June 23, 2021

To: John Karl Scholz, Provost and Vice Chancellor for Academic Affairs

From: Kathryn A. VandenBosch, Dean and Director, College of Agricultural and Life Sciences

Re: Final Summary of 10-Year Program Review for:
   • Genetics & Genomics BS
   • Genetics MS
   • Genetics PhD
   • Genetics PhD Minor
   • Certificate for Cytotechnology

The program review for the programs in the Department of Genetics was completed by a review committee chaired by Bill Tracy, Professor, Department of Agronomy with members: Katrina Forest, Chair, Department of Bacteriology; Erik Dent, Chair, Department of Neuroscience; Beth Meyerand, Vice Provost for Faculty and Staff and GFEC representative. The review committee was charged with assessing the strengths and weaknesses of the program and making recommendations for future directions. The CALS Academic Planning Council discussed the review on February 16 and March 16, 2021, and approved the review committee report as complete on March 16, 2021. Based on my review of the report and the APC response, I am providing the following executive summary of the program review.

Overview
This review examined the five academic programs administratively housed in the Department of Genetics and revealed the department is fulfilling its mission of teaching and learning at a high level.

Since the last ten-year review, the department has made several improvements within their programs. The Genetics and Genomics undergraduate program, which changed its name during the review period to add “Genomics,” has grown enrollment from about 300 to over 380 students in the last 5 years to become the third largest major in the college. The program has improved undergraduate instruction in core genetics courses and has an average overall time-to-degree of 3.72 years. The Genetics PhD program has attained a five-fold increase in the number of applicants from under-represented groups. Of the T32 eligible domestic students, 35-40% were under-represented students in 2018 and 2019. The PhD program has also secured more TA funding, and has implemented required, annual committee meetings with each PhD student.
The Cytotechnology program, under the direction of a new faculty director, is working to increase enrollment to its allowable capacity and improve the percentage of students passing the board exam. This program is unusual in that it is a certificate program created by the Wisconsin State Laboratory of Hygiene in 1957 to prepare students for clinical work.

The Genetics MS is a non-admitting master’s program, and the Genetics doctoral minor has awarded no awards in at least the last five years.

**Recommendations**
These are opportunities for improvement for each program.

1. **Genetics & Genomics BS**

   A main area of opportunity for the Genetics and Genomics undergraduate major is to improve career advising for their students. This will include an increased focus on career advising among the department faculty and professional staff advisors, as well as collaboration with alumni, employers, and CALS Career Services.

   The program has made great strides improving the undergraduate curriculum by finalizing its assessment plan, completing course learning outcomes, implementing course evaluations, adjusting the core genetics courses, expanding organic chemistry options, and developing an introductory-level genetics course for first or second-year students. The program is encouraged to continue fine tuning its curriculum to meet the needs of students.

2. **Genetics MS**

   The Genetics MS is a non-admitting master's program. There are no recommendations at this time.

3. **Genetics PhD**

   The program should evaluate the experiences for students in TA positions, the training provided and how assignments are made to ensure a more standardized experience for all students. It was also suggested evaluation of the timing of TA opportunities with respect to the level of students during their course of study is warranted.

   The program climate is of utmost importance to ensure a healthy learning setting for students. The department is encouraged to continue its focus on climate to improve support for underrepresented students and to ensure its program environment is free from hostile and intimidating behavior.

   During the review process, concerns were raised about the stipend level and competition from other top institutions. While it is outside the scope of the
academic review, it is expected that stipend level will be an area of ongoing
discussion with programs in similar fields and the college as a whole.

4. Genetics Doctoral Minor

The program has awarded zero doctoral minors over the last seven years. The
department should discontinue the Genetics Doctoral Minor or work to define the
role of the Genetics Doctoral Minor for a given student audience. The department
can work with CALS Academic Affairs to work through the governance process
necessary to discontinue this program effective June 2022.

5. Certificate for Cytotechnology

The Cytotechnology program currently has a maximum capacity of 12 students. The
program must work harder to meet that capacity annually and possibly investigate
if that capacity can be raised. The program must also continue its dedicated work to
improve the percentage of students that pass the board exam. Last, the program’s
accrediting bodies, the Council on Allied Health and Education and the American
Medical Association, are expected to require new professional standards that will
require a master’s degree to work in the field. The program must work with the
Department of Genetics, CALS Academic Affairs, Academic Planning and
Institutional research, and the Division of Continuing Studies to determine the
future of the program to ensure the program can meet educational goals and fiscal
obligations.

I want to thank the Genetics department, the many researchers that make up the UW-
Madison Genetics Training Program, and the review committee who made this review
possible. This process provides a valuable opportunity to reflect, plan intentionally for the
future, and ultimately provide students with an outstanding UW-Madison learning
experience.

CC: Francisco Pelegri, Chair, Department of Genetics
Audrey Gasch, Director, UW-Madison Genetics Training Program
Kaitlin Sundling, Faculty Director, Cytotechnology, Department of Genetics
William Tracy, Chair, Program Review Committee
Beth Meyerand, GFEC Representative, Program Review Committee
Jocelyn Milner, Director, Academic Planning and Institutional Research
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James Keck, Associate Dean, SMPH
Andrea Poehling, Policy and Planning Analyst, SMPH
Karen Wassarman, Associate Dean, CALS
Sarah Barber, Assistant Dean, CALS
April 8, 2019 UPDATED

TO: John Doebly
   Chair, Laboratory of Genetics

FROM: Karen M Wassarman
      Associate Dean of Academic Affairs

RE: 10-Year Review of Academic Programs in Genetics

As you know, the Board of Regents requires that all academic programs be reviewed at least every ten years. We would therefore like to initiate a comprehensive review of the following programs:

- Genetics and Genomics, BS (formerly Genetics, BS)
- Genetics, MS, PhD and Doctoral Minor (jointly administered with School of Medicine and Public Health)
- Cytotechnology, Certificate

We request that the department conduct a self-study in preparation for a comprehensive review by preparing a single self-study document for the programs listed above. Given the joint nature of several of the programs, the self-study should be jointly developed with faculty in the School of Medicine and Public Health. For the Cytotechnology Certificate program, the 2018 accreditation report may serve as the self-study documentation. Once the self-study is completed, we will convene a cross-college review committee (which will include a member from SMPH) to review these materials, talk with you, your colleagues and students, and prepare a report to the CALS and University Academic Planning Councils and the Graduate Faculty Executive Committee. These governance bodies will discuss all of the documents and make recommendations about the programs. Completion of the full review process is due to the Board of Regents by Spring 2021. In order to meet this deadline, we ask that you please submit your self-study to academicaffairs@cals.wisc.edu by June 1, 2019.

Purpose of the Review

As you prepare for the review, please consult the UW-Madison Program Review Guidelines and Resources, posted at http://apir.wisc.edu/programreview.htm, and excerpted here:

*Purpose of Ten-Year Reviews:*

a. *Focus on the recent past and key points over the past decade as context for present and future improvements.*
b. Concentrate on the academic program and student experience.
c. Review program learning goals and assessment of learning.
d. Understand the current student experience with regard to academics, advising, climate, and career development.
e. Identify program strengths and recommendations for improvements.

The overall well-being of the administrative home is also important for the success of academic programs, particularly how the functioning of the administrative home relates to educational programs and student outcomes. As such, CALS practice has been to use the program review as an opportunity to summarize the departmental trajectory and priorities. This approach provides a context to align program planning with that of the department overall. We encourage you to use the consultative nature of the review process to identify and resolve administrative or structural matters that affect your programs. Your self-study will draw upon all of this information to reflect more generally on the quality and future of the programs.

**Content of the Self-Study**

In preparing your self-study, please refer to the following resources that outline the campus required components to be included in the self-study:

- Self-Study Guidelines: [https://kb.wisc.edu/vesta/page.php?id=63649](https://kb.wisc.edu/vesta/page.php?id=63649)
- Self-Study Template: [https://kb.wisc.edu/vesta/page.php?id=63649](https://kb.wisc.edu/vesta/page.php?id=63649)

In addition, the CALS Dean’s Office also requests a concise overview of other aspects of the department, including the faculty, facilities, and research and Extension/outreach missions. Please include a brief discussion and assessment of these aspects in a separate section of the self-study, emphasizing not only how they affect and intersect with the academic programs under consideration, but also how they impact the overall strength of the department. Of particular interest in this section are how the department’s overall strengths and priorities align with the academic programs under review, and how any long-term trends affecting the department or the discipline impact the academic programs.

In addition, the Dean’s office asks that you please address the following topics in your self-study:

- The graduate programs are jointly administered with the School of Medicine and Public Health and administratively housed in the Department of Genetics within CALS. Please comment on this joint structure, including consideration of governance, administrative support, student experience, and the overall quality of the structure.
- What is the status of the training grant and implications for the PhD program, if any?
- Please comment on the relationship of your academic program to the other programs under review, including any useful synergies that may exist. We have intentionally structured the program review process to cluster reviews of similar programs at the same time in order to evaluate the relationship between like subjects. The following programs are also undergoing review:
  - Microbiology, BS, MS, PhD, Doctoral Minor
  - Bacteriology, MS
  - Biochemistry, BS, MS, PhD, Doctoral Minor
**Resources for Program Review**

It may be helpful for the self-study to include data relevant to the program, such as program requirements, number of students declared, number of students completing the program, etc. The UW-Madison Office of Academic Planning and Institutional Research offers a wealth of data and metrics that can help with program evaluation. We strongly encourage you to consult these resources, consider them in light of similar programs, and reflect on whether or not the data reveal any issues that require attention. (For example, see [https://apir.wisc.edu/students/degrees/](https://apir.wisc.edu/students/degrees/); and Resources that Support Program Review: [https://kb.wisc.edu/vesta/page.php?id=56637.](https://kb.wisc.edu/vesta/page.php?id=56637.)

Thank you for your prompt attention to this important activity. We look forward to working with you in this process. If you have questions, please contact Nikki Bollig or myself.

cc:  
Nikki Bollig, CALS  
Audrey Gasch, SMPH  
Robert N. Golden, SMPH  
James Keck, SMPH  
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Kathryn VandenBosch, CALS  
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GENETICS & GENOMICS Undergraduate Major

A. Response to previous program review recommendations

The last program review for the Laboratory of Genetics (LOG) was done in 2010. There were several recommendations overall that were directed at maintaining the laboratory's area of excellence at UW-Madison. The recommendations for the undergraduate program are summarized as follows:

*Increase allocations for teaching assistantships to support the teaching of major service courses like Genetics 466.* The LOG has worked with the College of Agricultural and Life Sciences on central funding for teaching assistants (TA) and has expanded TA opportunities in more Genetics and Genomics undergraduate courses, including NEW major courses Gen 133, 467 and 468, in addition to Gen 566. TA opportunities exist and have also expanded in Gen 466. We have developed an innovative opportunity for TA’s to teach our hands-on laboratory course Gen 545 and plan to implement this opportunity in the near future. We understand opportunities for instruction, mentorship, and understanding pedagogy are vital to graduate students considering careers with instructional and curricular responsibilities. In the LOG we are committed to supporting these efforts, as they not only benefit the graduate students but also our faculty associates and professors of these courses.

*Increase advanced coursework options around areas in quantitative and evolutionary genetics.* The Genetics department and our partners in other departments on campus have added multiple new courses with quantitative and evolutionary content in recent years. These include: Evolution Seminar (Gen 522), The Genomics Revolution (Gen 548), Population Genetics (Gen 633), Molecular Ecology (Gen 624) and Genetic Mapping (Gen 615).

*Revise the capstone experience courses.* The capstone experience is designed to be a course in which students are required to integrate diverse bodies of knowledge to solve a problem or formulate a policy of societal importance with the intent of facilitating the transition to post-baccalaureate life. Courses in the department were evaluated to determine if they met these criteria. The courses Gen 564 and Gen 566 were redesigned to meet these goals, and Gen 567 Research companion was also found to meet
these requirements. This past year we proposed and added Gen 527 to the list of capstone courses available to students. This was partly to offer additional capstone experiences in the fall and provide more seats for the growing number of students in the major.

**Encourage and promote undergraduate research opportunities for genetics major lab/research requirement and incentivize faculty to become mentors.** The Genetics Department has taken two concrete steps in the past five years to meet this challenge. First, we now offer funding to support undergraduate research in faculty laboratories annually. About six awards are made each year on a competitive basis. Second, we have established an “Excellence in Undergraduate Education” gift account to raise money for undergraduate research, and we have made fundraising for undergraduates one of our top funding priorities. Genetics faculty also continue to mentor a large number of undergraduates in their laboratories every year.

B. Overview of the Program

The undergraduate major in Genetics and Genomics, name newly changed in 2018, is designed to have a diverse curriculum that exposes students to a variety of courses covering the general concepts of genetics and genomics, along with specialized classes that delve more deeply into specific systems (such as Human, Plant, Population, and Quantitative Genetics) or biological processes (such as Developmental Genetics, Neurogenetics, Cancer Genetics, etc.). Students also have exposure to bioinformatics, statistics, and other methods of quantitative trait analysis.

The Genetics and Genetics program is a singular major where students will take a variety of lecture, laboratory, discussion, and seminar-based courses. They also have the opportunity to do undergraduate research for credit or the CALS honors program. There are no additional concentrations or tracks as of right now. The major is available to students in the College of Agricultural and Life Sciences, as a Bachelor of Science degree. The degree and major requirements are available on the Guide, at [http://guide.wisc.edu/undergraduate/agricultural-life-sciences/genetics/genetics-genomics-bs/](http://guide.wisc.edu/undergraduate/agricultural-life-sciences/genetics/genetics-genomics-bs/).

Students are allowed to adhere to CALS policy and apply for a double major and dual degree with the Genetics and Genomics major. All advisors work with students on this process to determine fit, feasibility, required coursework, adherence to policy, and time to degree considerations. In an effort to promote quality of coursework and not just quantity, this process is taken very seriously by all advisors to uphold the integrity of the degree.

There is one formal collaboration within the Laboratory of Genetics, which is the partnership with the certificate program in Cytotechnology. This certificate is accredited by the Council on Allied Health and Education and accredited by the American Medical Association. In this application-based certificate, students will have specific training over three terms focusing on the various applications of cytotechnology. Genetics is the subject listing for these courses, and the students in the program come from a variety of biological and physical science backgrounds. This partnership benefits the department and the college by providing hands-on application and training for the workforce, and adequate preparation for students to take their certification examination and enter the job market.

The formal mission statement of the College of Agricultural and Life Sciences is “to advance and share knowledge, discover solutions and promote opportunities in food and agriculture, bioenergy, health, the environment and human well-being”. Additionally, they have a vision “to lead in science, innovation and collaboration that improves life and sustains the natural world.” With a strategic framework and guiding

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principles, they follow through with that mission and vision. The Genetics and Genomics undergraduate major aligns with this mission as it educates and trains students through a collaborative effort.

To stay innovative, the major has undergone changes to its core curriculum and introductory courses and revised the name to include genomics. We have also started new conversations about future updates to the major including revising the organic chemistry requirement, adding in scientific writing or ethics options, and more formally incorporating the cytotechnology certificate curriculum.

The major learning outcomes are as follows:

- Demonstrate an understanding of genetic principles at the level of molecules, cells, systems, organisms, populations and ecosystems.
- Use quantitative approaches to evaluate experimental design, critically interpret, and analyze data sets from primary research papers.
- Integrate genetic data and apply the scientific method to formulate research questions.
- Communicate genetic concepts to multiple audiences with written, oral and visual presentations.
- Understand mechanisms of segregation and expression of genetic material during development and homeostasis.
- Apply primary genetic approaches used to study biological processes, including the use of model organisms.
- Describe how environmental influences may modify the inheritance and expression of the genetic material.
- Apply the use of quantitative methods to implement genetic analysis, including the linkage of gene variants with traits.
- Appreciate how the fields of genomics, proteomics and other data-driven approaches facilitate research and clinical assessment.
- Understand the contribution of genetics analysis to elucidating population history and evolution.
- Address the connection between genetics and trends in clinical practice, such as personalized medicine, cloning and regenerative biology.
- Understand evolutionary processes, with current variation in human traits as its natural outcome.
- Appreciate the contributions of genetic methods to sustainability, including food production, bio-energy generation and the preservation of ecosystems and biodiversity.

Our current learning outcomes will undergo revision and updates in the 2019 year. We have been charged by the Provost’s Office in collaboration with CALS Academic Affairs to re-imagine not only our learning outcomes, but our course syllabi and course requisites. This will be a months-long project that will be instructor driven and supported by the student services coordinator and Department Chair.

The Laboratory of Genetics and its program are governed in a democratic way, following the Faculty Policies and Procedures of UW-Madison. The Department Chair is evaluated annually by the faculty and either reappointed or a new Chair appointed following an annual faculty preference ballot and the decision of the Dean. For our undergraduate and graduate degree programs, there are two key committees. The “Undergraduate curriculum committee” is appointed annually by the Chair of Genetics and this committee oversees all issues related to undergraduate education. We also have a formal, written undergraduate degree program policy that governs the administration and decision process for
our undergraduate degree. The “Graduate training program committee” is appointed annually by the
Director of Graduate Studies (DGS) and oversees all issues related to graduate education in Genetics.

We also have a formal, written graduate degree program policy that governs the administration and
decision process for our graduate degree. The DGS is elected by the faculty of the Genetics Department.
Faculty membership in the Genetics Department is determined by a vote of the faculty. Typically,
membership begins when new faculty are hired, however we also have a process to allow UW faculty to
transfer their appointments from other departments to Genetics. All members of the Genetics
Department are expected to participate in our undergraduate degree program. Membership in the
Genetics Graduate Training Program (GGTP) is open to all geneticists at UW, even those whose
appointments are in departments other than Genetics. Membership in the GGTP is determined by a
vote of the Genetics faculty.

C. Program Assessment and Evaluation

The Genetics Department developed an assessment plan for the Genetics and Genomics undergraduate
major in 2017 (see Appendix A). Unfortunately, a key faculty (Kate O’Conner-Giles) and staff (Martha
Reck) departed the department in 2017 and 2018, and the plan was never completely implemented and
no reports were ever filed. After a recent discussion with Karen Wassarman, the Associate Dean for
Academic Affairs in the College of Agriculture and Life Sciences, we have decided to revisit and revise
the assessment plan. The revised plan will assess student as they enter our degree program and re-
asses them at the end of their capstone course. The Chair of Genetics has now appointed a special ad
hoc committee that will revise the assessment plan during summer 2019.

Over the last five years, we have made a focused effort to improve the quality of classroom instruction
in Genetics. We have implemented on-line course and instructor evaluations for classes. The
evaluations are administered by the Genetics office staff, replacing the prior system in which each
faculty member administered their own evaluations. One question on the evaluations is: “Overall, how
would you grade this instructor? A, AB, B, ... from which we calculate the Instructors Grade or GPA.

In Gen 466, teaching teams were changed to improve quality. As a result, instructor GPA has risen from
about 2.5 (BC) to nearly 3.5 (AB). This improvement is highly statistically significant (P=0.0007).

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<thead>
<tr>
<th>Term</th>
<th>GPA</th>
<th>Team</th>
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<tbody>
<tr>
<td>Spring 2015</td>
<td>2.71</td>
<td>Old Team</td>
</tr>
<tr>
<td>Fall 2015</td>
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<td>Old Team</td>
</tr>
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<td>Old Team</td>
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<td>Fall 2016</td>
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<tr>
<td>Spring 2018</td>
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<td>New Team</td>
</tr>
<tr>
<td>Fall 2018</td>
<td>3.44</td>
<td>New Team</td>
</tr>
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In addition to changes in teaching teams for Gen 466, we have changed teaching assignments for some smaller enrollment courses with the same goal of improving instructional quality. As a result, there is improvement when we look at instructor GPA overall for Genetics Courses. The improvements are statistically significant (P=0.02).

D. Recruiting, Admissions, and Enrollment

The undergraduate major in Genetics and Genomics has been participating regularly in college-wide recruitment efforts including Your UW days, Admitted Student Days, and Majors Fairs. At these events, each CALS major sends a representative, and Genetics has been utilizing the student services coordinator or a faculty associate to represent our academic program and engage with students. These events provide opportunity to highlight our curriculum, opportunities, and resources for students.

The Genetics and Genomics major is not currently limited-enrollment, competitive enrollment, nor requires a supplemental application for admission. We welcome all students and thus our participation in recruitment events helps us yield and retain students by being visible and accessible.

Regularly, the student services coordinator and faculty associates meet with prospective students in one on one meetings. Our resources are adequate for staffing events and meeting current student demand. As our major grows, we see a need for additional advising and instructional resources.

An area in which we aim to improve is recruitment of underrepresented student populations. Our student population should be diverse and inclusive of all backgrounds. Since we do not control admissions, we will make strides where we can on college-wide and greater campus recruitment initiatives, as well as supporting and retaining our current underrepresented student populations. One resource we have to do this is the STEM Diversity Network, a new initiative led by Genetics Faculty Dr. Ahna Skop. This online resource www.stemdiversity.wisc.edu is an excellent compilation of news, resources, and information for all audiences from undergraduate, graduate, postdoctoral, to faculty and staff. This new and excellent resource can be used for our students from all diverse backgrounds to ensure continued success while they are undergraduate students at UW-Madison.
Additionally, there have been specific and strategic efforts in the last ten years to enhance student diversity in regards to recruitment and retention accomplished through the diversity committee, also led by Dr. Ahna Skop. The committee is made up of 6 faculty and two graduate students and takes on a variety of initiatives and activities. Yearly, some of their activities include large recruitment meetings to the national conferences SACNAS and ABRCMS, where undergraduates and graduate students attend. At those events, UW faculty and students work booths, recruit students, and in the past have hosted dinners and other events. Dr. Skop is also a faculty mentor to UW’s SACANAS chapter.

On a smaller scale, Genetics has expanded the representation of underrepresented groups in the colloquium seminar series that happens all year long. In recent years, all of our faculty and staff have participated in breaking the bias training, or unconscious bias training. These powerful workshops offer learning opportunities to reflect and understand better how we are teaching and advising our students.

These efforts, in collaboration with college and campus wide programs like the CALS Equity and Diversity Committee continue the important conversations and work around diversity and inclusion. The climate of our program and department is important to measure and assess. We are proud of our efforts and will continue to prioritize this work to make sure underrepresented students feel welcome and included on our campus, and that they want to persist in our major to graduation.

Overall, our major has seen small enrollment hikes when we look back on our 10- and 20-year statistical data. Overall, our declared majors have increased over 20% in the last 10 years. With this growth in enrollment, the program has allocated resources to continue providing exemplary courses and instruction to students on a variety of topics. In the fall of 2016, the major unveiled two new courses for declared students, Gen 467 and Gen 468. This new requirement for students provided deeper content and concepts across the basics of genetics curriculum. The department also hired an additional faculty associate in the Fall of 2018 to provide instruction for undergraduate courses across elementary, intermediate, and advanced levels. If continued growth is a trend, the major will need to seek resources in advising and instruction to ensure access to major courses and adequate advising loads.

Our overall growth shows students are seeking diverse bio-science majors and academic programs at UW-Madison. Genetics and Genomics provides that option with rigor and opportunity across many aspects of genetics topics. Especially popular is the convergence of genetics with human health, medicine, and disease. Many of our students have intentions for health-related careers in patient care, public health, or research. We are also one of only 39 Genetics majors in the nation, a distinctive major that is not available at many other colleges and universities.
E. Advising and Student Support

The Genetics and Genomics major has one student services coordinator who advises in addition to three faculty associates who also advise. Hiring of advising staff has occurred due to staff vacancies. In times of staff transitions, students have been communicated of the change via email or in-person communications and encouraged to work with other advisors or Genetics Staff on an interim basis. There has been an effort for smooth transitions and less disruption when staff vacancies have occurred.

Students are assigned to advisors if they attend Student Orientation Advising and Registration (SOAR) with CALS based on an alphabetical-split designation. This allows even distribution to advisors. After SOAR, students are assigned to the advisor they first seek advising with. This ratio averages one advisor per every 90 declared students. We express to students that advising is a critical part of their academic success at UW-Madison and encourage once a semester check-in’s or at minimum, yearly appointments.

The student services coordinator supports both the undergraduate and graduate Genetics programs thus has a wide range of responsibilities. These duties vary from curriculum and timetable management, implementing changes in policies and curriculum, project-based work, student communications, undergraduate and graduate recruitment efforts, data management, event planning, student organization support, committee participation, and work with a T-32 grant. The work for this role has a greater variety due to supporting both undergraduate and graduate student’s needs, in addition to supporting the overall department on various projects and initiatives related to our student populations.

The faculty associates primary responsibility is instruction. They are all in charge of various lecture, seminar, or lab-based courses which require lengthy course preparation, delivery, and follow-up. They host office hours, grade projects and exams, and mentor and manage a course Teaching Assistant (TA). They also do miscellaneous projects or initiatives for the department on an ad-hoc basis. It is of note that our faculty associates are on contract for 9-month appointments, but often teach a summer course from department or campus funds that support summer term instruction. We have seen a need and demand for Genetics courses provided in the summer and this year have piloted two online versions of our already existing courses, Gen 133 and 466.
We have an excellent website for information on undergraduate education, in addition to accurate and updated information on the UW’s Guide pages. At events, in advising appointments, or other face-to-face interactions, we have several print materials and curriculum sheets that are popular with students for degree planning or learning about opportunities. The student services coordinator helps maintain updates and information in all these areas.

Undergraduate advisors have the opportunity to attend many of the Office of Undergraduate Advising advisor events, aimed at professional development. This includes workshops, the Advising Conference, or committee-work. Participation is encouraged and not limited. It is also encouraged to use Advisor Gateway and the ANS system to accurately track and monitor all advising conversations.

Performance reviews for the academic staff who advise varies by supervisor. The faculty associates and student services coordinator do not share a common supervisor but do all adhere to the same human resources policies and procedures on yearly performance reviews. Those are holistic and not solely focused on academic advising performance and output. To our student population, we do not currently assess our academic advising formally. In the future a survey, or more formalized process could take place to assess our student’s likeliness to see their advisor, our impact on student time to degree, and the overall impression of our advising services as a department. The survey could be built upon the Core Competencies in Academic Advising as defined by NACADA, the international academic advising professional association. Their framework for academic advising core competencies is as follows:

Underpinning the core competencies for academic advising and serving as the foundational elements for effective advisor training programs and advising practice are three content components – the conceptual, informational, and relational. An understanding of these content areas provides advisors the knowledge and skills to be effective guides for their students.

- The Conceptual component provides the context for the delivery of academic advising. It covers the ideas and theories that advisors must understand to effectively advise their students.
- The Informational component provides the substance of academic advising. It covers the knowledge advisors must gain to be able to guide the students at their institution.
- The Relational component provides the skills that enable academic advisors to convey the concepts and information from the other two components to their advisees.

To achieve excellence in their work, regardless of the specifics of their individual campus’ advising mission, all academic advisors must understand all three components and be able to synthesize and apply them as needed in academic advising interactions (NACADA).

F. Program Community and Climate

The Laboratory of Genetics aims to foster a positive, welcoming, and inclusive climate starting with recruitment efforts and admissions events, through summer orientation, and beyond. Each year we welcome new students at the College of Agricultural and Life Sciences Orientation event, alongside offering our first-year seminar, and individual advising sessions. Students have a variety of ways to interact with the department, advisors, and instructors in courses.

Throughout the first months of the semester, the student services coordinator also welcomes new students, explains advising expectations, and advertises any relevant events or workshops. Regular
email communications help share information that is key to the success of every student. One-on-one meetings are encouraged to discuss personal or academic matters.

Students from underrepresented backgrounds or communities are supported through a variety of campus-wide support programs and organizations. These focus on first-generation, racial and ethnic minorities, as well students who identify as religious minorities on campus. Some of these programs include, but are not limited to, CeO, PEOPLE, CAE, First Wave, Posse, and Hillel. Spaces on campus are built to house and provide sanctuary for students like the LGBTQ Center, Black Student Union, Multicultural Student Center, and others. We encourage all students to find community and camaraderie on campus. In our major specifically we aim to support all underrepresented students understanding their challenges in today's political and social climate, keeping an eye on everyday happenings at UW-Madison that may impact our student experiences' if due to their race, ethnicity, religion, sexual orientation, or other marginalized identity.

Our current staff of 19 faculty includes two Hispanic, one Native American, three Chinese, and one Japanese faculty members. We have strived to recruit and retain faculty of color from diverse backgrounds and are proud of our range of people from different backgrounds. Of our faculty members, we have four women and 15 males, which we consider insufficiently representative and therefore a key element of our current faculty recruitment has been focused on recruiting more women faculty. The faculty in Genetics strongly supports building and maintaining a diverse range of faculty and staff, who bring in different experiences and expertise. This helps to become good mentors and role models to the students we teach.

G. Degree Completion and Time to Degree

Our Genetics and Genomics major is among a group of related bio-science majors on campus that can serve as a strong comparison to our program. This includes the Biology and Biochemistry majors that are housed jointly through CALS or L&S. Over the last 20 years, we have seen consistent and then growing numbers of students that we are graduating on a yearly basis in the fall or spring semesters. Compared to our data since 1999, it's a positive growth trajectory we hope to maintain as long as we have sufficient course offerings for the students to graduate on time.

Additionally, our overall student population has grown and continued to make Genetics and Genomics a popular major choice in CALS. The graphs below show details on the Biochemistry major and Biology, respectively, major for comparison. This data is based off students enrolled through CALS.
In the past several years, the LOG has been working to improve current course offerings and increase the number of courses that are offered. The most important change has been the creation of new major-specific genetics core sequence which includes Gen 467 (General Genetics I), and Gen 468 (General Genetics II). In the past, genetics majors took just a single class, Gen 466 (Principles of Genetics), as their core requirement. Some students take this new sequence as early as their sophomore year if eligible, and most take the sequence in their junior year. In addition to these changes, LOG has sought to offer new upper level elective courses and increasing the offering frequency of other more popular upper level elective courses. Gen 520 (Neurogenetics), Gen 527 (Developmental Genetics for Conservation and Regeneration) and Gen 548 (The Genomics Revolution) are new courses that are offered every Fall and Spring, respectively. Gen 627 (Animal Developmental Genetics) is now available every spring instead of every other spring. Gen 662 (Cancer Genetics) is now a three-credit course instead of two. In addition to new course offerings, LOG undergraduate advisers work closely with majors to make sure they are on track to graduate within four years or less. As mentioned in the above section on advising, once a semester meeting are recommended to ensure timely degree and extracurricular planning.

Our continued improvement on advising, curriculum, and instruction has impacted our time to degree. Over the last ten years, we have seen our students be able to consistently finish our major in four years or less. The more recent data shows a trend that many Genetics and Genomics undergraduates are able to complete in less than four years, which may indicate a trend in taking summer term courses. We also have fair number of students coming into their college experience with transfer credit or Advanced Placement Credits, which increases the likelihood of finishing in less time.
In comparison to our peers in Biochemistry and Biology, the data shows that Genetics and Genomics students are completing their degrees faster or at the same time as their peers in these majors. Overall it is pleasing to see that biological science students can complete their degrees in a 3 ½ to 4-year plan, then move onto their professional goals of further education or working in industry.

In the process of completing this self-study, we read and understood research UW has done on time to degree, especially in relation to targeted minority groups. In a memorandum authored by Jocelyn Milner from 2006 with further updates in 2013, the analytical data showed that UW’s overall time to degree was 4.1 years at the time, where targeted minority students were on average taking 6 months longer to complete their degree than their white peers. The document also cites instances that impact time to degree, such as if a student studies abroad, takes fewer credits per semester, is put on academic probation, is dropped from the university, or they withdraw formally from the university for any length of time. These are things the LOG is very mindful of in relation to our student’s degree completion.
In looking at our own time to degree metrics, it is also true that our minority students are completing their degree in slightly more time than their peers. The figure above outlines this information. The non-minority time to degree as indicated is 3.78 while the minority time to degree rate is 4.16 in the year 2016. This is a difference we are reflecting on and strategizing further steps to close this gap.

With proper advising, we hope to accurately help students plan their credits each semester. This will help improve time to degree, as well as fit in their other priorities such as study abroad, internships, or research opportunities. Advisors will be the drivers of student support, especially underrepresented students, and communicate about resources to improve their academic success and study skills. We will use proactive measures such as these, in addition to continuing learning about the equity gap that exists on campus and in higher education.

We also assessed data on time to degree evaluating differences by gender. The figure above shows some variation and changes between 2013-2014 year, but in the years since, many of our male and females are graduating at similar rates. It is of note that women in our program are historically graduating at faster rates, and that has been consistent since 2010.

H. Career Services and Post-Graduation Outcomes

The students in the Genetics and Genomics major have three main areas of they broadly pursue after they graduate including going into workforce industry, research enterprise, or focusing on graduate studies. The graduate studies include masters, PhD or licensure programs, in addition all disciplines of health professional programs. Many of our students are career oriented towards health professions such as physicians, dentists, or veterinarians.
From 2014-2016 APIR data on post-graduation plans, 50.5% of respondents in the Genetics and Genomics major cited they would work full-time after graduation. At the time of the survey, 42% of students had accepted a position and 47% were still actively searching for employment. Of all students 62% shared they plan to work in the state of Wisconsin after graduation, and 26% were undecided.

40.6% of Genetics graduates go to graduate school full time. Of these students, 30% go on to pursue a Doctor of Medicine Degree, 25% a Doctor of Philosophy Degree, 25% a Master’s of Science, 5% to other graduate programs, 5% to Law Degrees, and 10% reported pursuing a second bachelor’s degree, likely in a more specialized field or to gain licensure for a professional career.

Career resources exist in a multitude of forms. Formally, students can access career resources and advising through CALS Career Services. They offer one-on-one advising to talk about professional development, interviewing skills, networking, career fields, opportunities with internships and full-time jobs, Handshakes job portal, and broad career exploration. Additionally, they offer workshops, events, and resume critiques as part of their portfolio.

Students also gain value and benefit from the connection with faculty, researchers, and graduate students to receive career advice. Genetics faculty and instructors value time with students to mentor and advise on all aspects of future opportunities for our students. This is especially helpful for students considering science or genetic based graduate programs at the masters and PhD level.

Our students are prepared for all these career paths due to their required coursework for their degree and major requirements. As global citizens, they should have competencies to understand other cultures, religions, races, ethnicities, sexual orientations, and other identity markers that make someone unique. We hope our students have a broad understanding of the social sciences and people in the world around them, in addition to appreciating the humanities such as literature, arts, and culture. From various assignments, it is our goal that they can apply knowledge and skills in real world settings, draw conclusions from facts and evidence, and work collaboratively with others. While these are all broader learning outcomes and skills not specific to our major, if our students can achieve these things, communicate effectively, and apply the scientific knowledge they have gained, we see success in their future endeavors. We feel confident that our academic major prepares students well for the challenges we face in the world and make strides in the current genetics and genomics revolution.

I. Overall Analysis of the Self-Study and the State of the Program

It is with pride we reflect on our last ten years of growth and change within our undergraduate program. We have found success with increasing and improving our academic course offerings. This includes our new course sequence for majors, Gen 467 and Gen 468, and moving many of our upper level courses to three-credit offerings. This helps student complete their required coursework well and in a timely manner, as our time-to-degree data showcases. We are also proud to continue to offer topics that pique student interests such as population genetics, epigenetics, cancer genetics, and the genomic revolution. Students in these courses get a deeper, more critical dive on these topics and make meaning from this learning that can apply to their future careers or graduate study. We are excited to explore the opportunity to re-thinking our course learning outcomes, revise course syllabi, and review course requisites. While these initiatives will take place later in 2019, they will have a profound impact on the major and student experience and keep our instruction relevant for the next ten years ahead.
The LOG has also been successful with hiring additional resources in the form of faculty and staff to continue excellence in teaching and research endeavors. We hope to see further growth of these human resources in the near future with additional faculty hires, and the consideration of a fourth faculty associate. With these hires, our goal will be to have diversity and inclusion be at the forefront of those decisions, especially considering candidates who identify as women, or identify from marginalized racial, ethnic, and religious backgrounds. For overall diversity and climate, the LOG is committed to being a strong advocate for all students, especially to those from underrepresented backgrounds. The ever-changing political and social climate we live in will continue to drive us as faculty and staff to pay attention and understand the experiences our students are going through. From this we can best support every student who declares the Genetics and Genomics major.
GENETICS Graduate Program

A. Response to previous program review recommendations

The last program review for the Laboratory of Genetics (LOG) was done in 2010. Overall, the previous review of the Graduate Training program was very positive. One critique focused on the maintenance of trainers for the program. In response to the critique on lack of trainer removal process, we enacted a mechanism of formal removal (with similar Steering Committee and LOG voting structure as for trainer approval) and we established a new policy to review trainers 10 years after initial acceptance, and every 5 years thereafter. Part of the renewal process assesses trainer engagement and participation. An additional critique of the program related to our student annual meetings and lack of consistency. To address the critique that there was no enforcement on the annual thesis committee meeting, we now require that the annual meeting be held in order for students to register for classes. Additionally, we now have formal paperwork that tracks compliance, IDPs, progress, and graduation plans for senior students.

Concerning the previously identified “dearth of paid TA positions,” there has been a positive change creating an opportunity to earn more TA funding. CALS has implemented a “money follows activity” model in which departments are awarded TA positions based on the number of students enrolled in their courses. Genetics has benefited in this regard by the efforts of our three faculty associates who teach our large enrollment courses, thereby earning us TA credits. We now have the opportunity to engage faculty to teach courses in which students would like to enroll and thereby earn more funding for TAs.

B. Overview of the Program

The mission of the UW-Madison Genetics Training Program is to train the next generation of genetic researchers in rigorous, responsible, cutting-edge research that addresses modern questions in genetics and genomics, while preparing students for diverse careers that leverage that training. The program is administered by the Laboratory of Genetics (LOG) but supports over 75 trainers on campus that span four colleges. The Training Program is advised by a Steering Committee that includes 6 trainers (including 2 LOG faculty) and the Director of Graduate Studies (DGS) as voting members. The program operates according to LOG-approved bylaws, which outlines committee makeup, terms of appointments, and governance policies. The DGS is elected by the LOG and serves for an unlimited term with annual review by the LOG.

Trainers are very active in the program. Quantified at the time of our 2018 NIH T32 grant renewal submission, a third of trainers teach a required or elective course or serve on a programmatic committee, 73% are members of at least one Genetics Thesis Advisory Committee, and nearly all participate in new-student recruiting, the annual Retreat, and/or the weekly Genetics Colloquium seminar series. A new goal in the program is to invite a rotating set of trainers each year to participate in the Tips for Success meeting for first-year students, the required Responsible Conduct in Research (RCR) course in the second year, and the RCR for Future Group Leaders workshop for 4th/5th year students.

Students are also actively engaged in the program. All students, regardless of funding or admission mechanism, complete the same degree requirements, with the option to perform a specialized doctoral minor according to University requirements. Genetics PhD degree requirements are found at [https://guide.wisc.edu/graduate/genetics/genetics-phd/#requirementstext](https://guide.wisc.edu/graduate/genetics/genetics-phd/#requirementstext) and learning goals are
outlined at: https://guide.wisc.edu/graduate/genetics/genetics-phd/#learningoutcomestext. The program frequently assesses curriculum, advances in the field, and new mechanisms to keep our training abreast of latest best practices, latest technologies, and direction of the field. As outlined below, we aim to connect students with diverse professional development activities, knowledge of different career paths that leverage a PhD, and connections with alumni and recruiters from various companies and institutions. Our students have had excellent success in attaining post-graduate opportunities of their choice, as outlined in detail below. As a testament to our efforts and in recognition of the strength of the program, our T32 training grant was just renewed and will carry us into 49 years of continuous NIH funding.

C. Program Assessment and Evaluation

The program strives for excellence and continual improvement. In recent years, the program has improved formal tracking of student programs through required annual committee meeting paperwork that outlines student progress and areas for improvement, graduation plans for all students starting in their fourth year, and semi-annual check-ins about graduate plans for students beyond their fifth year. Learning objectives on which students are assessed are also provided to thesis committees for the preliminary exam to guide committees in the exam. The program assesses learning outcomes through: core coursework required of all students (Gen 701, 702, 707, 708), the preliminary exam taken in Year 2 of the program, and through annual committee meetings that report on student knowledge and progress.

The DGS, student services coordinator (SSC), and steering committee discuss at least annually changes that should be made to didactic training within the program. Examples of recent changes are: 1) elimination of the written “Prelim A” exam at the end of the second year; 2) acceleration of the oral preliminary defense (previously called “Prelim B”) from Year 3 to Year 2 of the program; 3) renewed focus in courses on experimental design and tackling research problems (e.g. “Prelim A” style questions in Year 1 coursework). Future changes will include: explicit training on rigorous and reproducible research, integrated throughout the graduate training, and integrating professional development training currently provided by the program (e.g. grant writing, inclusive teaching, diversity training) into a First-Year course. As for connection to industry and government leaders, the DGS maintains relationships with several recruiters (e.g. at Cargill, FDA, Prevention Genetics, NHGRI, Ancestry, and others). Some have attended past retreats where they have talked about their industry and how students can market their skills for job competition. We are investigating bringing others to future retreats.

D. Recruiting, Admissions, and Enrollment

We evaluate recruiting and retention rates annually. The program has put renewed focus on advertising the program in the last few years. 2018 saw a record number of applicants, with a slight drop this 2019 season. Our efforts to recruit admitted students for matriculation has been successful in recent years, generally around ~40% matriculation rate (29% this year due to conservative invitations to only the top students). We continue to see demand for students from trainers and estimate that the program could accommodate larger class sizes. Our students have excellent job placement rates, generally acquiring positions in their chosen fields, and fill diverse positions ranging from postdoctoral fellowships (27% at the time of grant renewal submission in 2018), academic or biotechnology labs (38%), clinical genetics (18%), education (9%), and other careers that leverage a PhD in Genetics. Thus, there is the demand for
increased class sizes based on quality and numbers of student applicants, demand from trainers, and demand from hiring agencies.

One challenge that we will have to address is incoming class sizes: our long-standing model was to fund all first-year students on the NIH T32, which provides student funding during rotations. However, with the shrinking sizes of NIGMS training grants (including the Genetics grant, which was renewed at 12 slots from 16 in the last five-year grant cycle), and with the changing landscape at NIGMS (which does not like that all students in the program receive funding), we will need to investigate a new model to maintain the size of the program – this model will require more investment from colleges, in addition to existing Graduate School support, to cover rotations of incoming students who do not receive T32 funds. We have seen an up-tick in Direct Admit students in the last few years. These students are fully integrated in the program and otherwise treated identically to traditional-admit students. Still, to compete for the best students will require a mechanism to fund their rotations.

We are fully committed to increasing diversity in the program. Recruiting efforts include sending faculty, students, DGS, and SSC to URM recruiting conferences (including SACNAS, ABRCMS, NIH recruiting fairs) and recruiting through the UW programs (e.g. the former Bioscience Opportunity Program (BOPs) and Summer SROP experiences). We are investigating partnering with one or more HBCUs for more targeted recruiting. The last 10 years has seen a five-fold increase in the number of applicants from under-represented groups. Of our T32 eligible domestic students, 35-40% in 2018 and incoming 2019 are URM students. A major focus is to maintain a welcoming and supportive climate to retain and support these students, as discussed below (Section F). At the time of grant renewal, retention of URM students is not statistically different from non-URM students.

E. Advising and Student Support

Incoming students attend a program orientation the last week of August, where they meet the staff and program leadership, learn the details of the program including learning goals (and receive access to the Graduate Student Handbook that is updated annually), and receive guidance on choosing a rotation from the DGS and Chair of the Student Advisory Committee. Students also hear short talks form trainers taking new students. Students choose three labs to rotate in during the first semester and complete paperwork stating their plans. The SSC surveys students and advisors after each rotation to look for red flags in student acclimation to graduate school. Students meet at least two times with the Student Advisory Committee in the first semester to discuss how to choose a thesis lab, and once with the DGS and invited trainers in the spring to discuss Tips for Success in Graduate School which reviews learning objectives, curricular requirements, grievance/support processes, and responsible conduct in research (also found in the Graduate Student Handbook online). By the end of the first year, students will choose and meet with their thesis committee (five required for graduation) to certify coursework and didactic plans.

The program provides regular in-person and electronic updates on the program. The DGS holds at least one (often two) Town Hall meetings annually for students to discuss changes and possible improvements to the program. Afterwards, students meet privately over dinner to discuss amongst themselves and provide feedback to the DGS and SSC. In recent years, students also founded the Graduate Student Committee, a committee run by the students and for the students, with one yearly rotating representative per class. This committee organizes social/science events for students, coordinates professional development opportunities, and provides a direct link between faculty and student concerns. The program also has strong support from the SSC, who meets privately with many
students, has held one-on-one intervention sessions between students and PIs, and works with the DGS to track students who may need extra support. Occasionally students have transitioned between labs. In these cases, the DGS and/or SSC work with the students to discuss the issues and navigate additional rotations. In the past, the LOG has provided funds for 1-2 months as students rotate in other labs before choosing a new home.

Students receive annual feedback from the program in the form of their in-person annual committee meeting and associated written paperwork. The SSC reviews all paperwork to assess sufficient progress and follow-up with the student and advisor on any red flags. In terms of encouraging good mentorship, we have surveyed students on what they want in a good mentor and what they see as problems in bad mentors. This information is provided to all new trainers and to all trainers when they take a new Genetics student. To further improve our training system, we are now requiring that all Genetics trainers take a training workshop, done in partnership with WISCIENCE, on what the program and students require in a good mentor. Training workshops taken through other programs will be honored. In all, we hope that these measures ensure good communication between the program, students, and trainers and how to strengthen our training and degree outcomes even further.

F. Program Community and Climate

A major focus is to instill in all our students and trainers our value of diversity and inclusivity. All first-year students participate in workshops on diversity in their first semester and inclusive teaching during TA training led by WISCIENCE in their second year. All trainers receive written guidelines on inclusive mentoring and will now receive direct instruction during trainer training workshops.

To maintain and foster a strong climate, the Graduate Student Committee recently devised a Student Vision Statement that outlines expectations from students for the climate and community they strive for; all incoming students will receive the Student Vision Statement. The LOG also maintains a Diversity Committee with graduate students. The DGS explicitly mentions our commitment to diversity during recruiting and orientation, and the Chair of the Diversity Committee (Ahna Skop) gives a short welcome during recruiting. The Graduate School exit survey shows overall positive assessment of our climate.

We rely on a close relationship with the SciMed GRS program to support our underrepresented minority (URM) students. If there are signs that students are struggling, we work with SciMed GRS to provide coordinated support. Such support is usually in the form of one-on-one meetings with the SSC or DGS to help students navigate other UW support systems, such as UHS and the McBurney Disability Resource Center. As for faculty/staff representation, the Diversity Committee within the LOG has several initiatives to increase diversity. For example, faculty choose at least one speaker from an underrepresented group to speak in the Genetics Colloquium. A goal for the upcoming year is to work with the emerging Bioscience Initiative Recruiting Network (BIRN) program to host diversity speakers from partner institutions including several HBCUs. We recently decided to invite students to suggest diversity speakers. These are all efforts we hope to support, build or continue as scientists from diverse backgrounds bring enriching perspectives to our UW-Madison Genetics community of scholars.

G. Degree Completion and Time to Degree

The program has put renewed focus in the last several years on decreasing the time to degree. At the time of grant resubmission in 2018, our average time-to-degree over the last 15 years was 5.9 years. Outliers in 2016 include our first legally blind student and several students who moved with their
advisor to another institution. Our analysis in 2018 showed no significant difference in time-to-degree or completion rates for URM versus non-URM students or women versus men. Our goal is to decrease to under 5.7 years. To accomplish this goal, we have implemented several changes: we encourage students at time of entry that they should aim for a 5 year PhD, and we give students tips to meet that goal; we make it clearer to faculty that time-to-degree is important for the program; we accelerated the deadline for the oral prelim to be by the end of the second year (instead of the third year); we now ask all 4th year students and above on their annual committee meeting paperwork what their graduate plans are; we touch bases with 5th year students about their graduate plans every ~6 months.

We strive to increase our graduation rate, which hovers at ~85% (discounting 3 students in the last 5 years who switched programs, including to Mathematics, Computer Science, and Microbiology). We aim to decrease our attrition rate to <10%. We have put new focus on mental health support for students, since a substantial number of students who have left the program are struggling with personal challenges. Tracking students during their first year, surveying faculty that students rotate with, and SSC-student check-ins during the first year were implemented to address this challenge.

H. Career Services and Post-Graduation Outcomes

In the last three years, the program has put much more focus on supporting students in professional development to prepare them for diverse careers that leverage at PhD. Students are strongly encouraged to pursue professional development outside the required curriculum. There are many activities through the Graduate School PD website, workshops put on at our annual retreat, and through resources organized by the Graduate Student Committee. We aim to help connect students with career opportunities via our UW-Madison LinkedIn page. In this format students can connect to alumni in diverse careers and companies/institutions, the DGS builds and maintains relationships with recruiters at various companies and government agencies, and the students have invited alumni to the annual retreat for presentations. We found social media and technology are excellent mechanisms for our students to connect on professional development and career preparation resources.

Our students have been very successful attaining positions after graduation (see breakdown from the last 15 years, https://genetics.wisc.edu/prospective-ph-d-students-2-2-2/). As quantified in 2018, 27% of students supported by the T32 were in postdoctoral fellowships, 38% in academic or biotechnology labs, 18% in clinical genetics, 9% in education, and other careers that leverage a PhD in Genetics. We track career outcomes by maintaining communication with alumni, including our LinkedIn group. The NIH T32 requires tracking of students funded by the last 15 years of our grant.

I. Overall Analysis of the Self-Study and the State of the Program

Overall, we are proud of our accomplishments and will strive for further excellence in the Genetics Training Program. We have several goals for the next two years. The first is to update didactic curriculum. We will maintain a focus on experimental design and genetic problem solving in Genetics 701 and 702 and will expand to explicitly cover Rigorous and Reproducible Research topics. We will also introduce a First-Year course that meets for 8-12 weeks, which will combine several ad hoc meetings done in the first year and provide coherent support, community networking, and specialized content. Second, we will continue to build connections between the program and other industries to help students in job placement. Although our students are overall quite successful in finding science-related careers, support in finding non-academic careers was among the lowest rated metric in the most recent
Graduate School Exit Survey. Recent changes to the program are hopefully already improving connections for current students.

A second pair of goals is to decrease our time to degree and attrition rate. Time to degree is being addressed as outlined above, through explicit actions to more closely monitor student progress and provide support where needed. Attrition is more challenging, since many students who’ve left the program in recent years have struggled with mental health issues (sometimes quite significant). Renewed focus on catching red flags early, supporting students through regular check-ins, and relying on UW support mechanisms like UHS and McBurney are several mechanisms we’re focusing on.

Finally, a major goal for the program is to increase and support diversity, in particular by recruiting more African Americans to the program. URM recruiting, especially of African Americans, is a major hurdle for UW-Madison, given its white, Midwestern demographics and culture. A key goal is to increase critical mass of URMs and African Americans. While we work closely with SciMed GRS to provide some of that mass, we’d like to have it in the program. Goals for this year include: continued recruiting at URM recruiting conferences, targeted recruiting of URM students for the UW-Madison SROP, which is a great gateway for students from underrepresented groups, and through partner relationships with other institutions including HBCUs that we are exploring (in part through the emerging BIRM program).

In all, we are encouraged with the strength of the program (and external recognition of that strength through renewal of the NIH T32 Genetics Training Program grant) and filled with renewed energy to maintain our upward trajectory toward excellence.

Additional Considerations for Graduate Students

J. Funding

The program is supported by a T32 from NIGMS, which in the past has supported all students for two years of training but will now drop to funding students for one year with the option to apply for a second year. To ensure financial stability for students, labs are not allowed to take a student unless they have funds to cover the student for 1 year (being revised with news of the TG renewal at fewer slots). Students receive support in writing NSF GRFP their first year and in writing their prelim document with the goal of submitting for funding. The SSC works with students in need to help them find grant and TA opportunities. In some cases, funds from the Graduate School Biosciences Competition fund are used to support senior students as outlined in the award. In recent years, 2-3 students annually have received NSF GRFP awards and 1-3 students annually have received SciMed GRS funds. Graduate School funds support our URM recruiting activities. The LOG also has a gift fund to support diversity efforts.

K. Professional Development and Breadth

In the last three years, the program has put much more focus on supporting students in professional development to prepare them for diverse careers that leverage at PhD. Students are strongly encouraged to pursue professional development outside the required curriculum; they find out about activities through the Graduate School PD website, workshops put on at our annual retreat, and through resources organized by the Graduate Student Committee. Representative PD our students have participated in recently include: certificates and training through WISCIENCE and the Delta Institute, ACI Carpentry Bootcamp, WARF workshops, various bioinformatic/analysis workshops through the UW Biotechnology Center, etc. All LOG committees (except the Student Advisory Committee) include a
student representative, providing our students with leadership opportunities. Students also receive formal professional development through the program, including: a required Writing Workshop for first-year students; instructions on writing through course mini-grant proposals and workshops on NSF GRFP preparation and prelim preparation; written feedback from the audience on their presentations during the Summer Colloquia series; a one-week teaching workshop taught in the second year.

All students are required to maintain an IDP; although not required, they are strongly encouraged to discuss their IDP with their advisor and thesis committee. The annual committee meeting paperwork requires that students have updated their IDPs and entered compliance in the UW database. The program have several mechanisms of support for conference travel, including: $300 to each student funded on the T32, the Laboratory of Genetics Stone Travel award, which funds up to 10 students each year for travel, notification of travel funds from the Graduate School.
CYTOTECHNOLOGY Certificate Program

A. Response to previous program review recommendations

Not applicable, the program has not been reviewed previously through CALS.

For additional documents including the 2017 annual report, course syllabi, and the 2018 accreditation self-study, please this Box folder: https://uwmadison.box.com/s/f3w7socs0xtw4cfffhy1cz1r77jnh4h5

B. Overview of the Program

Cytotechnologists are medical laboratory professionals who specialize in finding and diagnosing rare abnormal cells under the microscope. They perform a subset of their work independently and work under the supervision of pathologists (physicians specializing in laboratory diagnostic medicine).

The cytotechnology certificate program is a one-year certificate that runs each year from August to August, spanning 50 weeks. Students enter our certificate program with either a bachelor’s degree or after completion of their junior year at an affiliated institution (includes Edgewood College and some UW System schools, see https://cytotechprogram.wisc.edu/academic-affiliations/). All students enroll as Special Students (UNRS) through the Division of Continuing Studies. The program consists of 38 credits of coursework in dedicated cytotechnology program courses in Genetics.

Our mission is to prepare our students for clinical work and lifelong learning in the evolving field of cytotechnology. Our mission fits with the University of Wisconsin mission to improve quality of life for the people of Wisconsin through preparation of cytotechnologists with excellent diagnostic skills. Many of our graduates have chosen jobs within the state of Wisconsin over the last 10 years.

Although our program does not currently have approved learning outcomes, each individual course has learning outcomes available in the course syllabi (see linked Box folder). A summary of course-level learning outcomes is presented below.

For each organ system-specific course:

- Demonstrate fundamental knowledge of the anatomy, histology, and pathology of the organ system.
- Recognize cellular degenerative, reactive, and reparative changes and identify all clinically relevant organisms associated with the organ system.
- Apply standard diagnostic criteria to make the appropriate interpretation of cellular changes seen microscopically.
- Recommend and interpret ancillary tests appropriately in the context of the molecular basis of diseases of the organ system.
- Correlate each patient’s history, clinical, and radiologic findings with the microscopic findings and know the proper follow-up recommendation for their diagnosis.
- Integrate organ system knowledge and diagnostic skills with knowledge and skills from previously studied organ systems.

Selected learning outcomes for the remaining courses:

- Demonstrate competency in cytopreparatory techniques.
- Recognize and correct pre-analytical, analytical, and post-analytical errors.
● Recommend best practices for specimen collection, transport, and processing for the relevant ancillary studies performed on cytology specimens.
● Identify best practices in quality assurance and quality control.
● Recognize regulations and accreditations requirements for the cytology laboratory.
● Relate laboratory administrative and workflow functions to the quality of patient care.
● Demonstrate appropriate laboratory safety procedures.
● Compare supervisory and business management practices in different laboratory settings.
● Recommend cytogenetic and molecular studies on cytology specimens when appropriate.
● Demonstrate appropriate specimen triage and preparation for cytogenetic specimens.
● Recognize the role of chromosomal and other genetic abnormalities in human disease.
● Interpret cytogenetic nomenclature appropriately.
● Demonstrate significant expertise in the chosen cytology topic.
● Communicate clinical cytology-relevant knowledge with others.
● Integrate a body of scientific evidence to support a conclusion.
● Produce scientific publication-quality written work in the field of cytology.

We propose the following learning outcomes for our program:
● Establish the biological and medical background knowledge necessary to understand the clinical significance of cytologic diagnoses and related ancillary tests
● Become proficient in screening of gynecologic and nongynecologic slides for rare findings
● Develop diagnostic accuracy and speed as expected by future employers
● Demonstrate professional and ethical standards of conduct within the medical laboratory

Refinement and approval of these program-level learning outcomes will become part of our strategic plan for the next 5 years.

In terms of collaborations, we offer a “3+1” option for selected students at affiliated institutions. These students complete their undergraduate coursework through the end of their junior year at the home institution, then complete the certificate concurrent with their senior year. The bachelor’s degree is granted by their home institution and the certificate is conferred by UW–Madison.

The program’s governance model includes all program faculty, who meet weekly and have direct input into all aspects of the program, including curriculum design, recruiting/outreach, and admissions. For anticipated changes in program leadership, a potential successor is identified and involved as a faculty/leader in the program prior to the transition in the role. Transitions in leadership over the last 10 years have included:

Michele Smith replaced John Shalkham as Program Director (2013)
Changhong Ye replaced Michele Smith as Education Coordinator (2013)
Daniel Kurtycz (Medical Director) replaced Michele Smith as acting Program Director (2018)
John Shalkham replaced Daniel Kurtycz as Program Director (2019)

During each of these transitions, key information was communicated through in-person meetings, email, and electronic sharing of files. Former leaders have remained in contact for questions and follow up. Currently, a change in the Medical Director is anticipated within the next two years. Daniel Kurtycz currently holds this position, and it is expected to transition to Kaitlin Sundling (current instructor and Faculty Director). Some of the difficulties in program leadership transitions have highlighted the need to develop improved documentation and standard operating procedures for essential program functions, including documentation for accreditation.
C. Program Assessment and Evaluation

Each year, our program provides an annual report to the Commission on Accreditation of Allied Health Education Programs (CAAHEP) and Cytotechnology Program Review Committee (CPRC). Below is a summary of the data included for the last 10 years. The 2017 annual report is available in the linked Box folder.

<table>
<thead>
<tr>
<th>Enrollment Year</th>
<th>Initial Enrollment</th>
<th>Completed Certificate</th>
<th>Attempted Board Exam</th>
<th>First Time Pass</th>
<th>Overall Pass</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>5</td>
<td>3</td>
<td>NA</td>
<td>NA</td>
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<tr>
<td>2018</td>
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<td>11</td>
<td>11</td>
<td>11</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>

Key evidence used in the assessment of our program is our boards pass rate (first time and eventual) and job placement in cytotechnology and related fields.

The number of students attempting and passing the board exam has varied considerably over the years. The students who never attempt the board exam generally fall into two categories: students who decide to pursue additional education (such as graduate or medical school) and students who realize that cytotechnology is not a good fit for them. Although individual student family and personal life circumstances have been a contributor to individual students failing the board exam, our boards pass rate lags behind our peers. Our overall boards pass rate was 83.8% for the last 10 years, and 87.5% for 2016-2018. For comparison, here are the boards pass rates advertised by some of our peers:

- Mayo Clinic: 96% (time range not given)
- University of Nebraska: 100% (2015-2017)
• Cleveland Clinic: 100% (2016-2018, first time)

Regarding job placement, the most recent available data from 2013-2017 indicate 62.2% placement of alumni within the field of cytotechnology. Most of the remaining alumni are working in related fields of biotechnology or health professions. We currently do not have a reliable system to track alumni careers. We anticipate to include this in our 5-year strategic plan.

Due to the small size of our program, we have the opportunity to work one-on-one with each of our students. In the last few years, faculty have often been aware through monitoring of student performance that particular students were struggling prior to taking the board exam. Interventions including one-on-one review with faculty have been provided, with varying degrees of success either before or after the students’ first attempt. Additional help after certificate completion is provided for students who remain in town following an unsuccessful board attempt.

The cytotechnology field is undergoing a period of remarkable growth and change in practice. While cytotechnologists previously were largely expected to perform only their routine microscopic work, many medical laboratories now have additional expectations that add to the intellectual challenge and independence of the work. For example, cytotechnologists often accompany and assist physicians on procedures where a rapid assessment of the sample is required. Many cytotechnologists have also seen their scope of practice expand into molecular testing, fluorescence in situ hybridization, and quantification of biomarkers.

In the last 10 years, the program has increased the students’ training in molecular testing and cytogenetics through the addition of a 1-week molecular biology course through Promega/[new abbreviation] as well as a 2-week cytogenetics course, taught by a genetic counsellor and cytogenetics technologists at the Wisconsin State Laboratory of Hygiene.

In the 2018-2019 academic year, we discontinued the separate molecular biology course in response to student feedback as well as review of the course syllabus. Alternatively, we expanded our curriculum on biomarker testing (immunohistochemistry) and molecular testing as integrated with the organ system-based curriculum.

We expect these emerging areas of cytotechnology practice to continue to grow, and we will continue to monitor the field to ensure that our curriculum stays up to date with current clinical practice and employer expectations, as well as anticipated advances in the field.

Annually, our program hosts an Advisory Board meeting. The Advisory Board is composed of representatives from the following groups: current students, former students, affiliate institutions, biotechnology industry, Wisconsin State Laboratory of Hygiene staff, government agencies, and members of the public. The advisory board meeting includes updates on recruiting, student outcomes, curriculum changes, and updates on the field of cytotechnology.

D. Recruiting, Admissions, and Enrollment

Per our accreditation by the Commission on Accreditation of Allied Health Education Programs, our capacity is 12 students, and we have the resources and faculty to support this level of enrollment. The 2018-2019 enrollment was 4 students.
Historically, recruiting efforts have been focused on specific target populations including biological science students at universities and students with interest in laboratory work. Although the program has at times had a number of international students, our diversity in terms of underrepresented groups such as racial/ethnic minorities, first generation college students, and low-income students has been low. A significant recruiting barrier for underrepresented groups is the cost of attendance of the program. Scholarships have been offered in the past. However, the external source of funding of these scholarships is no longer available.

As part of our 5-year strategic plan, we plan to broadly expand our recruiting efforts. These efforts will include pre-college programs to both improve diversity as well as expand the pool of potential applicants.

Our current enrollment is low, and this mirrors a national trend with about 30% of cytotechnology program positions going unfilled nationally. As cytotechnology is a behind-the-scenes profession, many potentially interested students may not be aware of this option with a shorter pathway to the workplace than many other health profession options. For the last 10 years, our program has done reasonably well in the past based on modest recruitment efforts, the strong reputation of the program, and word-of-mouth recommendations of alumni to friends and colleagues.

Going forward, we intent to recruit a broader base of applicants. We recently learned that the previous program admission requirements of 28 credits of biology and chemistry is no longer required by our accrediting body. With less stringent requirements, we hope to recruit students from a broader range of majors, including potentially some non-science majors and returning adult students.

Within the state of Wisconsin, cytotechnology jobs are limited in supply and tend to be quite competitive, especially in the Madison area. Nationally, cytotechnology continues to be in demand, with many potential employers eager to recruit students immediately upon program completion. Some potential employers have offered clinical rotations with paid expenses and a job interview with potential acceptance prior to program completion. Looking beyond Wisconsin, only 21 active cytotechnology programs remain nationally. Nearby states Illinois, Michigan, and Iowa do not have programs. Minnesota, Ohio, and Indiana each only have one program with limited capacity. Thus, out-of-state recruiting may be fruitful.

E. Advising and Student Support

Due to the small size of the program, all students are welcome to meet with the program faculty for advising as needed. Advising is primarily career oriented. We do not maintain separate advising information online due to small student population. We do however, have a student policy manual that is updated annual. It includes program contacts, logistical information, and policies on the following: attendance, health and safety, evaluations and assessments, professionalism and student conduct, and grievances. Our students receive timely feedback on their academic performance. Most major assignments are graded and returned within one week. The students receive grading feedback in Canvas, and faculty reach out to students who are observed to have a decline in performance.

Our faculty are cytotechnologists and pathologists with connections to multiple professional organizations to assist our students with networking. We do not currently make use of additional tools for advising, as most job opportunities are shared informally via email and phone to program faculty. Advising is not currently separately evaluated but is included in the evaluation of teaching for our small
program. An evaluation of advising will be included in our upcoming strategic plan. We assess our success as both educators and as advisors by placement and performance of our students in an appropriate career setting. Please see below for information on student placement.

F. Program Community and Climate

The first week of our program includes welcome and orientation activities, including orientation to the classroom, Wisconsin State Laboratory of Hygiene facility, pick up of Wiscards and bus passes, review of the policy manual, and required safety and privacy (HIPAA) training. The students are also introduced to the online course software, computer system, required print and electronic textbooks, and the basics of microscopy. Students are directed to campus resources as needed.

For upcoming classes, we plan to create an introductory module into the online course software (Canvas) to provide a more interactive and on-demand approach to the policy manual and course syllabi.

Although our program is small, the faculty cover some range of backgrounds, including a first-generation college student and a member originally from China. We introduce additional diversity through guest lecturers from the Wisconsin State Laboratory of Hygiene staff as well as the pathology resident physicians from University of Wisconsin Hospital. We also seek to enhance our diversity through affiliation with clinical sites around Wisconsin and beyond.

G. Degree Completion and Time to Degree

Of other midwestern programs, Mayo Clinic and Cleveland Clinic report 100% completion rates. In the past 10 years, our completion rate has been 95.9%. This year (2018-2019) was an unusual year in that one student withdrew within the first two weeks of class, and another student withdrew in the spring semester. The first student withdrew to re-start her previous career as a speech and language pathologist working directly with children/patients. The second student struggled significantly academically and withdrew from the program despite extensive assistance by the program faculty and McBurney Disability Resource Center. An offer was made to extend the program over 2 years.

Given the high faculty-to-student ratio in our program, there is plenty of opportunity for small group and one-on-one interaction with students who may be struggling to complete the program requirements. Daily feedback is given one-on-one from instructors to students on the daily glass slide work. Most days have built-in unstructured time for independent review of glass slides or other educational materials. During this time, students may seek help from faculty, who are available daily during working hours either in the classroom during defined hours, or two doors down in their offices.

Given our role as a certificate program for either college graduates or seniors, we expect that students will enter the program with basic background knowledge and skills to succeed, including study and writing skills. When students struggle with the basics, one-on-one help as well as referral to campus resources is provided. Although we have not had a large number of students from underrepresented groups, we have seen that students from a variety of educational backgrounds will vary in the way that they adapt to our fast-paced curriculum. We hope that future changes to the curriculum will help with issues of pacing and the timing of feedback and be more inclusive to students who may come from less privileged backgrounds.
H. Career Services and Post-Graduation Outcomes

Our primary goal is to prepare our students for careers as cytotechnologists. Our students may practice in academic hospital, community-based, or corporate laboratory settings.

The program faculty receive calls and emails throughout the year regarding job openings nationwide. The students may also find out about job openings through their clinical rotations. The program faculty provide assistance with job applications, developing a resume/CV, and job interview skills as needed on an individual basis. In the future, we hope to increase the number of clinical rotations that may represent pathways to jobs.

We follow up with our alumni formally within the first year after completion with formal surveys, and then periodically afterward. A more formalized system of tracking work provides additional feedback for the program. Additionally, we plan to improve our informal networking with alumni through social media (Twitter, LinkedIn, and Facebook).

I. Overall Analysis of the Self-Study and the State of the Program

Our strength include the maintenance of our national Commission on Accreditation of Allied Health Education Programs (CAAHEP) and Cytotechnology Program Review Committee (CPRC) accreditation, our high faculty-to-student ratio, and our learning environment and resources. We provide high quality cytomorphologic training with experienced cytotechnologists in an active cytology laboratory with access to an extensive teaching collection. Clinical affiliation with University of Wisconsin Hospitals and Clinics provides additional breadth to our students experience with procedures and non-gynecologic cytology.

The major challenges our program faces are building up our recruitment efforts, improving student performance on the board examination, and developing processes for continuous curriculum improvement. Given the short length of our program, it is a challenge to guide students in developing lifelong, self-regulated learning strategies. It is also crucial for us to develop effective interventions for students who struggle academically. In this rapidly changing field, maintaining instructor competency is also an important priority for the future.

Our key priority for the next year is to develop a 5-year strategic plan for the program. This will include many points from this self-study as well as a comprehensive recruiting and financial plan for the program.
## APPENDIX A: Assessment Plan

<table>
<thead>
<tr>
<th>Assessment Plan</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrate an understanding of genetic principles</td>
<td>In Genetics 467 and 468 students will complete questions embedded in exams and quizzes and the results will be analyzed.</td>
</tr>
<tr>
<td>at the level of molecules, cells, systems, organisms,</td>
<td>In Genetics 467 and 468 students will complete questions embedded in exams and quizzes and the results will be analyzed.</td>
</tr>
<tr>
<td>populations and ecosystems. (1)</td>
<td>In Genetics 566 students will complete an embedded question on a quiz and the responses will be analyzed.</td>
</tr>
<tr>
<td>Use quantitative approaches to evaluate experimental</td>
<td>In Genetics 566, 567, 564 students will complete a journal club and/or individual research presentation highlighting genetics concepts that will be critiqued by faculty. * All capstones-all students</td>
</tr>
<tr>
<td>design, critically interpret, and analyze data sets</td>
<td>In Genetics 467 and 468 students will complete questions embedded in exams and quizzes and the results will be analyzed.</td>
</tr>
<tr>
<td>from primary research papers. (2)</td>
<td>In Genetics 299, 699, or 545 students will complete experience in lab. Students and mentors write learning goals. At the end of the experience students complete poster, presentation, lab report.</td>
</tr>
<tr>
<td>Integrate genetic data and apply the scientific</td>
<td>In Genetics 468 students will complete embedded exam questions that will be analyzed.</td>
</tr>
<tr>
<td>method to formulate research questions (3)</td>
<td>In Genetics 467 and 468 students will complete questions embedded in exams and quizzes and the results will be analyzed.</td>
</tr>
<tr>
<td>Communicate genetic concepts to multiple audiences</td>
<td>In Genetics 468 students will complete embedded exam questions that will be analyzed.</td>
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<tr>
<td>with written, oral and visual presentations. (4)</td>
<td>In Genetics 468 students will complete embedded exam questions that will be analyzed.</td>
</tr>
<tr>
<td>Understand mechanisms of segregation and expression</td>
<td>In Genetics 468 students will complete embedded exam questions that will be analyzed.</td>
</tr>
<tr>
<td>of genetic material during development and</td>
<td>In Genetics 468 students will complete embedded exam questions that will be analyzed.</td>
</tr>
<tr>
<td>homeostasis. (5)</td>
<td>In Genetics 468 students will complete embedded exam questions that will be analyzed.</td>
</tr>
<tr>
<td>Apply primary genetic approaches used to study</td>
<td>In Genetics 468 students will complete embedded exam questions that will be analyzed.</td>
</tr>
<tr>
<td>biological processes, including the use of model</td>
<td>In Genetics 468 students will complete embedded exam questions that will be analyzed.</td>
</tr>
<tr>
<td>organisms. (6)</td>
<td>In Genetics 468 students will complete embedded exam questions that will be analyzed.</td>
</tr>
<tr>
<td>Describe how environmental influences may modify</td>
<td>In Genetics 468 students will complete embedded exam questions that will be analyzed.</td>
</tr>
<tr>
<td>the inheritance and expression of the genetic</td>
<td>In Genetics 468 students will complete embedded exam questions that will be analyzed.</td>
</tr>
<tr>
<td>material (7)</td>
<td>In Genetics 468 students will complete embedded exam questions that will be analyzed.</td>
</tr>
<tr>
<td>Apply the use of quantitative methods to implement</td>
<td>In Genetics 468 students will complete embedded exam questions that will be analyzed.</td>
</tr>
<tr>
<td>genetic analysis, including the linkage of gene</td>
<td>In Genetics 468 students will complete embedded exam questions that will be analyzed.</td>
</tr>
<tr>
<td>variants with traits. (8)</td>
<td>In Genetics 468 students will complete embedded exam questions that will be analyzed.</td>
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<td></td>
<td>In Genetics 468 students will complete embedded exam questions that will be analyzed.</td>
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<table>
<thead>
<tr>
<th>Timetable</th>
<th>Year 3</th>
<th>Year 3</th>
<th>Year 1</th>
<th>Year 1</th>
<th>Year 3</th>
<th>Year 2</th>
</tr>
</thead>
</table>

*All capstones-all students*
Assessment Plan

| Assessment Plan | Appreciate how the fields of genomics, proteomics and other data-driven approaches facilitate research and clinical assessment. (9) | Understand the contribution of genetics analysis to elucidating population history and evolution. (10) | Address the connection between genetics and trends in clinical practice, such as personalized medicine, cloning and regenerative biology. (11) | Understand evolutionary processes, with current variation in human traits as its natural outcome. (12) | Appreciate the contributions of genetic methods to sustainability, including food production, bio-energy generation and the preservation of ecosystems and biodiversity. (13) |

Method

| Method | In Genetics 468 students will complete embedded exam questions that will be analyzed. | In Genetics 468 students will complete embedded exam questions that will be analyzed. | In Genetics 565 students will complete embedded exam questions that will be analyzed. | In Genetics 467 and 468 students will complete questions embedded in exams and quizzes and the results will be analyzed. | In Genetics 527 and 566 students will be exposed to these concepts. |

Timetable

<table>
<thead>
<tr>
<th>Course</th>
<th>Year 3</th>
<th>Year 3</th>
<th>Year 2</th>
<th>Year 3</th>
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<td>X</td>
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<tr>
<td>468</td>
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</tbody>
</table>

1. Who is responsible for assessment? The Undergraduate Curriculum Committee is responsible for assessment.
2. What is the plan for the review of the assessment information? The Undergraduate Curriculum Committee will provide information at its annual report to the faculty.
3. What is the plan for the production of an annual summary report? The Undergraduate Curriculum Committee will look at the questions and forms and will provide report to the faculty at the meeting of the annual report to the faculty.
4. How will recommendations be implemented? After faculty review the Undergraduate Curriculum Committee will work with teaching faculty to implement recommendation
Date: November 29, 2019
To: William Tracy, Professor, Chair of the Program Review Committee
    Katrina Forest, Professor
    Erik Dent, Professor
    Beth Meyerand, Professor, GFEC representative
From: Karen Wassarman, Associate Dean
Re: Program Review Committee for:
    • Genetics and Genomics – BS (historically, Genetics – BS)
    • Genetics – MS
    • Genetics – PhD
    • Genetics – Doctoral Minor
    • Cytotechnology – Certificate

Thank you for agreeing to serve on the committee to review the academic programs in the
department of Genetics. Information about program review in general is available at the
university’s academic program review website at: https://apir.wisc.edu/academic-
planning/program-review/.

We expect your work to take place over the next few months and would appreciate receiving your report by March 1, 2020. We will forward your final report to the department chair to review for errors of fact and then to the CALS and University Academic Planning Councils as well as the Graduate Faculty Executive Committee.

The self-study document prepared by the program will serve as your main reference for organizing the review. The review committee chair should work with the department chair, John Doebley, to coordinate meetings with the program’s faculty, staff, and students and to tour the facilities, if appropriate. CALS Academic Affairs can assist with scheduling as needed; please contact Sarah Barber sarah.barber@wisc.edu for assistance.

The chair of the committee will be responsible for convening committee meetings, setting the meeting agendas, making specific assignments to committee members, getting feedback from the committee, overseeing the writing process, and submitting the final report to Sarah Barber sarah.barber@wisc.edu in the CALS Academic Affairs office.

The review committee’s final report (5-10 pages) should focus on evaluating the quality and function of the academic programs. Rather than reiterating the self-study, the report should validate it and accentuate noteworthy topics (whether to be applauded or remediated) with particular regard to program quality and student learning. The report is expected to include a summary of the strengths and challenges for all programs under review, and make
recommendations for improvement or focused attention within the context of the following questions.

The most important question for the committee to consider is the most general: **How well is the department fulfilling its mission of teaching and learning through quality academic programs?**

The following questions may help you focus on aspects that contribute to this general question:

1. How well are the academic programs functioning? Are there areas that are exemplary? Are there areas that need improvement? If the latter, do you have particular recommendations for steps the department should take to strengthen its performance?
2. How does the climate of academic programs support student learning, faculty and staff engagement, and inclusivity at all levels?
3. Are there a sufficient number of students in each program and are the students of high caliber? Are the students well supported (e.g., Is student advising and mentoring functioning well, are student expectations clearly communicated to students)?
4. Should the department be taking any steps to improve the quality of its educational programs? Are student learning goals clear? How is learning evaluated and used for program improvement? How well does the learning assessment plan measure student achievement of learning goals? Are the curricula clear and appropriately designed to achieve the learning goals?

While the focus for the review is the academic programs, it may be useful to briefly address the following questions that provide context surrounding the functioning of the academic programs:

1. What is the standing of the department within its disciplinary base and within the University of Wisconsin-Madison? Is it in need of strengthening? If so, what can be done to improve its standing?
2. Is the climate in the department one that encourages productivity and feelings of inclusiveness by staff, students, and faculty?
3. Are there issues concerning the department’s functions or interactions within CALS that should be considered as part of the College’s ongoing strategic planning process?

Please do not hesitate to contact me or Sarah Barber, Assistant Dean for Academic Programs and Policies, if you have any questions as you proceed. We will represent the dean’s office to assist you in the review process.

Thank you again for taking time on this important task. You are performing a valuable service to the department and CALS, and we all appreciate your efforts. I look forward to seeing your final report.

cc: Sarah Barber  
    John Doebley  
    Jocelyn Milner  
    Karen Mittelstadt  
    Parmesh Ramanathan  
    Andrea Poehling  
    Kate VandenBosch
Laboratory of Genetics Academic Programs Review Summary and Recommendations
Review Committee: Erik Dent, Katrina Forest, Beth Meyerand, William Tracy (chair).

**Background:** The Laboratory of Genetics (LOG) is located in The Biotechnology Building on Henry Mall on the UW-Madison campus. There are currently 19 tenure-track faculty in the department and 6 professional instructional staff. The LOG has five academic programs: BS Genetics and Genomics, MS Genetics, PhD Genetics, Doctoral Minor Genetics and a Certificate in Cytotechnology. The mission of the academic programs of the LOG fits well within the mission of the College of Agricultural and Life Sciences (CALS), “to advance and share knowledge, discover solutions and promote opportunities in food and agriculture, bioenergy, health, the environment and human well-being”, and the CALS vision statements “to lead in science, innovation, and collaboration that improves life and sustains the natural world.”

The UW-Madison Genetics Graduate Training Program trains genetics researchers in rigorous, responsible research addressing modern questions in genetics and genomics. The program is administered by the LOG and is supported by over 75 trainers spanning four colleges. The training program is advised by a steering committee. The program operates according to LOG bylaws.

The mission of the cytotechnology certificate program is to prepare students for clinical work in the evolving field of cytotechnology. The cytotechnology certificate program is a one-year certificate. Students enter the certificate program with either a bachelor’s degree or after completion of their junior year. All students enroll as Special Students (UNRS) through the Division of Continuing Studies.

The M.S. Genetics and the Doctoral Minor in Genetics were described as ‘quiescent’.

**Review Process:** The committee was charged by CALS Associate Dean Karen Wassarman to review the Academic Programs of the Laboratory of Genetics as follows:
- Genetics and Genomics – BS (historically, Genetics – BS)
- Genetics – MS
- Genetics – PhD
- Genetics – Doctoral Minor
- Cytotechnology – Certificate

The committee received and reviewed the Laboratory of Genetics self-study, including data on admission, enrollment, and other metrics for the various degrees over the past 10 years. The committee also requested from the Laboratory of Genetics the reviews of the 2018 NIH Predoctoral Training Program in Genetics proposal.

**Schedule of meetings**

- 12/19/2019 Committee met to plant review.
- 1/30/2020 Committee interviewed John Doebley, Lauren Foley and Katie Vermillion. This meeting was primarily about the undergraduate major.
- 2/24/2020 Committee interviewed Audrey Gasch, Lauren Foley, John Pool, and Errol Wizda. This meeting was primarily about the graduate program.
- 3/9/2020 Committee met with SMPH Associate Dean Keck.
- 4/14/2020 Committee interviewed Kaitlin Sundling and Daniel Kurtycz regarding the cytotechnology program.
- 4/22/2020 Committee interviewed 5 graduate students.
- 4/22/2020 Committee interviewed 5 undergraduate students.
Overall Summary and Recommendations

Areas of Strength

- All programs are generally strong and attract good students
- The department has made substantive changes in the previous ten years that have improved each program. The department remains flexible and open to addressing concerns to improve each program.

Areas of Concern

- The undergraduate major could work towards getting students involved in the major earlier in their undergraduate careers. The major could also improve career advising and update assessments and syllabi. There also is concern that they need more teaching and computer lab space and resources.
- The main area of concern in the graduate program was finding a way to increase student stipends so that they did not lose out on promising students that are matriculating at peer institutions that offer higher stipends. The one aspect of the graduate experience that viewed negatively by the students was the TA component, due to both the required duties and timing of this requirement.

Recommendations

B.S. Genetics and Genomics

- The program needs to update learning outcomes, assessment plans, and syllabi
- Consider ways to get students involved in major earlier
- Work with CALS and other departments to resolve teaching lab issues
- Work with CALS Office of Student Affairs to improve career advising

Ph.D.

- Find funds and mechanisms to increase stipends for Ph.D. students. The program is top recruits to peer institutions. They believe this is due to the noncompetitive stipends.
- Consider reorganizing the TA component of the program so that students have more opportunity to teach, rather than act primarily as graders. The timing of the requirement could also be shifted away from its current overlap with preliminary exams.

Cytotech

- The certificate program should strive to improve the percentage of students passing the board exam to the levels of its peer programs
- The program should increase enrollment to the 12 student maximum, possibly through a wider recruiting effort. Since this is a revenue generating program, this will increase resources for the program.

M.S. program and Ph.D. Minor in Genetics

- The program needs to clarify plans and purpose of these programs.

Dean Wassarman indicated that the most important question for the committee to consider is: **How well is the department fulfilling its mission of teaching and learning through quality academic programs?**

In answer to this question, the review team believes that the Laboratory of Genetics is fulfilling its mission of teaching and learning at a high level. Since the last review they have worked hard to update and improve curricula, services and advising. But there are concerns.
Degree Programs

Overview of Undergraduate Instruction

The Bachelor of Science in Genetics major of the LOG was recently renamed Genetics and Genomics. It is a high quality, healthy undergraduate program, giving its graduates strong training in basic biological sciences. Students in the Genetics and Genomics major have three main areas they pursue after graduation: research, general workforce, or graduate studies. Graduate studies include M.S., PhD, or licensure programs, and the health professions. Many students are interested in the health professions.

Since the last review staff and faculty have put in considerable effort addressing specific problems, upgrading advising and also modernizing the curriculum and student services. Faculty and staff are sensitive to issues of culture and climate and continue to work to improve the program regarding those issues.

The number of students majoring in Genetics and Genomics has been on a slight upward trend over the last 10 years, from 275 to 350 in recent years. The average time to degree has decreased over the last ten years to 3.7 years, indicating that the students are receiving appropriate academic advising and the availability of courses needed to fulfill graduation requirements is sufficient. The students we interviewed were uniformly happy with the major and the instructors.

How well are the academic programs functioning? Are there areas that are exemplary? Are there areas that need improvement? If the latter, do you have particular recommendations for steps the department should take to strengthen its performance?

Overall, the Genetics and Genomics undergraduate major is performing well, but there are some concerns regarding the undergraduate program discussed below. The programs made numerous changes since the last review and student numbers, time to graduation and student comments indicate that these efforts have been successful.

- Genetics 466 had a horrible reputation with terrible student reviews, from both majors and non-majors alike. Genetics 466 was turned into a non-majors’ course and a two semester sequence was created for majors. The two semester sequence is less intense but offers more depth. An effort was made to recruit faculty that had an interest in teaching to take over the classes.
- The department also implemented on-line teaching evaluations for all faculty. Moreover, summary teaching evaluations of all faculty are reviewed by the undergraduate committee. If they see a problem, they are required to report it to the Chair. As a result of these changes, evaluations of 466 have improved significantly and the new courses have been well received.
- 466 is now also offered in the summer. Last summer it had 150 students.
- The undergraduates that were interviewed were uniformly positive about the instruction and generally happy with advising.
- The program has also created a number of new and topical courses, including epigenetics, the genomics revolution, cancer genetics and immunogenetics. They have adopted a “Let’s try new courses philosophy”.

Areas needing improvement
• Students were unhappy that genetics majors take no genetics courses until their junior year. The department has implemented a freshman seminar course which may address this issue.

• All five students we interviewed were unhappy about career advising but they indicated that they were directed to go CALS career advisors. The students did not find their interactions with CALS career advisors helpful because their advice was too general and did not address their specific needs.

• Faculty indicated that more medium-sized classroom spaces are needed, specifically active learning style classroom space for seminars and the capstone requirement. Also, more teaching lab space is needed. Currently, lab space fills every semester.

*How does the climate of academic programs support student learning, faculty and staff engagement, and inclusivity at all levels?*

The intradepartmental interactions appear healthy. The academic staff, advisors, lecturers, professors and administrators are highly dedicated to providing an excellent undergraduate experience. Following the last review, the department appears to have undergone a serious overhaul of the undergraduate program and their approach to teaching undergrads.

The department has started scheduling a gala and dinner that students, staff, and faculty attend. This gathering allows faculty and students to meet, mingle and dine with one another. They also have a separate graduation ceremony for majors where they present awards to distinguished seniors.

*Are there a sufficient number of students in the undergraduate program and are the students of high caliber? Are the students well supported (e.g., Is student advising and mentoring functioning well, are student expectations clearly communicated to students)?*

The Genetics and Genomics major has a sufficient number of students (~350 majors currently) and they are of high caliber. The program competes well with Neurobiology and Biochemistry programs for quality students. From discussions with advisors and students it appears that expectations are clearly understood. Currently, there are four advisors, with 120 students per two advisors and 80 for the other two. We were told the program was in the process of hiring another advisor to improve advisor to student ratios. The advisors reach out to students to inform them of relevant events, which helps the students feel connected. The advisors provide the students with instructions for how they can report bias and resources for students if they have mental health issues. There have been no climate issues reported to the advisors.

*Should the department be taking any steps to improve the quality of its educational programs? Are student learning goals clear? How is learning evaluated and used for program improvement? How well does the learning assessment plan measure student achievement of learning goals? Are the curricula clear and appropriately designed to achieve the learning goals?*

Faculty and staff recognize the deficiency in clear learning outcomes and assessment plans. The review committee was told that the program had developed an assessment plan for the Genetics and Genomics undergraduate major in 2017. But the plan was never completely implemented, and no reports were filed. The program has discussed this with Associate Dean Karen Wassarman. They must revisit and revise the assessment plan. We were told that the revised plan will assess students as they enter the degree program and reassess them at the end, using the capstone course.
Likewise, the program has been charged by the Provost’s Office and CALS Academic Affairs to re-imagine not only their learning outcomes, but also course syllabi and course requirements. This will be a months-long project that will be instructor-driven and supported by the student services coordinator and department chair. These reviews and revisions were not completed at the time of their review.

**Undergraduate degree in genetics and genomics**

**Areas of Strength**

- The department has a strong commitment to undergraduate teaching with a good blend of faculty associates and faculty teaching undergraduate courses.
- The department has worked hard to improve the quality of teaching and has developed methods of continuous improvement.
- Students indicated happiness with the quality of teaching and advising and diversity of courses
- Strong summer program, including general genetics serving 150 students.

**Areas of Concern**

The program needs to update its learning outcomes and assessment plans for the major. Classroom size and space does not fit with current needs. Teaching lab space is inadequate for the current size of the major. Students reported that career advising was not sufficient for their needs.

**Recommendations**

- The program needs to update learning outcomes, assessment plans, and syllabi
- Consider ways to get students involved in major earlier
- Work with CALS and other departments to resolve teaching lab issues
- Work with CALS Office of Student Affairs to improve career advising

**Overview of the Genetics Ph.D. Program**

The program is nationally recognized and competes with top programs in recruiting graduate students. However, there is concern that due to low stipends the program is falling behind in matriculating excellent students. Since the last review the program has instituted numerous quality control programs aimed at overall climate, student success, and mental health.

The program is committed to increasing diversity. Over the last 10 years the program has attained a five-fold increase in the number of applicants from under-represented groups (URG). Of the T32 eligible domestic students, 35-40% in 2018 and 2019 were URG students. At the time of training grant renewal, retention of URG students was not statistically different from non-URG students. UW-Madison Genetics PhD graduates have had success in attaining post-graduate opportunities of their choice, as outlined in detail below.

**Response to the last program review.** The last program review for the Laboratory of Genetics (LOG) was done in 2010. Overall, the previous review of the Graduate Training program was positive. One critique focused on the maintenance of trainers for the program. In response to the critique on lack of trainer removal process, the program enacted a mechanism of formal removal.

An additional critique of the program related to the lack of consistency among student annual meetings. The program has instituted a series of changes to address this. The program now tracks student programs through required annual committee meetings that address student progress and graduation.
plans for all students starting in their fourth year, plus semi-annual check-ins about graduation plans for students beyond their fifth year.

Concerning the previously identified “dearth of paid TA positions,” there has been a positive change creating an opportunity to earn more TA funding since CALS implemented a “money follows activity” model for calculating funding return to departments. Genetics has benefited in this regard by the efforts of three faculty associates who teach large enrollment courses, thereby earning TA credits. The program now has the opportunity to engage faculty to teach courses in which students would like to enroll and thereby earn more funding for TAs.

Are there areas that are exemplary? Are there areas that need improvement? If the latter, do you have particular recommendations for steps the department should take to strengthen its performance? Strengths

Based on the information provided in the self-study and the information from interviews with graduate students, the Genetics PhD program is functioning at a high level. The program recruits excellent students. Student feedback included the following points:

- Students like the course sequences. They feel the courses are valuable, providing what they need and not anything excessive. The core classes are useful. All the students agreed that computational biology classes should be required. They mentioned that they enjoy the opportunity to meet with colloquium speakers after seminar.

- Students mentioned that the student coordinator keeps information on each student; what lab they are in, feedback on their PI, when they took their prelim, how it went, research progress, etc. The students felt that this gives them a voice and helps incoming students from joining a lab that’s not a good fit. The students appreciated that they were represented on the hiring committee for a new student services coordinator.

- The graduate program would be the envy of many universities, but the faculty have serious concerns. Matriculation rates of highly recruited students are down, losing students to what the program considers peer institutions. Based on student feedback the basis for the reduced competitiveness seems to be the student stipend, which tends to be lower than elsewhere. The number of graduate student slots in the training grant has been decreasing. This coupled with tuition remission makes it difficult to expand the program. They would like to raise the stipend but are constrained by budget issues and by the need to coordinate with other campus graduate programs leading to an overall trend of attrition in the grad program. It is difficult to justify increasing slots from NIH when the graduate program numbers are going down.

To quote directly from the self-study “One challenge that we have to address is incoming class sizes: their long-standing model was to fund all first-year students on the NIH T32, which provides student funding during rotations. However, with the shrinking sizes of NIGMS training grants (including the Genetics grant, which was renewed at 12 slots from 16 in the last five-year grant cycle), and with the changing landscape at NIGMS (which does not like that all students in the program receive funding), we will need to investigate a new model to maintain the size of the program – this model will require more investment from colleges, in addition to existing Graduate School support, to cover rotations of incoming students who do not receive T32 funds. We have seen an up-tick in direct admit students in the last few years. These students are fully integrated in the program and otherwise treated identically to traditional-admit students. Still, to compete for the best students will require a mechanism to fund their rotations.”
• Among the students there is unhappiness with both experience and timing of the teaching assistants. All but one of the students felt that the workload was too heavy for the teaching assistants (quiz a week for 60 students). More importantly don’t see any career benefit from the TA experience. Students we spoke with said they were graders not teachers. They don’t give lectures and the main opportunity doesn’t give them teaching experience. Some said they’d prefer pay if they are going to be graders but wouldn’t mind not getting paid if they got to lecture and learn more about teaching. Another said, “it is souring their feelings on teaching in the future”. Another said, “I know no one who has had a positive TA experience”.

The other student said she is TAing for “Genetics in the News” which is a 100 level class. She gets to plan out lectures and she has a grader, so she was quite happy.

• The timing of the teaching assistant appointments was viewed as problem. Apparently, most of the students TA in their second year and this is also when they take their prelims. The group we met with thought that TAing and prelims should not be in the same academic year. The students thought TAing in the 3rd year would be better.

How does the climate of academic programs support student learning, faculty and staff engagement, and inclusivity at all levels?

From the self-study it appears that the program takes the issues of climate and inclusivity seriously and has been making positive strides. The Graduate School exit survey shows overall positive assessment of their climate.

• A major goal for the program is to increase and support diversity, in particular by recruiting more African Americans to the program. URG recruiting, especially of African Americans, is a major hurdle. A key goal is to increase critical mass of URGs and African Americans.

• All first-year students participate in workshops on diversity in their first semester and inclusive TA training led by WISCIENCE in their second year. All trainers receive written guidelines on inclusive mentoring and moving forward will receive instruction during trainer training workshops.

• The Graduate Student Committee recently devised a student vision statement that outlines expectations from students for the climate and community for which they strive. All incoming students will receive the student vision statement.

• The LOG also maintains a Diversity Committee with graduate students.

• The program relies on a close relationship with the SciMed GRS program to support their URG students. If there are signs that students are struggling, the program works with SciMed GRS to provide coordinated support.

Are there a sufficient number of students in the graduate program and are the students of high caliber? Are the students well supported (e.g., Is student advising and mentoring functioning well, are student expectations clearly communicated to students)?

• As mentioned above the number of graduate students is at a healthy level. However, the program competes for students with other top programs in the country and in terms of recruitment and matriculation of the best students, they believe they are losing that competition too often.

• The students they do matriculate are of high caliber and have excellent job placement rates and hiring entities would like to see more students, as would the faculty. The funding model is an
Based on student comments and the self-study it appears that the students are well-supported. Students receive annual feedback from the program in the form of their in-person annual committee meeting and associated written paperwork. The student services coordinator (SSC) reviews all paperwork to assess sufficient progress and follow-up with the student and advisor on any red flags. In terms of encouraging good mentorship, the program has surveyed students on what they seek in a good mentor and what they see as problems in bad mentors. This information is provided to all new trainers and to all trainers when they take a new genetics student. To further improve their training system, the program is now requiring that all genetics trainers take a training workshop, done in partnership with WISCIENCE, on what the program and students require in a good mentor.

The students indicated that they felt a good support system was in place. The SSCs know the students well and what’s going on in their lives. If students have a challenging situation with their PI, they know they can go to SSC, who keeps track of how rotations are going. If students aren’t finding a professor for rotations the SSC will help them find a lab, as she is aware of who has openings, and who might be a good fit for a specific student.

The program provides regular in-person and electronic updates on the program. The director of graduate studies (DGS) holds at least one (often two) town hall meetings annually for students to discuss changes and possible improvements to the program. Afterwards, students meet privately over dinner to discuss among themselves and provide feedback to the DGS and SSC.

All students are required to maintain an IDP; they are also strongly encouraged to discuss their IDP with their advisor and thesis committee. The annual committee meeting paperwork requires that students have updated their IDPs and entered compliance in the UW database.

The program has several mechanisms of support for conference travel, including: $300 provided to each student funded on the T32, the Laboratory of Genetics Stone Travel award (which funds up to 10 students each year for travel), and notification of travel funds from the Graduate School.

The program has put much more focus on supporting students in professional development to prepare them for diverse careers that leverage at PhD. Students are strongly encouraged to pursue professional development outside the required curriculum.

According to the self study the program frequently assesses curriculum and keeps up on the latest best practices, latest technologies, and direction of the field. The DGS, SSC, and steering committee discuss changes that should be made to didactic training within the program at least annually. Learning objectives on which students are assessed are provided to thesis committees for the preliminary exam to guide committees. The program assesses learning outcomes through core coursework required of all students (Gen 701, 702, 707, 708), the preliminary exam is taken in Year 2 of the program, and annual committee meetings report on student knowledge and progress.

The program has put renewed focus in the last several years on decreasing the time to degree. At the time of grant resubmission in 2018, the average time-to-degree for the Genetics PhD over the last 15 years was 5.9 years. Analysis in 2018 showed no significant difference in time-to-degree or completion rates for URM versus non-URM students or women versus men. The program’s goal is to decrease average time to under 5.7 years. To accomplish this goal, they have
implemented several changes: they encourage students at time of entry that they should aim for a 5 year PhD, and they give students tips to meet that goal; they make it clear to faculty that time-to-degree is important for the program. They check with fifth year students about their graduation plans every ~6 months.

Cytotechnology review
Interview on April 14th, 2020
Moderated by Bill Tracy

Present: Beth Meyerand, Daniel Kurtycz, Erik Dent, Kaitlin Sundling, Katrina Forest, Bill Tracy

This is a program that grants a certificate accredited by the Council on Allied Health and Education and the American Medical Association. In this application-based certificate, students receive specific training over three terms focusing on the various applications of cytotechnology. The program takes one year to complete and runs from August – August.

How well are the academic programs functioning? Are there areas that are exemplary? Are there areas that need improvement? If the latter, do you have particular recommendations for steps the department should take to strengthen its performance?

• The Certificate in Cytotechnology is a small program of usually eight students per year. The maximum capacity is 12. They would like to increase numbers and would welcome support in doing this. The program appears to be functioning well. Graduates must pass a board exam to be certified. The self-study indicated that the number of students passing was lower than that of the self-identified peers. The certificate has new leadership and direction in Professor Kaitlin Sundling (incoming Faculty Director), and she has identified this as a place for improvement.

• The program has had fairly frequent leadership and staff changes over the years. There have been some difficulties in program leadership transitions. These problems highlighted the need to develop improved documentation and standard operating procedures for essential program functions, including documentation for accreditation. Professor Sundling is aware of these challenges and is committed to improvement.

How does the climate of academic programs support student learning, faculty and staff engagement, and inclusivity at all levels?

• We did not interview any students. With the size and structure of the program the students have easy and regular access to the faculty director and instructors for advising.

Is there a sufficient number of students in each program and are the students of high caliber? Are the students well supported (e.g., Is student advising and mentoring functioning well, are student expectations clearly communicated to students)?

As mentioned above, there is a desire for growth in the Certificate in Cytotechnology program. Based on the funding model and resources, eight appears to be a sustainable number, but the program would like to expand, and they could use assistance in recruiting.

Should the department be taking any steps to improve the quality of its educational programs? Are student learning goals clear? How is learning evaluated and used for program improvement? How well does the learning assessment plan measure student achievement of learning goals? Are the curricula
clear and appropriately designed to achieve the learning goals?

- The certificate program should strive to improve the percentage of students passing the board exam to the levels of its peer programs.
- The program should increase enrollment to the 12 student maximum. Since this is a revenue generating program, this will increase resources for the program.