Graduate Student Handbook

Master of Science in Integrative Genomics
Black Hills State University

Academic Year 2008- 09

GRADUATE STUDENT HANDBOOK

Department of Science, Academic Year 2008 – 09

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INTRODUCTION

Welcome to Black Hills State University and the Black Hills. We recognize the challenges associated with relocating to a new place, institution, and program, and hope that this handbook will ease both the process of relocation and serve as a valuable source of information throughout your stay. This is the first edition of the Handbook, which has been reviewed by the Science Department faculty, University Graduate Committee, several administrators, and two outside reviewers.

We believe that graduate education provides training for a profession, and we expect students to contribute fully to the Department as professionals. This includes contributing substantially to departmental affairs, excelling in course performance and teaching roles, serving as thoughtful, responsible representatives of the Department and University, and both receiving and providing constructive criticism during interactions with faculty and student colleagues.

Many sources of information about western South Dakota, Black Hills State University and the Department are available to you. The Chamber of Commerce is a short walk from campus and provides numerous brochures about life in and around Spearfish. General information and regulations concerning graduate study at Black Hills State University, as well as courses offered by the Department, are described in the "Graduate Bulletin" found via the University homepage (www.bhsu.edu) or the Office of the College of Arts & Sciences, room 108 Jonas. The Black Hills State University Graduate Catalog also contains a wealth of information about the University and the services it provides. On a more local scale, faculty and graduate students can assist you in all matters concerning your full integration into the program. <u>You need to become thoroughly familiar with this Graduate Student Handbook and the on-line Graduate Catalog.</u> In conjunction with the Graduate Catalog, this Handbook provides a concise and detailed statement of current regulations and guidelines you must follow during your graduate career at Black Hills State University. The Handbook will accurately describe most information relevant to you, but changes may occur prior to your arrival or during your studies in the Department. Subsequent alterations in policy or process may supersede previous procedures, subject to the approval of your advisory committee. We must emphasize that it is the responsibility of the student to adhere to the regulations and guidelines described in these publications, and not the responsibility of the Faculty Advisor.

TO WHOM THE HANDBOOK APPLIES

The contents of this handbook are applicable to all students entering the Department in the fall semester, 2006 and thereafter. Students who entered before this date should use the recommendations and requirements herein as far as is possible, but have the option of continuing under the requirements in effect at the time they were admitted to their current program.

ADMISSION TO THE INTEGRATIVE GENOMICS GRADUATE PROGRAM

Students have the option of taking either a thesis or non-thesis track. The thesis track requires at least one satisfactory and relevant manuscript from original research for publication in a peer-reviewed journal. The non-thesis track substitutes an internship with a relevant biotech company or the equivalent (e.g., Environmental Protection Agency laboratory) and one course in business marketing and management.

Application requirements:
Successful applicants will be required to:

1. Complete the online application (https://www.bhsu.edu/Admissions/Apply/Graduate/tabid/2272/Default.aspx)
2. Send a one page statement of interest
3. Send transcripts showing completion of the Bachelor's degree in either biology or chemistry and at least one course in genetics
4. Submit two letters of recommendation
5. Provide Graduate Record Examination (GRE) results (the general test only; the advanced subject test is optional)
6. Provide TOEFL results (if your most recent academic degree is from a university where English is NOT the primary language of instruction)

All of the above materials should be submitted by March 15 for admission in the fall semester, with late applications reviewed July 15. Materials should be sent to the College of Arts and Sciences Office, 1200 University St. Unit 9003, Spearfish, SD 57799-9003, fax to (605) 642-6762,
email to ShelbyCihak@bhsu.edu.

Admissions will depend upon the availability of a Faculty Advisor. In addition, funding for the student, adequate space, research resources and equipment must also be available.

Because of the limitations on admissions and the necessity for a faculty member to support acceptance, a meeting with potential faculty advisors prior to admission is strongly recommended. Prospective students should contact faculty directly during a visit to campus. If this is not possible, contact should be made at professional meetings, or by letter, e-mail or telephone. Applicants should be prepared to discuss their backgrounds, specific areas of interest, and career goals.

Graduate degrees are awarded only to students holding Graduate Regular Standing. This status is conferred when a student has fulfilled all requirements for admission to both the Graduate College and to the MSIG program and has been recommended by the Department for admission to the Graduate College. Any "conditional admission" criteria must be satisfied to graduate.

Graduate credit may be earned by students holding Graduate Provisional (Conditional) Standing or Graduate Non-Degree Standing. Provisional Standing may be assigned to a student who, for some reason, is not qualified for Graduate Regular Standing. It may be that the student lacks prerequisites for the program (Bachelor's degree in either biology or chemistry and at least one course in genetics), did not file all necessary transcripts, has

a low cumulative undergraduate GPA (i.e., less than 2.9), or has some other deficiency. Non-Degree standing is for students who do not intend to pursue a degree program. Normally no more than 12 credit hours of graduate credit earned while the student has Graduate Provisional or Non-Degree standing may be applied toward a graduate degree. Please note that students who have completed hours while on Graduate Non-Degree Standing and who have fully completed application procedures for Regular Standing are not assured admission to the graduate program of the Department. They must be considered for admission along with all other applicants.

GRADUATE PROGRAM COMMITTEE (GPC)

Oversight of graduate studies in the Department resides with the Graduate Program Committee (GPC), which will consist of two faculty members, one graduate student representative, the Director of the MSIG program, and the Department Chair. The Integrative Genomics Graduate Student Association (IGGSA) will recommend the graduate student member, who will have voting status except in admissions and assistantship decisions. The faculty members will serve two-year terms and will be selected by the Dean of the College of Arts and Sciences.

The GPC is responsible for periodic review of policies and procedures concerning the MSIG program. Revisions to policies and procedures are subject to ratification by the MSIG faculty, and final approval by the Dean of Arts & Sciences. The Director of the MSIG program is also responsible for monitoring the timely completion of degree requirements as outlined in the student's Program of Study and this Handbook in conjunction with the student's Major Professor and Advisory Committee.

Admissions are overseen by the GPC who recommend admission of applicants and recommend to the Dean of Arts & Sciences candidates for financial support. Applications for admission are normally reviewed in the Spring Semester (application deadline is March 15th) of each academic year for admission the following fall. Depending on availability of positions, there will also be a review of late applications (deadline is July 15th). Sometimes, though not typically, applications may be considered for Spring admission if completed by October 15th. Recommendations for admission and financial support are made to the Dean of Arts & Sciences and forwarded by the Dean to the Director of Graduate Studies for final action. The Department Chair, in consultation with the Director of the MSIG program, balances committee recommendations with overall curricular and programmatic needs of the Department.

GETTING STARTED

Here are a few initial items requiring students' attention upon arrival. These and more will be covered at the fall orientation program.

- **University ACE card:** The university identification card or ACE card is obtained from the University Support Services office on the second floor of the Woodburn administration building.
- **E-mail:** You will need to apprise the department office of your e-mail address to be kept informed of issues, topics, meetings, funding opportunities, deadlines, workshops, etc. important to your graduate student functions in the department

and university. We strongly recommend that you use your official BHSU email account.

- **Mailbox:** Graduate students in residence will have a mailbox available to them in the Arts & Science mailroom, Jonas building first floor. See the department office staff.
- **Keys:** First fill out a key request form, which can be found in the drawer of forms in the mailroom, and then give it to the Arts & Science office staff for processing.
- **Office space:** Consult with your Faculty Advisor regarding desk space and the phone in her/his research area.
- **Photocopies:** See the department office staff for current procedures.
- **Parking:** Permits to park on campus are purchased at Facilities Services.
- **Pay Day:** Last day of each month.
- **Residency Status:** Non-state residents with graduate assistantships will be considered state residents for tuition purposes.

FACULTY ADVISOR

Throughout your studies here you will work most closely with your Faculty Advisor (major professor). This relationship will be established by mutual agreement based on your shared interests and available resources. Your Faculty Advisor should be determined either prior to or shortly after your arrival, and this advisor will ordinarily be permanent; however, the student may change advisors if deemed advisable after consultation with the current advisor, the potential advisor, and the GPC. It is imperative that you work closely with your Faculty Advisor to plan your program of study and to insure that requirements are met in a timely manner and in accordance with the policies of the Department and University.

Each Faculty Advisor will have individualized expectations or lab policies for the students training in her/his research program. You should discuss these right away with your advisor so that you both have a clear starting point, realizing that changes may evolve as your graduate program develops. Regular, clear and open communication can prevent misunderstandings with your advisor (and Graduate Advisory Committee). This is very important: do not disregard topics such as:

- Mutual expectations of <u>you</u> as a trainee and your <u>advisor</u> as a mentor,
- Good practice and ethics in scientific research,
- Animal care and use regulations,
- Protection of human subjects and associated regulations,
- Safety/required training for all manners of handling radioactive and/or hazardous materials,
- Data notebooks, ownership of data and other research materials,
- Order of authorship on future manuscripts and presentations,
- Financial support: stipend (amount & years), travel to meetings, supplies, etc.,
- Post-degree letters of reference/recommendation and assistance with placement.

GRADUATE ADVISORY COMMITTEE

A student's graduate advisory committee must include the student's major professor, at least one other faculty member from the Integrative Genomics program, and a third member, which could include another faculty from the Integrative Genomics program or another appropriate faculty member from another academic institution, such as SDSM&T, or department. To clarify, faculty "inside" the Integrative Genomics program includes those individuals with voting status in the Department of Sciences or an allied department, such as Psychology, and active research interests in Integrative Genomics. Faculty of the Integrative Genomics program also includes those faculty that are regular participants in the Integrative Genomics course curriculum (see below under Program course work). Those faculty with training outside the Biological Sciences or allied fields are recommended as co-advisors with a member of the Integrative Genomics program or to have strong collaborative ties or research interests within the area of genomics. Thus, the majority of members of a Graduate Student Advisory Committee will be composed of faculty "inside" the Integrative Genomics program. Faculty Emeriti and adjunct faculty of the Department are also considered "inside" the department for the purposes of a Graduate Student Advisory Committee.

MASTER OF SCIENCE IN INTEGRATIVE GENOMICS (MSIG)

Black Hills State University's Master of Science degree in Integrative Genomics is an interdisciplinary graduate program that combines genomics, ecology, evolution, and physiology to better understand the evolutionary forces that have shaped the mechanisms that are important to species interactions in the wild. The degree was based on a seminal paper on Integrative Genomics (Evolutionary and Ecological Functional Genomics) that formally defined the field (**Feder, M. E., and T. Mitchell-Olds. 2003. Evolutionary and ecological functional genomics. Nature-Reviews-Genetics. 4:651-657. Available in the Arts and Science office for copy.)** and therefore should be consulted for a better understanding of the scope of the topic and degree program. The program is designed to provide M.S. students the necessary skills and intellectual background to work cooperatively with others in this research area that takes a systems-wide approach and incorporates an organism's history and natural environment to understand the organization and expression of its many genes and gene products. Exposure to modern techniques and instrumentation in the laboratory and field will prepare the student for success in both academic and other biotechnology-related pursuits.

Students have the option of taking either a thesis or non-thesis track. The thesis track requires the submission of at least one satisfactory and relevant manuscript from original research for publication in a peer-reviewed journal. The non-thesis track substitutes an internship with a relevant biotech company or the equivalent (e.g., Environmental Protection Agency laboratory) and one course in business marketing and management.

BHSU is uniquely qualified to administer this program because of (1) the proximity of the Black Hills, a natural laboratory for Integrative Genomics, (2) the proximity of the Dusel Laboratory at Homestake Mine, which will provide opportunities for collaboration with other major universities (to study, for example, the meta-genomics of the unique microbial communities found in extreme environments), (3) recent faculty hires (in

addition to an evolutionary geneticist, a conservation biologist and a physiologist, new faculty with interests in molecular biology, molecular ecology, functional ecology, molecular evolution, molecular phylogeny and signal transduction have been hired) and training (statistical genetics, bioinformatics, transcript profiling etc.), (4) recent and continued funding (National Science Foundation, Environmental Protection Agency, National Institute for Health) for Ecological Genomics and Conservation Genetics laboratories and the Western South Dakota DNA Core Facility, and (5) current research programs in Integrative Genomics that involve various collaborations at major institutions. All segments of the Department share a long history of teamwork on both professional and social levels; all contribute significantly to the Department's functions and well-being.

Working with your Faculty Advisor and Graduate Advisory Committee: A Faculty Advisor for a student is selected at the time a student is admitted into the program, or shortly thereafter. The advisor and student arrange a class schedule for the first semester. As indicated earlier, it is possible for the student to change advisors after consultation with the current advisor, the potential advisor, and the GPC.

Before mid-semester of the first semester in residence, a Graduate Advisory Committee will be formed by the student (see pg 7 for committee membership). The graduate student, in consultation with the advisor, should select a group of potential committee members who can best advise the student in the area of research. You should then discuss your plans with these faculty members to determine their willingness to serve on the Graduate Advisory Committee. The student and advisor then submit the list of committee members and brief description of the proposed thesis project by mid-semester to the Chair of the Department, who will take it to the GPC for review. The GPC will determine the potential feasibility of the proposed project and its match with the expertise of the committee. If there is an apparent problem, the student and advisor will be asked to make the appropriate changes or to clarify any misunderstandings. This initial check will also ensure that that the project falls within the general field of Integrative Genomics. Once approved, the list of committee members and project description should be filed in the College of Arts and Sciences.

First Committee Meeting: For students entering the program in the fall semester, a committee meeting should be held by January 15th. For students entering in the spring semester the first meeting should be held by May 15th. All students must ensure that advisory committee meetings are confirmed one month ahead of the scheduled date. The first meeting is to plan a program of courses and discuss a thesis plan of study. The actual "Plan of Study" should be in the form of a grant proposal or review article, and must include an itemized budget. This document should be worked over by the student and their major advisor before being submitted to other committee members for review. This plan of study provides the committee with the following information:

a) The major questions or hypotheses to be addressed
b) The significance of these questions
c) The extent of current knowledge in the area of research
d) The materials and methods to be used to answer the questions
e) The schedule for completion of stages of the work

The first meeting, the student presents his/her proposed masters thesis project to the committee. One member of GPC must also be in attendance. The committee will question the student to see if the plan is sound and if the student understands the literature. The committee will also look at which courses the student has taken, what they are planning to take, and whether there are any weaknesses they need to address in their coursework and research plan. The committee will discuss whether the student has access to the expertise and funding needed to do the project, or if any adjustments should be made to the committee or work plan. Before the meeting and upon completion of the meeting, the "Graduate Advisory Committee Annual Meeting Form" (see Appendix I) will be completed, which is essentially a record of progress, future plants, and committee recommendations.

In signing The Graduate Advisory Committee Annual Meeting Form the committee and the GPC representative are giving their recommendation for the student to be admitted to candidacy for the master's degree. A copy of the signed form must be put in the student's file in the College of Arts and Sciences Office and the recommendation forwarded by the Dean to the Director of Graduate Studies Office. Once a formal proposal and budget are written and approved, the student is expected to complete the project without switching advisors, committee members, or projects. Extenuating circumstances must be approved by GPC. The major advisor, the new advisor, the GPC and the Department Chair, must approve any switch.

If any member of the committee or the GPC member does not sign off on the Graduate Advisory Committee Annual Meeting Form soon after the committee meeting, the student is put on probationary status for no longer than one semester, at the end of which the student will have made sufficient progress to satisfy the dissenting member, or the student will be terminated from the MSIG program following agreement by the GPC and the Department Chair.

Subsequent Meetings: Students will arrange a meeting of their Graduate Advisory Committee in mid fall of their second year in order to assess progress, discuss research results and/or future research plans. Preparation for the meeting involves a full report of the past year's research including analysis of data and a well-developed plan of research for the remainder of the program. The Technical Review can be combined with this meeting or held separately up to three or so months before the student expects to defend. During the Technical Review, the student should present the work to the Graduate Advisory Committee and GPC representative, who should be highly critical of the work. This will effectively flush out any problems in the research or candidate preparedness that would otherwise show up at the defense. At the time of the Technical Review, the student should have time to fix things. If the work is weak, the student will be informed that he/she must come back for another Technical Review. This process will be repeated until every committee member and the GPC representative approve of the project for the defense. Any single committee member or the GPC representative could veto a scheduling of the final defense. All should feel strongly that the student is ready. The Technical Review stage will provide the real checks and balances on quality.

During the spring or summer of the second year, students will be asked to present on their research to the department and to take part in an oral examination by the student's graduate advisory committee. The presentation and oral examination constitute the thesis/internship defense (see below).

By the end of the second year, students will have written a thesis in the form of a manuscript(s) for peer-reviewed publication or an internship final report.

Thesis Track - Research Requirements and Thesis: If in the thesis track, the student must submit a thesis based on original research and must complete at least 12 credit hours of thesis research (BIOL 798). The thesis should be of such quality that major portions of it are publishable in a national research journal in the field of study. Writing the thesis as a research paper or papers for submission to a specific journal is a requirement.

Before the thesis is submitted to your Graduate Advisory Committee, it must have been reviewed by the Faculty Advisor, revised by the student, and approved again by the Faculty Advisor. The initial submissions of the thesis to the committee needs to be made well in advance of the Final Oral Examination (minimum of four weeks) in order to allow for further revisions based upon the committee members' recommendations. Committee members must provide timely feedback on the thesis within two weeks if their changes are to be incorporated into the final draft of the thesis. The thesis, as close as possible to being a final copy, including all figures, tables, and references must be distributed to all committee members and a member of the GPC at least seven working days before the date of the Final Oral Examination. Any committee member who considers the thesis needs more work may demand that the Final Oral Examination be rescheduled. If the entire committee concurs, then a new date for the oral will be set at that meeting.

Internship Track – Final Report Requirements: The final report for the non-thesis track in Integrative Genomics should reflect the completion of 12 credits of internship work and preparedness of the student for an entry-level management position in a biotech or biotech-related laboratory. This includes both scientific knowledge and business practices. The guidelines for preparing the final report are in APPENDIX III.

Thesis/Internship Defense: MSIG students are required to present results of their research or internship in a formal presentation to the department (approximately 45 minutes and open to the public) and at a professional meeting (usually 10 to 15 minutes). It is recommended that, when possible, the final oral exam be held immediately following the campus presentation. The campus presentation and oral examination constitute the thesis defense.

The oral examination is designed to test a student's knowledge in Integrative Genomics and competence in research, as well as the adequacy of the thesis or internship. All members of the student's Graduate Advisory Committee give the examination. This exam typically lasts 2-3 hours, with half the time devoted to knowledge in Integrative Genomics and half to research and thesis. All faculty members are free to attend the oral examination and may ask questions if invited to do so by the Chair of the Graduate Advisory Committee.

In preparation for this examination the student must observe the following points:

- A copy of the thesis/report in virtually final form must be distributed to all committee members at least seven working days before the date of the examination.
- The student must arrange the date for the examination so that all members of the committee can attend. Such a date must fall within the Fall or Spring semesters (excluding Final Examination Week), and faculty must have a confirmed time, date, and place in writing from the student.
- For students wishing to graduate at the spring graduation, the exam must be taken at least four weeks before the end of the last semester of the student's enrollment, in order to allow time for any necessary changes before submitting the final thesis copies to the appropriate offices.
- Students must be enrolled during the semester in which they submit the thesis.
- The Application for Graduation should be made to the Graduate College no later than the second week of the semester of graduation.
- With meetings of the Graduate Advisory Committee scheduled each academic year, it is expected that each member will be familiar with the research progress and with early drafts of the thesis. Frequent consultation with his or her advisor and committee members is encouraged throughout the student's research and preparation of the thesis.
- Prior to the Final Oral Examination, the student will provide to each committee member a list of courses taken for the MSIG degree; i.e., a current copy of his/her approved Graduate Advisory Committee Annual Meeting Form (Appendix I).

Questions in the examination will evaluate the candidate's understanding of the basic principles of the Integrative Genomics core curriculum and specific aspects of the designated discipline. Questions on research and thesis may relate to points of clarification, analytical procedures, basic biology and systematics of the species studied, possibilities for future research and publication, and areas where research could be improved. Each committee member will keep notes on all questions asked, record satisfactory or unsatisfactory for the answer, and make a general summary of the student's performance. After discussion a final pass or fail vote will be recorded by secret ballot. A student must obtain at least two-thirds of the votes in favor of passing the oral exam and accepting the thesis. The Chair of the Graduate Advisory Committee (the Faculty Advisor) will report the result of this exam in writing to the Director of the MSIG program and to the Dean of Arts & Sciences (APPENDIX II). If the examination is failed it may be repeated only once.

Seminar Requirements: All graduate students are expected to attend general departmental seminars (BHSU Science Seminar Series) while in residence. Student and program assessment will take into account such professional involvement in Departmental activities. In addition, one seminar course (BIOL 590) on a relevant topic selected by the instructor is required of all MSIG students.

Graduate students are expected to attend all department seminars (usually Friday at noon). The exposure to a wide range of ideas and an opportunity to meet and interact with other scientists is a valuable experience for graduate students, both when the speaker is in one's own field and when she/he is not. Furthermore, all members of the department,

including graduate students, have a professional responsibility to show interest in speakers whom the department has invited to present their work, and to be involved with entertaining the visitor.

Evaluation of Progress and Grade Requirements: The student's Graduate Advisory Committee will meet to evaluate the student once each year. To remain in good academic standing, students are expected to maintain a grade point average of B (3.0) or better throughout the course work for the M.S. degree, and to make significant progress in research each semester. No more than two courses or six credit hours of course work with a grade of C may be used toward the M.S. requirements. Accumulation of more than 6 credit hours of graduate course work with a C grade or below will result in the termination of the student's M.S. program regardless of the grade point average. A terminated student may petition the Graduate Council for readmission based on their individual circumstances. It would be the student's responsibility to articulate their case and explain why an exception is warranted. The minimum cumulative grade point average in graduate courses is 3.00 (=B) for graduation. Students with, or applying for, financial support must maintain a grade point average of 3.00 or better. Students are expected to complete courses listed on their approved program plan before taking other courses. Exceptions and substitutions can be made if unique courses are identified that would benefit a students program. The student advisor and Department Chair must approve such exceptions and substitutions.

Program course work:

M.S. in Integrative Genomics	Credit Hours	Percent
Required Core Courses	12	37.5
Required Thesis or Internship	12	37.5
Electives	8	25.0
Total required for the degree	32	100.0

Core Courses and Thesis work

Prefix & Num	Course Title	Credit Hours
BIOL 574/L	Ecological Genomics	4
BIOL 590	Graduate Seminar	1
BIOL 724L	Genomic Techniques	2
BIOL 735	Evolutionary Genomics	2
PHPH 792	Bioinformatics (USD)	3
BIOL 798 BIOL 794	Graduate Research (Thesis) or Graduate Internship	12

Take 8 elective credits from the following two sets of courses –

Mid-tier Restricted Elective Courses (minimum of 2 required)

Prefix & Num	Course Title	Credit Hours
BIOL 544	Microbial Genomics	3
BIOL 710	Population and Quantitative Genetics	3
BIOL 792	Topics**:** Genomics	2
SCI 588	Biological Applications and Remote Sensing	3
MATH 587	Design of Experiments	3

Program Electives

Prefix & Num	Course Title	Credit Hours
BIOL 530	Neurobiology	3
BIOL 531	Field Biology	2
BIOL 534/L	Herpetology	4
BIOL 537	Biometry	3
BIOL 565	Evolutionary and Ecological Plant Physiology	3
MATH 581	Probability and Statistics	3
ATM 503	Biogeochemistry (SDSM&T)	3
BSM 710	Services Marketing Management*	3

Recommended course schedule:

First Year:

Fall	Cr	Spring	Cr
BIOL 574/L Ecol. Genomics*	4	BIOL 590 Graduate Seminar	1
BIOL 724L Genomic Techniques	2	BIOL 735 Evolutionary Genomics	2
BIOL 531 Field Biology or Other restricted elective	2-4	PHPH 792 Bioinformatics	3
BIOL 798 Graduate Research or BIOL 794 Grad. Internship	0-1	BIOL 798 Graduate Research or BIOL 794 Grad. Internship	2
Total Credits	**8**	**Total Credits**	**8**
TA one course		TA one course	

Summer:

To retain Graduate Assistantship, a student is expected to work full-time on research.

Second Year:

Fall	Cr	Spring	Cr
BIOL 792 Genomics or Other restricted elective	2-4	BIOL 798 Graduate Research or BIOL 794 Grad. Internship	4-6
Restricted Elective	2-3	Write thesis or Internship Report	
BIOL 798 Graduate Research or BIOL 794 Grad. Internship	2-5	Restricted Elective	2-4
Total Credits	**8**	**Total Credits**	**8**
TA one course		TA one course	

***If this course is not offered, take it in the fall of the second year and trade it for a Restricted Elective (listed for fall, second year). Students must be enrolled for a minimum of 8 credits to receive a MSIG Graduate Assistantship.**

Graduate Research Assistantship: Students in the Integrative Genomics Program and in good academic standing will be supported through Graduate Research Assistantships. Most of the students will receive full-time Graduate Assistantships, which will require responsibilities in research, mentored laboratory teaching, and mentoring undergraduates in research experiences in addition to program course work. The starting stipend for FY09 is $16,640, with second year students receiving a 4% raise. Students must be full-time and enrolled in a minimum of 9 credits each semester or in at least 18 credits by the end of the first year and work full-time on their research project during the summer to maintain the 12-month stipend. (The Graduate Bulletin states that a 9-credit load is full-time for financial aid purposes, but for the MSIG graduate assistantship, 8 credits is a full-time load. The grant support we have for the stipends requires the full 9-credit load, however.) During the second year students must also be enrolled in 8 (9 if receiving the stipend) credits per semester or on track to complete the degree with at least 32 credits by the end of the second year. Students with the Graduate Assistantship will receive the reduced resident tuition rate (which must be applied for each semester). Graduate students within this program do not need to register for credits during the summer.

Students with, or applying for, financial support must maintain a grade point average of 3.00 or better.

Teaching experience: Part of the graduate experience in this program involves supervised teaching and mentoring undergraduates on a research project, most likely assisting the graduate student with his or her own work. Teaching involves assisting in one upper division course (approximately 10 hours per week) per semester, usually the laboratories and some selected lectures. This aspect of the requirements for the program prepares graduate students for doctoral programs in which this will be a standard program requirement, for laboratory research where collaborative teamwork usually is valued highly, and for possible future careers in academia.

Tuition and fees: In FY09 students with graduate stipends pay $44.55 tuition and $107.70 in fees per credit. The total cost is $152.25/cr, which is $1370.25 for 9 credits per semester. Students can pay this in 4 installments of $343 each, with the first payment due during fee payment. In addition, they pay $51.30/ lab course. These rates generally go up each year. An authorization for reduced tuition form (picked up in J108 or the VPAA office) must be filled out before each semester and taken to the office of the Assistant Vice President for Academic Affairs, Woodburn Hall 214. After the form is approved, students must take it to the office of the Dean of Arts and Sciences, and then to the business office.

The University provides the services of a physician's assistant and nurse practitioner for primary care and health screening. Students may purchase supplemental hospitalization and surgical insurance at reduced student rates.

Time Limits: This is a 2-year, full-time program, and university funds for Graduate Research Assistantships are limited to two years. External funds from grants may be used to sustain students beyond the 2-year period, limited to 4 years. You must complete all requirements for the MSIG degree within a 4-year period, including time as a non-degree seeking graduate student. If you take courses from other institutions and transfer them to the MSIG program at BHSU, they must also be taken within the 4-year period.

One extension of the time to complete degree requirements (of up to two years) may be granted if there are compelling extenuating circumstances. Extensions may be granted for a variety of reasons which may include, but are not limited to, job relocation, military duty, pregnancy, illness, a serious accident, divorce, or other personal tragedies within the immediate household.

If you wish to petition for an extension of the 4-year limit, you must request an extension on the appropriate form. Your advisor and the department chair must support your petition by signing the form.

Credit Load: The minimum full-time credit load for a student not on a graduate assistant appointment is 8 hours, or at least 16 hours the first year, and on schedule for graduation with at least 32 hours by the end of the second year. Please see above under Graduate Research Assistantship for credit load requirements for graduate assistant appointments.

Summary of expectations and timeline: This is a 2-year, full-time program. During the first semester students should 1) take eight credits (9 if receiving an assistantship) of core and elective courses, 2) assist teaching in one upper division course (approximately 10 hours per week), 3) identify the members of their graduate advisory committee and report these to the Department Chair and GPC (by mid-semester), 4) conduct a thorough literature search of their research area and prepare a plan of study, and 5) schedule the first committee meeting one month in advance for a meeting time no later than January 15th to finalize plan of study and receive recommendation for admission to Master's candidacy. During the second semester students should 1) take eight credits of core and elective courses, 2) assist teaching in one upper division course (approximately 10 hours per week), and 3) begin research project.

During the summer students are required to conduct research, working full-time on the project. Graduate students are not required to enroll in any courses.

The final year will be spent 1) completing program course work (9 credit hours per semester if receiving a graduate assistantship), 2) assisting with teaching in one upper division course (approximately six hours per week), 3) conducting research towards the completion of the thesis, 4) scheduling and preparing for second Advisory Committee meeting, and 5) scheduling and preparing for the Technical Review, which should occur at least three months prior to the planned thesis defense (4 and 5 can be combined). The thesis should be nearly completed by the end of the spring semester, with the thesis defense following shortly thereafter. Time during the subsequent summer will usually be needed to finish up and produce a manuscript for publication. In these cases, ideally, only minor revisions to the thesis will be needed, allowing students to legitimately walk in the May graduation ceremony (with an official graduation date of August 15th).

APPENDIX I

Integrative Genomics Masters Program

Black Hills State University

Graduate Advisory Committee Annual Meeting Form

Section I (Progress Report) should be completed prior to the committee meeting. If this is the student's first committee meeting, please indicate this under Section I-C.

Section II (Plan of action) should be filled out by the student during the committee meeting to reflect the content of the discussion that takes place regarding suggested course work and objectives and directions for research during the coming year. **The graduate student and all Advisory Committee members must sign the form at the end of the meeting.**

Please print legibly OR TYPE

Student's name: _____

Meeting date: _____

I. Progress Report (to be filled by the student prior to the start of the meeting)
   a. Course work completed (or in progress)

Course title	Grade earned

Progress Report (continued)

b. Cumulative GPA (must be 3.0 or higher) _____

c. Research accomplishments

d. Address research objectives stipulated during the previous meeting

II. Plan of Action

e. Suggested course work

f. Research objectives

Signatures

Printed Name *Signature* *Date*

_____ Student _____

We recommend _____ be granted admission to candidacy for the Masters in Integrative Genomics.

_____ Committee Chair _____

_____ Cmte. Member _____

_____ Cmte. Member_____

_____ GPC member _____

APPENDIX II

BLACK HILLS STATE UNIVERSITY
DEPARTMENT OF SCIENCES
SPEARFISH, SOUTH DAKOTA, U.S.A. 87799

REPORT ON RESULTS OF FINAL ORAL EXAMINATION FOR MASTER'S DEGREE IN INTEGRATIVE GENOMICS

CANDIDATE'S NAME:		**DATE**:	

THESIS TITLE (if applicable):	

COMMITTEE VOTE:

PASSED:		**votes**
FAILED:		**votes**

Two-thirds votes are needed to pass
(See Handbook for policies)

COMMENTS:

Members of Committee:

_____, Program Committee Chair

_____

_____

_____

_____

_____, Director of MSIG Graduate Studies

Date: _____

Distribution of this form:

a. Director of MSIG Graduate Studies
b. Vice President for Academic Affairs
c. Graduate Student
d. Advisor
e. Original: Department File

Masters of Science in Integrative Genomics
Final Approval Form for Graduation

Student Name:_____

Graduate Advisory Committee -

_____ We recommend this student for graduation from the MSIG graduate program as s/he has successfully completed the required course work, teaching, thesis or internship and thesis or internship defense required for the degree. **The report on the final oral examination is attached.**

_____ We do not recommend this student for graduation from the MSIG graduate program. The following needs to be completed before a positive recommendation will be considered:

Members of Committee:

_____, Advisor Date _____

_____

_____

_____

_____, Director of MSIG Graduate Studies

College of Arts and Sciences approval:

_____, Dean

Graduate Studies approval:

I, _____, Director of Graduate Studies _____recommend _____do not recommend _____(Student's name) for graduation from the MSIG graduate program.

Signature_____
Date: _____

Distribution of this form:

a. Director of MSIG Graduate Studies
b. Vice President for Academic Affairs
c. Graduate Student
d. Advisor
e. Original: Department File

APPENDIX III

INTERNSHIP FINAL REPORT guidelines

(Modified from the Biotechnology Professional Science Masters Degree at Oregon State University)

The Internship Final Report should contain the following document parts, in the order listed below.

1. Title
2. Abstract
3. Scientific Report
    1. Introduction
    2. Materials and Methods
    3. Results
    4. Discussion
    5. Summary or Conclusion
    6. Literature cited
    7. Tables
    8. List of figure legends
    9. Figures
4. Business Report
    1. Description of the business
    2. Marketing
    3. Finances
    4. Management/Human Resources
5. Appendices

- **Abstract**

Describe where your internship was conducted (name of company, department, location, type of business). Summarize your internship goals, activities, and accomplishments, highlighting key knowledge or skills gained. How did this internship benefit you, and how did it benefit the company? The abstract is limited to 350 words in length.

- **Introduction**

The introduction is a concise statement of the problem and an outline of the scope, aim, and nature of the project. A review of the literature pertinent to the subject should be included and used to provide context for the internship report.

- **Materials and Methods**

The purpose of the Materials and Methods section is to recount, in a concise manner, the materials and methods used to approach the project. It should include sufficient information so that the study could be repeated. Care should be exercised not to include superfluous information. Also,

extreme caution must be used to avoid including results and/or conclusions.

- **Results**

The results reflect the findings of your investigation only, not the findings of other researchers in the area. This is a summarized form of extensive data that may appear in the figures, tables and/or appendices.

- **Discussion**

The discussion section provides an analysis of the data acquired. In this section, you may draw comparisons with findings of other researchers in the field or even speculate to some degree and, if appropriate, suggest additional research.

- **Summary or Conclusion**

The conclusion is a final brief statement, which draws together the objectives and findings of the entire research project.

- **Acknowledgments**

If you wish, you may include a page with a brief note of dedication or acknowledgment of help received from particular individuals.

Writing the Business Report

The business report should define a company, identify its goals, and incorporate results from your internship project in a meaningful way. A business *plan* is a document designed to detail the major characteristics of a firm ~ its products or services, its industry, its market, its manner of operating (production, marketing, management) and its financial outcomes with an emphasis on present and future initiatives. Your business report should be similar but emphasize the internship project, potential costs of implementation, and anticipated benefits. The report should summarize the internship project in the broader context of the company's overall goals from an applied perspective.

Individual student internships vary considerably and therefore no two business reports will be alike. You might have focused your internship on a specific research project to learn additional technical skills, but project results should eventually be utilized for some purpose. Broadly consider the application that your internship project is or could potentially be tied to. To help you focus on what to include in your business report, you may want to consider the following set of questions:

- What service or product does the company provide and what needs does it fill?
- How did my internship project contribute to the overall goals of the company?
- Who are the potential 'customers' for my product or service and why will they purchase it from this company?
- How will this company reach potential customers?

There are some elements common to all business plans, whether they are written for non-profit or for-profit organizations. A typical business plan is usually divided into four distinct sections, which you should include in your business report:

1. Description of the Business
The description should include information about the company's history, ownership, location, key services or products provided, general administrative structure, and long-term goals. Within this context, conclude with a brief summary of the goals of your internship project.

2. Marketing Strategies
What are the company's target market, future trends and areas for potential growth? Identify the main competitors, distribution patterns, and things that make the company unique. Consider how the customer benefits from the product or service, what their needs are, and how they can be reached. Include strategic information specifically relating to your internship project, how it will be implemented, what personnel are required, and what this means for the organization.

3. Finances
Begin with a broad overview of the company's general budget (e.g., income and expenses with major allocations) and then focus on the finances tied specifically to your internship project. Do your best to describe start-up and on-going expenses as well as anticipated income and profits. If project benefits are not monetary, how will your results be utilized in light of the company's overall goals?

4. Management and Human Resources
Describe whom you worked with (title and position) and how they fit into the overall hierarchy of the company. How did different units within the company (e.g., research development and business marketing) work with one another? Did you have an opportunity to interact with different types of staff within the company? How can the firm improve organizational management? Are any changes required to properly implement your internship project results?

Appendices

This last section may contain supporting data for the text in the form of one or more appendices. Examples of appendix material are data sheets, questionnaire samples, illustrations, maps, charts, etc. A copy of your internship journal notes should also be included in this section.