Integrated & Applied Sciences

Saint Louis University

Handbook

for

PhD Studies

2015 - 2016

**Approved by Integrated & Applied Sciences Administrative Committee,
12 August 2015**

Graduate Programs – Integrated & Applied Science
Saint Louis University

A. General

(1) Mission Statement

The last two decades have seen a significant increase in emphasis on interdisciplinary approaches within the scientific community and current students graduating with a PhD will need to be skilled in the art of collaboration. The Integrated and Applied Sciences PhD program has been established in order to broaden student exposure to all areas of science, encourage collaboration across departments and colleges, and to better train graduate students to present their research to a more diverse audience. This interdisciplinary program is large enough to provide students with broad exposure to collaborative scientific projects, yet is small enough for students to have the one-on-one interaction with their faculty mentor that is necessary to develop the communication skills that will enhance their employment opportunities and, in keeping with our Jesuit Tradition, endow the students with the tools to better contribute to society.

(2) Degree Program Overview

The Integrated and Applied Sciences PhD program exists within the framework of the University and the College of Arts & Sciences. Our program is governed by the rules and requirements contained in the current edition of the Graduate Education Catalog, which can be found on the Graduate Education website (http://www.slu.edu/x52519.xml). The Integrated and Applied Sciences (IAS) Program is administered by a Program Director (PD) assigned from faculty in the College of Arts and Sciences. The program allows participation by any science faculty member at SLU provided they have external funding to support their graduate student(s), the ability to get Graduate Faculty standing, and the approval of their Department Chair or Center Director.

The Integrated and Applied Sciences program offers a research-intensive PhD degree with emphasis in specific tracks given by the appointment of the primary mentor. Those tracks are given below and detailed in section G. The majority of the coursework will be in the discipline-specific department, although students are required to take courses in other departments as well as courses specific to the Integrated and Applied Sciences program. Details on the specific degree requirements can be found in section D.

(3) Discipline-specific Concentrations Offered by Participating Departments

(i) Chemistry: Analysis and Physical Characterization; Synthesis and Materials (Department of Chemistry)
(ii) Biology: Bioinformatics, Integrated Geospatial Biology (Department of Biology)
(iii) Environmental Sciences & GIS (Department of Earth & Atmospheric Sciences/Center for Sustainability)
(iv) Physics: Nanomaterials and Condensed Matter (Department of Physics)
(v) Sustainability Science (Center for Sustainability)

B. Admission

(1) Procedure

Applicants for the Integrated and Applied Sciences PhD program must submit a formal application through Graduate Admissions. The admission requirements and procedures are detailed in the Graduate Education Catalog. After an application is submitted to Graduate Admissions, they will forward the application materials to the IAS PD. The PD will then forward the application to the proposed IAS faculty primary mentor (PM). The PM will then be responsible for writing a letter

back to the PD confirming the funding mechanism for supporting the student. If funding is sufficient, the PD will forward the application to the IAS Administrative Committee (AC) for review.

(2) Application Requirements

Admissions to the Integrated and Applied Sciences (IAS) Program will be on a rolling basis. The application must include:

1. a completed electronic application with application fee
2. official transcripts from all colleges and universities attended (if the college or university is located outside of the US, an external equivalency evaluation from a company like ECE (www.ece.org) will be required)
3. three letters of recommendation
4. a curriculum vitae
5. a professional goals statement including a list of at least one (but up to 3) IAS faculty that the student would like to be mentored by
6. GRE scores will not be required for admission, but can be submitted if desired
7. TOEFL or IELTS scores for international students from countries where English is not the primary spoken and written language.

(3) Prerequisites for Admission

The IAS AC will ensure that the applicant possesses a minimum of a baccalaureate degree from an accredited, recognized college or university in a discipline relevant to the research of the PM, along with a passing score on the TOEFL(80)/IELTS(6.5), if applicable.

(4) Program Admission Requirements

The IAS AC will ensure that the applicant's previous academic record indicates the ability needed to pursue advanced studies. The IAS AC (through the PD) will then make an admissions recommendation to the Arts & Sciences Associate Dean for Graduate Education who provides the final approval. Notification of admission is issued by the Office of Graduate Education.

(5) Graduate Student Advising

It is expected that all new students will have already identified a PM, as that mentor is responsible for obtaining financial support for student (see section B(1)). During the second (but no later than the third) semester in the Ph.D. program, students are expected to also choose a secondary mentor (SM) from a different department or discipline to that of the PM.   The PM, SM, PD and the IAS AC will be available for advising students on their course schedules, committee formation, and other appropriate matters. Until a Proposal Dissertation Committee (PDC) is formed, the PM and SM will be responsible for advising the student on research matters. See sections B(8) and C(2) for additional information about the PDC.

(6) Definition of Full-time Graduate Students

(a) All enrolled students holding fellowships, teaching or research assistantships are defined as full time students regardless of hours registered.

(b) Students who are not on an assistantship and have not yet passed their written and oral examinations must enroll in 6 or more hours during a regular semester (fall or spring) and 3 or more

hours during the summer semester.

(c) Students who are not on an assistantship and have passed both their written and oral examinations must be continually enrolled in a course but can do so for 3 credit hours.

(7) Continuous Registration

All graduate students on 11-month assistantship who are pursuing a degree are required to register *every* semester (*including* the summer session).

(8) Selection of Primary and Secondary Mentors and Dissertation Committee

The PM must have funding to support the graduate student. They must also have graduate faculty standing and PhD mentoring status (determined by the College of Arts & Sciences' Graduate Faculty Membership Committee). It is expected that all new students will have already identified a PM, as that mentor is responsible for obtaining financial support for student. During the 2nd semester (but no later than the 3rd semester) in the PhD program, students are expected to also choose a SM. While the PM will serve as the main director for their graduate student's research project, the SM will also play an important role in the direction and research advising of the student. The SM will meet with the PM and graduate student to collaborate on experimental design and planning as well as subsequent implementation. Such collaboration enables the fostering of interdisciplinary relationships between participating programs and will be viewed as critical to the success of the overall program. The SM may or may not provide funding for the student. The SM may also direct the student's work through an *Interdisciplinary Research* course. Prior to candidacy (during the 3rd or 4th semester), the student will select a Dissertation Proposal Committee (DPC), which shall be comprised of no less than 5 faculty members, including the PM and SM. See section C(2) for additional information about the DPC.

(9) Review of Student Progress

It is expected that the PM will have continual interactions with the student to help direct both the research project and coursework plans. The SM will perform a unique function for students involved in this interdisciplinary program. The SM will be a member of a different discipline than the PM, yet they may be directly involved in the experimental design, data interpretation, and data analysis. It is expected that the student will meet with the SM at least once a semester to discuss coursework options and research progress.

       At the end of each calendar year each student is required to submit a mandatory Annual Report to their PM. The report form may be found in section H, but an electronic copy will be made available and should be completed electronically and forwarded by email. The student's progress will be rated by their PM (in consultation with the SM if assigned) as either 'satisfactory' or 'unsatisfactory'. These are defined by the following criteria:

'Satisfactory'	o Maintained ≥3.0 GPA in coursework.
	o Maintained research effort expected in a work week resulting in, or appearing to show promise in leading to:
	o Publication in a peer-reviewed journal and/or
	o Public presentation of results at a professional scientific conference.
	o Maintained cordial and constructive relationship with primary and secondary mentors.
'Unsatisfactory'	o Cumulative GPA <3.0 in coursework.

	o Clear lack of research ability.
	o Lack of significant research progress.
	o Failure to take preliminary doctoral candidacy exams in a timely manner.
	o Failure to pass either Written Comprehensive or Oral preliminary exams.
	o Failure to form Dissertation/Thesis Committee.
	o Failure to fulfill Teaching Assistant responsibilities (if applicable).

The completed Annual Report for the calendar year (Jan-Dec) must be forwarded to the PD by January 30 of the following year. If a rating of 'unsatisfactory' is returned, students and their PM and SM should arrange to meet briefly with the PD within 2 weeks of submission of the Annual Report.

Once formed, the student will be required to formally meet with their DPC once a year, typically in the weeks following submission and receipt of the Annual Report (ie. in the Spring semester). It is the responsibility of the student to arrange the date, time and location for the meeting with each member of the DPC. The Annual Report will be made available to all members of the committee prior to the meeting. The student must summarize recent research developments with respect to objectives laid out in the pre-candidacy dissertation proposal oral exam, typically in the form of a Powerpoint presentation. The meeting will be chaired by the PM, who will relay assessment of the student's progress to the PD via email at the conclusion of the meeting. If the student is in their final semester and preparing to defend their PhD dissertation, this annual review meeting should still occur though no later than 3 months prior to the final defense date. The student should briefly outline the content of their dissertation defense. The main purpose of this meeting will be to determine whether the student is fully prepared to undertake their dissertation defense.

C. Graduate Committee Structures

(1) Administrative Committee (AC)

The IAS Program Director (PD) will be head of the Administrative Committee (AC). Initially the AC will be comprised of an additional 4 faculty members that represent contributing academic units participating in the IAS Program (Chemistry, Biology, Physics, and EAS or Center for Sustainability), with 2 faculty being the maximum number that can come from one department. In the future, the number of faculty on the AC may be expanded. The PD, working with the AC, will provide primary oversight for the program. The PD will be in charge of student recruiting, budgetary issues, and awarding of travel funds. The PD will also be the primary liaison between the program and the Graduate Education Program in Arts & Sciences, and shall report to Associate Dean for Graduate Education.

As described below in the Admissions section, the PD and the AC are key in the admissions process. This body will also be charged with developing and implementing student recruiting mechanisms. The AC will be responsible for keeping the program current. This involves the development of new tracks and the recruiting of new participating faculty. The AC will also be responsible for all policy making decisions involving implementation of the academic program consistent with the policies of the Graduate Education Program at Saint Louis University. This may include deciding any disputes concerning oral or written exams, removal of students who do not pass the written or oral exams, any exceptions to the admissions procedure, or exceptions to academic requirements. The AC will determine acceptable ranges for assistantship stipends and approve any exceptions. Finally, the AC will interface with chairs of participating departments to

delegate faculty members to be in charge of the teaching courses that are specific to the IAS program.

(2) Comprehensive Written Exam Committee (CWEC)

The Comprehensive Written Exam is administered each year (as needed) by the IAS PD (see section D for more information about the exam itself). The Comprehensive Written Exam Committee (CWEC) is made up of 3 committee members that have either instructed the student in a class or can ask questions that represent the student's previous coursework. One of these members must represent coursework taken outside of the student's primary department, as to test the interdisciplinary training of the student. Both the PM and SM are eligible to be on the CWEC. Prospective CWEC members should be solicited directly by the student (in consultation with the PM) and declared to the PD before the beginning of the semester in which the Comprehensive Written Exam is to be taken.

(3) Dissertation Proposal Committee (DPC)

The Dissertation Proposal Committee (DPC) for each student will consist of the PM, the SM, and 3 other members of the Graduate Faculty (giving a total of 5 graduate faculty members). Up to one external (non-SLU) faculty member is permitted to be on the DPC with appropriate permission from Arts & Sciences Graduate Education Program . The DPC will be responsible for oversight of the student's research development through candidacy and will be responsible for administering the precandidacy Dissertation Proposal Oral Exam. See Section D for more information concerning the oral examination and the dissertation defense. Prospective DPC members should be solicited directly by the student (in consultation with the PM and SM) and declared to the PD prior to the scheduling of the Comprehensive Written Exam. A completed Doctoral Oral Examination Form to set up the DPC and pre-candidacy Dissertation Proposal Oral Exam must be submitted to the Doctoral Candidacy Advisor no less than 10 days prior to the proposed exam date. This form may be found on the Graduate Education website.

(4) Dissertation Defense Committee (DDC)

The Dissertation Defense Committee (DDC) may comprise exactly the same 5 graduate faculty members as the DPC. The DDC members shall fulfill the role of dissertation readers and shall oversee the final public presentation and dissertation defense oral exam. Should any DPC faculty member withdraw and no longer be available, they may be replaced with permission from the PD. At least 3 voting members of the DDC (including the PM and SM) must be present at the oral exam to render a final decision, thus allowing for 2 DPC members to withdraw without being replaced.

D. Degree Requirements

The PhD degree requires a minimum of 42 hours of postbaccalaureate credit. At least three years must be completed in residence. The Graduate Education Program requires that students complete the PhD program within 8 years if entering from a baccalaureate and within 7 years if entering from a completed Master's degree program.

The requirements for the PhD degree include:

- A minimum of 30 hours of post-baccalaureate coursework (exclusive of dissertation credits);
- 12 hours of Dissertation Research (IAS 6990);

- Passing of pre-candidacy Comprehensive Written and Dissertation Proposal Oral Examinations;
- A dissertation;
- A public, oral presentation and dissertation defense.

(1) Entering BA or BS Students

(a) Coursework

The exact distribution of courses in the various areas should be developed and determined by the student in consultation with their PM, SM and the PD with a minimum total of 30 credit hours between all lecture and laboratory coursework areas. A total of 42 credit hours will be required with the remaining 12 credit hours coming from dissertation credits. Some portion of these units may be fulfilled from the appropriate MS program taken at SLU or elsewhere (and governed by the Graduate Education rules for importation of credit hours).

I. Participating Departmental Core Courses (in department where research is performed)

9-12 Credit Hours

Students will take 3-4 lecture or laboratory-based courses in addition to departmental Seminar courses taken at the 5000 and 6000 level within one of the participating departments in the IAS Program. A maximum of 10 credits of 4000-level courses may be taken in accordance with Graduate Education rules. Three credit hours of Introduction to Research coursework in each of the sub-disciplines of the student's choice may also be included. Section F provides a summary of course offerings in the various tracks.

II. Interdisciplinary Credits

18-21 Total Credit Hours

(i) Students will choose 2-3 courses from a department outside of their core department. These may be taken from:

- Chemistry
- Earth & Atmospheric Sciences
- Engineering
- Physics
- Mathematics and Computer Science
- Biology
- Biomedical Sciences
- Public Health
- Research Methodology
- Center for Sustainability
- GIS courses

Because the IAS program is flexible and in a constant state of growth, coursework from other science programs may be considered and indeed new tracks developed by the IAS students in consultation with faculty mentors, the IAS AC and Graduate Education.

(ii) Interdisciplinary Seminar, IAS 6010 (4 credit hours)

(iii) Current Topics in Interdisciplinary Research, IAS 6030 (8 credit hours)

(iv) Interdisciplinary Research Credits (0-3 credit hours)

An interdisciplinary seminar course, IAS6010 Interdisciplinary Seminar (1 credit hour per semester), will be taken for 4 semesters during the 2nd and 3rd years of the program. This will involve attendance at research seminars in the student's primary department, in addition to research seminars in programs of the student's secondary area of interest. Additionally, students will take IAS6030, 'Current Topics in Interdisciplinary Research' (2 credit hours per semester), typically concurrent with IAS 6010 enrollment where students will investigate and discuss the current scientific literature across the various disciplines. Both these courses will feature lectures and discussion across disciplinary boundaries. Students will also be encouraged to become actively engaged in interdisciplinary research outside their particular field of specialization, especially if it relates to their own research project. This may involve enrollment in a research course for a semester in the department or program of their SM, if one is available.

III. Dissertation Credits:

<u>12 total credit hours</u> in Dissertation Research, IAS 6990 under the section number of their PM.

IV. Total Credit Hours:

<u>42 total credit hours</u> will be the minimum required to fulfill the degree requirements.

(b) Advanced Standing

If a student wishes to receive credit for graduate coursework at another institution, a petition for Evaluation of Advanced Standing must be submitted, accompanied by a transcript showing the work, for approval by the PM, PD, and Associate Dean for Graduate Education. The grade received must be B or better. The petition form may be found on the Forms and Petitions page of the Graduate Education website.

(c) Selection of Primary and Secondary Research Mentors, Change of Concentration

Unlike most science PhD programs, a primary research mentor (PM) in the IAS concentration of interest to the student is selected during the application process. This is in part due to the financial support mechanism for the IAS program. Thus students will have typically identified their research mentor during this process prior to enrollment in their first semester of graduate studies at SLU. By the end of the 2nd semester (and no later than the end of the 3rd semester), a secondary mentor in a collaborating department will be identified by the student and PM and declared to the IAS AC. The SM will perform a unique function for students involved in this interdisciplinary program. The SM will be a member of a different discipline than the PM, yet they may be directly involved in the experimental design and data interpretation and analysis. The SM may or may not provide funding for the student. The SM may also direct the student's work through a research course in their home department (Section D(1)(a)II(iv)).

A decision to change either PM or SM should not be taken lightly. A change of PM in particular should only be considered if a new faculty member has been identified with financial support for the student in place. Given this support, permission to change PM must be sought from the PD and IAS AC. A change in concentration that may result from a change in PM must be made by a formal petition to the Associate Dean of Graduate Education to change the degree program.

The form for the *Petition to Amend the Graduate Program* may be found on the Forms and Petitions page of the Graduate Education website.

(d) Pre-candidacy Examinations

Candidates for the IAS PhD degree must submit to two forms of pre-candidacy examination in compliance with the requirements of the Graduate Education Program. A student may advance to candidacy (and enroll for dissertation hours) for the PhD degree only after successful completion of both written and oral preliminary examinations. The Comprehensive Written Exam should normally be completed prior to the 5th full semester (of the third year) of enrollment, with the Dissertation Proposal oral exam taking place toward the end of the same semester (and no later than the 6th semester). Candidates and their PMs should ensure that the committees for the requisite exams are in place and approved by the IAS PD toward the end of the 4th semester, i.e. by the end of the second year. The procedures for PhD students may be found on the Graduate Education website.

(i) Comprehensive Written Exam

The Comprehensive Written Exam Committee (CWEC) is made up of 3 committee members of the Graduate Faculty that have either taught the student in a lecture class, directed the student in an advanced lab class, or can ask questions that represent the student's previous courses. The committee members each write an exam section that will take approximately 2-3 hours to complete. The 3 sections will typically be administered separately by the PD during the course of a single business day, usually with a short recovery period between each section. Any exceptions to this should be granted by the PD. The student is responsible for determining the date of the exam in consultation with the 3 committee members and should make arrangements accordingly with the PD.

The content of the questions is up to each individual committee member but it is expected that these questions will cover material the students have been exposed to in their coursework. CWEC members may ask a series of questions based on specific subject knowledge, or they may format an exam that requires the student to provide critical analysis of a research paper(s) or development and construction of a short research proposal. It is the student's responsibility to confer with each committee member to discuss expectations in the weeks prior to the exam, CWEC members may provide literature for the student to study before taking the exam. CWEC members should decide and communicate clearly to the student and to the PD exactly what literature materials (hard copies or internet) the student may have access to during the formal examination time.

Each CWEC member will be responsible for grading the section that they wrote. The student must obtain a 70% (full pass) on 2 of the sections and at least a 50% (conditional pass) on the other section. The requirements for a conditional pass are to be determined by the appropriate CWEC faculty member and if they are not met, the assessment may be returned as not passing. If the student fails to obtain these percentages, they will have one additional chance to pass that section, in an exam that takes place no more than 1 month after the results of the initial exam are given to the student. The exact format of the retaken section should be prepared as described for the initial exam above. The student should be aware through discussion with the committee member that content may not necessarily be the same as in the first attempt.

(ii) Dissertation Proposal Oral Exam and Advancement to Candidacy

Following successful completion of the Written Comprehensive Exam, the student may prepare for the Dissertation Proposal Oral Exam. To formally set up the DPC and pre-candidacy Dissertation

Proposal Oral Exam, a completed Doctoral Oral Examination Form must be submitted to the Doctoral Candidacy Advisor no less than 10 days prior to the proposed exam date. This form may be found on the Graduate Education website. The Doctoral Candidacy Advisor must also prepare a Degree Audit Form for the student and PM and this must be completed by the time of the Dissertation Proposal Exam.

The exam shall be comprised of two components to be executed within one semester of the Written Comprehensive Exam:

(1) A written proposal of thesis research that conforms to the guidelines for submission of a grant proposal to the National Science Foundation. Guidelines for the proposal may be found on the NSF website (www.nsf.gov) and, in particular, candidates should refer to the following sections of the Grant Proposal Guide, NSF 04-23 (the PDF file of which may be currently downloaded from http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg):

- Section II.B (Format)
- Section II.C.2.b (Project Summary)
- Sections II.C.2.d.i and II.C.2.d.ii (Project Description)
- Section II.C.2.e (References)

The Project Description should include a section on background material as well as the presentation and discussion of any relevant preliminary data so far accumulated. A budget is not required.

The guidelines from an alternative science funding agency may be adopted, providing they are proposed by the candidate's PM and approved by the IAS AC.

(2) Upon completion of a satisfactory written thesis proposal (as determined by the candidate's PM and SM), the student shall submit this proposal to their Dissertation Proposal Committee (DPC) members in advance of a closed oral presentation of the proposed thesis research of not more than 30 minutes. See Section C(3) for DPC details). DPC members should be given sufficient opportunity to read and critique the written proposal – no less than 1 week before the oral exam.

The Dissertation Proposal Oral Exam presentation shall include a question-and-answer session conducted by the candidate's DPC. If both the written proposal and oral examination satisfy the DPC (with a minimum of 3/5 faculty assigning a 'pass''), they may then request that the IAS PD recommend to the Graduate Education Program that advancement to PhD candidacy proceed. If the outcome is unsatisfactory (with a minimum of 3/5 faculty assigning a 'fail'), the DPC may make recommendations to the student to amend their written and/or oral work and represent their thesis proposal in a further private (committee-only) presentation, to be scheduled within two weeks of the first oral exam. If the assessment of the candidate's thesis proposal remains unsatisfactory, then the student's program will be terminated. A recommendation to transfer to a departmental, non-IAS terminal MS degree program may be made (see Section D(1)(e) below),

(e) Transfer to a Terminal MS Degree Program

If the student fails to meet the passing standard for either the Written Comprehensive Exam (2 full passes and 1 conditional pass) or the Proposal Dissertation Oral Exam and any such decisions are upheld on appeal (see Section F), they will not be permitted to proceed to PhD candidacy and will be terminated from IAS program. There is no terminal MS degree in the IAS program itself. However, the student may at this point be eligible to graduate from SLU with a terminal MS degree, or be eligible to transfer into a departmental MS degree program – most likely

awarded by the department of their PM. Students in this situation must approach the Graduate Program Director for the relevant department and seek permission to transfer into that program. Any decision to accept or deny such a transfer is beyond the scope of the IAS PD or AC, and can only be completed at the discretion of the targeted department, their graduate student admissions committee, and ultimately with the approval of the Associate Dean for Graduate Education (via formal petition).

(f) PhD Dissertation Research

After successful completion of the written and oral pre-candidacy examinations and the required coursework (as verified by the Degree Audit), the student will be automatically advanced to candidacy for the PhD degree. With advancement to candidacy, the PhD student officially undertakes his/her PhD research. Typically, the IAS doctoral student will have already initiated his/her research prior to advancement to candidacy. Students may begin to accrue dissertation credits beginning in the semester during which they are expected to advance to candidacy – but not before. Students should enroll in IAS 6990 with the section number assigned to their PM..

The DPC may be rolled into a 5-member Dissertation Defense Committee (DDC), although it is permissible to reduce the number to 3 with the proviso that the PM and SM remain on the committee.

After the research is completed, the candidate prepares his/her dissertation, which is then approved by his/her PM, given to the each DDC member (referred to as 'readers' in the Graduate Education Catalog) for corrections and approval.

(g) Dissertation Format

Students should prepare the dissertation according the most recent Formatting Guide, which may be found on the Graduate Education website. There is a Format Checklist found at the end of the Guide to be used as a final review. Format review by the Doctoral Candidacy Advisor is not done until after the Final Defense (see Section D(1)(i)).

(h) Public Presentation and Defense of Dissertation

The Graduate Education Program requires a public, oral presentation and defense of the dissertation.

At the beginning of the semester in which the student expects to defend their dissertation and complete all degree requirements, the student should submit an online Application for Degree. The instructions for completing this form, which is electronically submitted in Self-Service Banner, may be found on the Graduate Education website.

The presentation may be scheduled by the student in consultation with the DDC after all committee members have approved the dissertation. The 'Notification of Readiness for the Public Oral Defense' form must be submitted to the Doctoral Candidacy Advisor at least 2 weeks in advance of the final defense date. IT IS HIGHLY RECOMMENDED THAT STUDENTS SUBMIT THIS FORM AT LEAST *6 WEEKS* IN ADVANCE OF THE FINAL DEFENSE. Candidates anticipating May graduation must submit the aforementioned materials no later than the date set in the Office of Graduate Education's Calendar of Deadlines. This date is typically communicated to the student by the Doctoral Candidacy Advisor upon completion the Application for Degree. Students should make arrangements with their home departmental administration for the date, time and location of their public presentation and are responsible for posting seminar

announcement flyers in the departments of their PM and SM. The oral presentation should itself last no longer than 30-40 minutes. Following the presentation, the candidate must be prepared to respond to questions from the assembled audience, followed by questions from the DDC in a closed session. One of the committee members (not the PM) serves as the moderator for the presentation and defense. The final defense normally will last 1-2 hours. The student will then be briefly excused, and the committee will complete the Results Form on whether to approve the dissertation and defense. A majority vote is required to pass. The DDC may discuss the student's performance and will notify the student verbally of the results. The Office of Graduate Education will provide official notification of the committee's decision.

In the event of an unfavorable decision, the student will be notified immediately and a new defense date scheduled at an appropriate time. A new 'Notification of Readiness for the Public Oral Defense' form must be prepared and submitted to the Doctoral Candidacy Advisor. The DDC may or may not request a further public presentation but the closed question-and-answer session is mandatory. If the result is favorable, then the student may proceed to Format Review and Electronic Dissertation Submission. If the second exam yields an unfavorable result, then the DDC must consult as to whether a third oral exam may be required or whether to let the result stand.

(i) Final Requirements and Electronic Dissertation Submission

Students who have passed the Final Dissertation Defense Oral Exam may proceed with a Format Review appointment with the Doctoral Candidacy Advisor. The Format Review appointment should be scheduled for a date after the Final Defense and after all required corrections requested by the DDC members have been made to the dissertation. Instructions for making the Format Review appointment are typically received from the Doctoral Candidacy Advisor after the Application for Degree has been processed.

After the Format Review appointment and after any additional corrections are made for formatting, the student will need to convert the dissertation document into a single PDF file prior to submitting the document to Pro Quest/UMI. ProQuest digitally archives the dissertation and published the abstract via Dissertation Abstracts International. Complete instructions will be provided at the Format Review appointment. The PhD degree will not be conferred until electronic submission has been successfully completed.

(j) Degree Schedule

Year	Date/Time	Curricular Activity	Curricular Activity Progress
1	Fall Spring Summer	Coursework Coursework + research Coursework + research	Student consults (and/or works) with PM and SM is selected if not already known.
2	Fall Spring Summer	Coursework + research Coursework + research Coursework + research	Student takes Comprehensive Written Exam (focus on knowledge in required field(s)).
3	Fall, Spring & Summer	Dissertation research (IAS 6990) and Seminar/Current Topics courses(IAS 6010/6030 – Fall, Spring only)	Student takes pre-candidacy Dissertation Proposal Oral Exam (focus on proposed dissertation research objectives) Student advances to PhD Candidacy. 1.
4	Fall, Spring & Summer	Dissertation research (IAS 6990) and	Student defends dissertation.

		Seminar/Current Topics courses (IAS 6010/6030 – Fall, Spring only)	

(2) Entering MS Students

The guidelines discussed in Section D(1) are equally applicable to students who enroll in the in the IAS program with a SLU MS degree. Students will, under the guidance of their PM and the IAS PD, complete outstanding coursework for their chosen track and then proceed to the pre-candidacy examinations, ideally within the first semester or two of beginning the IAS program. Research MS students must have successfully defended their MS research thesis independent of any PhD candidacy exams, although research from the MS degree may form the basis of PhD dissertation research and be included in the final dissertation.

Students who have obtained appropriate MS degrees at other institutions may, according to Graduate Education policy and in consultation with the PM and PD, apply for advanced standing to receive credit for relevant coursework taken in their Master's, providing those courses transfer in with a minimum B grade. Such students must then accrue coursework credit as discussed in Section D(1). The petition for evaluation of advanced standing may be found on the Graduate Education website.

E. Assistantships and Fellowships - Detailed information regarding Assistantships and Fellowships may be found on the Graduate Education website.

Several sources of tuition and cost-of-living funding are available to future and current IAS graduate students. Some of these sources will be considered as *internal*, i.e. coming from academic units of Saint Louis University such as the Office of Graduate Education, selected academic departments, etc. Other sources of funding shall be considered as *external*, typically state or federal government agencies that support research and education. The National Science Foundation, NASA or the NIH are examples. Other external sources shall include also foundations or private donors who are not directly connected to Saint Louis University.

Funding sources are also distinguished by whether they are *Assistantships* or *Fellowships*. The former refer to grants conferred in exchange for a service to Saint Louis University, such as assisting professors in research or the teaching of undergraduate classes with large numbers of students. On the other hand, the latter category refers to grants that require no substantial commitment to the University. In other words, students funded by fellowships are expected to work full-time on their graduate classes and thesis research.

Graduate Education policy is that the maximum number of years that a graduate student may receive university funding is five years in a doctoral program. In the case of a student entering the doctoral program with a Master's degree from Saint Louis University, eligibility for university funding is for not more than five years total. On the other hand, a student with two years of assistantship support during their Master's program at Saint Louis University is eligible for a maximum of three additional years of assistantship support in their doctoral program. Note that grant-based assistantships contribute to the total number of years of support allowed.

(1) Internal funding

(a) Teaching Assistantships

Teaching Assistantships (TAs) are not typically available in the IAS program. Students in all concentrations are supported solely by Research Assistantships (RAs) (see section E(1)(b)) unless special arrangement is made with the PM's Department.

Persons holding a TA may work with students in small groups, lead group discussions, monitor examinations and grade papers, help prepare lectures, conduct laboratory sessions, or even be responsible for a course as the primary instructor. Under the close supervision of the faculty, the TA concurrently develops teaching skills and a deeper understanding of the discipline.

An 11-month award includes a stipend, a health insurance package for the student (plus the option to purchase family coverage), and a tuition scholarship of 18 hours during the regular academic year and three hours during the summer session. (Summer registration is also mandatory.) These awards begin on July 1, at which time the student is **required** to be in residence. Upon petition to the IAS Program Director, under certain circumstances the start date may be delayed. The student is expected to begin preparing for laboratory/coursework duties during July and August.

(i) *Applicant Qualification*

Normally, students applying for admission may be considered for TAs at the same time, if they so desire. The final decision on awarding a TA rests with the PM's department and the Graduate Education program in the College of Arts & Sciences. The appointment to a TA will be by contract offered by the Graduate Program to the nominated individual.

(ii) *Criteria for Assignment of Teaching Assistantships*

Students wishing to be considered for a TA are referred by the IAS PD to the Graduate Program Director of the department concerned. The Graduate Affairs Committee of that department uses the following criteria in nominating individuals for Teaching Assistantships:

For students currently holding an Assistantship:

Graduate students currently with an Assistantship (Teaching or Research) are normally awarded an assistantship the following year, provided the student has not exceeded the years of Teaching/Research Assistantship support described above. **However**, the student may fail to receive an assistantship for one of the following reasons:
- *Students with a GPA of less than 3.0 are not eligible for assistantships*
- *Poor teaching evaluations*

Continuation is dependent upon satisfactory performance of the assigned teaching responsibilities. Teaching evaluations provided by the classroom mentor and undergraduate students will play a primary role in determining whether a TA is renewed. Based upon evaluations, the departmental Graduate Program Director may recommend that the student not receive a TA the following year. Alternatively, the Graduate Program Director may recommend a course of action that may improve performance of the student as a TA (e.g., enrollment in the Center for Teaching Excellence or acquisition of a faculty teaching advisor).

- *'Unsatisfactory' rating on the student's progress*

Student progress will be rated each year. An 'unsatisfactory' rating may preclude a student from receiving an assistantship renewal and may lead to termination from the program altogether.

For incoming students and/or students without a prior Assistantship

1. English-speaking ability (as determined by the ESL Program). This aspect is required for effective teaching of undergraduate students as part of the TAs duties.
2. Academic standing. Includes undergraduate grade point average (GPA) and Graduate Record Examination (GRE) General Test scores.
3. Letters of reference and any additional materials (publications, presentations, etc.).
4. Degree program. Research MS students are given priority over MS non-research students.
5. Students currently enrolled in the graduate program, but not supported by an assistantship, are in competition with the current applicant pool for TA awards. In other words, that student does not receive priority simply due to being enrolled in the graduate program. However, the committee will solicit a letter from the student's mentor PM and examine current academic standing to aid in the decision process.

(iii) *Teaching Assistant Duties*

TAs will be assigned by the departmental Graduate Program Director and Chairperson of the department to instructional duties in the courses, lectures, and laboratories offered by the department. The appointment is half-time, and teaching duties will not require more than 20 hours per week (thus allowing the student to spend substantial time in laboratory research). The duties will include instructional time in the classroom or laboratory, necessary preparation for class or lab, marking papers, and other instructional activities as required. TAs must also arrange for reasonable 'office hours' for meeting with undergraduate students, and inform their students of the time and place of office hours. The department will provide a suitable office or other place for TAs to meet with their students.

Students who begin their assistantships/fellowships during the summer are required to begin their residence at this time. Students may be assigned teaching responsibilities. Students should contact the departmental Graduate Program Director to arrange their summer schedule as soon as they are notified that they have received an assistantship.

(iv) *Teaching Assistantship Evaluations*

Semester evaluations are to be completed by both faculty instructors overseeing the TA as well as by students being taught by the TA. All evaluations will be turned in to the department office to be included in the graduate student's file.

(b) Research Assistantships

Internal Research Assistantships (RAs) awarded by Graduate Education in the College of Arts & Sciences are intended as 'bridge' funding for students in time periods where external support (see Section E(2)) for students is not available. Unless approved by the IAS PD and the Associate Dean for Graduate Education, they may not be renewed after one year. An RA is assigned a range of duties such as library searches, field work, laboratory experiences, and preparation of research proposals and grants so as to gain professional skills in research that complement the student's graduate education.

An 11-month RA award includes a stipend, a health insurance package (plus the option to purchase family coverage), and a tuition scholarship of 18 hours during the regular academic year and 3 hours during the summer session. (Summer registration is also mandatory.) Deadline for application: <u>March 1</u>.

(i) *Applicant Qualification*

Any applicant for graduate degree study in the IAS program may apply to the Graduate Education Program for an RA in IAS. Students may apply for RA by letter to the IAS PD stating their need for the assistantship. There are normally no instructional duties associated with appointment to a RA. Instead, the RA is assigned to a faculty sponsor (PM) responsible for directing research duties of the student.

(ii) *Criteria for Assignment of Research Assistantships*

The IAS AC uses the following criteria in nominating individuals for RAs:

1. Academic standing. Includes undergraduate grade point average (GPA), graduate school GPA, and Graduate Record Examination (GRE)[†] General Test scores.

2. Letters of reference and any additional materials (publications, presentations, etc.).

3. Annual Report evaluation-*The student's progress will be rated each academic year. An 'unsatisfactory"' rating may preclude a student from receiving an assistantship renewal.*

4. Identification by the student of a faculty member in whose lab the student will carry out research. This must include a letter from the faculty member. This is a mandatory requirement for admission to the IAS program.

5. Term of the student's graduate program. Students nearing the end of their graduate program that could greatly benefit from an RA may be given a modest priority.

   Once appointed to an RA, a student will be eligible for reappointment after one year only with permission from the IAS PD and the Associate Dean of the Graduate Education Program.

(c) Dissertation Fellowships (For PhD students in the last year of their program)

During the writing phase of the dissertation, the PhD student is encouraged to apply for a Dissertation Fellowship. The student must be nominated by the IAS AC. In general, students are not obliged to carry out any instructional or research duties, other than those associated with their thesis or dissertation research. Information and application packet may be found on the Graduate Education website

(d) Diversity Graduate Fellowship

The award includes an 11-month stipend, health insurance, and a tuition scholarship of 18 hours during the regular academic year and 3 hours during the summer session. (Summer attendance is also mandatory.) The student must be nominated by the IAS AC and the application is coupled to the admissions process. The award is for a maximum of two years for a Doctoral degree recipient. Information and application packet may be found on the Graduate Education website.

(e) Presidential Graduate Fellowship

The award includes an 11-month stipend, health insurance, and a tuition scholarship of 18 hours during the regular academic year and 3 hours during the Summer session. (Summer registration is

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[†] Not required for admission to the IAS program but if scores are available they may be taken into consideration.

also mandatory.) The award is targeted for students who have demonstrated outstanding scholastic achievement in their degree programs prior to application for the PhD. The student must be nominated by the IAS AC and the application is coupled to the admissions process. The award is for a maximum of four years for a Doctoral degree recipient. Information and application packet may be found on the Graduate Education website.

(f) Other Fellowships/Scholarships

Students may receive financial support from outside sources. The terms of such fellowships/scholarships will be specified by the award sponsor. In general, students with fellowship support will pursue their degree requirements, but will not be obliged to carry out any instructional or research duties, other than those associated with their thesis or dissertation research. The terms of appointment, continuation, and maximum support will be governed by the terms for teaching assistantships, unless there are overriding conditions specified by the fellowship sponsor.

(2) External Funding

This is the primary mode of student financial support in the IAS Program. Individual departments or programs may receive funding from sources external to the University for support of graduate students requiring no service in return. From such grants, graduate students may be appointed to fellowships or traineeships consisting of stipends and full tuition scholarships with the academic approval of the Associate Dean for Graduate Education. Trainees will be required to participate in training experience as demanded by the grantor. Such awards are made for one year, but ordinarily are renewable. If expired external grants leave students unfunded, then application for a Graduate Program RA may be made by the PM through the IAS AC.

(a) Governmental Support from Research Grants

Faculty members will sometimes agree to pay a graduate student's stipend from grant funds. In such cases, the faculty member can petition the Graduate Education Program for a tuition scholarship for that student. Tuition scholarships may or may not be provided, depending upon funds available for this purpose.

(b) Private Grants

Funding from foundations, corporations and private individuals may also be used to cover all or part of the tuition and cost-of-living. The number of such private funding sources is truly very large. Student Financial Services may be contacted about possible funding opportunities.

Additionally the COS (Community of Science) Pivot Funding Opportunities website (http://pivot.cos.com/) is a large, comprehensive online database providing access to information for graduate school scholarships and other sources of funding for graduate school outside of Saint Louis University. The COS Funding Opportunities website also allows individuals to search by search term, allowing individuals to pursue funding for research interests or tuition assistance.

For students currently holding an Assistantship:

The student may fail to receive an assistantship for one of the following reasons:

- *Students with a GPA of less than 3.0 are not eligible for assistantships*

- *'Unsatisfactory' rating on the student's progress*

Student progress will be rated each year as part of their Annual Report review (Section B(9)). An 'unsatisfactory' rating may preclude a student from receiving an assistantship renewal and may lead to termination from the program altogether.

(3) Graduate Student Orientation

All new graduate students TAs and RAs are required to attend the New Graduate Assistant Orientation at the beginning of their first semester. Announcements of the time and place will be sent to each new assistant prior their first semester at Saint Louis University. Orientations organized by Graduate Education are typically held at the beginning of the Fall and Spring semesters. Information may be found on the Graduate Education website. Students may be required to attend departmental orientations depending on their PM's home department and the type of assistantship. Failure to attend required orientation(s) is considered a violation of any Assistantship contract.

F. Student Appeals Procedures

A student who has failed either pre-candidacy exam or the Dissertation Defense Oral Exam may appeal the decision that has led to them being terminated them from the program.

(1) Comprehensive Written Exam

An initial appeal must be made within 30 days of the decision communicated or made available to the student. A statement of appeal should first be submitted to the CWEC faculty member(s) concerned and copied to the IAS PD. If any CWEC member denies the appeal, the student has 30 days from this decision to submit an appeal to the IAS AC via the PD. If the decision of the CWEC member is upheld by the AC, the student has 30 days from when this decision was communicated to submit their appeal to the Board of Graduate Education (BGE) of the College of Arts & Sciences. Details for appeals submission procedures at the BGE level and above may be found in Section F(4) below.

(2) Dissertation Proposal and Dissertation Defense Oral Exams

An initial appeal must be made within 30 days of the decision communicated or made available to the student. A statement of appeal should first be submitted to the PM, who will forward it for consideration by the SM and DPC/DDC. The appeal should be concomitantly forwarded to the IAS PD. The DPC/DDC will confer and if the appeal is denied, the student has 30 days from when this decision was communicated to submit their appeal to the IAS AC via the PD. If the decision of the DPC/DDC is upheld by the AC, the student has 30 days from when this decision was communicated to submit their appeal to the Board of Graduate Education (BGE) of the College of Arts & Sciences. Details for appeals submission procedures at the BGE level and above may be found in Section F(4) below.

(3) Appealing Decisions Made by Student Mentors

Students in disagreement with any decision made by their mentors that directly affects their status in the IAS PhD program (such as withdrawal of funding) may appeal that decision. A formal written appeal must first be made to the PM. If the PM denies the appeal, the student may submit a formal appeal to the IAS AC via the PD within 30 days of receiving such notification from the PM. If the decision is upheld by the AC, the student has 30 days from when this decision was communicated to submit their appeal to the Board of Graduate Education (BGE) of the College of

Arts & Sciences. Details for appeals submission procedures at the BGE level and above may be found in Section F(4) below.

(4) Appeals to the Board of Graduate Education

Should the student wish to continue the appeal process, the next step involves the Board of Graduate Education (BGE) of the College of Arts and Sciences. An appeal to the BGE must be made in writing and submitted to the Associate Dean for Graduate Education within 30 days of the decision by the department chairperson or program director. The Associate Dean will notify all parties involved of the appeal and will provide both parties an opportunity to submit any supporting documentation they believe the BGE should review. Written submissions will be limited to 10 pages, with additional appendices if necessary, from each side in the dispute.

The appeal may be heard as an agenda item at one of the regularly scheduled BGE meetings, or a special meeting may be called. A quorum of the BGE, excluding ex-officio members, must be in attendance. When the BGE sits as an appeals board, a graduate student selected by the Graduate Student Association will be appointed to the board as a voting member. This student must be a graduate student in the College of Arts and Sciences but not from any department involved in the appeal. Since this is an internal and not a legal procedure, students involved in the appeals process may be accompanied by someone who is not acting as an attorney or representing the student in his/her capacity as an attorney. If a member of the BGE is a member of the department or program involved in the appeal, that BGE member will abstain from active participation in the appeals process. The Associate Dean for Graduate Education shall be present throughout the entire process, but shall not be allowed to propose or second any motion, or to cast a vote on any motion related to the appeal.

The BGE will hear the case presented by the student and others supporting the student's appeal and will also hear the presentations of the other parties involved. Then, the BGE will conduct a discussion. If the BGE finds that insufficient information has been presented, it may request a period of not longer than 30 days to obtain the information, meet again, and reach a decision. The BGE will consider the merits of the student's appeal and the adequacy of procedures followed in the department. The BGE may (1) support the decision being appealed, (2) overturn it, or (3) change the penalty imposed. The Associate Dean will inform the student in writing of the BGE's decision.

Should the student wish to appeal the decision beyond CAS, a written appeal may be submitted to the Associate Vice President for Graduate Education. This must occur within 30 days of the decision by the BGE. The AVP will review the documents as submitted to the BGE and may request additional information to determine whether or not the process as outlined in this section was appropriately followed. The AVP cannot overturn a decision but can remand the decision back to CAS for further investigation if the process was not followed.

G – Departmental Concentrations

Concentration: Chemistry

Departmental Courses (9-12 credits)

Core
- CHEM 5*x*99   Introduction to Research (3)

Students will choose at least 1 course from the following list for the *Chemical Synthesis & Materials Science* area:
- CHEM 5160   Advanced Synthetic Chemistry (3)
- CHEM 5460   Synthetic Organic Chemistry (3)
- CHEM 5470   Principles of Medicinal Chemistry (3)
- CHEM 5500   Advanced Inorganic Chemistry (3)
- CHEM 5550   Organometallic Chemistry (3)
- CHEM 5560   Solid State Chemistry (3)
- CHEM 5590   Special Topics in Inorganic Chemistry (3)
- CHEM 5800   Fundamentals and Design of Nanoarchitectures (3)
- CHEM 5850   Polymer Chemistry (3)

Students will choose at least 1 course from the following list for the *Chemical Analysis & Physical Characterization* area:
- CHEM 5150   Statistical Methods for Physical Scientists (3)
- CHEM 5170   Advances in Analysis and Modeling of Chemical Systems (3)
- CHEM 5200   Analytical Chemistry II (3)
- CHEM 5205   Analytical Chemistry III Lab (1)
- CHEM 5250   Bioanalytical Methods of Analysis (3)
- CHEM 5260   Analytical Separations (3)
- CHEM 5270   Electroanalytical Chemistry (3)
- CHEM 5280   Chemical Sensors (3)
- CHEM 5290   Special Topics in Analytical Chemistry (3)
- CHEM 5330   Advanced Physical Chemistry (3)
- CHEM 5340   Advanced Thermodynamics (3)
- CHEM 5350   Elements of Surface and Colloid Science (3)
- CHEM 5370   Computational Chemistry (3)
- CHEM 5390   Special Topics in Physical Chemistry (3)
- CHEM 5400   Organic Spectroscopy (3)
- CHEM 5450   Advanced Organic Chemistry (3)
- CHEM 5570   Group Theory & Spectroscopy (3)
- CHEM 5700   Environmental Chemistry (3)

Seminar
- CHEM 5920   Seminar (0) - Students should register for zero credit hours each semester of their first 2 years before registering for IAS 6010 in years 3 and 4 – see below.

Interdisciplinary Courses (18-21 credits)

Interdisciplinary (out of department) – Students will choose 2-3 courses from Earth & Atmospheric Sciences, Engineering, Physics, Mathematics, Biology, Biomedical Engineering, or Biomedical Sciences, Center for Sustainability (6)

Interdisciplinary Seminar (interdepartmental)
- IAS 6010   Interdisciplinary Seminar (4) – Students will register for 1 hour per Fall/Spring semester in years 3 and 4.

Interdisciplinary Research Discussion Group (interdepartmental)
- IAS 6030   Current Topics in Interdisciplinary Research (8) - Students will register for 2 hours per Fall/Spring semester in years 3 and 4.

Interdisciplinary Research – Students may carry out research in the disciplines outlined above as it relates to their own research project in this track (0-3)

Research Credits (12 credits)

- IAS 6990   Dissertation Research – Students must register for the section number assigned to their PM.

Concentration: Biology - Bioinformatics or Integrated Geospatial Biology

Departmental Courses (9 - 12 credits)

Core
- BIOL 4060   Structure and Function of Ecosystems (3)
- BIOL 4090   Plant Ecology (3)
- BIOL 4260   Biology of Amphibians and Reptiles (4)
- BIOL 4270   Field Studies with Amphibians and Reptiles (1)
- BIOL 4280   Biology of Fishes (4)
- BIOL 4310   Biology of Birds (4)
- BIOL 4320   Cave Biology (4)
- BIOL 4330   Spring Flora of the Ozarks (4)
- BIOL 4340   Systematic Biology (3)
- BIOL 4350   Biology of Parasitic Organisms (4)
- BIOL 4360   Animal Behavior (3)
- BIOL 4370   Animal Behavior Laboratory (1)
- BIOL 4380   Biology of Mammals (4)
- BIOL 4400   Applied Ecology (3)
- BIOL 4450   Ecological Risk Assess/Risk Management (3)
- BIOL 4480   Conservation Biology (3)
- BIOL 4600   Developmental Biology (3)
- BIOL 4630   Foundations of Immunobiology (3)
- BIOL 4640   General Microbiology (3)
- BIOL 4650   Microbiology Lab (2)
- BIOL 4670   Population Biology (3)
- BIOL 4680   Landscape Ecology and Management (3)
- BIOL 4700   Molecular Biology (3)
- BIOL 4760   Plant Biochemistry (4)
- BIOL 4910   Internship in Conservation (3)
- BIOL 5060   Advanced Topics in Molecular Biology (4)
- BIOL 5070   Advanced Biological Chemistry
- BIOL 5100   Cellular and Molecular Genetics (3)
- BIOL 5120   Signal Transduction (3)
- BIOL 5190   GIS in Biology (3)
- BIOL 5300   Problems in Vertebrate Physiology (2-4)
- BIOL 5340   Problems in Cell Biology (1-2)
- BIOL 5350   Current Topics in Cell Biology
- BIOL 5400   Problems in Genetics (1-4)
- BIOL 5410   Ecological Genetics (3)
- BIOL 5420   Problems in Evolutionary Biology (1-4)
- BIOL 5450   Biogeography (3)
- BIOL 5460   Systematic Biology (3)
- BIOL 5480   Conservation Biology (3)
- BIOL 5500   Problems in Ecology (2-4)
- BIOL 5550   Advanced Ecology (3)
- BIOL 5600   Development Genetics (3)
- BIOL 5670   Advanced Population Biology (3)

- BIOL 5700   Advanced Molecular Biology (3)
- BIOL 5770   Coevolution (3)
- BIOL 5840   Graduate Seminar in Ecol, Evol, and System (2)
- BIOL 6040   Current Topics in Developmental Biology (3)
- BIOL 6150   Neural Basis of Behavior (3)
- BIOL 6510   Plant-Water Relationships (3)
- BIOL 6970   Research Topics (1-3)
- BIOL 6980   Graduate Reading Course (1-3)

Seminar
- BIOL 5810   Department Seminar (0)
- BIOL 5820   Graduate Seminar/Cell and Molec Regulation (2)
- BIOL 5860   Scientific Communication Practicum (3)

Interdisciplinary Courses (18-21 credits)

Interdisciplinary (out of department) – Students will choose 2-3 courses from Earth & Atmospheric Sciences, Engineering, Physics, Mathematics, Chemistry, Biomedical Engineering, or Biomedical Sciences, Center for Sustainability, or IAS GIS courses.

Interdisciplinary Seminar (interdepartmental)
- IAS 6010   Interdisciplinary Seminar (4) – Students will register for 1 hour per Fall/Spring semester in years 3 and 4.

Interdisciplinary Research Discussion Group (interdepartmental)
- IAS 6030   Current Topics in Interdisciplinary Research (8) - Students will register for 2 hours per Fall/Spring semester in years 3 and 4.

Interdisciplinary Research – Students may carry out research in the disciplines outlined above as it relates to their own research project in this track (0-3)

Research Credits (12 credits)

- IAS 6990   Dissertation Research – Students must register for the section number assigned to their PM.

Concentration: Environmental Sciences and GIS

- Departmental Courses (9-12 credits)

    o **Core**
      - EAS 4350 Ground Water Hydrology (3)
      - EAS 4500 Scientific Communication (2)
      - EAS 5190 Seminar in Geoscience (3)
      - EAS 5900 Geoscience Journal Club (1)
      - EAS 5170 Divergent/Convergent Margins (3)
      - EAS 5180 Transform/Plate Interiors (3)
      - EAS 5600 Atmospheric Chemistry (3)
      - GIS 5010 Introduction to GIS (3)
      - GIS 5020 Intermediate GIS (3)
      - GIS 5040 Introduction to Remote Sensing (3)
      - GIS 5060 Geospatial Methods in Environmental Studies (3)
      - GIS 5070 Research Methods (3)
      - GIS 5080 Digital Cartography & Geovisualization (3)
      - GIS 5090 Programming for Remote Sensing/GIS (3)
      - GIS 5100 Microwave Remote Sensing: SAR Principles, Data Processing and Applications (2 or 3)
      - GIS 5110 Interferometric Synthetic Aperture Radar (3)
      - GIS 5120 Geographic Information Science, Society and Sustainability (3)
      - GIS 5970 Research Topics (0-6)

- Interdisciplinary Courses (18 – 21 credits)

    o **Interdisciplinary (out of department)** - *2-3 courses from pre-approved lists from affiliated departments should be taken in the research emphasis area, outside the research specialization of the PhD candidate. A sample of these courses includes:*
      - BIOL 4680 Landscape Ecology and Management (3)
      - BIOL 5190 GIS in Biology (3)
      - BIOL 5480 Conservation Biology (3)
      - BIOL 5500 Problems in Ecology (3)
      - CHEM 5700 Environmental Chemistry (3)
      - SOC 5205 Science, Technology, & Public Policy (3)
      - BSDP 5101 Fundamentals of Disaster Planning (3)
      - EOH 5970 Research Topics in Environmental & Occupational Health (3)
      - EAS 5340 Cloud Physics (3)

    o **Interdisciplinary Seminar (interdepartmental)**
      - IAS 6010 Interdisciplinary Seminar (4) – Students will register for 1 hour per Fall/Spring semester in years 3 and 4.

    o **Interdisciplinary Research Discussion Group (interdepartmental)**
      - IAS 6030 Current Topics in Interdisciplinary Research (8) - Students will register for 2 hours per Fall/Spring semester in years 3 and 4.

    o **Interdisciplinary Research** – Students may carry out research in the disciplines outlined above as it relates to their own research project in this track (0-3)

- Research Credits (12 credits)

  - IAS 6990 Dissertation Research – Students must register for the section number assigned to their PM.

<u>Concentration</u>: Physics - Nanomaterials and Condensed Matter

- Departmental Courses (9-12 credits)

    - *Core*

        - PHYS 5010 Nanoscience and Nanofabrication Frontiers
        - PHYS 5020 Experimental Physics
        - PHYS 5030 Mathematical Methods in Classical Mechanics
        - PHYS 5040 Fundamentals of Electricity & Magnetism
        - PHYS 5050 Quantum Mechanics

    - *Special Topics*
        - Physics 5070 Condensed Matter Physics

- Interdisciplinary Courses (18-21 credits)\

    - **Interdisciplinary (out of department)** – *Courses selected outside the core department (Choose 2-3 courses from this list, but no more than two 400-level courses)*

        - CHEM 5570 Group Theory & Spectroscopy
        - CHEM 5340 Advanced Thermodynamics
        - CHEM 5370 Computational Chemistry
        - CHEM 5800 Fundamentals and Design of Nanoarchitectures
        - CHEM 5560 Solid State Chemistry
        - ECE 5131 Low Noise Electronics Design
        - ECE 5132 Analog Integrated Circuit Design
        - ECE 5235 Digital IC Design
        - ECE 5142 Microwave Theory & Techniques
        - ECE 5143 Antenna Theory and Design
        - ECE 5150 Advanced Filter Design

    - **Interdisciplinary Seminar (interdepartmental)**
        - IAS 6010 Interdisciplinary Seminar (4) – Students will register for 1 hour per Fall/Spring semester in years 3 and 4.

    - **Interdisciplinary Research Discussion Group (interdepartmental)**
        - IAS 6030 Current Topics in Interdisciplinary Research (8) - Students will register for 2 hours per Fall/Spring semester in years 3 and 4.

    - **Interdisciplinary Research –** Students may carry out research in the disciplines outlined above as it relates to their own research project in this track (0-3)

- Research Credits (12 credits)

    - IAS 6990 Dissertation Research – Students must register for the section number assigned to their PM.

Concentration: Sustainability Science

Departmental Courses (9-12 credits)

Core
- MOS 5020   Sustainability Foundations (*required*)
- MOS 5050   Sustainable Business Practices (*required*)
- MOS 5060   Environmental Aspects of Sustainability (*required*)
- MOS 5110   Sustainability in Society and Cultures (*required*)
- MOS 5160   Environmental Politics and Policy
- MOS 5220   Certification in Sustainability Reporting
- MOS 5490   GRI Certification
- MOS 5930   Special Topics

Interdisciplinary Courses (18 – 21 credits)

Interdisciplinary (out of department) - *2-3 courses from pre-approved lists from affiliated departments should be taken in the research emphasis area, outside the research specialization of the PhD candidate. A sample of these courses includes:*
- UPD 5010   Research Methods (*required*)
- GIS 5010   Introduction to GIS (3)
- GIS 5020   Intermediate GIS (3)
- GIS 5040   Introduction to Remote Sensing (3)
- GIS 5060   Geospatial Methods in Environmental Studies (0 or 3)
- GIS 5070   Research Methods (3)
- GIS 5080   Digital Cartography & Geovisualization (3)
- GIS 5090   Programming for Remote Sensing/GIS (3)
- GIS 5100   Microwave Remote Sensing: SAR Principles, Data Processing and Applications (2 or 3)
- GIS 5110   Interferometric Synthetic Aperture Radar (3)
- GIS 5120   Geographic Information Science, Society and Sustainability (3)
- GIS 5970   Research Topics (0-6)
- GIS 5350   Introduction to GIS for the Social Sciences and Humanities
- GIS 5370   Intermediate GIS for Social Sciences
- GIS 5380   Advanced GIS for Social Sciences
- UPD 5000   Urban and Regional Development Theory
- UPD 5100   Local Economic Development Policy and Practice
- UPD 5150   Real Estate and Economic Development
- UPD 5250   Infrastructure Planning and Process
- UPD 5300   Theory and Foundations of Planning
- UPD 5310   Land Use Planning and Analysis
- UPD 5330   Real Estate Finance
- UPD 5340   Community Development Finance
- UPD 5430   Environmental Planning
- UPD 5440   Planning and Development Studio
- UPD 5480   Sustainability and the Built Environment
- UPD 5490   Sustainable Site Planning
- UPD 5600   Planning and Development in St. Louis

Interdisciplinary Seminar (interdepartmental)
- IAS 6010   Interdisciplinary Seminar (4) – Students will register for 1 hour per Fall/Spring semester in years 3 and 4.

Interdisciplinary Research Discussion Group (interdepartmental)
- IAS 6030   Current Topics in Interdisciplinary Research (8) - Students will register for 2 hours per Fall/Spring semester in years 3 and 4.

Interdisciplinary Research – Students may carry out research in the disciplines outlined above as it relates to their own research project in this track (0-3)

Research Credits (12 credits)

- IAS 6990   Dissertation Research – Students must register for the section number assigned to their PM.

H. Forms for the *Integrated & Applied Science* Program

201x Student Annual Report

"[Click here & type Name & Surname]"

Research report for the degree of

Doctor of Philosophy (PhD) in Integrated & Applied Sciences

"[Click here & type Concentration]"

"[Click here & type Date]"

1. COURSES TAKEN – TO BE COMPLETED BY STUDENT

1. Spring 2015

    > <type text - box will expand automatically>

2. Summer 2015

    >

3. Fall 2015

    >

4. If the written comprehensive exam was taken, provide the following information:

    > Date of exam:
    >
    > Exam committee faculty member #1 / dept:
    >
    > Exam committee faculty member #2 / dept:
    >
    > Exam committee faculty member #3 / dept:

2. RESEARCH PRODUCTIVITY – TO BE COMPLETED BY STUDENT

1. Research (provide a brief summary of research project(s), no more than 500 words).

2. Provide dissertation proposal exam information (if known).

Dissertation committee chairman (primary mentor) / dept:
Dissertation committee member #2 (secondary mentor) / dept:
Dissertation committee member #3 / dept:
Dissertation committee member #4 / dept:
Dissertation committee member #5 / dept:
Date of oral exam (if taken):

3. Publications (provide: authors, title, publication name, year, volume/chapter, page numbers).

    a. Peer-reviewed journal articles.

    b. Conference proceedings.

    c. Non peer-reviewed articles and papers.

    d. Research abstracts.

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    e. Monographs, books, and book chapters.

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    f. Textbooks.

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    g. Edited publications.

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    h. Reviews of books and scholarship.

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4. Lectures, papers, speeches presented at professional meetings/settings or educational institutions (provide: authors, presentation title, meeting name, location, month, year).

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5. Local, regional, national or international recognition or awards.

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6. Publications in progress.

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7. Specific research goals for coming year.

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8. Projected month/year for final PhD defense.

Forward to your research mentor for completion.

3. **RESEARCH PRODUCTIVITY – TO BE COMPLETED BY PRIMARY FACULTY MENTOR**

1. Name and department.

> <type text - box will expand automatically>

2. Name and department of secondary mentor (if assigned).

>

3. Please indicate funded grants/contracts used to support research by this student.

>

4. Please indicate unfunded grants/contracts intended to support research by this student. Indicate whether pending or unsuccessful.

>

5. Provide brief assessment of student's research progress.

>

6. Rate student's academic standing (according to the IAS Program Handbook): satisfactory or unsatisfactory.

>

Email completed report to: jellissp@slu.edu

4.   PROGRAM DIRECTOR NOTES

1. Date for meeting student & Primary Mentor.

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<type text - box  will expand automatically>
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2. Program Director Notes.

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3. Final assessment: satisfactory or unsatisfactory.

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