UNIVERSITY FACULTY SENATE FORMS

Academic Program Approval

This form is a routing document for the approval of new and revised academic programs. Proposing department should complete this form. For more information, call the Faculty Senate Office at 831-2921.

Submitted by: ___Melinda K. Duncan_____phone number__0533___

Action: ____Request for New Concentration in Chemistry-Biology Interface for the Ph.D. in Biological Sciences_____
(Example: add major/minor/concentration, delete major/minor/concentration, revise major/minor/concentration, academic unit name change, request for permanent status, policy change, etc.)

Effective term___08J_____
(use format 04F, 05W)

Current degree_____Ph.D. _____
(Example: BA, BACH, BACJ, HBA, EDD, MA, MBA, etc.)

Proposed change leads to the degrees of: __Ph.D. _____
(Example: BA, BACH, BACJ, HBA, EDD, MA, MBA, etc.)

Proposed names:___ Ph.D. in Biological Sciences with a concentration in Chemistry-Biology Interface; _____
Proposed new name for revised or new major / minor / concentration / academic unit (if applicable)

Revising or Deleting:

Undergraduate major / Concentration:_____
(Example: Applied Music – Instrumental degree BMAS)

Undergraduate minor:_____
(Example: African Studies, Business Administration, English, Leadership, etc.)

Graduate Program Policy statement change:__See attached_____
(Attach your Graduate Program Policy Statement)

Graduate Program of Study:_____
(Example: Animal Science: MS Animal Science: PHD Economics: MA Economics: PHD)

Graduate minor / concentration:_____

List program changes for curriculum revisions:
None, this proposal seeks to codify our ongoing departmental policies at the level of the University.

List new courses required for the new or revised curriculum:
(Be aware that approval of the curriculum is dependent upon these courses successfully passing through the Course Challenge list. If there are no new courses enter "None")

None

Other affected units:
(List other departments affected by this new or revised curriculum. Attach permission from the affected units. If no other unit is affected, enter "None")

None

Rationale:
(Explain your reasons for creating, revising, or deleting the curriculum or program.)

Our department has required all of our graduate students to complete the curricular requirements of a "track" for many years although the track curricular requirements were never approved at the university level. At the request of the Office of Graduate Studies, we submitted our graduate program policy to through the appropriate channels for approval. In February of 2008, it was suggested by the University Graduate Studies Committee that we further revise our curriculum to change the term "Track" to "Concentration" so that the student's curriculum is noted on their transcript . This new proposal is in response to this request by the University graduate studies committee.

Program Requirements:
(Show the new or revised curriculum as it should appear in the Course Catalog. If this is a revision, be sure to indicate the changes being made to the present curriculum.)

See Attached.

ROUTING AND AUTHORIZATION: (Please do not remove supporting documentation.)

Department Chairperson _____ Date _____

Dean of College _____ Date _____

Chairperson, College Curriculum Committee _____ Date _____

Chairperson, Senate Com. on UG or GR Studies _____ Date _____

Chairperson, Senate Coordinating Com. _____ Date _____

Secretary, Faculty Senate _____ Date _____

Date of Senate Resolution _____ Date to be Effective _____

Registrar _____ Program Code _____ Date _____

Vice Provost for Academic Programs & Planning _____ Date _____

Provost _____ Date _____

Board of Trustee Notification _____ Date _____

Revised 11/03/04 /khs

Concentration in “Chemistry-Biology Interface”

Policy and Curriculum

The prospective student must meet all general requirements for the Ph.D. degree in the Department of Biological Sciences. The curriculum described below was developed to ensure that students achieve breadth of knowledge, written and oral communication skills, and proficiency in the practice of research expected of individuals holding an advanced degree with a specialization at the interface of modern Biology and Chemistry. All students are expected to have basic competency in biochemistry and molecular biology upon admittance to the program since these fields underpin the training provided by this concentration. These competencies can be demonstrated by superior performance in biochemistry and molecular biology courses from another institution. Acceptance of these courses from other institutions is subject to approval by the Concentration Coordinator. CHEM 641 and CHEM 642 can be used to provide competency in biochemistry and molecular biology, respectively.

Fall, Year One

Course Name(s) and Number(s)	**Credits**
BISC 631 - Practice of Science (core)	3
CHEM 641 - Biochemistry* (core)	3
BISC 827 - Graduate Research Seminar, course in oral presentation skills (core)	1
CHEM 667 - interface research: CHEM/BIOL**	3
Total: 10 credits	

Winter, Year One

Tutorial**

Spring, Year One

Course Name(s) and Number(s)	**Credits**
One of the following literature-based graduate courses: (core) BISC 612 - Advanced Cell Biology BISC 654 - Biochemical Genetics BISC 656 - Evolutionary Genetics BISC 679 - Virology CHEM 624 - Principles of Mass Spectrometry CHEM 646 (667-011) - DNA: Protein Interactions	3
CHEM 642 - Biochemistry*	3
BISC 827 - Graduate Research Seminar, course in oral presentation skills (core)	1
Total: 7 credits	

*Or a course from the elective list below if the student already has demonstrated competency.
**At least one tutorial should be done in the lab of a faculty member whose primary appointment is outside the department of Biological Sciences.

Summer, Year one

June

- Preliminary examination (see below)

July and August

- BISC 868 - Research in the thesis/dissertation laboratory (3 credits)
- Identification of Advisory Committee and first committee meeting***

***The Advisory Committee will be constituted as described for the overall Ph.D. graduate program in Biological Sciences, with the additional stipulation that at least three members of the committee must be Chemistry-Biology interface faculty. This can include the student's advisor.

Fall, Year Two

Course Name(s) and Number(s)	**Credits**
BISC 665 - Advanced Molecular Biology and Genetics (core)	3
BISC 827 - Graduate Research Seminar, course in oral presentation skills (core)	1
BISC 964 - Research, in thesis/dissertation laboratory	6
Total: 10 credits	

Spring, Year Two

Course Name(s) and Number(s)	**Credits**
Elective chosen from list below (core)	3
BISC 827 - Graduate Research Seminar, course in oral presentation skills (core)	1
BISC 964 - Research, in dissertation laboratory	6
Total: 10 credits	

Electives: Choice of electives should be made with approval of the student's thesis advisor.

- BISC 602 - Molecular Biology of Animal Cells
- BISC 605 - Advanced Mammalian Physiology
- BISC 612 - Advanced Cell Biology
- BISC 615 - Vertebrate Developmental Biology
- BISC 639 - Developmental Neurobiology
- BISC 646 - Plant Cell Biology
- BISC 654 - Biochemical Genetics
- BISC 656 - Evolutionary Genetics
- BISC 671 - Cellular and Molecular Immunology
- BISC 679 - Virology
- BISC 693 - Human Genetics
- BISC 806 – Advances in Cell and Organ Systems
- ANSC 644 - Bioinformatics
- CHEM 624 - Principles of Mass Spectrometry
- CHEM 643 - Intermediary metabolism
- CHEM 644 - Mechanisms of Enzyme Catalysis
- CHEM 645 - Protein: Structure and Function
- CHEM 646 - DNA: Protein Interactions
- CHEM 647 - Biochemical Evolution
- CHEM 667 - Bioorganic Chemistry and Chemical Biology
- CHEM 830 – Special topics in Organic Chemistry
- ELEG 673 - Signal Processing in Neural Systems
- PLSC 635 - Plant Developmental Biology
- PLSC 804 - Plant Molecular Biology
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If any graduate courses equivalent to those listed above have been taken in previous graduate degree programs and have been accepted as graduate level transfer credit by the University, the transferred courses may be used to satisfy the Concentration requirements with the approval of the Concentration Coordinator.

Other courses in addition to those listed above may be taken upon the advice of the student's advisor and thesis/dissertation committee.

Year Three - until successful completion of qualifying exam

Course Name(s) and Number(s)	**Credits**
BISC 964 - Pre-candidacy Study	6
BISC 827 - Graduate Research Seminar	1

Total: 7 credits

After completion of qualifying exam

Course Name(s) and Number(s)	Credits
BISC 969 - Doctoral Dissertation	9
BISC 827 - Graduate Research Seminar	1
Total: 10 credits	

Doctoral students must complete 2 semesters of teaching assistantship to enhance their oral presentation skills. It is recommended that this requirement be fulfilled during the second or third year since most students in this concentration are on NIH training grant support in the first year of the graduate program..

Doctoral students must pass a qualifying examination in order to advance to candidacy for the Ph.D. degree.

The Preliminary Examination

Graduate students in the Chemistry-Biology Interface Concentration are expected to possess a fundamental body of knowledge in biochemistry equivalent to CHEM 641 and molecular/cellular biology equivalent to BISC 401 and CHEM 642, and the ability to critically analyze scientific literature. To ensure that this is the case, an oral preliminary examination will be administered to all graduate students in the Concentration at the end of their first year of study.

In order to be eligible to take the preliminary exam, students must have completed first year core courses (including CHEM641 and CHEM642, if needed) with a grade of B or better. In all cases, the student is expected to correct all deficiencies in their performance in the first year curriculum by the end of the semester after the deficiency occurred, but no later than the end of their third semester in the program. If the applicable course is not offered, a suitable substitute will be determined by the Concentration coordinator. Failure to obtain a B or better in a required course in the second attempt will result in termination from the Concentration. Students are expected to take the preliminary exam within six weeks after the first year curriculum has been successfully completed. If the student fails to complete the preliminary exam by this time, the student with be terminated from the Concentration and recommended to the Graduate Affairs Committee for termination from the graduate program.

Procedure

Students will be provided with at least four sets of papers from the primary literature selected by faculty from which they must choose one set as the basis for their oral examination. These papers will be available at least six weeks before the exam, usually no later than May 1, so that the exam can be administered the second or third week of June. Four weeks prior to the exam, the student should inform the Concentration coordinator of the chosen paper set and arrange the time of the exam. Prior to the exam, the student should prepare transparencies or computer graphics of all of the figures and tables presented in the papers so that they will be available for discussion during the exam.

During the exam, the student will be tested by a committee of four to six faculty members on his/her comprehension of all aspects of the paper including background and related information. Students present a 10 minute synopsis of the primary paper, then the examination committee will ask questions pertaining to background material, methodology, experimental results and their significance, as well as the article’s overall significance to the field. It therefore is imperative that the student searches and reads the literature for background and related information. While a good starting point is the bibliography at the end of the chosen paper set, it is likely that other

primary literature sources will need to be consulted. Prior to the exam, students are encouraged to contact faculty to discuss the topics they are responsible for and to clarify difficult concepts.

Grading

After the oral examination, the examination committee will determine an appropriate grade. Four grades are possible at the initial exam: unconditional pass, conditional pass, re-examination or failure. If the student receives an unconditional pass, the exam was completed satisfactorily and no conditions are applied. In a conditional pass, the student performed marginally in one or more areas and may be asked to complete (with a grade of B or better) one or more courses as a condition for changing the grade to pass. The examination committee may prescribe conditions in addition to, or in lieu of, course enrollment. Once the condition is fulfilled, the student is responsible for informing both the Biology Graduate Program Director and the Concentration Coordinator so that the grade can be changed officially. If the student receives a re-examination, the student's performance was unsatisfactory and the exam must be repeated preferably within three months, but no later than six months after the initial examination. Only one retake will be permitted. If the student receives a failure, the student's performance strongly indicated an inability to complete an independent research project and the student will be terminated from the Chemistry-Biology Interface Concentration without the possibility of a retest. If the student does not perform satisfactorily in a re-examination, the student will be terminated from the Chemistry-Biology Interface Concentration and will be recommended to the Graduate Affairs Committee for termination from the graduate program.

Once the student passes the preliminary examination, he/she becomes eligible to take the qualifying examination for advancement to Ph.D. candidacy.

The Ph.D. Candidacy Examination

The purpose of the oral candidacy examination is to give the student the opportunity to demonstrate:

- the ability to write and defend a research proposal;
- an understanding of the research area in which he or she is interested;
- the ability to formulate a research problem and to comprehend its significance; and,
- the ability to design appropriate experimental approaches to solve the problem.

A student's performance will be regarded as satisfactory only if the student:

- demonstrates an adequate knowledge of the field in general as well as the research specialty in which he or she is interested;
- formulates a research problem, the solution of which will make a substantial contribution to our existing knowledge;
- demonstrates that the experimental design and methods proposed are appropriate to solving the problem.

Ph.D. Research Proposal

At the end of the student's third year, the student is expected to have spent at least two years working on a research project in the laboratory of the dissertation advisor. At this time, the student, in consultation with the dissertation advisor, will prepare a proposal in a format similar to an NIH grant proposal that outlines the background of the project, the hypothesis to be tested, the research accomplishments to date and the research to be completed to fulfill the requirements

of a Ph.D. in Biological Sciences. It is the student's responsibility to submit the Research Proposal to each member of the dissertation committee at least two weeks prior to the oral exam date (see below).

The Research Proposal must be double-spaced and should include:

- Specific Aims: State concisely and realistically what the research is intended to accomplish and what hypothesis is to be tested. Do not exceed two pages.

- Background and Significance: Briefly sketch the background to the present proposal, critically evaluate existing knowledge, and identify gaps that the proposed research is intended to fill. State concisely the importance of the research by relating the specific aims to longer term objectives. Four to eight pages.

- Research Design and Methods: Briefly summarize the experimental design and the procedures to be used to accomplish the specific aims of this research. Include a description of the types of data to be obtained and how they will be analyzed to accomplish the specific aims. Students must be prepared to discuss potential pitfalls in the experimental design and contingency plans in the event that the data run counter to expectations. Fifteen to twenty pages.

- Literature Cited: All citations must include all author names as well as article titles. A suggested format (the standard for Journal of Cell Science for EndNote users) is below:

  Mazaki, Y., Uchida, H., Hino, O., Hashimoto, S. and Sabe, H. (1998). Paxillin isoforms in mouse. J. Biol. Chem. 273, 22435-22441.

The Proposal should also contain a concise Preliminary Results section. However, the candidacy examination is not meant to be a defense of the student's previous laboratory work, but rather it should be an evaluation of the student's ability to construct a hypothesis and to design the means by which to test it.

Exam for admission into candidacy for the Ph.D. (Qualifying exam)

The exam will be administered by the student's dissertation committee **excluding the student's primary research advisor**. Since the primary advisor for the dissertation will not be present during the examination, the student must choose an examination committee chair from among the four remaining members. The chair will be responsible for the conduct of the exam and the completion of a detailed report outlining the student's strengths and weaknesses, as well as any suggestions for alterations to the research proposal after the defense.

Prior to the exam, the student should meet with each committee member to clarify which topics that member feels are relevant for the background knowledge portion of the exam. At the oral defense, the student will present the background and significance of the work, the hypothesis to be tested and the preliminary data collected. The majority of the presentation should be devoted to explaining the research to be performed in the two years remaining in the student's degree program. Students should plan on a 30-45 minute presentation during which the committee will not ask questions except to clarify very specific issues (graph axes, incubation times, etc.). At the conclusion of the formal presentation the committee will evaluate the student's scientific background as well as the scientific validity of the proposed research project. It also is essential that the student demonstrates the ability to make a significant intellectual contribution to their project.

If the student receives a grade of **unconditional pass**, the student will be admitted into candidacy and should arrange for the appropriate paperwork to be filed with the graduate school. If the student receives a grade of **conditional pass**, deficiencies were found in the student's preparation that need to be rectified by completion of the "condition(s)" before the student is admitted into candidacy. The student is responsible for informing the Graduate Program Director

when any such conditions are fulfilled so that the student can be admitted into candidacy. If the student receives a **re-examination**, deficiencies in the written proposal and/or the student's scientific background will need to be corrected and the defense repeated. Only one reexamination will be permitted. If the student **fails** the qualifying exam on the first or second attempt, the student either may be recommended for a terminal Master's degree outside of the Chemistry-Biology Interface Concentration or for termination from the Ph.D. program by the examining committee.
