students may also select a major professor from any of several cognate departments and graduate programs, including the Departments of Microbiology and Molecular Genetics, Physiology, and Pharmacology and Toxicology, or the Programs in Genetics and in Cell and Molecular Biology. Students in the interdisciplinary dual-major degree programs may select a major professor from the participating departments. The major professor serves as the student's academic advisor and normally serves as the student's doctoral dissertation research advisor. So that incoming graduate students may be able to identify the most suitable laboratory in which to do their dissertation research, they are encouraged to become familiar with the research programs in the Department.

If the major professor (research advisor) is a regular faculty member in the Department of Biochemistry and Molecular Biology, then the major professor will chair the Guidance Committee (see section VII). If the major professor (research advisor) is not a regular faculty member in this department, then the department will assign a regular faculty member to serve as chair of the Guidance Committee.

Several considerations have bearing on the selection of a research laboratory and major professor. The professor must have the financial support and physical space for the student's research. The laboratory should be engaged in research that is of particular interest to the student. The student should develop a suitable rapport with his/her major professor that will promote an atmosphere conducive to the development of the student's creative potential and ability to conduct modern biochemical research. With the foregoing in mind, the following procedures were developed to aid the student in selecting a suitable research laboratory.

VI.B. Procedures

VI.B.1. As part of the orientation program for incoming students each Fall semester, faculty who wish to participate will present their research interests to the assembled incoming graduate students. During orientation, the students are also encouraged to visit the laboratories and become acquainted with the professors and students.

VI.B.2. Faculty members will be encouraged to make available to interested students their reprints, research proposals, and a statement of future research goals.

VI.B.3. During and after the orientation period, students will arrange one or more laboratory rotations to participate in the research activities of several laboratories on a sequential basis (see section IV.A.3.). These rotation arrangements shall be reported to the Graduate Programs Director. In rare occasions, an incoming student will have selected a major professor in concert with admission to the program, in which case rotations are not required.

VI.B.4. Students supported by departmental funds are normally expected to defer selection of a major professor until the middle of the third rotation (or toward the end of the second rotation if an early selection can be justified). It must be understood that selection of a dissertation research advisor by the student does not guarantee acceptance by the faculty member. Space and funding limitations and differences of research attitude are necessary factors which must be considered. The student may request assistance from the Graduate Programs Director in selecting a laboratory, particularly if difficulties in selecting a mentor are

encountered. After a mutual agreement is reached between a student and a professor, the student must immediately notify the Graduate Programs Director in writing so that departmental approval and administrative records can be established.

VI.B.5. The relationship between the graduate student and the research advisor has a strong bearing on the student's intellectual development and research progress and thus completion of the degree. The student and mentor should strive to realize a mutually pleasant and productive association. However, circumstances can develop in which insurmountable obstacles arise in the relationship, severely impeding the progress in the program. The selection of a dissertation research advisor accordingly need not be irrevocable. Students considering a change of research advisor should consult with the Graduate Programs Director before proceeding. Obviously, such a decision should not be reached lightly.

VI.C. Master's Degree Student: Selection of Major Professor

Section VI.B of the Ph.D. program applies here, except that laboratory rotations should not be necessary. It is desirable that the major professor be chosen early, preferably before entering the first semester of graduate study.

VII. FORMATION OF THE GUIDANCE COMMITTEE

VII.A. The Doctoral Guidance Committee

The student is responsible for initiating the selection of the other members of the Guidance Committee as soon as possible after the major professor has been chosen. The Guidance Committee must be selected within 12 months after entering the graduate program or enrollment will be withheld until such time as the Guidance Committee selection is complete (see section IV.H). Students who have previously obtained an M.S. degree from this Department should form their committees in the first semester of work toward the Ph.D degree. Assistance will be provided by the major professor and the Graduate Programs Director.

VII.A.1. Membership. The Guidance Committee shall normally consist of five members, and must include (i) the major professor (research mentor, thesis advisor), (ii) three other regular faculty members of this department, one of whom is appointed by the Graduate Programs Director and is designated the Departmental Representative, and (iii) one regular faculty member from a department other than Biochemistry and Molecular Biology. If the major professor is not a regular faculty member of this department, then the four additional committee members shall all be members of this department. The composition of Guidance Committees of students in dual-major programs is defined elsewhere (II.D.).

If the major professor (research advisor) is a regular faculty member in the Department of Biochemistry and Molecular Biology, then the major professor will chair the Guidance Committee. If the major professor (research advisor) is not a regular faculty member in this department, then the department will appoint a regular faculty member to serve as chair of the Guidance Committee.

Selection of two of the three BMB departmental faculty members and the non-departmental faculty member is the responsibility of the doctoral candidate with the advice and consent of the major professor. Since this committee serves as a scientific advisory group for the doctoral thesis research, selection should be based primarily on the relevance of the expertise of the committee members to the student's intended dissertation project. Following this selection, the Graduate Programs Director will appoint the Departmental Representative to the committee. The student may request another faculty member as the Departmental Representative. Substitutions for an absent member of the Guidance Committee, or any other changes in the composition of the Guidance Committee, should be arranged with the Graduate Programs Director by the student and the major professor.

VII.A.2. Responsibilities. The Guidance Committee is charged with the following responsibilities:

VII.A.2.a. to hold an initial meeting with the student for the purpose of planning his/her Ph.D. program. This initial meeting, chaired by the major professor, should be scheduled by the candidate and held as soon as possible after the Guidance Committee has been selected, and *must* be held within 15 months after entering the graduate program (see section IV.H.). (Students who have previously obtained an M.S. degree in this Department should hold the initial Guidance Committee meeting during their first semester in the doctoral program.) The meeting must include the following: (i) a written summary outline, normally 1 to 3 pages, must be prepared by the student with the advice and consent of the major professor and be presented to each committee member at least two days in advance of the meeting); (ii) a short oral presentation by the student of the proposed dissertation research; (iii) selection of the course work to be required in the student's program; (iv) approval by the committee of the proposed thesis research topic

and its general aims and scope; and (v) completion of the form entitled "Report of the Guidance Committee — Doctoral and Other Programs." This form, which is available from the Graduate Programs Secretary, should be completed by the Departmental Representative and returned to the Graduate Programs Secretary immediately following the meeting for further processing. The signed form will then be transmitted by the Graduate Programs Secretary to the relevant Dean's office, with copies distributed to the student and to each member of the Guidance Committee. All items described in this paragraph must be completed before the student schedules the comprehensive examination. If the Guidance Committee does not initially concur with the topic, scope or aims of the proposed research project, their concerns should be explicitly outlined to the major professor and the student so that approval of a modified proposal can be obtained at a subsequent meeting prior to the comprehensive exam.

VII.A.2.b. to review the candidate's progress by the end of each 12-month period following the completion of the comprehensive examination. The Graduate Programs Secretary will notify the student and each Guidance Committee member of this obligation two months prior to the due date for each annual meeting. The student shall prepare a report (normally 5 to 15 pages) summarizing the year's research progress and future plans, and present a copy to each Guidance Committee member one week prior to each annual meeting. The student is responsible for scheduling the meeting. (Failure to hold this meeting by the deadline will lead to an academic hold on the student's enrollment, which will be released when a meeting date has been set; see section IV.J.) At the meeting, which shall be chaired by the Departmental Representative, the student will present a 10- to 20-minute oral report. The meeting will include discussion of the report and any other matters relevant to the student's progress in the graduate program. The student's dissertation research advisor may attend as an observer, but either the student, the advisor, or the Committee may request that the advisor not attend the meeting. In cases where the dissertation research advisor does not attend the meeting itself, the advisor may join the other Committee members after the meeting for discussion of the student's progress. This annual meeting should serve to: (i) assess whether progress has been made; (ii) provide motivation and opportunity for the student to gain experience in the presentation and defense of his/her work; and (iii) provide opportunity for the members of the committee to make suggestions regarding methods, direction and appropriateness of the research plan outlined by the student, keeping in mind that final decisions regarding the research project are the responsibility of the major professor.

VII.A.2.c. to provide the Graduate Programs Director with an evaluation of the student's progress, as determined in each annual meeting. The Departmental Representative is responsible for the preparation of this report. (A form for reporting the evaluation will be prepared by the Graduate Programs Secretary upon receipt of the written comments from the Departmental Representative. The completed form will be circulated for signature by the Graduate Programs Secretary with a copy maintained in the student's file and the original distributed upon return. If the members reach a consensus evaluation, a single report signed by all members will suffice. Should substantial disagreement occur, individual statements representing minority views may be appended to the report. Any specific additional requirements which the student must meet, as well as how and on what schedule the student will meet the requirement(s), should be included as part of the Committee report. The student must sign the report; if (s)he disagrees with the evaluation, a written rebuttal may be appended. The Committee report and appended documents will become part of the student's permanent file. If the consensus of the Guidance Committee is that satisfactory progress toward the Ph.D. degree cannot be achieved, the Graduate Programs Director and Department Chairperson shall be informed as described in section IV.N. and X.B.6.

VII.A.2.d. to serve, collectively or individually, as resource personnel on matters of professional development as well as matters that may influence academic or research performance.

VII.A.2.e. to evaluate the dissertation and administer the final oral examination in its defense (see section IX.A.).

VII.B. The Master's Degree Guidance Committee

VII.B.1. Membership. The Guidance Committee shall consist of a minimum of three regular faculty members, the majority of which must be from the Department of Biochemistry and Molecular Biology. The Guidance Committee should be selected by the end of the first year in the program. As with doctoral guidance committees, if the major professor (research advisor) is a regular faculty member in the Department of Biochemistry and Molecular Biology, then the major professor will chair the Guidance Committee. If the major professor (research advisor) is not a regular faculty member in this department, then the department will appoint a regular faculty member to serve as chair of the Guidance Committee.

VII.B.2. Responsibilities. The Guidance Committee is charged with the following responsibilities: (i) to plan the M.S. program with the candidate, (ii) to meet annually with the student to evaluate the student's academic and research progress, and (iii) evaluate the thesis and administer the final oral examination in its defense.

VIII. Comprehensive Examination

VIII.A. Purpose of the Comprehensive Examination

The purpose of the Comprehensive Examination is to evaluate the student's academic and research progress and potential. The examination provides information to help the student and the faculty to determine whether the goals of the student are consonant with his/her abilities and with the standards of the Department, and whether his/her rate of progress merits continued support of the student by the Department in terms of research facilities and resources, faculty time, and direct financial aid.

VIII.B. Description of the Comprehensive Examination

The Comprehensive Examination consists of the preparation of a written research progress report and proposal (see section VIII.F.), its oral presentation in a public seminar, and its defense before an examining committee. (The composition of the examining committee is described below in section VIII.D.1.) The examination will focus on an evaluation of (i) the studies the student has already conducted in the laboratory of his/her dissertation research advisor, (ii) the proposal for future research that will serve as the basis for the doctoral dissertation, and (iii) the student's knowledge and understanding of the facts and fundamental concepts that are pertinent to the dissertation research. Thus, the student must demonstrate defensible logic in the formulation of questions and in the attempts or proposals to answer these questions experimentally, as well as a knowledge and understanding of the facts and concepts important to the research (See also section VIII.E. on the evaluation of performance.)

VIII.C. Preparing for the Comprehensive Examination

What will the student be expected to know for the examination, and how should (s)he prepare for it? To answer these questions in part, the following considerations are put forth:

VIII.C.1. A BMB doctoral student must know a certain essential body of information in order to understand the field, to communicate with others, and to build upon others' work. Much of this factual knowledge can be learned from course work and from the current basic textbooks of biochemistry and molecular biology. Therefore, early in their graduate careers, students are encouraged to systematically review a good textbook to fill in the gaps in their knowledge and understanding, as assessed by coursework and conversations with the major professor or Guidance Committee members. This must be complemented by learning from other sources such as those described below.

VIII.C.2. The Department is very interested in a student's research potential and capabilities. These are assessed by testing the student's ability to ask significant questions, to synthesize logical hypotheses, to design and execute appropriate experiments to answer these questions, and to interpret the results properly. Thus, a major aim of the comprehensive exam is to determine if the student can solve biochemical problems logically and creatively. The exam will also require knowledge of various laboratory techniques, including the theoretical basis for methods of isolation, identification, and analysis of biomolecules. Thus, it is to the student's advantage to begin laboratory work as soon as possible, since it is often easier to learn about methods in a practical setting.

VIII.C.3. The student will gain in the understanding of contemporary approaches to biochemical problem-solving by reading selectively in recent issues of biochemical research journals. This does not mean skimming numerous articles, but carefully analyzing a few selected

ones to understand the questions the authors asked, the general approach and specific techniques used to answer the questions, and to what extent the authors actually answered the questions. By making it a practice to look up in standard texts, reference books, and cited articles those matters in these papers which are not understood, students will systematically add to their body of essential biochemical knowledge. This approach has been a very successful adjunct to simply reviewing textbooks and research papers independently.

VIII.C.4. Finally, much of the distinction between the Doctor of Philosophy and the technician lies in the areas of self-assessment and self-direction, and in having a sense of the significance of a research problem in a larger setting (including relationships with other research problems). These abilities are learned as the student obtains the specific knowledge, skills, and competencies required of a Doctor of Philosophy in Biochemistry and Molecular Biology. Part of the student's education involves the process of comprehending what is important to know, what skills are needed, what the priorities are at a given time, and what is effective communication. This requires in large part a self-directed development of a sense of scientific judgment and awareness, and through the dynamic interaction of a student with the major professor, colleagues in the laboratory, and other interested scientists. However, students should also feel free to call upon faculty members for help in the pursuit of these goals. Progress will occur as the student actively participates in research, laboratory seminars and discussions, departmental seminars, and journal clubs, and reflects on what (s)he is doing and planning to do.

VIII.C.5. The dissertation research advisor should not directly participate in the writing of the Comprehensive Examination Progress Report and Research Proposal or in the preparation for the oral presentation. These should represent the student's individual efforts and abilities. Prior to the time that a student begins preparing for the comprehensive examination, the dissertation research advisor is expected to play a major role in preparing the student for this evaluation by directing the student to relevant review and research articles, discussing the scope, significance and specific aims of the project, analyzing data arising from experiments by the student and by others, and discussing strategies for effective writing and oral presentation.

VIII.D. Scheduling and Administration of the Comprehensive Examination

A student may attempt the comprehensive examination if his/her academic performance meets the standards described in section IV.B., and the initial meeting with the Guidance Committee has been held and officially documented by submission of the signed Guidance Committee report (see section VII.A.2.a). The examination must be taken no later than one month after the beginning of the third year in the program. Typically, for students entering the program in August, the deadline must be September 30th of the third year; and, if the outcome is other than a Pass without Conditions, the examination must be completed by December 15th of the third year. (Students who have previously earned an M.S. degree in this Department must complete the comprehensive examination no later than one month after the beginning of the second year in the Ph.D. program.).

No later than three months before a student's latest possible examination date (i.e., typically by June 30 of the second year), the student shall establish a date for the comprehensive examination by consulting with the guidance committee members and the departmental Comprehensive Exam Organizing Committee (CEOC), who will appoint one member of the examining committee (see VIII.D.1). If a student has not selected an exam date by the indicated deadline, the CEOC will assign an open examination date for that student. If a student feels that the assigned date presents an undue hardship, s/he can request an alternative date by written request to the Graduate Programs Director. The Graduate Programs Director should be kept informed of the examination schedule.

The following procedures and requirements pertain to students who are in the process of scheduling, preparing for, and taking the examination:

VIII.D.1. CEOC will select each student's Comprehensive Examination Committee in accordance with the following requirements. The Comprehensive Examination Committee shall consist of four BMB department faculty members and, in most cases, one non-BMB faculty member. The Chairperson of a student's Comprehensive Examination Committee will be a member of CEOC who is not a member of the student's Guidance Committee. The remainder of the committee will be composed of three BMB faculty members from the student's Guidance Committee, including the Departmental Representative but excluding the student's major professor (research advisor). In addition, the non-BMB faculty member on the Guidance Committee may serve on the Comprehensive Examination Committee except in those cases where (s)he is also the dissertation research advisor. (If the Guidance Committee includes more than one non-BMB faculty member, only one may serve on the Comprehensive Examination Committee, and must be a member of the regular MSU faculty.)

For students in dual major degree programs (II.D), the comprehensive exams are arranged according to the guidelines of the primary department. The examining committee should include members from both departments, with three members from the primary department and two members from the secondary department. If BMB is the primary department, the student's major professor (primary advisor) is excluded from the comprehensive exam committee. The Guidance Committee in consultation with the Graduate Programs Director will decide whether the secondary advisor would appropriately participate in the comprehensive exam.

VIII.D.2. One member of the BMB department faculty may serve as a Reader for the research proposal prior to the Comprehensive Examination. This Reader will evaluate and comment on the student's best effort at a progress report and research proposal. The Reader must not be a member of the Comprehensive Examination Committee for that student. The Reader will be chosen by agreement between the student, the major professor (research advisor), and the selected faculty member. To the extent possible, the Reader's expertise should overlap the topic of the student's research. The Reader will try to help the student anticipate problems with the progress report and research proposal, both with respect to presentation and scientific content. However, the primary responsibility for developing an acceptable proposal rests with the student. Students are encouraged to consult with other students or faculty members, and to make use of other resources such as workshops on proposal writing, to develop as strong a proposal as possible before giving it to the Reader. Use of a Reader is very strongly encouraged, but is not required. If a Reader is used, the student must give the progress report and research proposal to the Reader at least four weeks before the comprehensive examination. The Reader must return the progress report and research proposal to the student within one week. This will allow at least two weeks for the student to make revisions, since a copy of the progress report and research proposal must be given to each member of the Comprehensive Examination Committee at least one week before the comprehensive examination.

VIII.D.3. The student will set a firm date for the examination after consulting with the members of his/her Comprehensive Examination Committee (date subject to the time limitations stated above). At least one week prior to the scheduled date of the exam, the student must present a copy of his/her Comprehensive Examination Progress Report and Research Proposal to each member of the Comprehensive Examination Committee and to the Graduate Program secretary.

VIII.D.4. The public oral portion of the examination (i.e., seminar) should be approximately 50 minutes in length, and the remainder of the examination should be scheduled for the following two hours. The seminar presentation is typically held in Room 208 Biochemistry (scheduled through the departmental staff or website), although comparable rooms in buildings nearby may also be used. Announcements of the seminar should appear in the *Biochem Weekly* and on appropriate bulletin boards. The closed portion of the examination that immediately follows the seminar should be held in one of the conference rooms in the Biochemistry Building or an adjacent building; the candidate is responsible for scheduling one of these rooms in advance.

VIII.D.5. The Comprehensive Examination Committee will attend the oral presentation but will not participate in the public discussions which ensue. As soon as the public discussion is completed, the Committee will meet with the student in a pre-scheduled conference room (see above paragraph) for private consideration of the research report and research proposal. Before the closed examination begins, the committee will briefly discuss any relevant general issues and the chair will remind the committee of the purpose, scope and criteria for the examination. Near the conclusion of this examination, the student will be excused from the room while a decision is reached. The chairperson of the student's Comprehensive Examination Committee will inform the student and the major professor/research advisor as soon as possible of the decision and the reason(s) for it. See the following section (VIII.E.) for the criteria used for evaluating performance and the procedure for submitting the required written report of the examination result.

VIII.E. Evaluation of Performance on the Comprehensive Examination

The overarching purpose of the Comprehensive Examination is to assess the potential of the graduate student to successfully complete a research project suitable for their dissertation and thus for completion of their degree requirements. The exam should evaluate the student, not the project itself. The following criteria will be used in evaluating student performance on the comprehensive examination. First, the candidate shall demonstrate an understanding of the scope and significance of the research, and shall have defined and defended the specific aims of the proposed project. Second, the candidate shall demonstrate knowledge and understanding of the fundamental concepts on which the thesis project is based. Third, the candidate shall demonstrate adequate knowledge of the basic principles and concepts of biochemistry and molecular biology (metabolism, structure and function of biomolecules, enzymology of nucleic acids). Fourth, the candidate shall demonstrate skill in analytical thinking and in the application of the scientific method to the research topic. Fifth, the student will have made sufficient progress on the research project to demonstrate an ability to successfully execute experiments and interpret their results. Sixth, the student will have composed a suitable written proposal, including organization of the scientific concepts and appropriate professional writing style. Seventh, the student will have demonstrated adequate oral presentation skills including organization and clarity.

A pass decision shall require that there be not more than one dissenting vote. In cases either of marginal performance, or of strong performance but where areas of weakness were found, the examining committee can take advantage of a full range of options, including recommending or requiring rewriting of the progress report and/or research proposal, execution of certain laboratory procedures, or other alternatives uniquely appropriate to the candidate. Appropriate timeframes for completing these remedial activities shall be defined. At the discretion of the examining committee, a discussion may be held with the major professor at the conclusion of the exam. In the event of failure, the committee may recommend that the student apply to the M.S. program (see section III.B.2). The Department believes that recommendation to pursue the M.S. degree is not a punitive measure, but one which may serve to strengthen the candidate.

Normally, only one chance will be given to pass the comprehensive examination; however, a second opportunity may be offered on the recommendation of the Comprehensive Examination Committee after consultation with the student's major professor, the Graduate Programs Director, and the student. This decision should be rendered as soon as possible, and no later than one week after the examination date. The comprehensive examination, including any repeats, must be passed no later than the end of the first semester of the third year in the program.

The form used to report the examination result is available from the Graduate Programs Secretary. Within one week of the examination date, the completed form must be returned by the Comprehensive Examination Committee Chairperson to the Graduate Programs Secretary for the recording of the result, filing, and distribution of copies to the student, the major professor, the Graduate Programs Director, the CEOC Chairperson, and each member of the examining committee. The chairperson of the student's Comprehensive Examination Committee will inform the student and the major professor/research advisor of the decision without delay (see section VIII.D.5.).

A copy of the student's Comprehensive Examination Progress Report and Research Proposal must be maintained by the Department in the student's file.

VIII.F. Format of the Comprehensive Examination Progress Report and Research Proposal

The format below should be followed for the preparation of the progress report and research proposal. This document should be approximately 15 typewritten pages (double-spaced, using a clear 12 point font), with additional pages for figures, tables, bibliography, and appendix (if any), with section lengths approximately as suggested below.

VIII.F.1 Introduction and Background (≤ 3 pages). Give a concise history of the problem area, and the main issues which currently occupy attention in the area. Include annotation of cited references.

VIII.F.2 Statement of the Problem (≤ 1 page). What questions was your research designed to answer?

VIII.F.3 Methodology (≤ 3 pages). Concisely describe the general approach used to answer the questions asked in the project, indicating methods by name or by characterization rather than details. Cite references. Flow charts may be helpful in some cases. Give detailed experimental protocols for those experiments which are crucial to answering the questions asked. If these are lengthy, place them in an Appendix (not considered be part of the recommended 15 pages). Standard protocols may be referenced without giving details (e.g., Bradford protein determination, agarose gel electrophoresis, etc.). List non-standard materials, using *J. Biol. Chem.* articles as a guide.

VIII.F.4 Results (≤ 7 pages). Describe your principal results, presenting them in graphic, tabular, or other relevant form. Order them in a sequence which relates clearly to the sequence of questions asked. Figures and tables are to be of good quality, clear, and properly labeled and titled.

VIII.F.5 Discussion (≤ 3 pages). How do you interpret your results? What questions were answered, and what questions remain unanswered by the research? What further experiments are indicated? What alternative approaches might be productive? Did you ask the right questions?

VIII.F.6. Conclusions (\leq 1 page). Give a concise and precise summary statement of the conclusions that your data allow you to draw.

VIII.F.7. Proposal for Future Research (\leq 3 pages). Where do your results suggest future research should proceed? What do you propose for your doctoral dissertation research? Include a succinct statement of your specific aims and how they relate to the long-term goals of the research, as well as your proposed experimental strategy. The faculty regards this as an opportunity to ascertain whether the candidate understands the long-range methodology and theoretical implications of the work already undertaken, and of new work which is proposed. (Usually the proposed research will be a continuation of the research problem that the student has described in the research progress report section. However, if the proposed dissertation research is clearly unrelated to the student's previous research, the proposal should include a separate introduction and background, statement of the problem, proposed methodology, and selected pertinent references. This separate proposal should be about four pages plus the bibliography.)

VIII.F.8. Literature Cited (\leq 50 references). This section should include all references cited in the preceding sections, using the standard format of journals relevant to the field.

IX. THESIS/DISSERTATION DEFENSE AND FINAL ORAL EXAMINATION

IX.A. The Doctoral Dissertation

IX.A.1. Nature and Scope of the Dissertation. The dissertation must be based on original biochemical and/or molecular biological research that results in a significant contribution to knowledge. A major requirement is that the dissertation must clearly demonstrate that the candidate has reached a state of scientific maturity enabling him/her to perform independent research of high quality. The quality of the research should be commensurate with that published in refereed biochemical journals.

Since the dissertation is a scholarly work that should indicate scientific competence, it should reflect various attributes of the candidate. The foremost of these are:

- Intellectual ability.
- Technical competence.
- Knowledge in depth of the research area.
- Ability to construct and test hypotheses.
- Ability to interpret results and justify the interpretation.
- Ability to be critical.
- Understanding of the significance and limitations of the research findings.
- Ability to communicate in a competent manner.

If a major portion of the dissertation research is completed and similar results are then published by another laboratory, the Guidance Committee should be convened as soon as possible. The candidate should clearly communicate the nature of the problem and bring the committee up-to-date on the work accomplished. The committee will then recommend the course of action to be followed, basing its recommendation on the quantity and quality of the work the candidate has performed. The recommendation might range, depending on the individual case, from allowing the candidate to base the dissertation solely on the work already done to requiring a significant amount of additional experimentation.

IX.A.2. Preparation of the Dissertation The candidate is solely responsible for writing the dissertation; however, the dissertation, when presented for evaluation by the Guidance Committee, should reflect the input and standards of the dissertation research advisor. As a guide to the desired style and form of the dissertation, the students should examine the previously approved dissertations on file (as of January 2005, these are in room 202 BCH). The dissertation must be prepared in accordance with the specifications in the "The Graduate School Guide to the Preparation of the Master's Theses and Doctoral Dissertations," a handbook that is available, along with a packet of required forms, from the Office of the Graduate School.

The candidate is responsible for the cost of the dissertation. Under some circumstances, the major professor may pay for specific items. For example, the cost of the preparation of figures that will be used for manuscripts as well as for the dissertation may be paid from funds available to the research advisor.

IX.A.3. Evaluation of the Dissertation and Final Examination Procedure. At least one week (and preferably two weeks) prior to the scheduled defense date, the candidate shall submit to each Guidance Committee member a copy of the dissertation that represents his/her best effort. The copies should be complete, carefully proofread, clearly reproduced, and in a form which the candidate and the major professor consider as qualifying for the final version. The members of the Guidance Committee should critically review the work, feeling free to suggest changes in

both presentation and content. For example, additional experiments to clarify a point could be required. Any differences of opinion between a member of the Committee, the candidate, and/or the dissertation advisor should be arbitrated by the entire Guidance Committee. If substantial changes are required, the committee may request that the candidate submit a revision of the dissertation to each member of the Committee for review before final acceptance is given.

To ensure fairness in the examination procedure and maintenance of academic standards, the Dean of the College or the Chair of the Department may appoint an outside member to the examining committee. The outside member of the committee will read and critique the thesis/dissertation, will participate in the oral part of the exam, and will submit a report to the Dean of the College and/or the Chair/ of the Department.

As part of the final examination, the candidate will present an open seminar describing the dissertation research. It should be scheduled at a convenient time and must be announced in the *Biochem Weekly* and on appropriate bulletin boards.

Immediately following the seminar, the Guidance Committee will meet in private with the candidate to administer the final oral examination in defense of the dissertation. The Departmental Representative should record the Committee's decision on the form, "Record of Completion of Dissertation and Oral Examination Requirements for Doctoral Degree Candidates." In all instances, the acceptability or unacceptability of the dissertation shall be the subjective decision of the Guidance Committee. Acceptance shall require that there be not more than one dissenting vote.

IX.A.4. Degree Certification After completion of the final examination and any required revisions to the dissertation, four copies of the dissertation are required. An unbound original copy is to be delivered by the student to the Graduate School office. Suitably bound copies are required for the Department of Biochemistry and Molecular Biology, the major professor, and the candidate. The Department and the major professor must each receive a suitably bound copy of the Ph.D. dissertation or M.S. thesis before the Department will certify to the Graduate School that the degree requirements have been fulfilled by the candidate. Justifiable exceptions to this policy may be granted provided that all other degree requirements have been met, including submission of the unbound dissertation or thesis to the Graduate School, and provided that the candidate presents to the Department a copy of a receipt from the bindery which must indicate the delivery date and who, if not the candidate, will deliver the bound thesis to the department.

IX.B. The Master's Degree Thesis

The thesis should demonstrate that the student has acquired the technical skills to plan experiments, to carry them out with precision, and to interpret the results logically. It should be apparent that the candidate has the ability and training to participate successfully as a member of the research team. The thesis must be prepared in accordance with the specifications in the publication, "The Graduate School Guide to the Preparation of Master's Theses and Doctoral Dissertations," obtainable from the Graduate School. Other aspects of thesis preparation and presentation are as described in the section on doctoral dissertations (see section IX.A), except that an open seminar is not required. Suitably bound copies of the thesis must be presented to the thesis research advisor and to the Department of Biochemistry and Molecular Biology through the Graduate Programs Secretary. The degree will not be certified by the Department until the bound copies of the thesis have been received (see section IX.A.4).

X. DEPARTMENTAL POLICIES: ACADEMIC PERFORMANCE

Graduate students have a right to periodic evaluation of their academic progress, performance, and professional potential (GSRR 2.4.8). Therefore, the department has developed procedures to review the performance of each graduate student at least once a year. This section of the handbook explains the evaluation procedures and the policies for dismissal due to academic deficiencies.

X.A. Evaluation

X.A.1. The initial departmental evaluation of a student's overall progress and potential will be made during the first year by the Graduate Programs Director. This evaluation will be transmitted in writing in March, with a copy retained in the student's file. The evaluation will be based on the academic record and on written statements describing the research potential of the student. These statements will be supplied by those faculty members under whom research has been conducted in the rotation system, or as BMB 899 or 999. The content of these statements may be made available to the student.

X.A.2. Subsequent annual evaluations will also be provided in March by the Graduate Programs Director, with copies retained in the student's file. They will be based, to a major extent, on written judgments of research progress and potential supplied by the major professor and the Departmental Representative on the Guidance Committee. Graduate students who wish to rebut or appeal any part of the guidance committee's or faculty advisor's evaluations may do so in writing to the Chair of the Department or the Graduate Programs Director, and this appeal will be filed together with the annual progress report. Serious disagreements may be mediated by the Graduate Programs Director. Performance in course work and on the comprehensive examination will also be considered, as well as other evidence bearing on research progress and professional growth as may be available.

X.A.3. For doctoral candidates, the comprehensive examination is conducted by each student's Comprehensive Examination Committee, to be held within one month after the beginning of the student's third year in the program (see section VIII.). There is no equivalent examination for master's candidates.

X.A.4. For doctoral candidates, an annual evaluation by the Guidance Committee is required in the third and subsequent years by the end of each 12-month period following the passing of the comprehensive examination. The process for this annual evaluation is detailed in section VII.A.2.b. The Guidance Committee shall provide the Graduate Programs Director with an annual written evaluation of the student's progress, as determined in each annual meeting and as specified in section VII.A.2.c. This evaluation should identify any identified problems that might hinder progress to completion of the degree, and any actions or timeline for addressing those problems. A copy of this evaluation will be given to the student.

X.A.5. As a required component of the Ph.D. degree, training in teaching methods is provided by a section of BMB 961 entitled, "Instructional Methods in Biochemistry and Molecular Biology." This course acquaints students with the challenges they are likely to confront when teaching Biochemistry and Molecular Biology to college students at the introductory or higher level. Emphasis will be on teaching an analytical approach to problem-solving, designing problems to test for understanding not memorization, and assessment of student performance. Topics that are conceptually difficult for undergraduate students will be identified, and strategies for communicating the information will be discussed and practiced. Instructors for respective courses will mentor Ph.D. students on objectives and instructional

methods. In addition to formative evaluations during the experience by the supervising faculty member and the director of the BMB961 course section, a summary written evaluation will be prepared by the faculty member in charge of each course in which students participate in teaching and a grade of Pass/No Pass will be given. Instructor ratings from students enrolled in the courses used for the teaching experience may comprise a component of the evaluation. These evaluations will be transmitted by the faculty member to the Graduate Programs Secretary for inclusion in the student's file. With extremely rare exception, the Department does not hire graduate students in the capacity of teaching assistants with those rights and responsibilities as defined by the MSU/GEU contract (see <http://www.grad.msu.edu/geu/agree.pdf>)

X.A.6. The final evaluation will be made by the Guidance Committee after its examination of the doctoral dissertation or master's thesis and the student's performance in its defense. (See section IX.A.3 for doctoral candidates and section IX.B. for master's candidates.)

X.A.7. If the performance and/or the progress of a student does not meet departmental standards at any stage in the program, the student will be notified in writing of the deficiency by the Graduate Programs Director. The possible effect of the deficiency on the student's status will be included in such notice, as well as the actions required for remediation and a timeline for completing those actions. This notice will be given to the student as soon as the deficiency is apparent.

X.B. Minimum Standards for Retention

X.B.1. According to University regulations, a minimum cumulative grade point average required for graduation is 3.0 for graduate students. Withdrawal from a degree program may be required of a student whose grade point average is below 3.0; no graduate degree can be conferred on students with a GPA of less than 3.0. A grade point average of at least 3.0 must be achieved in all required courses. Withdrawal from a degree program may be required of a student who receives more than two unsatisfactory grades. For this purpose, an unsatisfactory grade is defined as one below 3.0 in courses required by the Department (see Section IV.B.) or the student's Guidance Committee, or a grade below 2.5 in any other graduate-level course (i.e., 400 level and above).

X.B.2. Remediation of unsatisfactory grades. The subject matter of each departmentally required BMB course (see sections IV.A.1 and IV.A.4) or any other course required by the student's Guidance Committee must be mastered sufficiently well to warrant a grade of at least 3.0. In the event of one grade, or at most two grades below 3.0, a student may attempt to remediate the substandard performance by any means negotiated between the student and the professor(s) who taught the course, and approved by the Graduate Programs Director. Normally the remediation would require the student to repeat the course if it can be done by the Spring semester of the second year; repeating a course may require approval by the College Dean. Completion of an approved remediation procedure to the written satisfaction of the professor(s) with whom it was negotiated, or earning a grade of at least 3.0 upon repeating the course, shall satisfy the requirement.

X.B.3. Similar objective standards cannot be described for performance in research. This evaluation must reflect to a major extent the professional, subjective judgment of the faculty concerned. A student may be asked to withdraw from the Ph.D. or Master's degree program on the basis of these judgments alone, regardless of the grade point average. If the consensus is that satisfactory progress is not being achieved in fulfilling these requirements, a recommendation will be made to the Department Chairperson that the student be dropped from the Ph.D. program. If the Department Chairperson concurs in this recommendation, the student may request that

his/her case be brought before the faculty (see X.B.6). Normal University procedures, defined in the Graduate Student Rights and Responsibilities document, are available for further appeal.

X.B.4 The admission of a student into a graduate degree program does not guarantee that student a research program of his/her own choosing. Thus, a student who fails, even with the assistance of the Graduate Programs Director, to identify a faculty member who will consent to serve as his/her major professor will be asked to withdraw or may be dismissed from the graduate program.

X.B.5. Students must adhere to the ethical standards described in section XI.A. of this handbook.

X.B.6. Failure to satisfy any of the core requirements of the graduate program (sections IV.A-G, I and X.B.1-2) may result in termination of the student's participation in the doctoral program. The Graduate Programs Director will review the circumstances in consultation with the Department Chairperson, who will then render a decision. The student may be invited to participate in this discussion. If the decision is other than termination of the student from the doctoral program, or if the student contests (on the merits of the case) a decision to terminate, the case will be considered as soon as possible in a faculty meeting. The student may make a presentation of his/her case to the faculty and may be represented by the major professor or, if not available, any willing member of the faculty chosen by the student. The recommendation may be (i) to retain the student in the program if the student can remediate the substandard performance by a specified procedure and schedule, or (ii) to terminate the student from the doctoral program. A majority vote by the faculty present shall decide which alternative to recommend to the Department Chairperson. A quorum is required, and voting shall be by secret ballot. The Department Chairperson must justify to the faculty any action other than that recommended by the faculty. If the decision to terminate the student is upheld by the faculty and the Department Chairperson, the student may appeal this decision to the Dean of the Graduate School.

If the student appeals a decision to terminate on grounds alleging an infringement of their rights (rather than on the merits of the case itself), the appeal process should begin with the Departmental Student Judiciary committee (see section XII) and thereafter through established University channels.

If any of the additional requirements (sections IV.K-M and X.B.3, 5) is not satisfied, the Guidance Committee in consultation with the student, the major professor and the Graduate Programs Director will review the circumstances and attempt to design a remedy for the situation. If the consensus is that satisfactory progress is not being achieved in fulfilling these requirements, a recommendation will be made to the Department Chairperson that the student be dropped from the Ph.D. program. If the Department Chairperson concurs in this recommendation, the student may request that his/her case be brought before the faculty (see preceding paragraph). Normal University procedures are available for further appeal.

X.B.7. A student who is dropped from the Ph.D. program may, with the approval of the Graduate Programs Director and Department Chairperson, be allowed to transfer to the M.S. program. Approval will depend in part on the recommendation of the student's doctoral Guidance Committee or Comprehensive Examination Committee, and on the availability of a regular faculty member who will consent to serve as the master's research advisor. If this alternative is approved by the Department and accepted by the student, the student should notify the Graduate Programs Director of his/her acceptance in writing.

X.C. Departmental files and access to student records

X.C.1. The department maintains files of student records which include the following information:

X.C.1.a. A copy of the admissions application materials, including grade transcripts, test scores (GRE, TOEFL), and letters of recommendation.

X.C.1.b. Academic records for work at MSU, including the form entitled “Report of the Guidance Committee, Doctoral and Other Programs” which describes the specific requirements of a student’s doctoral program, grade reports for courses taken at MSU, documentation of oral presentations, and certificates of completion for ethics training seminars.

X.C.1.c. comprehensive exam and progress reports, including a copy of the comprehensive exam proposal, the report of the exam committee (and documentation of any remediation thereof), annual reports of the guidance committee (and any formal responses by the student to those reports), annual reviews by the research supervisor (and any formal responses by the student to those reviews), and annual statements regarding financial support for the subsequent year.

X.C.1.d. nomination and supporting materials for awards and fellowships as well as any announcements that such awards have been conferred.

X.C.2. The student records will be maintained in a secure location by the Graduate Program secretary.

X.C.3. Access to student records will be granted to the student (except for those records to which the student has waived the right of access), the faculty advisor / research supervisor, members of the guidance committee, the Graduate Programs Director, or the chairperson of the Department. Normally such access is obtained by request to the Graduate Program Secretary during normal business hours.

X.C.4. Students may request that corrections be made to the information maintained in their departmental file by submitting such a request in writing to the Graduate Programs Director. Such a request should detail the alleged errors in the file and the corrective action requested. The decision on whether an error actually exists and the means of rectifying such errors will be the responsibility of the Graduate Programs Director.

XI. DEPARTMENTAL POLICIES: INTEGRITY AND SAFETY IN RESEARCH AND CREATIVE ACTIVITIES

Intent: Integrity in research and creative activities is based on sound disciplinary practices as well as on a commitment to basic values such as fairness, equity, honesty and respect. Students learn to value professional integrity and high standards of ethical behavior through interaction with members of their academic unit and their faculty advisor and by emulating exemplary behavior. This section of the handbook states the Department's expectations for the responsible conduct of research and creative activities of graduate students (GSRR 2.4.7) and defines the criteria for dismissal for reasons other than academic deficiencies, including research misconduct, dishonesty with respect to grades or academic records and scholarship, and violations of professional standards.

XI.A. Ethical Standards

Scrupulous honesty in the recording, the interpretation, and the use of scientific observations is one of the most important characteristics of a scientist. Only with such honesty can science advance, since its growth depends on accurate and reliable communication of observations within the scientific community and careful interpretation of the meaning of those observations. Accordingly, establishment of proofs of a breach of honesty by a student in the course of study or research performed pursuant to an advanced degree in Biochemistry and Molecular Biology at Michigan State University shall constitute grounds for dismissal from the graduate program in Biochemistry and Molecular Biology. Presentation of such proofs subsequent to the awarding of an advanced degree shall constitute grounds for revocation of that degree.

Each faculty advisor and graduate student will be provided with the document Guidelines for Integrity in Research and Creative Activities (<http://grad.msu.edu/staff/mentoreport.pdf>). Further information on the responsible conduct of science is available at the following website: <http://www.msu.edu/%7Ebiomed/rcr/>.

Completion of appropriate training in the responsible conduct of science is a requirement for advanced degrees from this department (section IV.A.4.a). This requirement can be satisfied by passing a course dedicated to that topic (e.g., NSC830) or by attending a series of seminars organized by the Vice President for Research and Graduate Studies, described at the following website: <http://grad.msu.edu/all/respconduct.htm>.

XI.B. Use of Human Subjects in Research

Extensive University, state and federal regulations have been put in place to protect the rights, welfare and privacy of human subjects who participate in research conducted by students and/or faculty affiliated with MSU. To achieve this goal, the Institutional Review Boards (IRBs) will 1) require all investigators be educated in the use of human subjects, 2) review all proposed research involving human subjects prior to initiation of the research, 3) approve, modify or disapprove research according to established criteria for protection of human subjects, and 4) monitor approved research to ascertain that human subjects are indeed protected during the performance of the research. The processes of education, review and monitoring serve to ensure the safe and ethical conduct of research that will protect human subjects in an atmosphere of mutual trust and integrity in the pursuit of knowledge and human benefit.

Graduate students must be aware of these regulations and must comply with them fully in the conduct of their research. These regulations and the processes for adhering to them are administered at MSU by the University Committee on Research Involving Human Subjects

(UCRIHS) and are stipulated in detail at the relevant University website: (<http://www.humanresearch.msu.edu/overview/mission.htm>).

XI.C. Use of Animals in Research

Research utilizing animals at MSU is governed by *The Animal Use & Care Program*, developed to ensure the highest standard of care for research animals and strict adherence to federal and state regulations. Any research involving the use of animals must be approved in advance by the *All-University Committee on Animal Use & Care* (AUCAUC). Graduate students must be aware of these regulations and must comply with them fully in the conduct of their research. These regulations and the processes for adhering to them are stipulated in detail at the AUCAUC web site: <http://www.aucauc.msu.edu/>

XI.D. Lab Safety and Security Policies

The management of University laboratory safety regulations and policies is the responsibility of the Office of Radiation, Chemical and Biological Safety (ORCBS). Graduate students are expected to comply fully with the policies and practices stipulated by ORCBS and as supplemented by site-specific safety plans instigated by the Department or by the principal investigator or research supervisor. Initial training in chemical and radiation safety will be routinely conducted as part of the orientation for new graduate students each August. Additional lab-specific safety training is the responsibility of the principal investigator or research supervisor. Annual refresher courses, often offered through the ORCBS website, should be completed by all graduate students for whom those courses are relevant. Each laboratory conducting chemical, radiological or biological experiments will have on site the appropriate training and practices manuals. Further information on these regulations, policies and training is available at the ORCBS website (<http://www.orcbs.msu.edu/>)

XII. STUDENT CONDUCT AND CONFLICT RESOLUTION

Any student who believes that there has been an infringement upon his/her academic or professional rights should first seek redress from the individual(s) involved. If a satisfactory conclusion is not reached, the student should present the problem to the Department Chairperson. If the grievance involves the Department Chairperson, the Chairperson of the departmental Faculty Advisory Committee should be contacted. If the problem cannot be resolved at this stage, it may be referred to the departmental Student Judiciary committee. This committee includes faculty and student representatives, as defined in the departmental Bylaws. The functions of the Student Judiciary are as specified in the relevant articles of the Graduate Student Rights and Responsibilities document. Subsequent appeal procedures are given in Article 5 of the Graduate Student Rights and Responsibilities document.

As part of the professional development program, the MSU Graduate School regularly conducts workshops on conflict resolution. Further information on these workshops is available at the following website: <http://www.msu.edu/user/gradschl/conflict.htm>

XIII. WORK RELATED POLICIES

This section defines the department's expectations concerning graduate student's work related to graduate assistantships. BMB graduate students are rarely appointed as teaching assistants, but any such cases must conform to the specifications of the current MSU/GEU Contract.

XIII.A. Departmental financial support is normally offered only to those students who are enrolled in the doctoral program. A student in the Ph.D. program who transfers to the M.S. program cannot continue to receive departmental support without specific departmental approval, which would only be given under exceptional circumstances. At the option of the major professor, support derived from the professor's research grant may be provided.

A five-year tenure for a student in the doctoral program is a reasonable goal. To facilitate the programming of departmental finances, departmental support will be committed for five years, provided that the student maintains satisfactory progress, and provided that funds are available. Support beyond five years is subject to review.

XIII.B. The Department views all doctoral candidates similarly regarding their obligations, regardless of their source of financial support. Although students are officially appointed in various categories (research assistants, NSF fellows, NIH trainees, etc.), we refer to them all as graduate research assistants and operate as if the responsibilities for all the categories were blended and divided equally among all students. These blended responsibilities include: (i) advancing at a reasonable rate the student's own scientific education, including as a major component the development of research abilities; (ii) working toward the discovery and reporting of new scientific information; and (iii) assisting with the teaching program including, in addition to assisting with the instruction, the more routine educational duties such as proctoring and grading examinations.

XIII.C. Research obligations transcend student training.

Research will properly be viewed by the student as an individual responsibility, as a major part of the training program, and as the basis for the presentation of a satisfactory dissertation or thesis. But by accepting direct or indirect departmental support, students also accept responsibility to their major professors, the Department, the University, the granting agencies, and society in general for continuing effort toward the goal of research results aside from research training.

XIII.D. Teaching requirement.

Participation in the teaching program of the Department is required of all candidates, regardless of their source of financial support. Involvement in formal teaching is an integral part of a Ph.D. program. The rationale for this requirement is the expectation that many of those completing the Ph.D. program will subsequently be involved in careers that include significant teaching responsibilities. Furthermore, teaching experience is considered beneficial to development of communication skills likely to be essential even in post-Ph.D. careers not involving a formal teaching component. This teaching experience is incorporated as an integral part of the BMB 961 course in the section entitled *Instructional Methods in Biochemistry & Molecular Biology*.

Students who enter with only a bachelor's degree generally do not receive their training in instructional methods during their first year so that they can concentrate on other aspects of their graduate program. Graduate students having an interest in a particular type of instruction may make this interest known to the Graduate Programs Director. While such requests will be taken

into consideration, students must realize that various other factors also enter into such decisions and hence honoring the requests may not always be possible. Generally, training in instructional methods occurs within the second or third years of the Ph.D. program, except that students who enter with the M.S. degree may be asked to participate in their first two years. Students are expected to participate in one or two laboratory courses as well as holding office hours or recitation sessions for other courses, or proctoring and grading examinations. Students who spend one or two semesters of their first year in the Ph.D. program, and then switch to the M.S. program, will be expected to fulfill the instructional methods requirement. In the case of students who are in a joint Ph.D./D.O., or Ph.D./M.D. program (e.g., a COM or CHM Medical Scientist Training Program), the Graduate Programs Director will attempt to tailor the requirement so as to best fit these special programs.

XIII.E. Service obligations.

Students are expected and encouraged to participate fully in the academic and scientific life of the Department. This participation might take various forms, including service on standing or ad hoc departmental committees, assisting with departmental seminars, proctoring examinations, or assisting with the grading of examinations. Such services are generally deferred until the second or third years of the graduate program, although some limited services may be requested during the first year. In some circumstances, students may be financially compensated (e.g., on an hourly pay basis) for such services. The Graduate Programs Director will strive to distribute these responsibilities in an equitable manner among all students having such obligations.

XIII.F. Other non-research activities.

Given the generally accepted significance of the Ph.D. as a "research degree", research activities are properly considered the major priority for doctoral students. This is particularly true in cases where financial support is provided to graduate students in the form of research assistantships, which carry with them the commitment to a funded research activity. Other activities (such as workshops, seminars, internships, committee service, or additional teaching activities) may also enhance a student's preparation for their future career. Care should be taken that participation in these legitimate activities should not unduly hinder progress towards completion of the doctoral degree. To avoid potential conflicts between research and other activities that might affect progress, the student should discuss any such activities with, and secure the approval of, his/her major professor *prior to* committing to that activity. The purpose of this discussion is to work out an understanding that would accommodate the additional activity while maintaining what would be judged by the major professor as acceptable progress toward completion of the research upon which the dissertation is based.

XIII.G. Vacation policy.

Any student who accepts financial support from or through the Department, regardless of the particular nature of the appointment, is viewed by the Department as accepting a responsibility equivalent to that of a half-time graduate assistant. As with other University employees on calendar-year appointments, a graduate assistant is entitled to a total of one month's annual vacation plus those University staff holidays so designated in the University calendar. Between-semester periods and Spring break are not considered to be holidays. Any absence from the University, except those authorized for scientific meetings, etc., must be considered to be part of the one-month annual vacation. Vacations must be arranged with the major professor or, in the first year, with the Graduate Programs Director. With these guides, each student is responsible for bookkeeping with respect to vacations. However, a student who plans to be absent from the

University area on regular weekdays should notify the Graduate Programs Secretary so that emergency situations can be met.

XIII.H. English Language Proficiency.

Foreign students must demonstrate fluency in oral and written English as indicated by scores on the Test of English as a Foreign Language (TOEFL) of 550 (paper) or 213 (computer) and as demonstrated by satisfactory grades (≥ 3.0 including remediation) in courses, seminars and scientific writing.

XIV. UNIVERSITY RESOURCES

This section includes a list of university resources available to all graduate students with particular attention to those that apply to the mission of the Department.

XIV.A. University policies.

This Handbook is intended and believed to be consistent with University and College policies. Relevant University policies can be obtained from the following websites.

- Academic Programs: www.reg.msu.edu/ucc/ucc.asp
- Graduate Students Rights and Responsibilities (GSRR): www.vps.msu.edu/SpLife/default.pdf
- Guidelines for Graduate Student Advising and Mentoring Relationships: grad.msu.edu/staff/mentoreport.pdf
- Guidelines for Integrity in Research and Creative Activities: grad.msu.edu/staff/mentoreport.pdf
- MSU/GEU Contract: grad.msu.edu/geu/agree.pdf

XIV.B. Colleges and Schools supporting the Department of Biochemistry and Molecular Biology

XIV.B.1. Graduate School (<http://www.msu.edu/user/gradschl/>)

XIVB.1.a. Dissertation and Graduation Requirements and checklists
<http://www.msu.edu/user/gradschl/graduation.htm>

XIVB.1.b. Career and Professional Development

<http://www.msu.edu/user/gradschl/professional.htm>

XIVB.1.c. Conflict Resolution

<http://www.msu.edu/user/gradschl/conflict.htm>

XIV.B.2. College of Natural Science (www.ns.msu.edu)

XIV.B.3. College of Human Medicine (www.chm.msu.edu)

XIV.B.4. College of Osteopathic Medicine (www.com.msu.edu)

XIV.B.5. Michigan Agricultural Experiment Station (www.maes.msu.edu)

XIV.C. Related Departments and Graduate Training Programs

XIV.C.1. Department of Microbiology and Molecular Genetics: www.mmg.msu.edu

XIV.C.2. Department of Physiology: www.psl.msu.edu

XIV.C.3. Graduate Program in Cell and Molecular Biology: www.ns.msu.edu/cmb/

XIV.C.4. Graduate Program in Genetics: www.ns.msu.edu/genetics/

XIV.C.5. MSU-DOE Plant Research Laboratory: www.prl.msu.edu

XIV.D. Additional support and services

XIV.D.1. ORCBS www.orcbs.msu.edu

XIV.D.2. University Lab Animal Resources: www.msu.edu/unit/ular/

XIV.D.3. Registration: www.reg.msu.edu

XIV.D.4. Department of Police and Public Safety: www.dpps.msu.edu

XIV.D.5. Course descriptions: ntweb1.ais.msu.edu/j4100/scripts/CatalogSearch.asp

XIV.D.6. Course schedules: ntweb8.ais.msu.edu/ScheduleBook/Schedule.asp

Appendix 1: Synopsis of the Doctoral Program

1. The First Year

- a. Completion of first-year courses selected in consultation with the Graduate Programs Director (section IV.A.1.)
- b. Laboratory rotations (each 10 weeks long) (section IV.A.3.)
 - c. Selection of the major professor/dissertation research advisor (section VI.A.)
 - d. Selection of the Guidance Committee (section VII.A.)
 - g. Beginning of dissertation research.
 - h. Evaluation of the student's progress by the Graduate Programs Director (section X.A.1.)

2. The Second Year

- a. Continuation of dissertation research.
- b. Enrollment in courses prescribed by the Guidance Committee (section IV.A.5.) including a course or workshop series in scientific ethics, if not taken in the first year.
- c. Initial Guidance Committee meeting. This should be held as soon as possible, and *must* be held within 15 months after entering the graduate program. At this meeting, (i) the student's written proposal for dissertation research must be presented and discussed, and (ii) the complete course program must be formally decided (section VII.A.2.a.)
- d. Submission of the form entitled "Report of the Guidance Committee--Doctoral and Other Programs." The final typed form must be signed by the student and all members of the Guidance Committee. This requirement should be completed in conjunction with the initial Guidance Committee meeting.
- e. Completion of a workshop for teaching assistants, if desired.
- f. Participation in departmental teaching activities as a component of the BMB 961 section entitled *Instructional Methods in Biochemistry & Molecular Biology* (section XII.D.)
- g. Evaluation of the student's progress by the Graduate Programs Director (section X.A.2.)

3. The Third Year

- a. Continuation of dissertation research.
- b. Enrollment in courses prescribed by the Guidance Committee (section IV.A.5.)
- c. Satisfactory completion of the comprehensive examination (section VIII.)
- d. At least partial completion of the requirement for four oral presentations (section IV.K.)
- e. Presentation of a written progress report by the student to the Guidance Committee.
 - f. Evaluation of the student's progress by the Guidance Committee (section VII.A.2.b, c)
 - g. Evaluation of the student's progress by the Graduate Programs Director (section X.A.2.)

4. Each Subsequent Year
 - a. Continuation of dissertation research.
 - b. Enrollment in courses prescribed by the Guidance Committee and graduate seminar courses (section IV.A.4)
 - c. Oral presentations until a total of four has been completed and documented (section IV.K.)
 - d. Presentation of a written progress report by the student to the Guidance Committee.
 - e. Evaluation of the student's progress by the Guidance Committee (section VII.A.2.b,c)
 - f. Evaluation of the student's progress by the Graduate Programs Director (section X.A.2.)

5. The Final Semester
 - a. Seminar on dissertation research.
 - b. Final oral examination in defense of the dissertation (section IX.A.3.)
 - c. Submission of the unbound dissertation to the University, and bound copies to the Department of Biochemistry and to the major professor (section IX.A.4.)
 - d. Submission of manuscripts based on the dissertation to refereed biochemical journals.

Appendix 2: Forms used by the Department of Biochemistry and Molecular Biology or by the University for graduate programs.

Appendix 2.A. University Forms

1. Report of the Guidance Committee - Doctoral and Other Programs
2. Record of Completion of Dissertation and Oral Examination Requirements for Doctoral Degree Candidates
3. Record of Comprehensive Examinations for Doctoral Degree and Educational Specialist Degree Candidates

Appendix 2.B. Departmental Forms

1. Guidance Committee Selection form
2. Annual Guidance Committee meeting report form
3. Annual Evaluation by the Graduate Programs Director
4. Comprehensive Examination report form
5. Laboratory Rotation evaluation form
6. Teaching experience evaluation form
7. Oral Presentation Report form
7. Exit form: leaving department at completion of degree (*in preparation*)