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VAIGS ACADEMIC CATALOG

INTRODUCTION

Van Andel Institute (VAI) was founded by Jay and Betty Van Andel in 1996 with a vision to enrich and enhance the lives of this and future generations through medical research and education. The biomedical research dimension of VAI has a mission to improve human health with current areas of strength in cancer cell biology, neurodegenerative disease, structural biology, metabolism and nutritional programming, and epigenetics. The educational aspect of VAI provides programs that engage K-12 students in thinking and acting like scientists and develops classroom-tested strategies and materials that transform instruction by K-12 teachers.

Encompassing both the research and education dimensions of the VAI mission, Van Andel Institute Graduate School (VAIGS) is incorporated in the State of Michigan with authority to grant PhD and MS degrees in molecular and cell biology. Given that VAIGS operates within and is supported by VAI, the school's mission and strategic plans align with those of VAI. The scientific investigators of the research institute are the faculty of the graduate school, and the dissertation research that comprises the heart of the PhD degree is conducted in the VAI laboratories. VAI administrative offices provide finance, information technology, human resources, facilities support, fundraising (through grants and private philanthropy) and public awareness services.



VAI Values

VAI has articulated six core values at the heart of our institutional culture that describe and direct our efforts towards accomplishing our mission. Every day, we commit ourselves to bringing them to life in all we do. These core values apply in specific and focused ways to VAIGS, fostering a culture of learning and discovery that is essential for fulfilling our mission with excellence.

1. **Be curious.** We thrive in the pursuit of discovery. We equip emerging scientists with the knowledge, skills, and motivation to identify new questions and to find new answers. We explore new and better ways to develop biomedical leaders.
2. **Take risks.** We do things that other graduate schools don't, in ways that they can't. We guide students to practice taking risks and to learn from the results. We create and test new ways to better develop young scientists.
3. **Collaborate.** We foster collaboration among students so that all learn better. We foster collaboration among faculty to help each other teach and mentor. We work with local and peer institutions to enhance the overall intellectual communities of which we are part. We learn from others and share with them what we do well.
4. **Respect everyone.** VAIGS students are regarded as colleagues and as the future stewards of our scientific disciplines. We foster the balanced well-being of faculty, students, and staff. We provide opportunities for students from a wide range of backgrounds.
5. **Work with urgency.** Our work matters, in the laboratory and in the classroom. We help our students and faculty achieve their goals of student success in an efficient, effective, and timely manner.
6. **Do the right thing.** The school holds the students' best interest as its primary focus. We exceed expectations for best practices and for standards of performance. We look carefully at our work and its outcomes and we seek ways to do things better.

Mission

The mission of VAIGS is to prepare biomedical research leaders through an intense problem-focused graduate program in molecular and cell biology, with emphasis on translation of this knowledge and technology to improve human health and well-being. We fulfill this mission by:

- Guiding doctoral students to learn, think, and act like research leaders
- Developing both laboratory research and leadership skills
- Integrating doctoral students into the professional networks and culture of science.

Philosophy

The fundamental philosophy underlying the VAIGS graduate program is that the students will be best prepared for their future work as professional scientists by practicing the habits and skills of that profession. Put simply, VAIGS graduate students should act and think like scientists, to generate new knowledge, to conserve and critique the knowledge already gained within the field, and to apply the skills of the discipline to transform the world around us. We anticipate our graduates will be the stewards of the discipline in whatever setting they advance their careers.

Every PhD is inherently a research degree, with the dissertation as the capstone demonstrating the ability of the student to conceive, design, analyze, and interpret experiments that address an original and important question in the field of study. To prepare students well for dissertation research, VAIGS provides a core curriculum shaped by a problem-based learning (PBL) approach that reflects the way scientists conduct research. This approach gives students the responsibility for their development and supports the growth of the intellectual skills and tools to ask and answer original research questions. Through this approach, our students master important concepts of genetics, cell biology, biochemistry, bioinformatics, and related disciplines. They also learn how to find key information when they need it; to digest the quality and relevance of that information; to place that information into a coherent conceptual framework; and to make use of that information to tackle a new scientific problem or test a novel hypothesis.

Although the central tasks of a scientist are to design, execute and interpret experiments, other responsibilities and roles are also important. These include writing and reviewing grant proposals and manuscripts of research publications, managing the financial support of a research program, and selecting and supervising a laboratory research team. VAIGS prepares its students for these roles through classroom activities, seminars, and periodic workshops.

VAIGS fosters the effective integration of our students into the complex and fascinating intellectual community of biomedical research. Students learn to work effectively in a local research team and with external collaborators. Students also learn to speak and write effectively and to critically evaluate the work of others. Students are encouraged (and supported) to attend a scientific conference or workshop each year, beginning in the summer of their first year.

VAIGS promotes a culture of freedom and creativity that encourages individuals to achieve their research goals with excellence and integrity. That culture includes an emphasis on effective mentoring. The mentoring team includes the Thesis Adviser, other VAIGS faculty, and an external member of the thesis advisory committee.

The VAIGS graduate program and curriculum is continually evaluated and revised. This process is appropriate for scientific education because it mimics the daily work of scientists: asking questions, gathering and analyzing data, applying the new results to previous paradigms, and integrating the new with the old in order to establish a better model and to improve outcomes.

Core Competencies

The educational goals of VAIGS include general goals common to higher education and the scientific research community, and specific goals that distinguish the VAIGS graduate program. VAIGS graduates will know principles and concepts of current biomedical science and their historical and clinical context. They will be prepared to conduct original research: design appropriate experiments, be expert in techniques of the life sciences, and think scientifically and analytically. They will be able to translate basic science to address problems of health and society; work collegially; communicate effectively verbally, in writing, and graphically; and practice the highest ethical and professional standards. VAIGS expects to develop graduates who are creative and confident in exploring new areas and techniques in biomedical research.

The VAIGS core competencies define the foundational learning outcomes for the graduate program in molecular and cell biology. These were compiled to explicitly illuminate the path to becoming an independent scientist. Student progress in developing these core competencies is evaluated each year by both students and Thesis Advisors. The core competencies include:

Knowledge:

- Describe key concepts in biomedical science
- Place core concepts in the relevant clinical context
- Know scientific literature relevant to the research area

Research:

- Define sound rationale/ identify gap in knowledge
- Frame an appropriate hypothesis
- Apply creative and appropriate experimental design
- Use controls appropriately
- Execute experiments with technical skill
- Demonstrate critical analysis and thinking
- Integrate results into relevant model

Communication:

- Speak effectively
- Write effectively
- Communicate to diverse audiences

Ethical/Professional Practice:

- Manage data with scientific integrity
- Engage in best authorship practices
- Address ethical problems in scientific research
- Comply with safety and regulatory standards in laboratory activities
- Display appropriate lab citizenship
- Work collegially and effectively as a team/ collaborator

ACADEMIC PROGRAM

VAIGS offers admission to a single academic program leading to the PhD degree in Molecular and Cell Biology.

VAIGS is also authorized to confer master's degrees in molecular and cell biology but does not admit students explicitly for the master's degree. Master's degrees may be conferred upon students who elect not to complete the doctoral degree, with the approval of the Dean.

Graduation Requirements for a PhD Degree

The essence of a PhD degree is the conduct of original and significant research relevant to that field. The research is described in a dissertation comprising published or publishable accounts of the work conducted by the student. The preparation and defense of the dissertation is the principal requirement for the PhD degree. This research is conducted under the supervision of a faculty member serving as the Thesis Adviser, with additional guidance and encouragement from a Thesis Advisory Committee.

Courses

Courses help provide the foundation and context for the conduct of this research. For VAIGS, course requirements include a set of core courses typically completed in the first year, and elective courses in the subsequent years. VAIGS requires a **minimum of 80 credit hours and a minimum grade point average (GPA) of 3.0 for a PhD degree.**

Grading Scale

Most courses are graded on a 4.0 scale common in American higher education. A grade of 3.0 or above is considered a passing grade for any VAIGS course. Two or more course grades below 3.0 may be grounds for academic probation. Some courses are graded on a Pass / Fail basis. The course syllabus will clearly indicate which grading system applies to that course.

- 4.0 = Outstanding, as good as one might ever expect
- 3.5 = Excellent, with some room for improvement
- 3.0 = Good, with several areas for development
- 2.5 = Insufficient for passing, significant weaknesses are evident
- 2.0 = Substantial weaknesses, future success uncertain
- 1.0 = Minimal effort put forth, continuation in program uncertain
- 0.0 = No effort or very serious deficiencies, should discontinue program

Course Requirements for a PhD Degree

The following courses are required for the PhD degree. A complete course list and course descriptions are found in a subsequent section of this catalog.

Strategic Approaches to Biomedical Research (SABR)

Three two-credit courses are offered in the first semester, and two two-credit courses and a one-credit cumulative exam are offered in the second semester.	2 semesters, 11 credits
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Historical Perspectives in Molecular Biology	1 semester, 2 credits
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Experimental Design and Biostatistics	1 semester, 2 credits
Data Analysis and Bioinformatics	1 semester, 2 credits
Scientific Communication 1 & 2	2 semesters, 4 credits
Experimental Skills 1 & 2	2 semesters, 3 credits
Responsible and Effective Conduct of Research	1 semester, 2 credits
Technical Writing and Grantsmanship I	1 semester, 1 credit
Professional Development Courses	
Elective courses, 1-2 credits per course, typically taken in years two through four.	4 credits minimum
Special Topics Courses	
Two-credit courses on a focused topics in basic or clinical research, typically taken in years two through four.	4 credits minimum
Elective, Special Topics or Professional Development	2 credits
Laboratory Rotations	
Three rotations of four-weeks duration, completed during the first two semesters; two credits for each rotation.	6 credits
Precandidacy Research	
Dissertation research conducted after selecting a thesis adviser and prior to successful completion of the Comprehensive Exam	Typically, 3 semesters, 3-6 credits/semester
Thesis Research	27 credits minimum

Thesis Research

Thesis Adviser

Thesis Adviser selections are made after three laboratory rotations have been completed (typically in May of the first year). Regular faculty members of VAIGS who hold a terminal degree and are appointed as head of a VAI laboratory may serve as Thesis Adviser for a VAIGS doctoral student. The student may request assistance from the Academic Adviser in selecting a Thesis Adviser. After a mutual agreement is reached between the student and the Thesis Adviser, the student must notify the Dean in writing. The Dean confirms this intention with the faculty member prior to approval. Once a decision is reached the student will then share their decision with any other faculty member in whose laboratory the student had rotated.

The relationship with the Thesis Adviser is central for a successful research project, intellectual development, and the completion of the graduate degree. The student and Thesis Adviser should strive to create a productive and ethical research environment with suitable rapport. The laboratory should engage in research of specific interest to the student and should have an atmosphere conducive to student development and training.

Thesis Advisory Committee (TAC)

Assignment of TAC members: Within three months of selecting a thesis adviser and laboratory (i.e., typically in August of the first year), the student and

Thesis Adviser will identify members of the TAC, subject to approval by the Dean. The TAC will consist of at least four members including the Thesis Adviser, two VAIGS faculty, and one outside expert on the thesis proposal topic. If the spouse of the thesis adviser is a member of the TAC, an additional VAI faculty member will be appointed as well. Additional members (internal or external) may be appointed if a specific benefit can be anticipated from their participation.

Prior to each TAC meeting, the student will update information in the Student Progress Report Form, including current goals for their Individual Development Plan (IDP). After the TAC meeting, members of the TAC Committee will add their comments and recommendations on the form, and each member will sign the form indicating their approval. The signed form will then be turned in to the Director of Enrollment and Records for the student's records.

***TAC Meeting Frequency:* To monitor and support student progress toward completion of their degree, students must meet with the TAC for**

- a. **Annual Summary, and**
- b. **Progress Report**

meetings on a semi-annual basis (i.e., every six months) until their dissertation defense. Students who do not fulfill this expectation may be subject to academic probation.

The initial TAC Meeting will typically take place in November or December of the second year. The TAC will review the initial thesis proposal to gauge whether the scope and focus of the project are appropriate for a doctoral dissertation. At this meeting the student will present a 3-to-5-page description of their project. With the advice and input of the TAC, the student will outline a set of research objectives to be met in the next year.

Following the Comprehensive Exam, the student will meet with their TAC at least once every six months. Two types of TAC meetings are envisioned. At the **Annual Summary** meetings, which will take place around the anniversary of a successful comprehensive exam, students will present the TAC with both a written Annual Summary of their research (perhaps including draft manuscripts or draft chapters of the dissertation) and a formal oral presentation. The TAC will advise the student on their progress toward fulfilling the requirements of the program and will set goals and objectives for the coming year. At the **Progress Report** meeting, about six months after each Annual Summary meeting, the student will present the TAC with a brief written and oral report outlining the progress that has been made toward achieving the objectives established at prior TAC meetings. The TAC will again offer guidance on the research project and the overall academic progress and may revise the objectives if circumstances warrant.

TAC Responsibilities: The TAC provides both advice on and supervision of several aspects of the student's progress towards the degree. The TAC obviously advises and monitors the thesis research conducted by a student. At the initial TAC meeting, the committee assesses the thesis proposal to gauge whether the scope and focus of the project are appropriate for a doctoral dissertation. After the comprehensive exam is passed, the TAC meets with the student and Thesis Adviser at least every six months to evaluate academic progress toward the

degree; to review the student's Individual Development Plan and steps towards achieving its goals; and to provide continuing advice on the dissertation research project. The TAC may also assess the student's development of the Core Competencies on a regular basis. The two VAIGS Faculty members of the TAC (and one non-TAC member of the VAI faculty) will participate in the comprehensive examination. All members of the TAC will participate in the dissertation defense. Finally, TAC members should (upon request) advise the student in their career planning and preparation and may be asked to provide letters of recommendation when the student pursues subsequent positions or applies for a predoctoral fellowship.

Student Responsibilities: Following the approval of a Thesis Adviser, the student and Thesis Adviser will explore topics for the student's thesis research. As stated above, the student will submit a 3–5-page written thesis proposal for the initial meeting of the TAC. With the advice and input of the TAC, the student will outline a set of research objectives to be met in the next year. The student will then follow through on Annual Summary and Progress Report Meetings, including each time an update to the goals from the Individual Development Plan.

VAIGS Responsibilities: Transcripts and grade reports will be provided to students at the completion of each semester via the VAIGS Student Portal. The Student Performance Review Committee will evaluate overall yearly progress based on academics, research, conferences and workshops, papers, and presentations in addition to the reports submitted by the student's TAC. Based on evaluation by the Student Performance Review Committee, the Dean will provide a letter, to each student in the summer, summarizing their progress and status in the program.

Comprehensive Examination

The goal of the Comprehensive Exam (also known as the PhD candidacy exam or preliminary exam) is to evaluate the student's potential and ability to explicitly identify and define a specific, testable hypothesis. This will be based on evaluating the relevant literature, drafting a testable and important hypothesis, proposing critical experiments to rule out or prove the hypothesis, and interpreting the experimental outcome. The student will be expected to demonstrate their knowledge of basic concepts as well as current and relevant scientific literature.

The Comprehensive Exam is typically taken about one year after joining the thesis lab (i.e., May or June of the second year). Exceptions may be made for students who have experienced a leave of absence or comparable changes to their academic program. The implementation of the Comprehensive Exam is described in detail in the *Guidelines for the Comprehensive Examination*. Another document, *Preparing for the Comprehensive Examination*, is intended to help students effectively anticipate and prepare for this exam. A brief summary is provided here.

The exam will have three principal components:

1. A written proposal of the thesis research project prepared in the style of a National Institutes of Health (NIH) predoctoral fellowship application

2. A research proposal on a topic in an area different than the student's chosen field of research but within the scope of research at VAI; and
3. An oral defense of the two written proposals together with an examination on the underlying concepts, principles, and research skills

Comprehensive Exam Committee

The Comprehensive Exam Committee will comprise three members including two VAI members of the TAC and one VAIGS faculty member not on the TAC (appointed by the Comprehensive Exam Organizing Committee, CEOC). The Thesis Adviser may attend as a silent observer but does not participate in the examination. If the spouse of the Thesis Adviser is a member of the TAC, that faculty member will either be a silent (non-voting) observer or will be excused from participating in the exam. The exam will be chaired by a member of the Comprehensive Examination Organizing Committee, who also does not vote on the examination.

Comprehensive Exam Outcomes

Passing the Comprehensive Exam requires satisfactory completion of all three principal components, based on a majority vote of the examining committee. For more detail regarding outcomes, see *Guidelines for the Comprehensive Examination*.

Upon successful completion of both the written and oral exams, the student will work full-time in the laboratory on their thesis project. The student must submit a predoctoral grant application to an external agency, to be considered for funding (typically as a predoctoral fellowship), within one year from the date of their Comprehensive Exam.

Dissertation Preparation and Defense

Dissertation Scope and Preparation

A key requirement for the degree of Doctor of Philosophy (PhD) is the submission and successful defense of a dissertation. The dissertation is a compilation of a student's research on an original and significant question in the field.

The dissertation submitted for the PhD degree must be based on original research that makes a significant contribution to our understanding of molecular and cellular biology relevant to human disease. The design, execution and presentation of the dissertation research must demonstrate that the candidate can perform independent research of a quality consistent with that published in refereed journals of the relevant disciplines. In most circumstances, it is expected that substantial portions of the thesis research will have been published or submitted for publication. The thesis and oral defense should provide clear evidence of the candidate's capacity to function as a professional scientist, including a broad knowledge of the research topic; ability to draft hypotheses and design effective tests of those hypotheses; ability to execute experiments accurately; ability to interpret results critically; and ability to communicate the research project effectively. Elements for the student evaluation can include, but are not limited to, a polished presentation that clearly communicates the science; a clear statement of well-grounded hypothesis and logical specific aims; the

potential clinical significance and beneficiaries of the proposed research; evidence of effective experimental design and proficient execution; appropriate data-gathering and analysis; logical and insightful derivation of experimental conclusions that address the hypothesis; adjustments in experimental design (if any) with clear rationale; insightful discussion of the work in the context of the field; and the future direction or application of this research.

Students are required to prepare a detailed written dissertation conforming to VAIGS requirements as outlined in the *Dissertation Preparation Manual*. Prior to preparing the dissertation, each graduate student must meet with their TAC to discuss future career plans and obtain permission to begin writing the thesis.

Dissertation Defense Committee (DDC)

When the student, Thesis Adviser, and TAC agree that the student is ready to prepare and defend the dissertation, a DDC will be formed to evaluate the graduate student's doctoral dissertation. The DDC will consist of all members of the TAC, including the Thesis Adviser (in a non-voting capacity); two additional VAIGS faculty members; and the external member of the TAC, all of whom have provided ongoing advice to the student throughout their thesis project. In addition, the DDC will include one additional external reviewer, suggested by the student and thesis adviser and approved by the Comprehensive Exam Organizing Committee and the Dean. The DDC will be chaired by a member of the Comprehensive Exam Organizing Committee.

The Thesis Adviser will attend the dissertation defense as a non-voting member and does not question the student during the dissertation defense. The Thesis Adviser may answer questions of the DDC for clarification. The Thesis Adviser has a vested interest in the success of the student in that the Thesis Adviser's research is logically intertwined with that of the student.

External review strengthens the quality of the doctoral degree and the graduate program as a whole. The additional external reviewer, who is not a member of the TAC, provides an independent assessment of the research. The additional external reviewer further validates the independent nature of the student's work. The student and thesis adviser will nominate independent investigators as external reviewers who have the appropriate expertise and who have no conflict of interest with the student's or Thesis Adviser's current research. Recommendations will be submitted to the Dean for selection of a single independent external reviewer as a fourth voting member of the DDC.

A member of the VAIGS Comprehensive Examination Organizing Committee (CEOC) will act as DDC chair and will ensure adherence to VAIGS standards and policies, monitor for potential conflicts of interest, and enhance consistency between different DDCs. The DDC chair will not vote on the outcome of the examination.

Conflict of interest is created when scientific or personal relationships between the student and/or advisers significantly skew the ability to have unbiased scientific objectivity during the evaluation process. DDC members should be evaluated for collaborations or interactions with the Thesis Adviser such that the

degree of collaboration does not introduce a conflict of interest which may provide an unfair or disfavored advantage for the student. The degree of conflict must be determined and approved by the Dean.

Dissertation Defense

The student will deliver a written dissertation to all members of the DDC **at least two weeks prior** to the defense date. The dissertation defense will consist of an oral presentation and an oral examination. The oral presentation is an open public seminar. The student will prepare and deliver a 40-45 minute presentation of the dissertation research and then field questions from the audience. The oral examination is closed and is conducted by the DDC following the presentation. The thesis adviser may participate in the questioning and discussion but should not answer on behalf of the student and does not vote on the outcome of the exam.

Defense Outcomes

Following the examination, the DDC will convene in private to discuss the student's dissertation, oral presentation, and performance in the oral examination. After deliberation, the DDC will make a recommendation to the Dean of whether or not to grant the PhD degree. A simple majority vote (at least three votes) from the four voting members of the DDC will be required to recommend to the Dean to grant the student a PhD degree.

The DDC may require additional revisions or amendments to the written dissertation. **Such requirements must be completed before the PhD degree is conferred.** The DDC chair will provide in writing (to the VAIGS Dean, the student, and the thesis adviser) a concise summary of the required changes as approved by the DDC. The DDC Chair and the Thesis Adviser together will monitor the accomplishment of these revisions and will certify to the Dean when the revisions have been accepted.

Following completion of document editing by the student and after final acceptance by DDC and the Format Reviewer, the successful candidate must provide to the Director of Enrollment and Records a copy of the completed and final version of the thesis in electronic form (as a single .pdf file).

Details for the preparation of the electronic documents are included in the guidelines for formatting theses and dissertations. The Graduate School will pay the binding costs for up to two printed color copies, one for VAIGS and one for the student. The student is responsible for costs of other bound copies for their own use or for their thesis adviser. Electronic dissertations and theses will be deposited at ProQuest for online curation.

Typical Program of Study for a PhD Degree

Students enrolled in the graduate program are expected to complete the requirements for the PhD degree within five years. In most cases students will complete all coursework by the end of Year Four. The typical academic plan for a VAIGS doctoral student is shown schematically in Appendix B. This program may vary for students in the MD-PhD program and for other special circumstances.

Graduation Requirements for an MS Degree

The VAIGS charter from the State of Michigan authorizes VAIGS to confer both doctoral and master's degrees. VAIGS recruits, admits, and enrolls students exclusively for the doctoral program. VAIGS does not recruit, admit or enroll students whose primary objective is a master's degree. Nonetheless master's degrees may be conferred upon students who, for various reasons and circumstances, elect not to complete the doctoral degree. This decision to pursue a master's degree must be approved in writing by the student's Thesis Adviser and by the Dean.

The requirements for the master's degree include all of the core course requirements defined for the PhD program, including successful completion of the comprehensive exam, except that the number of credits for Special Topics and seminar-style courses and thesis research are reduced. VAIGS requires a minimum of **60 credits**, and a minimum average grade point average (GPA) of **3.0, for a master's degree**.

A thesis providing evidence of the student's competence to perform research in the relevant discipline is required. The thesis research is conducted under the supervision of a faculty member serving as the Thesis Adviser, with additional guidance and encouragement from a Thesis Advisory Committee.

Course Requirements for an MS Degree

The following courses are required for the MS degree. A complete course list and course descriptions are found in other sections of this catalog.

Strategic Approaches to Biomedical Research (SABR)

Three two-credit courses are offered in the first semester, and two two-credit courses and a one-credit cumulative exam are offered in the second semester. 2 semesters, 11 credits

Historical Perspectives in Molecular Biology 1 semester, 2 credits

Experimental Design and Biostatistics 1 semester, 2 credits

Data Analysis and Bioinformatics 1 semester, 2 credits

Scientific Communication 1 & 2 2 semesters, 4 credits

Experimental Skills 1 & 2 2 semesters, 3 credits

Responsible and Effective Conduct of Research 1 semester, 2 credits

Technical Writing and Grantsmanship I 1 semester, 1 credit

Professional Development Courses

Elective courses, 1-2 credits per course, typically taken in years two through four. 2 credits minimum

Special Topics Courses

Two-credit courses on a focused topics in basic or clinical research, typically taken in years two through four. 2 credits minimum

Laboratory Rotations

Three rotations of four-weeks duration, completed during the first two semesters: two credits for each rotation. 6 credits

Precandidacy Research

Thesis research conducted after selecting a thesis adviser and prior to successful completion of the Comprehensive Exam

Typically, 3 semesters, 3-6 credits/semester. Minimum 8, maximum 18 credits.

Thesis Research

Minimum 9 credits (3-6 credits/semester)

Thesis Research

Students who receive a MS degree from VAIGS will conduct thesis research under the supervision of a VAIGS faculty member serving as Thesis Adviser. The roles of the Thesis Adviser and TAC are the same as those defined for the PhD student. Students will be expected to meet semi-annually with their TAC, for both Annual Summary and Progress Report meetings. The reports from these meetings will be submitted to the Director of Enrollment and Record to be included in the student's academic record.

Comprehensive Examination

The goal of the Comprehensive Exam is to evaluate the student's potential and ability to explicitly identify and define a specific testable hypothesis. Students who receive a MS degree from VAIGS must have passed the Comprehensive Examination based on the same criteria and standards as applied to PhD students. The scope and format of the Comprehensive Examination are described above and in documents cited there.

Thesis Preparation and Defense

Thesis Scope and Preparation

A key requirement for the master's degree is the submission and successful defense of a thesis in which is compiled the evidence of a student's competence to conduct research in cell and molecular genetics. The thesis submitted for the MS degree is smaller in scope than is a dissertation for the PhD degree and represents a body of work appropriate for at least one publishable paper. In most circumstances, it is expected that substantial portions of the thesis will be or will have been published or submitted for publication. The thesis and the oral defense should provide clear evidence of the candidate's capacity to function as a professional scientist, including broad knowledge of the research topic; ability to draft research questions, hypotheses and design effective tests of those hypotheses; ability to execute experiments accurately; ability to interpret results critically; and ability to communicate the research project effectively.

The master's thesis should conform to VAIGS requirements as outlined in the Thesis and Dissertation Preparation Manual. Prior to preparing the thesis, the student must meet with their TAC to confirm that the progress is sufficient to justify writing the thesis.

Thesis Defense Committee (TDC)

When the student, Thesis Adviser, and TAC agree that the student is ready to prepare and defend the thesis, a TDC will be formed to evaluate the graduate student's master's thesis.

The TDC will consist of all members of the TAC, including the Thesis Adviser (in a non-voting capacity); two additional VAIGS faculty members; and the external member of the TAC, all of whom have provided ongoing advice to the student throughout their thesis project. The Thesis Adviser will attend the thesis defense as a non-voting member and does not question the student during the examination. The Thesis Adviser may answer questions of the TDC for clarification. A member of the VAIGS Comprehensive Examination Organizing Committee (CEOC) will chair the TDC.

Thesis Defense

The student will deliver the written thesis to all members of the TDC **at least two weeks prior** to the scheduled defense date. The thesis defense will consist of a 40–45-minute oral presentation and an oral examination. The oral presentation may be open to public or not, at the discretion of the candidate and Thesis Adviser. The oral examination will be administered by the TDC and will be closed to the public. The closed examination will be chaired by the Dean's Representative. Based on the reading of the thesis, the oral presentation, and the oral examination, the TDC may require additional revisions or refinements to the written thesis. **Any such requirements must be completed prior to the conferral of the master's degree.** Upon completion of the defense, the TDC will make a recommendation to the Dean of whether to grant the master's degree. A simple majority (at least two votes from the three voting members of the TDC) in favor of a successful thesis defense will be required to recommend to the Dean to grant the candidate a master's degree.

The successful candidate must provide to the Director of Enrollment and Record a copy of the completed and final version of the thesis in electronic form (as a single .pdf file). Details for the preparation of the electronic and hard-copy documents are included in the guidelines for formatting theses and dissertations. The Graduate School will pay the binding costs for up to two printed color copies, one for VAIGS and one for the student. The student is responsible for costs of other bound copies for their own use or for their thesis adviser. Electronic dissertations and theses will be deposited at ProQuest for online curation.

Physician-Scientist Training Programs

VAIGS offers several innovative opportunities for training physician-scientists who will be well-positioned to combine clinical and research training in the pursuit of effective translational research.

MD-PhD dual degree program (with Michigan State University or with Western Michigan University)

This program combines medical training through the MSU College of Human Medicine or the WMU Homer Stryker MD School of Medicine with research training through VAIGS, culminating in both MD and PhD degrees. Admission to the dual degree program requires approval of both the respective medical school and VAIGS. During the first two years, the student will enroll in medical school courses. In the following four years, the student completes PhD training including all components of the VAIGS program on a somewhat condensed timeline. During this time, the student will engage in periodic clinical

experiences as directed by the medical school. After completing the doctoral dissertation, students undertake an additional two years in medical school for their clinical clerkships. During this time, students may participate in continued research activities as time and interest allow. More information is available at the [MSU College of Human Medicine](#) or at the [WMU Homer Stryker MD School of Medicine](#) websites.

Pediatric Hematology/Oncology Fellowship – PhD program (with Spectrum Health and Helen DeVos Children’s Hospital)

This program links subspecialty training in pediatric hematology and oncology with research training in cell and molecular genetics. The training program for each participant will include all components of the VAIGS doctoral program, including courses and dissertation research, although the timelines may be adjusted to meet clinical responsibilities of the clinical fellowship. Clinical training and research experience may be intertwined during portions of the training period. Details of the programs combining the VAIGS PhD with medical school or the clinical fellowship and residency training are articulated in memoranda of understanding with the partner organizations. These memoranda are available upon request.

Other Learning Opportunities and Experiences

Community Service

All students are encouraged to perform a minimum of four hours of community service per academic year during their time in the program. This can take the form of assisting in the VAI education program, summer intern or incoming graduate student peer mentoring, service at a local school, local hospital, or other medical-related facility, or working at an institutional-sponsored event. The student will provide documentation of community service by updating the Student Progress Report.

Oral Presentations

Training and experience in oral communication of scientific information and research results are important formative activities for VAIGS students. Once they have selected their thesis lab, first year students will present a selected journal article from current scientific literature in a Journal Club session of the Graduate Student Seminar Series. Beginning in the second year, students will also report on the progress of their dissertation research in the Research in Progress sessions of the Graduate Student Seminar Series. Students will be given training on presentation skills prior to their presentations and will be evaluated by VAIGS faculty and student peers. Research in Progress sessions are coached individually and allow feedback to be provided.

Poster Presentations

Beginning in the second year, all students are expected to present a poster at the annual VAI retreat if opportunities are provided.

Attendance at Scientific Meetings

Students are encouraged and expected to attend a national or international scientific meeting, conference, or workshop each year. First-year students normally attend a conference after the end of the second semester. Advanced students (third year and beyond) are expected to present their work at such a conference. VAIGS will provide financial support up to \$2,000 per student, per academic year (September through

August), to attend these events. Students are required to submit a short report to the Director of Enrollment and Records within one week of their return, describing the impact of the conference on their scholarly or professional development. (See policy: [VAIGS Student Travel Allowance](#)).

VAI Seminar Series

Each year, as a group, the graduate students will have the opportunity to invite and host at least one outside seminar speaker of their choice through the VAI Seminar Series. Students are also frequently invited to attend luncheons with many of the outside seminar speakers hosted by VAI. Students are strongly encouraged to take advantage of these opportunities to interact with these distinguished visitors.

Career Preparation and Planning

The Director of Student Support Services leads graduate school efforts in individual support and career planning/CV for graduate students. This includes resumé/CV review, interview prep, career exploration, and career assessments. Additionally, in collaboration with the VAIGS Director of Assessment and Professional Development, the VAIGS Graduate School Association (GSA) and the Van Andel Institute for Research VAI Office of Postdoctoral Affairs and the Postdoctoral Association to provide workshops and seminars on career preparation and planning for successful scientists. Additional workshops, information and activities will be coordinated by the Director of Student Support Services. A career day will be led each year by the Director of Student Support Services and a committee of graduate students.

Membership in Scientific Societies and Organizations

All students are encouraged to join a scientific society of their choice. Students may pay for these memberships from their own funds or (at the discretion of their Thesis Adviser) from their thesis laboratory's research funds.

Teaching Opportunities

Opportunities may be available for teaching classes or courses outside of VAI. Interested students should discuss these opportunities with their Academic or Thesis Adviser. VAIGS has no formal requirement to participate in outside teaching opportunities. However, VAIGS and/or the graduate student's Thesis Adviser reserves the right to institute such a requirement. A decision as to whether a student will utilize these opportunities will be decided on a case-by-case basis, by mutual agreement of the student and Thesis Adviser with final approval by the Dean. The External Activities policy describes the ground rules for such experiences and the process for obtaining approval.

COURSE LIST AND DESCRIPTIONS

VAI 8010-8051 Strategic Approaches to Biomedical Research (SABR), Fall and Winter semesters, 11 credits

In a progressive series of four-week modules, students develop research plans to address current hypotheses, questions or problems relevant to human disease. In the course of developing these plans, students learn foundational concepts in biochemistry, cell biology, molecular biology, genetics, bioinformatics, and pathobiology. This "problem-based learning" approach best simulates how professional scientists attack new research problems. Students emerge with a strong foundation in core concepts in the relevant disciplines, an understanding of experimental design principles, and experience in crafting

research plans. Across the Fall and Winter semesters of the first year, students undertake a total of five two-credit SABR modules and a one-credit, cumulative final examination. The first module is graded on pass/fail; all other modules and exams are graded on a 4.0 scale.

VAI 8210 Historical Perspectives in Molecular Biology

Fall semester, 2 credits

This course examines the historical context of current molecular and cell biology research. Students study classic papers in biomedical research and discuss how the work represented in those papers changed the models or paradigms that prevailed at the time the research was done. Topics include foundations of modern biology, mechanisms of genetic change, analysis of biological macromolecules, gene splicing and rearrangement, disease mechanisms, tumor suppressor genes, and organisms used as important experimental models. This course is graded on a 4.0 scale.

VAI 8230 Responsible and Effective Conduct of Research

Winter semester, 2 credit

This course addresses effective laboratory management practices including protection of human and animal subjects, scientific integrity, conflicts of interest, collaboration, authorship, peer review, data management, mentoring, communication, societal impacts, human resource management, grants and contracts, and fiscal responsibility. The course provides training and direction on how to recognize, address and prevent ethical dilemmas that arise during the course of conducting scientific research. This course is graded on a 4.0 scale.

VAI 9309 Technical Writing & Grantsmanship I

Fall semester, 1 credit

This course is intended to help students become more effective writers in scientific disciplines. The entire research process depends upon the communication of concepts, results and plans. For that reason, scientists must be skilled in communicating through presentation and in writing. The course addresses the characteristics of clarity, organization, and style in technical writing and especially in scientific proposals. A major theme of the course is the process of writing, involving composition, editing, and revising with feedback. Students participate in multiple exercises with opportunities for review and iterative development of a draft proposal. This course is graded on a 4.0 scale.

VAI 8240 Experimental Design and Biostatistics

Fall Semester, 2 credits

An increasing emphasis on rigor and reproducibility has highlighted the fundamental roles of experimental design and statistics in modern biological research. This course focuses on basic principles of experimental design and fundamental statistical concepts for modern data-intensive biological research. The material draws upon methods and applications from concurrent subject-specific modules. Topics include probability, random variables, sampling, estimation, hypothesis testing, linear regression, diagnostics for fit, model selection, and ANOVA. Students will develop skills in R with RStudio.

VAI 8245 Data Analysis and Bioinformatics
Winter Semester, 2 credits

Many research projects in modern molecular and cell biology require the analysis of very large datasets such as those generated in genomics, epigenetics, metabolomics, proteomics, and structural biology. Almost all aspects of modern biology incorporate large-scale data analysis to some extent. The efficient and accurate analysis and interpretation of these datasets are fundamentally important activities in biomedical research. This course delves into the algorithms and tools used in the application of bioinformatics to high-dimension datasets. Students will expand upon the R skills developed in the Biostatistics course and apply the skills to genomic, epigenomic, transcriptomic, and proteomic datasets, as well as downstream and integrative analysis.

VAI 8260 - 8261 Scientific Communication 1 and 2
Fall and Winter Semesters, 2 credits each

This course is intended to help students become more effective communicators in their scientific work. The scientific research process relies heavily on effective communication of concepts, plans, results, and conclusions. For that reason, scientists must be skilled in spoken and written communication. The course will provide foundational principles and iterative practice in communication as listeners, speakers, readers, and writers, in multiple formats and with various audiences. The formats for listening and speaking will include formal scientific presentations, chalk talks, lab meetings, talks for lay audiences, and posters. The written formats will include grant proposals, scientific papers, review articles, and lay summaries. Course content and activities will align with concurrent courses and with laboratory rotation experiences.

VAI 8250 - 8251 Experimental Skills 1 and 2
Fall Semester, 2 credits; Winter Semester, 1 credit

This course will provide a focused introduction to well-established and cutting-edge technologies, instrumentation, and methods important for addressing the scientific problems explored in Strategic Approaches to Biomedical Research (SABR), with an emphasis on technologies available in the Van Andel Institute Core Technologies and Services. The goal is for students to develop the knowledge and critical thinking skills needed to effectively incorporate these well-established and cutting-edge technologies, instrumentation, and methods into their own research.

VAI 9301-9313 Professional Development Courses
1-2 credits per course

These courses build student skills in communication, laboratory management, and organization. Courses complement the External and Internal Seminar Reporting. Recent offerings include Grantsmanship, Lab Leadership, and Origins of Cancer Scientific Conference Organization. These courses are graded on a 4.0 scale.

VAI 9001- 9024 Special Topics Courses
1-2 credits per course

These courses provide advanced study on focused topics in basic or translational research, and are typically taken in the second, third, and fourth years. Each course engages students in the study and discussion of the current scientific literature and

concepts of the topic selected. Specific content varies with each semester. Special topics courses in various fields are offered on a rotating basis. Additional courses may also be offered depending on student and faculty interest. These courses are graded on a 4.0 scale.

VAI 8501A-8504A Laboratory Rotations
minimum 3 rotations, 6 credits

Laboratory rotations in the first year provide early research experiences that are important in the development of students. These laboratory rotations assist students in their choice of a thesis adviser, laboratory, and dissertation project. Students will complete three rotations. A fourth rotation may be needed before an appropriate thesis adviser and dissertation laboratory can be selected.

During the orientation for incoming students, faculty will present their research interests to the new matriculates. Students are encouraged to visit the laboratories and become acquainted with faculty, lab managers, research technicians, and other researchers in order to choose. Students shall send their rotation preferences to the Dean, who will confirm that this intention is consistent with the faculty member's plans before confirming the placement.

The activities of the rotation should be planned to give the student a rich and deep understanding of the questions being addressed, the approaches and experimental methods employed, the mentoring and leadership style of the laboratory head, and the relationships with other members of the laboratory team.

Following each rotation, students will submit a Student Evaluation of Rotation Experience form to the Director of Enrollment and Records. The rotation mentor (faculty member) will also evaluate the student's performance in the rotation, which will be discussed with the student before being submitted to the Director of Enrollment and Records. Lab rotations are graded on a 4.0 scale.

VAI 9101-9130 Independent Study:
credits vary depending on effort

Students may petition the Curriculum Committee for approval of VAIGS academic credit for a course or workshop taken at another institution (whether in-person or online), or for learning experiences at VAIGS / VAI that are not incorporated into existing courses. Dependent upon content, Independent Study courses may fulfill requirements for Special Topics or Professional Development courses. A plan for oversight of the student's activity and performance by a VAIGS faculty member will be included in the proposal. See [Independent Study Policy](#). A recommendation by the Curriculum Committee will be forwarded to the Dean for final approval.

VAI 9800-9806 Precandidacy Research:
credits vary depending on effort

Students who have selected a thesis adviser but have not yet passed their comprehensive exams will acquire academic credit for their thesis or dissertation research. Students enroll in this course for three to six credits per semester, depending on the number of other credits taken in the given semester. Calculations are conducted by the Director of Enrollment and Records.

**VAI 9900-9905 Doctoral Candidacy Research:
credits vary depending on effort**

Students who have passed their comprehensive exams will acquire academic credit for their thesis or dissertation research. Students enroll in this course for three to six credits per semester, depending on the number of other credits taken in the given semester. Calculations are conducted by the Director of Enrollment and Records.

ACADEMIC CALENDAR

The following calendar pertains to the 2021-2022 academic year. Calendars for previous and future years can be found on the VAIGS SharePoint site.

August 16 – 27: Orientation, group-building, meet with potential rotation mentors
 23: Convocation
 27: Classes begin

Fall Semester: August 27 – December 17, 2021 (16 weeks)

Strategic Approaches to Biomedical Research Modules (SABR)

SABR Module 1	August 27 – September 24
Laboratory Rotation 1	September 27 – October 22
SABR Module 2	October 25 – November 19
SABR Module 3	November 22 – December 17
Experimental Design and Biostatistics	August 30 – December 13
Scientific Communication	August 30 – December 16
Historical Perspectives in Molecular Biology	August 31 – December 14
Experimental Skills (with Cores)	September 1 – December 15

[Winter Break: Dec. 18 – Jan. 9] (three weeks)

Winter Semester: January 10 – May 6, 2022 (17 weeks, including exams)

Laboratory Rotation 2	January 10 – February 4
SABR Module 4	February 7 – March 4
Laboratory Rotation 3	March 7 – April 1
SABR Module 5	April 4 – April 29
Data Analysis and Bioinformatics	January 10 – April 25
Scientific Communication	January 10 – April 28
Responsible & Effective Conduct of Research	January 11 – April 26
Experimental Skills (with Cores)	January 12 – April 27
Exams	May 4 – 6

[Spring Break: May 7 – May 15] (one week)

Summer Semester: May 16 – August 19, 2022 (14 weeks)

Thesis Lab Integration Week: May 16 – 20, 2022

Van Andel Institute for Research Scientific Retreat: June 8 – 11, 2022

[Summer Break: August 20 – August 28] (one week)

ACADEMIC POLICIES

This section provides summaries of key academic policies for VAIGS students. In most cases, complete policy statements and the forms relevant to those policies are available at the VAIGS SharePoint site. Students are also responsible for adhering to all relevant VAI policies, which are available at the VAI SharePoint site.

Admissions

The graduate program is intended for students seeking a PhD in Molecular and Cellular Biology that prepares them for leadership positions in all areas of scientific research. VAIGS is interested in matriculating persons with excellent academic preparation and performance, competence in skills important to scientific work (e.g., writing and critical thinking), and good moral and ethical character. The program is open to all applicants irrespective of race, gender, ethnic or national origin, religion, or age. International students (non-U.S. citizens or permanent residents) are welcome and encouraged to apply. International students are admitted to VAIGS under the F-1 (student) visa program administered through VAI. In rare circumstances, international students may be admitted through the J-1 (exchange visitor) visa program instead.

Applicants must have earned a Bachelor of Arts or Science (BA or BS) degree or equivalent from an accredited college or university prior to enrolling at VAIGS. The usual preparation is in the natural sciences with a range of courses in chemistry, biochemistry, biology, physics, and mathematics. The Admissions Committee seeks to identify those students with the most promise for superior achievement in our program, using a comprehensive review of all credentials. Consideration is given for each applicant's overall qualifications, as demonstrated by academic record, writing sample, research experience, and letters of recommendation.

VAIGS has not established minimum cut-off values for most of the required application materials but the following criteria will be considered. Advanced training in cell biology, molecular biology, genetics, and statistics is strongly recommended. A grade point average of 3.0 or better, during the last two full years of undergraduate study in courses pertinent to the pursuit of a career in science, is also recommended. For applicants seeking admissions to VAIGS as part of a dual degree (MD-PhD) program, MCAT scores are required. Official TOEFL scores are required for students who completed their studies in countries where English is not the official language. Only scores that are less than two years old will be considered. IELTS scores are accepted in place of TOEFL scores. The minimum required scores are as follows: TOEFL PBT: 580, TOEFL iBT: 90, IELTS: 6.5.

In order to ensure full consideration, the application and supporting documents for admission should be received by December 1 prior to the year the student plans to matriculate. The application packet should include:

- A completed online application
- Electronic transcripts of academic record received directly from the home institution. Unofficial transcripts are accepted for application, but the official transcripts must be sent before matriculation
- International transcripts must be accompanied by WES course by course evaluation with USA GPA equivalent. The cost of the WES evaluation is the responsibility of the applicant
- Official MCAT scores for MD/PhD applicants, TOEFL and / or IELTS scores for international applicants

- Three letters of reference. It is recommended that at least two come from faculty members who know the applicant and the applicant's academic work and, if applicable, who supervised independent study or research
- A cover letter or a personal statement of purpose indicating area of interest, long-term goals, research experience and the applicant's interest in the VAI Graduate School
- A personal resume or curriculum vitae
- A sample of scientific or academic writing (e.g., research report)

Domestic applicants with the strongest credentials will be interviewed in person, typically during a visit to VAI. International applicants may be interviewed via videoconferencing.

Those application packets completed by the December 1 deadline will receive the most thorough and timely consideration. Typically, interviews are scheduled for late January and February. Decisions are generally conveyed to applicants in March. Those receiving offers of admission are given until April 15 to respond, either accepting or declining the admissions offer.

Credit Hour Allocation and Requirements Policy

VAIGS offers courses on a semester basis, and the credits earned from VAIGS courses are deemed to be semester credits. Each VAIGS course will be allocated a specific number of credits based upon the number of instructional contact hours and study hours required each week per semester. These credit allocations are made by the VAIGS Curriculum Committee upon review of the syllabus and calendar for any proposed course.

For classroom-based courses, including core instructional courses, special topics courses, professional development courses, and graduate seminar courses, one credit hour is allocated for an expected activity of at least forty-five (45) hours of instructional and study time. Typically, one credit hour will be allocated for fifteen (15) instructor-student contact hours per semester along with a minimum expectation of two preparation or study hours for each contact hour. The balance of direct instructional hours and study or preparation time may vary as befits a given course.

For research-based courses, including first year laboratory rotations, pre-candidacy research, and doctoral candidate thesis research, one credit hour is allocated for a minimum of ninety (90) hours devoted to research activities, research-related meetings (with lab members or thesis adviser), and in preparation or study for these research activities and meetings. (See [Credit Hour Allocation and Requirements Policy](#))

Full-Time Student Status

VAIGS students are expected to devote their full professional effort toward the pursuit of the PhD. First year students are considered full-time students if they enroll for at least 12 credits in each of the Fall and Winter semesters. Continuing students who are enrolled for at least six credits during each semester are considered full-time students. (See [Enrollment policy](#)).

Some individual academic plans may require blending VAIGS academic activities with other professional development activities (e.g., medical residencies or fellowships). These will be established on a case-by-case basis with the approval of the Dean.

Enrollment

Students are automatically enrolled in non-elective courses by the Director of Enrollment and Records. Non-elective courses for first year students include the SABR modules, , Biostatistics and Experimental Design, Historical Perspectives in Biomedical Research, Scientific Communication 1 and 2, Experimental Skills 1 and 2, Bioinformatics and Data Analysis, Responsible and Effective Conduct of Research, First Year Exam, and Research Rotations I, II and III. Non-elective courses for subsequent years include Thesis Research (whether as pre-candidate or candidate). Students interested in registering for an elective course submit a course request electronically through the VAIGS student portal. Each student is required to consult with their academic or thesis adviser prior to submitting the student's course request through the VAIGS student portal.

Academic Advising

The aim of VAIGS is that students obtain their doctoral degrees within five years. To facilitate the five-year goal, student progress is monitored frequently throughout the program. Progress on fulfillment of requirements will be tracked by using the Student Annual Progress Checklist and the student's online degree audit. The Dean serves as the Academic Adviser for all first-year students to orient the student to the program and to monitor their progress through the core curriculum and laboratory rotations. Once a Thesis Adviser and TAC have been appointed, the Thesis Adviser serves as the primary academic adviser.

Assessment

Student work is evaluated for progress toward fulfilling the goals of the graduate program and to assist the student in measuring progress toward fulfilling the graduation requirements. The faculty expect the students to make satisfactory progress and will assist them toward that goal. Satisfactory progress includes passing all courses and completing the graduation requirements on a schedule that aims toward completion of all requirements for the degree within five years. Each student will be provided a degree audit to track their progress through the program. Student progress will also be monitored annually by the Student Performance Review Committee of the faculty.

Students are expected to complete their degrees in five years and every effort will be made to assist them in meeting appropriate milestones. Failure to make sufficient progress in the program is grounds for dismissal. Extension beyond five years will be allowed if the Dean determines there are extenuating circumstances (comparable to those defined for employees under the Family Medical Leave Act). Rarely will there be an extension beyond six years.

Students whose native language is not English must show fluency in oral and written English by satisfactory performance in courses, seminars and scientific writing. Failure to achieve fluency by the end of the second year may result in dismissal.

Students will be evaluated in the following ways:

Courses

The instructors assess student performance in courses, provide written evaluation of the work, and evaluate students on a 4.0 grade scale (for most courses) or a Pass/Fail decision (for certain specified courses). A grade of 3.0 or better is considered a passing grade. A grade of 2.5 or below will be considered a failing grade. Only grades of 2.5 in

required courses are considered for potential remediation. The accumulation of two failing grades in the graduate program provides grounds for dismissal.

Rotations

Following each laboratory rotation, students will summarize their findings and suggest further directions for the rotation project by writing a short (1-2 page) report using the Student Evaluation of Rotation Experience form. Rotation mentors will complete the Faculty Evaluation of Student Performance (Rotation) which will be discussed with the student before being submitted.

Core Competencies

VAIGS has defined a set of Core Competencies to describe the outcomes expected for successful PhD graduates of this program. The competencies are grouped in four major areas: **knowledge, research, translation, and ethical and professional conduct**. A rubric describing stages of development for each of the competencies is a useful guide for students to understand those expectations and for monitoring progress in achieving those expectations. The Core Competencies rubric (available through the SharePoint site) should be used at least once a year by the student and thesis adviser, for formative evaluation of the student's progress and for making plans to address any areas with deficiencies. The [Core Competencies rubric](#) (available through the SharePoint site) should be used at least once a year by the student and thesis adviser, for formative evaluation of the student's progress and for making plans to address any areas with deficiencies. Anonymous (de-identified) results of the Core Competencies evaluations are also used each year by the VAIGS staff to monitor general program outcomes. Students and faculty are expected to support this essential program review activity.

Comprehensive Exam

The Comprehensive Exam shall be completed about one year after joining a thesis laboratory, i.e., typically in May or June of the second year. The format and potential outcomes for the Comprehensive Exam are defined in a prior section of this catalog and in the *Guidelines for Comprehensive Exam*.

Research and TAC Reports

Students must meet with their TACs at least once every six months. The student shall provide to the TAC members either a brief research Progress Report or a more comprehensive Annual Summary. Members of the TAC Committee will add their comments and recommendations on the Student Progress Report Form, and each member will sign the form indicating their approval. The signed form will then be turned in to the Director of Enrollment and Record for the student's records.

Student Performance Review Committee

A standing committee of faculty members will conduct an annual review of the progress of each student. The composition and mandate of this committee is defined in the Faculty Bylaws. This committee will consider course grades, thesis committee reports, oral presentations by the student, and other relevant information. The committee will make recommendations to the Dean regarding continued participation of each student including, where appropriate, recommendations for remediation of any deficiencies. A copy of this report will be provided to the student, their Thesis Adviser and the Director of Student Support Services.

Thesis or Dissertation Defense

Students are required to make a public presentation of their research results and thesis as well as successfully defend the thesis or dissertation before the Thesis or Dissertation Defense Committee. The process for the thesis or dissertation preparation and defense is detailed in prior sections of this catalog.

Transfer of Academic Credit

Transfer of academic credit to another educational institution will be initiated by a request from the participating student and will be executed by the VAIGS Director of Enrollment and Records based on articulation agreements established with the external institution. VAIGS offers no guarantee that external institutions will grant academic credit for courses taken under this policy. VAIGS students may take graduate courses offered at other institutions for up to four credit hours toward the VAIGS PhD. VAIGS does not award credit for experiential learning prior to or concurrent with enrollment in VAIGS. (see Transfer Credits for VAIGS Courses)

Remediation

VAIGS students are expected to obtain a 3.0 grade or better (on a 4.0 scale) in each class. Circumstances arise, however, where student performance in isolated areas within a required course does not meet standards for a passing grade (3.0). In these rare cases, remediation may be recommended by the Course Director. Remediation is the prerogative of the course director and may not be an option for all courses. Remediation of research credits (rotations, pre-candidacy, candidacy thesis research) will be evaluated on a case-by-case basis by the Dean in consultation with the Thesis Adviser.

Remediation is restricted to focused areas of insufficient learning or substandard attainment of a small number of learning objectives. Only a grade of 2.5 may be considered for remediation. Opportunity to remediate will be made available by the Course Director when the initial grades are submitted to the Director of Enrollment and Records. The Remediation Plan will define the nature of the deficiency, the scope of remediation expected, the timing of completion, and signatures indicating understanding and agreement by the student and Course Director. With the outcome of successful remediation (from 2.5 to 3.0) the faculty will submit a grade change form to the Director of Enrollment and Records. (See VAIGS Course Remediation Policy)

Probation and Dismissal

Making errors is part of the learning process. Errors should generate feedback and lead to corrective actions. The nature of the feedback and corrective actions shall be determined by proportional response to the nature of error, the student's training needs, and the context of these issues. Therefore, processes for probation and dismissal operate on a case-by-case basis as established in the VAIGS Policy for Probation and Dismissal.

When students are not making adequate progress toward completion of courses or graduation requirements, as determined by their Academic or Thesis Adviser, the Student Performance Review Committee, and the Dean, they may be placed on academic probation. Grounds for probation include:

- Accumulation of two failing grades in course work, laboratory rotations, or research
- Failure to move through the program at an appropriate rate (e.g., failure to meet milestones throughout the degree program)
- Failure to meet with TAC in timely manner (approximately every six months)

- Unprofessional behavior (e.g., plagiarism, insubordination, violation of workplace policies)
- Poor performance on the Comprehensive Examination

Students and their Thesis Adviser will be given written notification of probation and written guidelines for removal of the probationary status. Should a student desire to withdraw from the program or take a leave of absence, such action is arranged in consultation with the Academic or Thesis Adviser and Dean. At the time of approval of the withdrawal or leave of absence, the student will be advised regarding the criteria for reinstatement.

Grounds for dismissal include:

- Three (or more) failing grades
- Failure to meet the terms of Student Probation Contract
- Failure to pass the Comprehensive Exam
- Failure to adhere to institutional standards in scientific integrity and research conduct, as defined in the VAI Research Misconduct Policy
- Violation of VAI/VAIGS policies regarding appropriate behavior in the workplace

Code of Conduct

Scientific work requires honesty and integrity, and the scientific community has strict standards for the conduct of research. Students are governed by the VAI policy on Reporting and Investigating Allegations of Research Misconduct, which encompasses research and coursework. Students are also bound by the [VAIGS Code of Conduct](#), which prescribes the standards of conduct expected of student enrolled at VAIGS, outlines actions that can be taken when conduct does not conform to the prescribed standards and establishes due process procedures for the imposition of those actions. Academic dishonesty in coursework or in fulfillment of other requirements will result in failure on that specific requirement and may be grounds for dismissal from the graduate program.

Tuition

Tuition for a full academic year (three semesters, including summer) is \$25,000. For individual courses, tuition will be assessed at a rate of \$835 per credit hour. Tuition will be waived for students supported by VAIGS fellowships, whether funded by VAIGS or thesis adviser.

Enrollment of non-VAIGS students in VAIGS courses is permitted under certain conditions defined in the VAIGS Tuition Policy. Such enrollment typically requires full participation in course activities (course auditing is not permitted) and payment of tuition. VAI employees may recoup the tuition costs through the VAI Tuition Reimbursement Program.

Course Auditing

Course Directors design instructional activities according to the number and ability of registered students. Classroom engagement and preparedness are critical for learning in all settings at VAIGS. In keeping with the VAIGS mission to maximize learning of students in all content areas, auditing is not permitted. All courses will be attended by registered students and instructors only. (See [VAIGS Course Auditing Policy](#))

Grievance

Student grievances regarding coursework, grading, academic progress, and VAIGS policies or practices should be directed to the Academic or Thesis Adviser, if they cannot be

resolved directly with the parties involved. If the grievance is still not resolved, the student should consult the Ombudsman (in most circumstances, the Vice President of Human Resources), who will advise the student and serve as a liaison with the faculty and administration. Unresolved issues or appeals should be presented to the Dean, in writing.

Grievances regarding research should first be directed to the Thesis Adviser. Should further resolution be necessary, the student can appeal to the TAC and the Dean in writing.

Students who experience or observe sexual harassment, racial or ethnic discrimination, or scientific misconduct should raise their grievance using VAI employment policies and procedures.

Grievances outside of the above parameters should be submitted through the Grievance Process (See [Student Complaint process](#)).

Outside Employment

Students enrolled in VAIGS are presumed to be devoting their full professional efforts toward the pursuit of their PhD. However, the policy on external activities outlines parameters under which students may participate in outside work (See [VAIGS Policy on External Work](#)). These activities typically must be approved by the thesis adviser and the Dean.

Religious Observance

In accord with the VAI holiday policy, VAIGS holds that basic rights regarding religious preference should be extended to students. Therefore, every reasonable effort will be made to grant students time off to attend worship services or to celebrate holidays consistent with their faith. All requests for time off for observance of religious holidays or worship services should be submitted to the Thesis Adviser or the Dean at least 48 hours in advance. (See [VAIGS Religious Observance Policy](#))

Student Verification for Online Assignments

The Higher Education Opportunity Act of 2008 and the rules issued by the US Department of Education include regulations regarding the verification of the identity of students in distance-education programs. The Higher Learning Commission, which is the accrediting body for VAIGS, requires its member institutions to demonstrate that their policies and practices support these regulations. In all academic work conducted online, VAIGS students are expected to represent their own work honestly; they must not perform academic work under another student's name and must not ask another student do work under their name. The Student Verification for Online Assignments Policy describes VAIGS practices for meeting these regulations. (See [Student Verification for Online Assignments Policy](#))

Equal Opportunity (EEO) and Non-discrimination

Van Andel Institute and/or its affiliated organizations, hereafter collectively called "the Institute", through its responsible managers, recruits, hires, upgrades, trains, and promotes in all job titles without regard to race, color, religion, sex, national origins, age, height, weight, marital status, disability, pregnancy or veteran status except when an accommodation is unavailable, or it is a bona fide occupational qualification. The Institute's policy also covers the non-employee relationships with students, including admissions and enrollment, instruction and grading, student services, and financial support. (See [Equal Employment Opportunity Policy](#))

LEGAL STATUS

Authority

VAIGS is incorporated in the State of Michigan and is authorized to award the master of science (MS) and doctor of philosophy (PhD) degrees in the field of molecular and cell biology.

Accreditation

Accreditation for VAIGS is governed by the rules and procedures of the Higher Learning Commission. Further information about the HLC and the accreditation status of VAIGS can be found at www.hlcommission.org. The most recent reaffirmation of accreditation of VAIGS was completed in May 2018.

Governance

The corporate name of the school is Van Andel Institute Graduate School (VAIGS). A Board of Directors appointed by the Van Andel Education Institute Board of Trustees governs the school. The Board of Directors includes persons with distinguished careers in biomedical research, higher education, and clinical training. The VAIGS Board of Directors normally meets twice each year, in the spring and fall. The President and Dean of VAIGS administers the school with advice from faculty committees.

VAIGS Board of Directors (as of August 2021)

James Fahner, MD, Chief of Hematology/Oncology at DeVos Children's Hospital
 Mary O'Riordan, PhD, Professor of Microbiology & Immunology, Associate Dean of Graduate & Postdoctoral Studies, University of Michigan Medical School
 Peter Jones, PhD, DSc (hon), Chief Scientific Officer, Van Andel Research Institute
 Karen Klomparens, PhD, Senior Advisor to the Provost, Michigan State University (retired)
 Candace Smith-King, MD, Vice President of Academic Affairs for Spectrum Health System, Pediatrician at Spectrum Health Helen DeVos Children's Hospital, Assistant Professor at Michigan State University College of Human Medicine
 Dan Welch, PhD, Professor, Department of Cancer Biology, University of Kansas Medical Center and Associate Director for Education, University of Kansas Cancer Center
 Juan Olivarez, PhD, President Emeritus of Aquinas College and Past President of Grand Rapids Community College (Board Chair)

Administration

Dr. Steven J. Triezenberg is the President and Dean of VAIGS. VAIGS is strongly and broadly supported by Van Andel Institute, including its Research arm and its Education arm. The administration of these entities includes the following:

VAI

- David Van Andel, Chief Executive Officer
- Jana Hall, PhD, Chief Operations Officer
- Timothy Myers, Vice President and Chief Financial Officer
- Jerry Callahan, PhD, Chief Strategic Officer, Business Development
- Linda Zarzecki, Vice President of Human Resources

VAN ANDEL INSTITUTE FOR EDUCATION

- Terra Tarango, Director and Education Officer
- Temple Rosenberger, Associate Director Sales Marketing and Operations

VAN ANDEL INSTITUTE FOR RESEARCH

- Peter Jones, PhD, Chief Scientific Officer
- Patrik Brundin, MD, PhD, Deputy Chief Scientific Director
- Darren Moore, Chair of the Department of Neurodegenerative Sciences
- Andrew Pospisilik, PhD, Chair of the Department of Epigenetics
- Bart Williams, PhD, Chair of the Department of Cell Biology
- Russell Jones, PhD, Chair of the Department of Metabolism and Nutritional Programming
- Huilin Li, PhD, Chair of the Department of Structural Biology
- Scott Jewell, PhD, Director, Program for Technologies and Cores

FACULTY AND STAFF LISTING

The faculty of VAIGS are persons appointed as VAI faculty and laboratory heads. Appointment to VAI as a faculty member typically requires a PhD, MD, or equivalent academic degree, plus a distinguished record of scholarship and contributions to the scientific community. Faculty appointment to VAIGS for persons who are not VAI faculty is made by nomination to the Graduate Program Committee and requires a vote of the full VAIGS faculty.

Adjunct faculty members of VAIGS supplement the permanent faculty. Adjunct faculty members participate in VAIGS as cooperating instructors for VAIGS courses, as members of VAIGS Thesis Advisory or Defense Committees, or as facilitators of professional development programs. Typically, adjunct faculty members are practicing professionals or faculty members from local colleges/universities.

Current VAIGS Faculty

- Stephen Baylin, Professor, Department of Epigenetics. MD (1968), Duke University, Durham, N.C.
- José Brás, Associate Professor, Department of Neurodegenerative Science. PhD (2010), University of Coimbra, Portugal
- Lena Brundin, Associate Professor, Department of Neurodegenerative Science. PhD (2001) and MD (2002), Lund University, Sweden
- Patrik Brundin, Deputy Chief Scientific Officer; Professor and Director of Parkinson's Disease Center; Jay Van Andel Endowed Chair in Parkinson Research. MD (1992) and PhD (1988), Lund University, Sweden
- Hong-yuan Chu, Assistant Professor, Department of Neurodegenerative Science. PhD (2010), Graduate School of Chinese Academy Sciences
- Gerry Coetzee, Professor, Department of Neurodegenerative Science. PhD (1977) University of Stellenbosch, South Africa
- Juan Du, Associate Professor, Department of Structural Biology. PhD (2011), University of Freiburg, Germany
- Stephanie Grainger, Assistant Professor, Department of Cell Biology. PhD, University of Ottawa, Ontario, Canada (2012)

Carrie Graveel, Research Assistant Professor, Department of Cell Biology. PhD (2002), University of Wisconsin-Madison

Rita Guerreiro, Associate Professor, Department of Neurodegenerative Science. PhD (2010), University of Coimbra, Portugal

Brian Haab, Professor and Assistant Dean, Department of Cell Biology. PhD (1998), University of California, Berkeley

Michael Henderson, PhD, Assistant Professor, Department of Neurodegenerative Science. PhD (2014) Yale University, New Haven, CT

Galen Hostetter, Associate Director, Pathology and Biorepository Core. MD (1993), University of Pennsylvania

Scott Jewell, Director, Program for Technologies and Cores; Professor, Department of Cell Biology. PhD (1993), Ohio State University

Peter Jones, Chief Scientific Officer; Professor, Department of Epigenetics; Director, Cancer Center. PhD (1973), University of London

Rusty Jones, Professor and Chair of the Department of Metabolism and Nutritional Programming, Professor. PhD, University of Toronto (2003)

Stefan Jovinge, Professor, Department of Epigenetics; Medical Director of Research, Frederik Meijer Heart and Vascular Institute. MD (1991) and PhD (1997), Karolinska Institute, Sweden

Connie Krawczyk, Associate Professor, Department of Metabolic and Nutritional Programming. PhD (2002), University of Toronto

Peter Laird, Professor, Department of Epigenetics. PhD (1988), University of Amsterdam, Netherlands

Heidi Lempradl, Assistant Professor, Department of Metabolic and Nutritional Programming. PhD (2006), University of Vienna, Austria

Huilin Li, Professor and Chair of the Department of Structural Biology. PhD (1994), University of Science and Technology, Beijing, China

Wei Lü, Associate Professor, Department of Structural Biology. PhD (2010), University of Freiburg, Germany

Karsten Melcher, Associate Professor, Department of Structural Biology. PhD (1990), Eberhardt-Karls University, Germany

Darren Moore, Professor and Chair of the Department of Neurodegenerative Sciences. PhD (2001), University of Cambridge

Sara Nowinski, Assistant Professor, Department of Metabolism and Nutritional Programming. PhD (2014), University of Texas at Austin

Gerd Pfeifer, Professor, Department of Epigenetics. PhD (1984), Goethe University, Frankfurt, Germany

J. Andrew Pospisilik, Professor and Chair of the Department of Epigenetics. PhD (2003) University of British Columbia, Vancouver

Scott Rothbart, Associate Professor, Department of Epigenetics. PhD (2010), Virginia Commonwealth University

Hui Shen, Associate Professor, Department of Epigenetics. PhD (2013), University of Southern California

Xiaobing Shi, Professor, Department of enter for Epigenetics, PhD (2001), Chinese Academy of Sciences

Matt Steensma, Associate Professor, Department of Cell Biology. MD (2002), Wayne State University School of Medicine

Piroska Szabó, Associate Professor, Department of Epigenetics. PhD (1992), Jozsef Attila University, Szeged, Hungary

Tim Triche, Assistant Professor, Department of Epigenetics, PhD (2013), University of Southern California
 Steven Triezenberg, President and Dean, VAIGS; Professor, Department of Epigenetics. PhD (1984), University of Michigan
 Hong Wen, Associate Professor, Department of Epigenetics, PhD (2001), Shanghai Institute of Biochemistry and Cell Biology
 Bart Williams, Professor and Chair of the Department of Cell Biology. PhD (1996), Massachusetts Institute of Technology
 Mary Winn, Instructor; Manager, Program Evaluation and Coordination, PhD (2011), University of California, San Diego
 Ning Wu, Assistant Professor, Department of Cell Biology, Signaling and Metabolism Program. PhD (2002), University of Toronto
 Tao Yang, Associate Professor, Department of Cell Biology. PhD (2001), Institute of Biochemistry and Cell Biology, Chinese Academy of Sciences

Faculty Committees

VAIGS faculty members are involved in the governance of VAIGS through appointed committees as defined in the Faculty Bylaws and described briefly as follows. Committee members typically will be appointed by the Dean to three-year terms, staggered to ensure continuity of experience. Student members of these committees are appointed to a single one-year term.

Admissions Committee

Composed of five faculty members and one graduate student member, this committee oversees the student recruitment process, reviews all applications, and makes recommendations to the Dean.

Comprehensive Examination Organizing Committee

Composed of up to five faculty members, this committee supervises the preparation and administration of the comprehensive examinations and thesis and dissertation defenses.

Curriculum Committee

This committee oversees the design, implementation and evaluation of the degree requirements, coursework, and grading policies of VAIGS. The committee assesses whether the course offerings provide adequate instruction in the core disciplines for VAIGS. The committee approves special topics courses (graduate seminar courses). The committee comprises four faculty members and one postdoctoral associate or graduate student member. In addition, the Assistant or Associate Dean sits on the committee as an *ex officio* member.

Graduate Program Committee

This committee recommends policy on graduation requirements, curriculum, admissions, and faculty. This committee also monitors the program and advises the Dean on administrative matters. This committee comprises four faculty members, in addition to the Dean who chairs the Graduate Program Committee as an *ex officio* member.

Student Performance Review Committee

This committee annually assesses the progress of each student with respect to the requirements for completing the intended degree. This committee comprises up to five

faculty members, in addition to the Dean who chairs the committee as an *ex officio* member.

Undergraduate and Internship Programs Committee

This committee of four faculty members and one graduate student is responsible for design, implementation, and evaluation of VAIGS programs and related policies whose primary constituents are students enrolled in other educational institutions. These students include those enrolled in high schools, undergraduate colleges or universities, and medical or other professional schools. This may also include students enrolled in masters or doctoral degree programs at other institutions for whom the relationship with VAIGS or VAI is time-limited. The programs within the purview of this committee include internships, guest student relationships, and regional undergraduate research conferences.

Faculty Bylaws

The Faculty Bylaws of VAIGS describe and define the organization of the Graduate School faculty and the procedures by which faculty fulfill their functions with respect to the Graduate School. The administrative structure of the Graduate School is further defined by the Articles of Incorporation (restated in 2017) and the Bylaws of the Van Andel Institute Graduate School (as amended in 2010). These faculty bylaws shall be in compliance with policies and bylaws of the Van Andel Institute (VAI). If, in any substantive manner, the VAIGS bylaws conflict with VAI bylaws and policies, the latter shall take precedence.

VAIGS Staff

- Steven J. Triezenberg, PhD, President and Dean, VAIGS
- Brian Haab, PhD, Professor, Assistant Dean, VAIGS
- Christy Mayo, MAOM, MEd. Director of Enrollment and Records
- Alli Roman, MSW, Director of Student Support Services
- Director of Assessment and Professional Development (vacant)
- Susanne Miller-Schachinger, Executive Assistant to the President and Dean
- Kathy Bentley, Senior Administrative Assistant II
- Michelle Love, Senior Administrative Assistant I

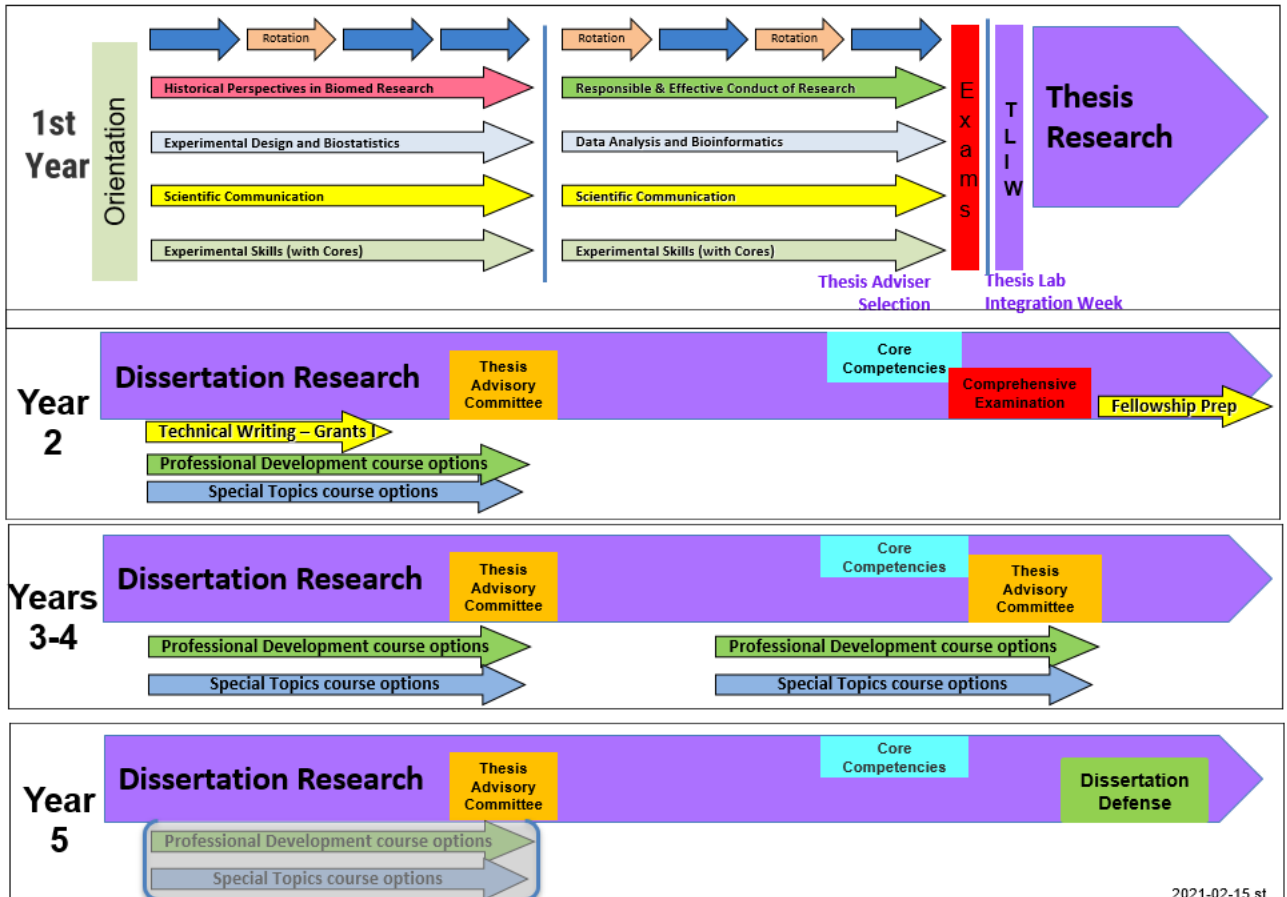
AMENDING AND REVISING THIS CATALOG

Any faculty member or graduate student may submit proposals to amend or revise the VAIGS Catalog. Amendments to be considered must be written and circulated to the faculty and graduate students not less than 14 days prior to the faculty meeting at which they are to be voted upon. Amendments must be passed by a majority of the "voting faculty". The VAIGS Catalog should be reviewed and re-approved at periodic intervals no greater than five years.

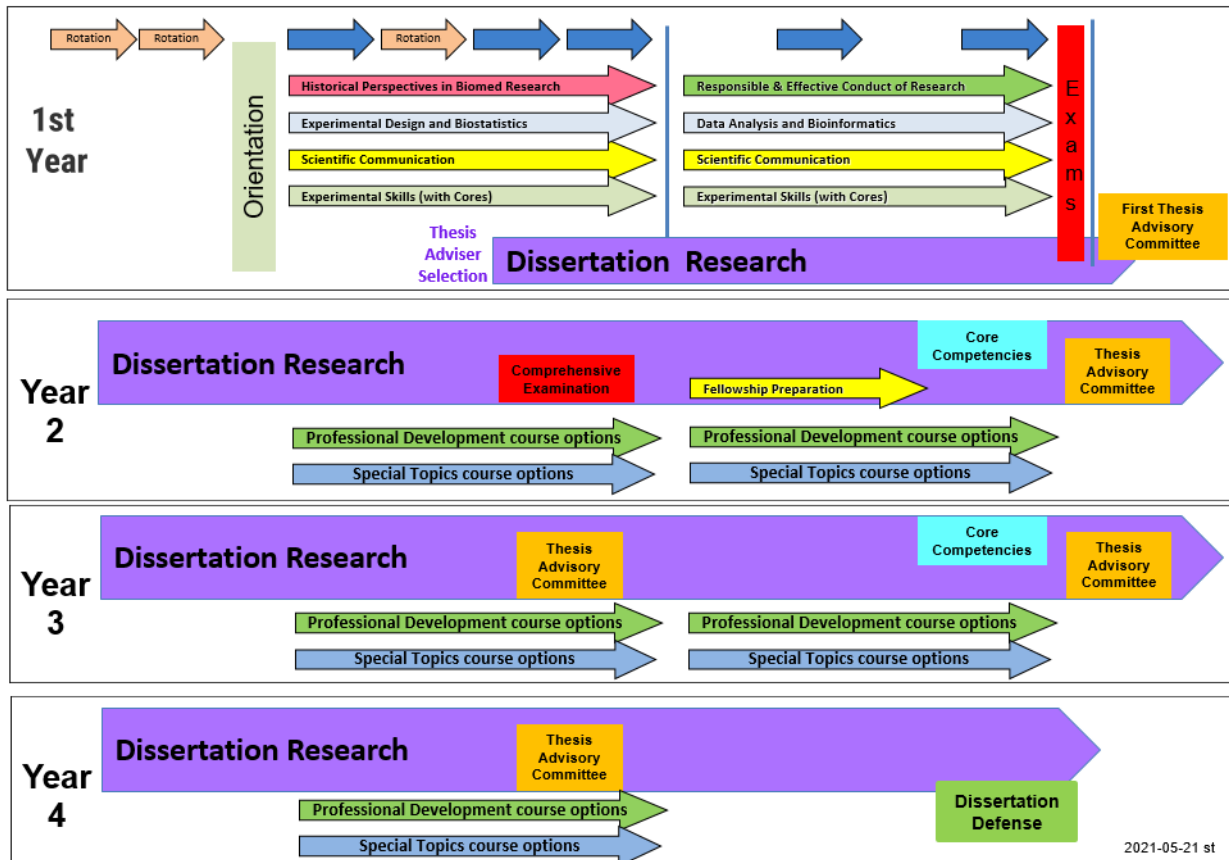
This document was originally approved by vote of the faculty on Feb. 23, 2007, and has been revised on the following dates: December 14, 2007, June 23, 2009, September 16, 2011, September 14, 2012, August 1, 2013, August 1, 2014, June 25, 2015, June 2016, July 31, 2017, July 31, 2018, August 28, 2019, July 23, 2020, August 10, 2021.

APPENDIX A: Typical program of study

VAIGS Curriculum Overview



VAIGS Academic Plan – MD-PhD





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