DOCTOR OF ARTS (DA) DEGREE IN BIOLOGY

The Doctor of Arts degree in Biological Sciences is granted for proven ability and scholarly attainment in biological science instruction. The program stresses preparation for undergraduate teaching at colleges and universities and the development of research abilities that complement instruction at the college level. The program is concerned with the development of the candidate as a biologist, a scholar, and a professional educator. The program is designed to provide the student with a broad background in the biological sciences, the ability to conduct and interpret research, and excellent pedagogical skills.

GOALS OF THE PROGRAM

All D. A. students must demonstrate:

1. a broad background in the biological sciences and an understanding of scientific inquiry.
2. the ability to synthesize concepts of biology and to effectively communicate these concepts.
3. the ability to conduct, analyze, and critique research in biological sciences and biological sciences instruction;
4. the ability to integrate current biological and educational research into their teaching;
5. an understanding of the history and philosophy of science and the impact of contemporary science on society;
6. expertise with teaching strategies appropriate for a variety of teaching and learning environments, including undergraduate research;
7. strong content knowledge in three of the departmental core coursework areas and competency in the remaining three core areas;
8. a well developed philosophy of education.

DOCTOR OF ARTS FELLOWSHIPS

Students admitted to the program with Fellowship Support can anticipate three years of support, contingent upon satisfactory performance toward their degree. Typically, provisions will be made for a fourth year of support but the student and his/her major advisor must submit a letter to the departmental Graduate Program Committee requesting an extension of support and providing a rationale and timeline toward completion of the degree.

MASTER'S DEGREE REQUIREMENT

All candidates for the program must have completed a Master's degree prior to entrance into the program. If a student enters the program without having completed a Master's level thesis or research paper in biology or a related science, he/she must complete this requirement in addition to the degree requirements or design a dissertation project that incorporates biological research as a major component. This additional requirement may increase the length of time in the program and may limit the flexibility of the degree.

DIAGNOSTIC EXAMINATION

Incoming D.A. students are required to take an oral diagnostic examination. The purpose of the examination is to assess the student's potential to become an effective instructor by examining the depth of his/her background in biological science and communicative skills. The examination is meant to be primarily diagnostic, and the results are used by the student's advisory committee to help plan the Program of Study. The examination covers all six of the core conceptual areas of biology (Cell biology, Genetics, Ecology, Evolution, Physiology, Organismal biology) and knowledge of pedagogy. The purposes of the oral examination are to validate the results of the Biology GRE and the coursework listed on the student's transcript, and to observe the student's oral communicative skills.

The oral examination is conducted no later than six weeks after the beginning of the first semester of the student's program (exception: for students taking the Biology subject GRE in November of their first semester, the oral exam may be delayed until the end of the student's first semester). The oral examining committee is appointed by the Chair of the Graduate Programs Committee. After completion of the examination, the oral examining committee will submit suggestions to the student and his/her advisory committee for planning the Program of Study. Normally, the student, in conjunction with the committee, will select three of the core areas to emphasize, however they must demonstrate competency in the remaining three areas.

Although the diagnostic examination is used primarily for advising purposes, if the student's performance is generally unsatisfactory, the oral examining committee will select one of the following options: (1) the student may continue in the program but with certain specified additional requirements, (2) the student may take a second oral examination the following semester, (3) the student will not continue in the program. If the performance on the second oral examination is unsatisfactory, the student will be dismissed from the program.

ADVISORY COMMITTEE.

Graduate programs in the Department of Biological Sciences are directed by advisory committees selected by the student, in consultation with their advisor. The committee will consist of at least four faculty members plus a Graduate Faculty Representative. At least three faculty must be from the Department of Biological Sciences and at least two committee members should have expertise in the core areas of coursework chosen by the student.

COURSEWORK REQUIREMENTS

The D.A. degree program requires a minimum of 48 semester credits beyond a Master's degree. A program of coursework will be established jointly by the student and his/her committee. The program should reflect previous coursework, previous teaching experiences, results of the diagnostic examination, the interests and professional goals of the student, and the goals of the DA in Biological Sciences instruction as previously listed in this document. All DA students are required to take Advanced Studies in College Teaching (4 credits) and a minimum of two Seminars in College Teaching (4 credits). DA students are encouraged to participate in topical seminars, professional organizations, grant writing, and to submit their work to education and scientific journals.

INTERNSHIP REQUIREMENT

Internships are a very important part of the DA program. Each internship should be a rigorous, thoroughly planned pedagogical activity that provides an opportunity for development of skills in traditional and innovative teaching methods and for utilizing techniques, etc. developed during the program. Students must follow the Guidelines for the Supervised Teaching Internships (appended). The internship requirement is flexible to accommodate the needs of each student.

Written proposals for each internship must be discussed and approved by the student's committee before the internship begins. Exact procedures for evaluating the internship will depend on the nature of what is done and where it occurs. However, evaluation is considered to be an integral and important part of the internship and students must develop an evaluation system in concert with the internship supervisors. It is expected that this evaluation will at least include provisions for substantive feedback from students, the major advisor, committee members, and supervising faculty. Students must complete an internship report within one semester of teaching.

Typically, students will be expected to focus on coursework and their scholarly research during their first two semesters in residence, and not begin internships until after their second or third semester in the program. Internships must be completed prior to the last semester of residency. A minimum of 9 credits of internship is required, but no more than 16 can be counted toward the degree. A comprehensive report of each internship, including their evaluation, must be submitted to the student's committee prior to the final seminar and examination. This comprehensive internship report should be prefaced by a Statement of Teaching Philosophy. A copy of this report will be retained separately in the student's departmental file unless it is part of the dissertation.

DISSERTATION PROPOSAL AND DEFENSE

During the first three semesters in residence, the student will prepare a written dissertation proposal. The dissertation can be designed to include multiple components such as:

- biological research;
- application of biological research to the classroom;
- pedagogical research related to biological sciences instruction at the college level;
- assessment of student learning;
- in-depth analysis and evaluation of internship teaching;
- multi-media or other curricular development, use, and evaluation;
- conducting research and involving undergraduates in such research, and evaluating the efficacy of such involvement.

The written proposal will include: (1) a survey of the literature, to develop a rationale for the research, (2) a statement of the problem(s) or hypothesis (es) to be addressed, (3) detailed descriptions of methods including the experimental design and planned statistical analyses, (4) preliminary data (optional, but strongly encouraged), (5) a time line, (6) a bibliography, and (7) a budget (optional).

When the research proposal has been approved by the major professor and the remainder of

the advisory committee, the student will prepare and present a one-hour seminar on the proposed research to the Department. This presentation will occur no later than the end of the student's third semester in residence. Immediately after the seminar, the student will be given an oral examination by his/her Advisory Committee. This examination will focus on the proposed research. The student's advisory committee will evaluate the student's performance and may (1) admit the student to further work toward the D.A., (2) recommend that the student revise the proposal and/or improve her/his background before attempting to continue graduate work, (3) recommend limitation of the program to the MS degree, or (4) in rare cases, recommend dismissal from the graduate program. In the event of the first two decisions, the committee will provide the student with specific recommendations or requirements. In the case of the second decision, the committee also will schedule a second evaluation after not less than one semester.

COMPREHENSIVE EXAMINATION.

The comprehensive examination consists of a written and an oral portion. The written examination tests the student's knowledge of the core areas of biology and the topics covered in the education seminars. Depth and breadth of the examination on these topics should be commensurate with the recommendations from the diagnostic examining committee, and the three selected core areas as represented in the student's program of study. The oral examination assesses the student's capability to communicate answers effectively and areas of weakness indicated by the written examination.

Each member of the student's committee will submit a section of the examination on which the student will be expected to write for 4 to 6 hours. Each committee member will individually determine whether the student passed his/her section of the examination; the student must pass at least 75% of these sections. If the written examination is not passed, the committee may recommend that the student not proceed further in the program or that the student re-take those portions of the written examination that were not passed.

The oral examination should be scheduled within two weeks of satisfactory completion of the written examination. Failure to pass the oral examination can result in the recommendation that the student not proceed further in the program or that the oral examination should be re-taken at a later date. Failure to pass the comprehensive examination twice results in automatic termination from the program.

DOCTORAL DISSERTATION

Every student working toward the DA degree must submit a dissertation embodying the results of original and creative research. The dissertation must demonstrate the student's ability in independent investigation and must be a contribution to scientific or science education knowledge. It must display mastery of the literature of the subject field and must demonstrate an organized, coherent development of ideas, with a clear exposition of results and creative discussion of the conclusions.

The form and style of the dissertation should comply with the format prescribed by the journal in which the student intends to publish the material and must meet the requirements of "Instructions for Preparing Theses, Dissertations, DA Papers, and Professional Projects," which is available from the Office of Graduate Studies. Within the framework of these

constraints, however, the format of the dissertation can vary, ranging from a series of stand-alone chapters to single, comprehensive unit. In the former case, a preface that explains the overall layout should be included. After the dissertation has been approved for format and content by the major professor, and not later than two weeks before the date of the final examination, the student must deliver a copy of the dissertation to each member of the Advisory Committee (including the GFR).

DISSERTATION DEFENSE

The student's Advisory Committee including the GFR will conduct the final examination of the dissertation. The final defense must be completed at least two weeks before the date set for the commencement exercises at which the student expects to obtain a degree. Students are required to give a departmental seminar on the dissertation immediately preceding the final defense. The examination is concerned primarily with the student's research as embodied in the dissertation, but it will also include the Teaching Internships. A majority of the examining committee must approve the dissertation and the final defense.