Review and Assessment of Undergraduate Academic Programs in the College of Agriculture and Life Sciences

Annual Report for the 2005-2006 Academic Year

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June 30, 2006
Introduction

The College of Agriculture and Life Sciences has 40-degree tracks leading to the bachelors of Science degree. These tracks are offered through 19-degree programs in 15 departments.

The review and assessment of departmental academic programs is a continual and ongoing process consisting of the following elements:

• A comprehensive departmental review every eight years including review and assessment of undergraduate and graduate educational programs. Individuals external to the university that are regarded highly in their disciplinary areas are utilized to review and provide input into departmental programs. The comprehensive departmental review process consists of gathering data, developing a self-study document, reporting to the review team, obtaining a written report from the review team, drafting a departmental response to the written report, and formulating action steps to be taken to address areas of change/needs identified by the review team. The processes and expected outcomes from the comprehensive departmental review program in the College of Agriculture and Life Sciences can be found at http://ceres.cals.ncsu.edu/cfdocs/star/modules/websitebuilder2/WebSite/index.cfm?CurrentWebSiteID=93&Current1.location=13.

• Development of objectives, goals and outcomes for each of the 19-degree programs. These statements are integral to the educational mission of the 15 departments that administer the degree programs.

• Annual identification of specific goals for the improvement of the educational process.

• Collection of data and observations that address the specific goals.

• Reflection on the data and observations collected and subsequent alignment of these results with the expected outcomes.

• Change programs to enhance the educational mission within departments.

• Report on an annual basis the assessment and review processes that were conducted that year and any changes that were made to the educational programs.

College-Level Action Plan:

The College of Agriculture and Life Sciences requires departments to undergo comprehensive reviews and to make annual assessment reports. Degree objectives, goals and outcomes are developed during the self-study phase of the comprehensive review process and then reviewed at the succeeding comprehensive review.
Annual assessment reports are required during the years between the comprehensive reviews. Annual assessment reports provide information relative to the activities, which contributed to the degree objectives, goals and outcomes for that year. In addition, annual assessment reports provide a listing of the review and assessment activities that were conducted in the past year and any changes that were made to the academic programs in the department.

The College of Agriculture and Life Sciences collects the annual assessment reports for each of the undergraduate degree programs. A college level report is prepared which provides a summary of the programmatic assessments and changes that were made during that academic year. In addition, administrators in the College of Agriculture and Life Sciences review each annual assessment report to determine whether additional steps should be taken to enhance the effectiveness of the education program. Action plans that are developed at the college level are specific and directed towards a particular degree program.

The 2005-2006 academic year was successful in regards to review and assessment of the academic programs in the College of Agriculture and Life Sciences and many steps were taken to enhance student learning and instructor effectiveness. Departments undertook many assessment processes during the year in an effort to continually evaluate and improve their degree programs. A similar assessment and reporting process is expected next year.

**Summary of Assessments That Were Conducted by Degree Programs During the 2005-2006 Academic Year**

1. Faculty reviewed student-learning objectives in courses they taught.

2. Faculty assessed the effectiveness of various teaching methods in courses they taught.

3. Faculty reviewed and assessed whether students were achieving goals established by programs, particularly as it relates to the development of critical thinking skills, collaborative learning, and the enhancement of communication skills.

4. Faculty evaluated student portfolios to assess student’s progress in the undergraduate major and to ascertain students’ mastery of specific subjects.

5. Formal and informal discussions by departmental committees and/or ad hoc committees were conducted to determine the effectiveness of departmental course content within a discipline and the sequence of courses that comprise an undergraduate degree within the major.

6. Department Heads and/or Undergraduate Coordinators examined numerical scores and individual comments from student course evaluations to assess the course effectiveness and whether the course is meeting curricular requirements within the major and the effectiveness of the instructor of the course.
7. Department Heads and/or Undergraduate Coordinators reviewed results of the standardized evaluation of advising process to determine the effectiveness of the student-advising program within the department.

8. Department Heads and/or faculty conducted peer evaluation of teaching to determine the teaching effectiveness of faculty, and where appropriate made recommendations regarding improvements.

9. Departmental guidelines were established for first time instructors, which in some cases included mandatory participation in programs in teaching effectiveness conducted by the College and/or University levels, and in other cases were mentored by a more senior faculty member.

10. Department Heads held faculty meetings to discuss departmental course and curricular matters, as well as meetings to ascertain whether the department was meeting their expected outcomes relative to undergraduate education.

11. Department Heads and/or Undergraduate Coordinators conducted personal exit interviews with graduating seniors to assess the perceived level of satisfaction of degree program and whether the program was meeting the overall degree objectives that are established for the program.

12. Department Heads, Undergraduate Coordinators, and faculty solicited feedback from employers to assess whether appropriate subjects were included in the curriculum and to determine whether students graduating from the degree program were prepared for the work force.

13. Evaluation of senior and alumni survey data for purposes of assessing the skills provided within the major for career success.

14. Evaluated the effectiveness of their degree program by the percentage of graduating students who successful passed a standardized exam that is required to work in that field.
The Following Changes Were Made During the 2005-2006 Academic Year
As a Result of Assessment Activities Changes in subjects within courses

1. Changes in courses within degree programs
2. Changes in degree requirements
3. Changes in student learning objectives
4. Changes in pedagogical approaches
5. Changes in assessment criteria
6. Changes in evaluation instruments and processes
7. Changes in the evaluation processes of instructor/faculty relative to their teaching responsibility
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**Degree Program:** B.S. in Agricultural and Environmental Technology

**Department:** Biological and Agricultural Engineering

**Curriculum Code(s):** AET

**Objectives of the Degree Program:**
The objectives of this program are to:
1. Develop technical knowledge of physical and biological sciences used in agricultural and environmental systems.
2. Apply critical thinking, existing technology and practical approaches to solve problems in agricultural and environmental systems.
3. Produce technologists able to work in teams and effectively communicate to audiences.
4. Develop in students an appreciation for life-long education that supports their careers.

**Goals of the Degree Program:**
The goal is to meet the objectives and measure the outcomes.

**Outcomes of the Degree Program:**
After completing the B.S. in Agricultural and Environmental Technology, students will be able to:
1. Identify and synthesize appropriate knowledge for the understanding and solution of technical problems.
2. Address agricultural and environmental issues in depth through areas of specialization.
3. Define, analyze and apply the most viable solutions to technical problems.
4. Utilize hands-on approaches in solving problems.
5. Work effectively in teams.
6. Prepare effective written materials.
7. Deliver effective oral presentations to multiple audiences.
8. Search on-line and vocational resources for information appropriate to their work.

**Assessment Activity during the 2005-2006 Academic Year:**
Educational outcomes were measured as follows:
1. By collecting examples of student homework and test questions from BAE 311, 323, 332, 333, 343 and 432 where they demonstrate their knowledge of physical and biological sciences. After further data collection a rubric will be used to assess student learning.
2. By collecting examples of student solutions to technical problems in homework assignments, projects and / or laboratories from BAE 311, 323, 332, 333, 343, and 432 that show their ability to solve technical problems.
3. By collecting examples of student laboratory assignments from BAE 201, 324, and 344 which demonstrate hands-on skills for technical, troubleshooting and solving problems. A rubric will be developed to assess these skills.

4. Students were assigned as teams in BAE 442. A team rubric was developed to determine the effectiveness of team working skills.

5. Students in BAE 323 and 442 prepared written reports. A rubric will be developed after further data collection to assess written reports and student.

6. Students in BAE 442 made oral presentations about their semester projects. A rubric will be used to evaluate the oral presentations and their effectiveness after further data collection.

7. In response to under enrollment in the program, all outcomes and the curriculum are being reviewed and a major curriculum revision is expected soon. BAE 324, Elementary Surveying, has also been revised to expand its content.
**Degree Program:** B.S. in Agricultural Business Management

**Department:** Agricultural and Resource Economics

**Curriculum Code(s):** ABM/BBM

**Objectives of the Degree Program:**

Students will be able to:

1. Recognize and demonstrate a sound understanding of basic concepts, principles, and terminology in economics and business.
2. Analyze and evaluate positions on economic/business issues.
3. Solve real-world economics/business problems effectively in the context of an industry or field of study.
4. Explain economics/business principles and concepts to lay audiences.
5. Graduate with a high degree of satisfaction in their education. Employers of graduates should likewise express satisfaction in their education and job skills.

**Goals of the Degree Program:**

The overall goal of the undergraduate program in the Department of Agricultural and Resource Economics is to offer its students a comprehensive theoretical and applied understanding of economic/business concepts. Students will be able to use the intellectual skills obtained to make reasoned choices concerning the resources which they control in personal, business, and professional decision making. Specific goals are listed below as the outcomes associated with each of the major objectives.

**Outcomes of the Degree Program:**

1a. Students can explain, through effective written and oral communication, economic/business concepts and principles in a way that demonstrates their comprehension of them.

2a. Students can dissect an economic/business issue into the various principles and concepts that form the basis for interpreting that issue.

2b. Students can critique an economic/business position on an issue in terms of the accuracy of its use of economics/business principles and concepts in making a claim about economics/business.

3a. Students can analyze appropriate economic data in terms of costs and benefits (returns).

3b. Students can present economic/business data and solutions to problems in a way that is clear and accurate.

4a. Students can translate economic/business concepts and principles into terms that can be understood by both general and specific audiences to help them understand economics/business more accurately.

4b. Students can take economics/business research and information and present it in a
way that is comprehensible to lay audiences who need to act on that information.

5a. Students will, upon reflection of the education received from the ABM/BBM major, express a high degree of satisfaction and confidence in their economic/business knowledge.

5b. Employers will seek ABM/BBM graduates and express a high degree of satisfaction in their education, knowledge and job skills

Assessment Activity during the 2005-2006 Academic Year:

1. Primary assessment of objectives and outcomes numbered 1 to 4 comes from regular evaluation and analysis of students’ work in departmental courses. Throughout the year, faculty in the department have held ongoing formal and informal discussions about the quality of work performed by students, identifying strengths and weaknesses, and exploring necessary adjustments to course content, expectations, presentation and delivery in order to enhance the ability of students to achieve those objectives.

2. Examined senior and alumni survey data to evaluate strengths and weaknesses and determine any changes relative to previous years. A comprehensive survey with objective questions (and an opportunity for subjective comments as well) is administered to graduating seniors during the fall and spring semesters. The ARE department has had a response rate among the highest in the university system. The departmental insert in the survey includes sets of questions geared to each specific objective. The alumni survey is similar in style to the senior survey. The departmental insert includes sets of questions geared to each specific objective along with other questions designed to solicit insights that alumni are in a better position to provide. The university surveys a sample of alumni every five years. Results of the most recent survey, in the fall of 2002, continue to be part of the overall ongoing assessment process.

3. Conducted exit interviews with graduating seniors. The department head invited graduating seniors to participate in small group exit interviews at the end of their last semester. This provides students an opportunity to assess their perceived level of competence in meeting the intended objectives. In addition, students can share their insights about curriculum strengths, weaknesses, and opportunities for enhancing courses and curriculum. The exit interviews are conducted near the end of each semester. The department head summarizes the results and shares it with the undergraduate curriculum committee as well as with individual faculty, as appropriate, during the faculty evaluations conducted yearly.

4. Thoroughly examined student course evaluations of each course taught and discussed the evaluation results, as well as other information related to teaching, with each instructor in annual evaluations of each faculty member. Objective and subjective evaluations are administered at the end of each semester. Responses are available 30-60 days after the semester ends. The department head reads all written comments on these forms before returning them to the individual instructor. In addition to course
and instructor information, these comments provide feedback indicating the success in meeting program objectives and outcomes.

5. Conducted a peer review of teaching on faculty during the 2005-06 academic year, as part of an ongoing regular rotation of peer evaluations each year.

6. Solicited employer comments on graduates and interns through personal contact/interaction, use of employers as guest speakers/lecturers in courses, and interaction through the CALS career fair and career placement office.

7. Focused on the evaluation of current departmental involvement and future direction of delivery of courses through distance education through departmental curriculum committee meetings, faculty meetings, and presentation of workshops on various aspects of distance education. Continued to evaluate and work towards the establishment of an ABM minor through distance education.

8. Held discussions among the department head, undergraduate coordinator, and lead faculty adviser for the BBM concentration to evaluate the needs, shortcomings, and future direction of the BBM program and how to best serve current student majors and prospective students desiring to major in BBM.

9. Studied the issue of plagiarism in departmental courses via faculty discussions and the departmental curriculum committee.
**Degree Program:** B.S. in Agricultural Education

**Department:** Agricultural and Extension Education

**Curriculum Code(s):** AED

**Objectives of the Degree Program:**
The objectives of the degree program are listed as the outcomes (below). Each objective/outcome of the program is associated with one of the major goals, as identified by the numbering system.

**Goals of the Degree Program:**
1. Demonstrate appropriate pedagogical skills in the classroom.
2. Develop well-rounded agricultural education programs in their schools.
3. Develop a broad base of agricultural knowledge to be communicated to learners.
4. Apply appropriate instructional technology for specific learning situations.
5. Apply critical thinking to solving educational and agricultural problems.
6. Demonstrate professional dispositions in education.

**Outcomes of the Degree Program:**
Outcomes are associated with the above Goals of the Program. Students who complete the degree program will be able to:

1.a. Select appropriate teaching techniques for specific situations.
1.b. Motivate students to learn
1.c. Adapt instruction to students with varying learning styles, academic abilities, and cultural backgrounds.
1.d. Evaluate learning and provide appropriate feedback to students.
1.e. Manage student behavior and solve discipline problems in the classroom.

2.a. Provide experiential learning opportunities for students.
2.b. Provide appropriate FFA activities consistent with agricultural education program objectives.
2.c. Provide agricultural education programs that meet the needs of the local community.

3.a. Ability to lead students in the solution of agricultural problems.
3.b. Communicate agricultural information to learners.

4.a. Use of a variety of instructional tools to communicate agricultural information.
4.b. Use of state-of-the-art instructional technology to aid instruction to students of various abilities.
4.c. Use of appropriate technology in the agricultural discipline.

5.a. Synthesize information from courses and educational experiences to arrive at appropriate solutions to problems.
5.b. Develop learning activities that develop problem solving skills in students.
6.a. Demonstrate fair and ethical treatment of students in educational settings.
6.b. Contribute to the overall welfare of the school.
6.c. Participate in professional development and professional improvement activities.

Assessment Activity during the 2005-2006 Academic Year:
The faculty in the department conducted the following assessment activities during the 2005-06 academic year.

1. Conducted an exit survey of all program completers (student teachers) to determine their perceived strengths and weaknesses upon completion of the program.

2. Collected exit evaluations of the student teachers' performance from the cooperating teachers in their student teaching centers and university supervisors based upon actual observations of student teachers' performance in the classroom. Multiple interim (formative) evaluations were also collected to determine progress of a student teacher during the student teaching experience.

3. Evaluated teaching portfolios for each student teacher to assess ability to plan learning activities and appropriate knowledge of the content area (agriculture).

4. Evaluated a separate technology portfolio to assess students' ability to use instructional technology in the classroom. Technology portfolios were evaluated by practicing teachers and university faculty.

5. Examined senior and alumni survey data in an effort to determine trends associated with program strengths and weaknesses.

6. Held faculty meeting to discuss findings from the above data. The results of the findings were that our students have met the objectives of planning and delivering instruction to students, but the program needs to be strengthened in the area of teaching diverse learners, especially students with learning disabilities. We also found that student teachers are uncomfortable with handling discipline issues in their classrooms, but actually are very competent in doing so. Agricultural knowledge and use of technology was found to be excellent. Student teachers were found to have excellent skills related to professional dispositions.

7. As a result of the assessment finding from this year, the department plans to include more instruction on special needs students in the methods class. We will explore the possibility of developing a new course in teaching students from diverse backgrounds. A request was made to the Department of Curriculum Instruction to add an existing course in teaching special needs students to the AED curriculum, but the response was that they did not have the resources to accommodate additional students in the course.
Degree Program: B.S. in Agronomy

Department: Crop Science

Curriculum Code(s): TAA/TAC/TAT

Objectives of the Degree Program:
To provide a basic and applied science education that prepares our graduates for agronomic and turfgrass professional careers within North Carolina and around the world

Goals of the Degree Program:
1. To develop a basic understanding of how agronomic plants grow in various cropping systems and the ability to apply this knowledge to farm management
2. To develop the ability to recognize biotic and abiotic stresses and their symptoms in field situations and make appropriate management decisions
3. To develop the ability to communicate proficiently and professionally

Outcomes of the Degree Program:
1. Graduates will be able to describe how various agronomic crops grow and develop
2. Graduates will be able to describe how natural resources affect farming practices at a regional and global scale
3. Graduates will be able to develop economically sound crop management plans for various farm enterprises
4. Graduates will be able to develop environmentally sound crop management plans for various farm enterprises
5. Graduates will be able to identify weeds, diseases, and insects that have the potential to cause economic crop loss
6. Graduates will be able to identify plant symptoms of disease and insect infestations and of abiotic stresses for major agronomic crops
7. Graduates will be able to evaluate the potential economic impact of crop pest infestations and abiotic stresses for various cropping systems
8. Graduates will be able to make crop management recommendations that minimize economic losses from plant pest infestations and abiotic stresses
9. Graduates will be able to make pest management recommendations that do not adversely harm the environment
10. Graduates will be able to write reports and business correspondence in a manner acceptable in their professions
11. Graduates will be able to prepare and confidently present oral reports
12. Graduates will be able to interact confidently and effectively in various professional settings

Assessment Activity during the 2005-2006 Academic Year:
Assessment of some of our goals will come from evaluating student performance through class exams and assignments. Other assessment tools we will include success of job placement and alumni (2-5 years post graduation) and employer surveys, to determine
how well our graduates are prepared for the work place. We will also continue peer review of teaching to evaluate class materials and will bring in evaluators from outside the university system to critically review our curricula and courses.
**Degree Program:** B.S. in Agronomy

**Department:** Soil Science

**Curriculum Code(s):** TAB/TSS

**Objectives of the Degree Program:**
Provide an understanding of basic soil properties and an integration with crop sciences to prepare graduates to solve agronomic problems.

**Goals of the Degree Program:**
see objectives

**Outcomes of the Degree Program:**
1. Understand the basic physical, chemical and biological properties of soil
2. Apply the principles of soil and crop science in land management
3. Communicate proficiently and in a manner required of agronomic professionals

**Assessment Activity during the 2005-2006 Academic Year:**
A majority of the graduating seniors completed the National Fundamentals of Soil Science Examination prepared by the Soil Science Society of America. All but one student taking the exam achieved a passing score. The specific exam results revealed some weakness in 2 of the 6 skill areas. These weaknesses in soil chemistry and soil biology are common to all students across the nation taking the exam. While the results in these areas were somewhat low, they were actually above the national average in many cases. These weaknesses are being addressed with the inclusion of more quantitative skill requirements in our soil fertility course and with the first time offering of a new soil microbiology course in the spring 2006 semester.
Degree Program:  B.S. in Animal Science

Department:  Animal Science

Curriculum Code(s):  SAS/IAS

Objectives of the Degree Program:
  Objective 1: Students should demonstrate the ability to understand and communicate information from the animal sciences in written form.

  Objective 2. Students should demonstrate the ability to engage in scientific inquiry.

  Objective 3. Students should demonstrate the ability to solve problems related to the animal sciences.

  Objective 4. Graduating seniors should be satisfied with the education they received from the Department of Animal Science.

Goals of the Degree Program:
  The goals of the Animal Science undergraduate degree program are to meet at least three of the four objectives each year (and on an ongoing basis).

Outcomes of the Degree Program:
  Outcome 1: Students will be able to write clear, accurate responses to essay and short-answer questions in Animal Science courses.

  Outcome 2: Students will be able to organize and summarize data/information in a way that is accurate and understandable.

  Outcome 3. When presented with a problem relevant to the field of Animal Science, students will be able to determine what information is appropriate to solving the problem and then find it, assess its authority and validity, and use it effectively.

  Outcome 4. Upon reflection on the education they received from their Animal Science Major, 80% or more of the responding students will be Very Satisfied or Moderately Satisfied with their overall education in Animal Science.

Course/Instructor Evaluations: The desired outcome is a score of 4.0 or higher (scale of 1 to 5, with 5 being best) for "overall course evaluation" and "overall instructor evaluation" for each course and instructor. The summary data (overall department, weighted by the number of students in each course) are presented with the College of Agriculture and Life Science data for "overall course evaluation" and "overall instructor evaluation." This summary sheet is shared with the department, but only the faculty member, Undergraduate Teaching Coordinator, and Department Head see the data for individual courses and instructors.

Peer Evaluation of Teaching: The Department of Animal Science has ongoing peer-
review of teaching to provide feedback to teaching faculty. A team of 3 faculty members each attend 10% of lectures and labs for the course they are reviewing, and results are shared with the faculty member who teaches the course as well as the Department Head in Animal Science. The desired outcome is to have at least 80% of all faculty reviewed every 5 years.

Advising Evaluations: For advising, the desired outcome is that 80% or more of the responding advisees indicate their advisor is effective and the advisee would recommend his/her advisor to another student. Each advisor can log onto a secure website to access his/her advising evaluation data.

Assessment Activity during the 2005-2006 Academic Year:

Outcomes 1 through 3 are assessed on a continuous basis by teaching faculty in the Department of Animal Science. The teaching faculty are in agreement that most incoming freshmen do not have the skills necessary to synthesize thoughts and utilize critical thinking skills to solve problems and express themselves in writing. Dr. Billy Flowers spends considerable time working with freshmen in ANS 150, Intro to Animal Science, to develop these skills. In Fall 2005, 126 of the 134 students who took ANS 150 or ANS 150H were successful in building these skills; 6 were unsuccessful, and 2 withdrew from the course. Faculty who teach the upper level Management and Discipline courses evaluated students utilizing projects, papers, and exams; results were shared in informal discussions as well as during formal teaching faculty meetings. The final Teaching Faculty Meeting (May, 2006) focused on strategies that can be adopted to cope with the anticipated 50% enrollment increase in Animal Science. A subcommittee was formed to further discuss the topic throughout the 2006 summer season.

Outcome 4 is assessed via the Graduating Senior Survey. For the May 2005 survey (results of which were received during the Fall 2006 semester), 90.19% of the respondents indicated they were Very Satisfied or Moderately Satisfied with the education they received overall with their Animal Science degree, which is above our stated objective of 80%. The Graduating Senior Survey contains valuable information that also allows the department to assess student interest in each species represented by our classes, and it gives us important information on the profile and interests of our students.

Course and Instructor Evaluations for Spring and Fall of 2005 (Spring 2006 is not yet available) provided the following assessment data: In Spring 2005, the Animal Science Department average score for "Overall Instructor" was 4.38 and for "Overall Course" was 4.21. In Fall 2005, the Animal Science Department average score for "Overall Instructor" was 4.44 and for "Overall Course" was 4.33. Both semesters exceeded our objective of having the evaluations be above a 4.0 on a scale of 1 to 5. The course and instructor evaluations provide additional data that allow the department to assess each course and each instructor; this information is discussed between the department head and each faculty member during the faculty member's annual one-on-one meeting with the department head.
Two faculty members had their undergraduate courses peer-reviewed in the 2005/2006 academic year. They were: Joe Cassady for ANS 440 (Selection of Domestic Animals) and Bob Harrell for ANS 150 (Intro to Animal Science). Comments from these reviews are used to make improvement in courses, and the results of the peer-review process are discussed between the department head and each faculty member during the faculty member's annual one-on-one meeting with the department head.

Advising evaluations were only available online for Spring 2006, and 163 Animal Science majors responded to the request from the College of Agriculture and Life Sciences to complete the online evaluation. Of the respondents, 84% said his/her advisor is effective and is recommended; 7% had no opinion. This exceeds our departmental objective of having 80% or more of the responding advisees indicate their advisor is effective and recommended. In addition to this information, the advising evaluation results provide the department and each advisor with information that allows assessment and improvement where necessary.

As a result of the ongoing assessment process, the following course changes occurred during this past year: ANS 205 (Anatomy & Physiology of Domestic Animals) was changed from a 3-credit course to a 4-credit course; the pre-requisite for ANS 400 (Companion Animal Management) was changed to be ANS 105 (Intro to Companion Animals); and ANS 225 (Principles of Nutrition) was developed as an online summer course for non-Animal Science majors. As a result of an administrative decision at the college level, our curricula (SAS, IAS) changed from requiring "ZO 160 or BIO 183" to requiring "ZO 160 or BIO 181;" this change was reflected in the degree audits of incoming transfer students beginning in March (despite no action being taken by the department to change the curriculum).
**Degree Program:** B.S. in Applied Sociology

**Department:** Sociology and Anthropology

**Curriculum Code(s):** ASA

**Objectives of the Degree Program:**

The objectives of the faculty in Sociology are to:

1. provide instruction to enable students to understand human behavior within a social context.
2. help students achieve competence in understanding, critically assessing, and using major sociological concepts.
3. make students knowledgeable consumers and producers of research applicable to social problems or issues.
4. introduce students to the varied theoretical perspectives of sociology.
5. encourage in their students an appreciation and respect for cultural diversity in societies.

**Goals of the Degree Program:**

Our objectives provide the means to achieving the goals of the two colleges (CHASS and CALS) as they relate to social science knowledge, understanding and application. Keys to effective service and engagement include an ability to examine the roles and responsibilities of individuals, groups, and institutions in larger society while displaying an understanding of the complex relationships between human behavior and the social context, as well as the ability to analyze human behavior within a social context. Our students must be knowledgeable producers and consumers of social science information as citizens, no matter what career paths or educational directions they may take.

**Outcomes of the Degree Program:**

Students should be able to demonstrate:

1. An understanding of human behavior within a social context. Specifically, students should be able to demonstrate that they:
   a. can examine the roles and responsibilities of individuals, groups, and institutions in larger society, displaying understanding of the complex relationships between human behavior and the social context.
   b. can analyze human behavior within a social context from different perspectives.
2. Competence in understanding, critically assessing, and using major sociological concepts. Specifically students should be able to demonstrate that they:
   a. can define major sociological concepts involved in understanding social behavior, interaction and organization.
   a. can apply major sociological concepts to specific situations, showing that they are able to (1) use the concepts to organize and make sense of what they find in specific situations and (2) use specific situations to exemplify, amplify, and critique major sociological concepts.
3. That they are knowledgeable consumers and producers of research findings applicable to sociological problems or issues. Specifically, students should be able to demonstrate that they:
   a. can critique sociological research reported in popular or scholarly publications by describing the research problem, methodology, and results and making persuasive cases for the strengths and weaknesses of each.
   b. can propose a plan of research for a sociological problem or issue, including conceptualization of the problem, review of pertinent literature, design of a research study, and identification of methods appropriate for exploring the problem or issue.

4. Familiarity with various theoretical perspectives of sociology. Specifically, students should be able to demonstrate that they:
   a. articulate what are several key attributes of various theoretical perspectives of sociology.
   b. can describe and critically analyze the assumptions that underlie particular theoretical perspectives.
   c. can apply various theoretical perspectives to issues in society, showing how a perspective frames each issue, i.e., how we understand the issue, the kinds of questions we can ask about it, and the kinds of research methods we can apply to answering the questions.

5. An appreciation and respect for cultural diversity in societies. Specifically, students should be able to demonstrate that they:
   a. are aware of and comprehend the diversity of views within and across various social groups.
   b. understand social groups in various societies in terms of differences in sociocultural resources and outcomes

**Assessment Activity during the 2005-2006 Academic Year:**

**Section 1–Evidence**

The 2005-2006 Sociology and Criminology Assessment Report is based on our evaluation of a sample of seniors’ papers. These senior papers are used as a measure of our Outcome 3.a. as outlined in the original 2003 Program Assessment Report for Sociology and Criminology which states:

Students should be able to demonstrate:

3. That they are knowledgeable consumers and producers of research findings applicable to sociological problems or issues. Specifically, students should be able to demonstrate that they:
   a. can critique sociological research reported in popular or scholarly publications by describing the research problem, methodology, and results and making persuasive cases for the strengths and weaknesses of each.
Summary of the senior paper evaluations: The overall assessment of our seniors’ paper is that the papers are mediocre at best. The judgement of these papers is comparable to recent years’ assessments. Based on recent survey results of those who teach 400-level classes, it seems fair to say that students do not appear to be well prepared for their upper-level writing assignments (based on the sample of papers that were assessed).

The assessment procedure, senior paper evaluation report, and evaluation rubric for this evaluation are available upon request. This assessment process represents the most carefully scrutinized of our majors’ efforts.

Section 2 – Actions

In addition to summarizing these evaluations, this report includes a discussion of the Undergraduate Committee’s related efforts toward reviewing our undergraduate program. These efforts along with the evaluation of senior papers are developed in tandem in an iterative process.

For example, last fall our department established guidelines for first time instructors of our Introduction to Sociology course – a course which has recently been made a requirement of all our majors. Our goal is to ensure that this course will provide the fundamental background for our majors by exposing our students to the discipline’s core concepts and theoretical perspectives.

As we discover strengths and weaknesses in our program, we explore ways to rectify problems and take advantage of the department’s strengths to do so. For example, we surveyed our faculty to determine the extent to which our students were being assigned major writing assignments in their senior-level courses. We found that 80% of faculty teaching senior level courses assigned a major research or term paper, and that the remaining 20% described the major writing experience for their students as ‘a series of papers’ or ‘several short reaction papers.’ This survey instrument helped us assess the nature of writing assignments our students were receiving. In addition, this survey sought to assess students’ preparedness for their senior-level course work. The results of our senior paper evaluations were somewhat explained by the survey responses by the faculty who reported their students were not well prepared for senior-level course work.

Our committee is addressing these shortcomings not only with our work with SOC202 instructors; but, also, it is preparing guidelines for courses at each 200-, 300-, and 400-level to provide faculty with tools to facilitate their students’ writing and research skills. These guidelines will comprise our committee’s major assessment efforts during the 2006-2007 academic year.
**Degree Program:** B.S. in Biochemistry

**Department:** Biochemistry

**Curriculum Code(s):** BCH

**Objectives of the Degree Program:**

Objective 1: A student in biochemistry is expected to have a foundation in the supporting fields of chemistry, life sciences, physics and mathematics.

Objective 2: A student in biochemistry is expected to have an understanding of the language and concepts of Biochemistry.

Objective 3: A student in biochemistry is expected to read, understand and express themselves confidently and competently in written and oral communications within the field of Biochemistry.

Objective 4: A student in biochemistry is expected to work effectively and competently in the laboratory.

**Goals of the Degree Program:**

The goal is to meet the objectives and measure the outcomes.

**Outcomes of the Degree Program:**

Outcome 1: Our students will successfully complete a variety of courses in chemistry, mathematics, physics, microbiology, biological sciences, genetics, botany and zoology.

Outcome 2a: A student in Biochemistry will be able to describe the structure and function of biomolecules: proteins, nucleic acids, lipids and carbohydrates.

Outcome 2b: A student in Biochemistry will be able to describe the concepts of metabolic processes - such as the synthesis and breakdown of biomolecules [amino acids, proteins, carbohydrates, lipids, nucleotides and nucleic acids], oxidative phosphorylation, photosynthesis, replication, transcription, and translation.

Outcome 2c: A student in Biochemistry will be able to describe the regulation of metabolic processes such as gene expression, enzyme activity and signal transduction.

Outcome 3a: A student in Biochemistry will be able to demonstrate through discourse with their peers an understanding of the words and concepts of Biochemistry.

Outcome 3b: A student in Biochemistry will be able to write effectively in the genre, including laboratory reports, written themes and research reports.

Outcome 3c: A student in Biochemistry will be able to read and summarize journal articles found in various Biochemical journals.
Outcome 4a: A student in Biochemistry will be able to demonstrate the mastery of basic laboratory skills, assays and techniques.

Outcome 4b: A student in Biochemistry will be able to be able to collect data, analyze data, pose hypotheses and draw conclusions.

Outcome 4c: A student in Biochemistry will be able to work effectively either singly or in a group.

Assessment Activity during the 2005-2006 Academic Year:
The quality of the graduating seniors continues to be very impressive:

- average GPA = 3.42
- 13 CALS honors students [18%]
- 4 Biochemistry honors students [5%]
- 12 Phi Beta Kappa inductees [17%]
- 12 valedictorians [17%]
- 8 cum laude [11%]
- 14 magna cum laude [20%]
- 23 summa cum laude [32%]
- 6 Parks Scholars
- 1 Goldwater Scholarship winner

The graduating seniors for May 2006 were surveyed using both a written survey and an individual oral interview. The oral interviews were conducted by the Undergraduate Coordinator and were typically 10 - 30 minutes in length. Of the graduating class of 72 students, 67 responded with the surveys. This represents a 93% response rate.

The students were asked to rank how well BCH 451 prepared them for both BCH 453 and BCH 455 on a scale of 1 to 5, with 5 being the most. The results are shown in graph #1. Most of the students felt that BCH 451 did prepare them for the two advanced courses. The mean value of 3.9 ±0.9 for BCH 453 is indistinguishable from the mean value of 3.7 ± 1.2 for BCH 455.

As a second part, the students were asked to indicate how much of the material in BCH 451 was needed for the two advanced courses. The results are shown in graph #2. The mean value of 52 ± 22% for BCH 453 is slightly less than the mean for BCH 455 [56 ± 26%]. This is better seen in the comparison of the two curves.

The students were also asked to rank their preparation for a variety of task and indicate whether they wished that they had had further preparation in that task. Again, the ranking of preparation was based on a 1 to 5 scale with 5 being the most prepared. The results are presented in graph #3.

<table>
<thead>
<tr>
<th>Task</th>
<th>Mean</th>
<th>SD</th>
<th>% response for more preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Writing a proposal</td>
<td>2.5</td>
<td>1.3</td>
<td>56%</td>
</tr>
<tr>
<td>Preparing an oral report</td>
<td>2.7</td>
<td>1.4</td>
<td>42%</td>
</tr>
</tbody>
</table>
Preparing a poster 3.1 1.3 26%
Keeping a lab book 3.6 1.3 23%
Preparing a resume 3.8 1.1 18%
Reading an article 4.1 1.3 26%
Finding an article 4.2 1.2 13%
Writing a lab report 4.3 1.1 12%

These data would suggest that the students feel confident writing lab reports and finding and reading the scientific literature, although a quarter of the respondents would like more practice with reading scientific articles. This would suggest that the department is providing good practice through the various laboratory courses. On the other side, a significant number of students felt that their preparation of an oral report and writing a proposal was lacking and that they wished that they had had more experience with these two tasks.

Since an overwhelming majority of the respondents wished that our department would offer an non-required senior seminar, perhaps this might be a way to address the deficiencies documented by the survey results.

Question Yes Maybe No
Should the department offer a senior seminar? 49% 43% 8%
Should the seminar be required? 22% 32% 46%
Should the department offer BCH 103? 60% 24% 16%

The average grade point averages were calculated for the various ethnic groups within the graduation class. The results are summarized in the following table:

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>GPA</th>
<th>SD</th>
<th>n</th>
<th>SD * t / ν(n-1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian</td>
<td>3.57</td>
<td>0.43</td>
<td>7</td>
<td>0.34</td>
</tr>
<tr>
<td>Caucasian</td>
<td>3.48</td>
<td>0.53</td>
<td>49</td>
<td>0.13</td>
</tr>
<tr>
<td>Native American</td>
<td>3.41</td>
<td>0.41</td>
<td>4</td>
<td>0.56</td>
</tr>
<tr>
<td>Afro-American</td>
<td>3.10</td>
<td>0.49</td>
<td>12</td>
<td>0.27</td>
</tr>
</tbody>
</table>

Based on the t-distribution for the 95% confidence interval, there is no statistically significant difference in the average GPA values between the different ethnic groups.

[Unfortunately, the figures would not be accepted by the program.]
**Degree Program:** B.S. in Biological Engineering

**Department:** Biological and Agricultural Engineering

**Curriculum Code(s):** BE/BEA/BEE/BEP

**Objectives of the Degree Program:**

The Biological and Agricultural Engineering Department offers an undergraduate BS degree program in Biological Engineering (BE). Emphasis is placed upon mastering the fundamentals of engineering and biology, developing the ability to solve engineering problems, improving self-confidence, and applying the creative process of engineering design. The BE program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 - telephone: (410) 357-7700. The BAE faculty, in concert with program constituencies, have developed the following undergraduate program educational objectives for the BE degree.

Graduates of this program, within the first few years following graduation, will be:

1. Prepared to establish successful careers in engineering, as related to one of the specialized program focus areas: Agricultural, Bioprocessing and Environmental.
2. Able to grasp and apply engineering principles, procedures, and time management skills needed to solve complex, real-world problems especially as related to the fields of man-machine systems, greenhouse and animal structures, agricultural water and waste management, and unit operations in food and biological systems.
3. Professionally responsible in their work ethic while performing engineering tasks at a high level of expertise and willing to accept the ethical responsibility for the social and environmental impacts of engineering practices.
4. Able to communicate effectively with diverse audiences and able to work effectively in today's integrated team environments.
5. Broadly educated engineers and life-long learners, with a solid background in the biological sciences, engineering sciences and mathematics; an understanding and appreciation for the arts, humanities, and social sciences; and, a desire to seek out further educational opportunities.
6. Knowledgeable of current advances in engineering practice and research; prepared for opportunities in graduate engineering education and making progress towards registration as a professional engineer.
7. Capable of contributing to the future economic and social well-being of citizens of North Carolina, the nation and the world.

**Goals of the Degree Program:**

To meet each of the program educational objectives.

**Outcomes of the Degree Program:**

1. To demonstrate that graduates have an ability to apply knowledge of mathematics, science, and engineering, they should:
   a. show that they can employ general principles, theories, concepts, and/or formulas from mathematics, science, and engineering in the solution of
particular engineering problems. For a particular problem, graduates should demonstrate that they can:

i. define and describe the pertinent principles and appropriate assumptions, theories, concepts, and/or formulas;

ii. explain how they are appropriate to the problem; and

iii. demonstrate how they have been applied in the solution of the problem.

b. respond positively, after they have been on the job, to the instruction and guidance they received at NC State in applying knowledge of mathematics, science, and engineering to the particular engineering problems they encounter at work;

c. achieve a positive rating from their employers regarding their ability to apply general principles of mathematics, science, and engineering to particular engineering situations.

2. To demonstrate that graduates have an ability to design and conduct experiments as well as analyze and interpret data, they should:

a. show that they can take an experimental problem and develop a hypothesis, define the pertinent dependent and independent variables, and establish a sound experimental method that will allow them to measure the variables and test the hypothesis;

b. show that they can conduct an experimental procedure, use laboratory materials properly and safely, carefully note observations in a laboratory notebook, and describe the procedure clearly for others;

c. show that they can measure and record raw experimental data and analyze those data for the purposes of understanding and explaining the data. Graduates should be able to represent data in both verbal and visual forms (equations, tables, graphs, figures, etc.) in a way that is both an accurate and an honest reflection of the data.

d. show that they can render the data meaningful by discussing the data in the context of the hypothesis and appropriate theories and principles and by stating, clearly and concisely, conclusions that can be drawn from the experiment.

3. To demonstrate that graduates have an ability to design a system, component, or process to meet desired needs, they should:

a. show that they can apply engineering and biological principles and concepts optimally and creatively in the process of design. Design is a multi-task process that requires a balance of opposing characteristics: divergent and convergent thinking, synthesis and analysis, aesthetic and utilitarian sensibilities, all geared toward achieving an optimal solution. The process itself is flexible and recursive; that is, designers often find it necessary to move seamlessly among the different phases of the process as dictated by the design process needs. It is helpful to think of the design process as defined by the following phases:

i. defining the project. Project goals (objectives) are clearly and concisely developed in verbal and written communication with the project sponsor, customers and engineering consultants. Another
important aspect of project definition is gathering information in on-site observations. Key engineering and biological principles are identified as well as project deliverables; developing the criteria (specifications) from the goals and the engineering parameters of the project;

ii. identifying relevant resources in the professional literature--such as scientific articles, U. S. patents, and standards--to find information and concepts that have a substantive impact on the design;

iii. forming a design team consisting of student(s), sponsors, engineering consultant(s) and others and managing time resources to meet critical project deadlines.

iv. brainstorming for alternative possibilities. These may be possibilities for achieving the goals of the project or possibilities for finding solutions to immediate problems that come up during the process;

v. identifying the best of the possible solutions. This part of the process involves optimization of the solution with respect to the criteria. Analytic and/or empirical evaluation of the alternatives is conducted to determine important optimal features;

vi. creating a physical prototype or model that embodies or represents the chosen features;

vii. testing the prototype or model against the criteria for the project. The results of this experimental evaluation may send the designers back to any of the above stages;

viii. choosing and justifying to an appropriate audience, in both written and verbal formats, the final system, component, or process designed. Presentation of final design results must be done with reference to the criteria developed for the project.

b. respond positively, after they have been on the job, to the training and guidance in design process they received at NC State;

c. achieve a positive rating from their employers regarding their ability to engage productively and creatively in the process of design.

4. To demonstrate that graduates have an ability to function on multi-disciplinary teams, they must:

a. possess a conceptual understanding of group dynamics, that is, how to make groups work effectively. This conceptual understanding includes:

i. how to create a group climate that encourages success,

ii. how to recognize and make effective use of power resources in group activities, and

iii. how to use communication and negotiation strategies for dealing productively with conflict.

b. show that they can participate effectively as team members in group projects: working cooperatively with others, accepting diverse views, encouraging active participation of others, dealing productively with conflict, and taking leadership roles as the need arises to accomplish the group's objective;

c. show that they can work successfully with people who are in other fields and those who perform a variety of functions within a group as well as
demonstrate flexibility in the roles and functions they play. This means that they must:

i. exhibit respect for these people and the diversity they bring to the group,
ii. accept and incorporate, where appropriate, ideas from people with different perspectives; and
iii. explain pertinent engineering principles and applications to people who have no training in those principles and applications but who need to make use of them.

d. report, upon graduation, positive experiences related to the work they have done in teams. And if those experiences have been negative they should show that they know what they could have done to make their teams work more productively;
e. respond positively, after they have been on the job, to the training and guidance they received at NC State in working in teams;
f. achieve a positive rating from their employers regarding their ability to work effectively in multi-disciplinary teams.

5. To demonstrate that graduates have an ability to identify, formulate, and solve engineering problems, they should:

a. show that they can identify engineering problems. Problem identification entails two procedures:
   i. the ability to recognize an engineering problem. An engineering problem is an opportunity for change in which engineering solutions can be applied to improve existing or anticipated conditions; and
   ii. the ability to define an engineering problem. Defining a problem means describing, in concrete and specific terms, the existing or anticipated condition that creates the opportunity for change and the goal state(s) that provides the direction and end-point for change.

b. show that they can analyze problems, that is, isolate and describe the important components of a problem: what is given (design specifications, availability of materials, performance requirements, testing standards, etc.); what is known from previous experience relevant to the problem; and what the unknowns are;

c. show that they can represent a problem in a form that makes finding solutions more efficient and effective. Such representations are typically visual, such as a model, flow chart, diagram, or table. This visualization should represent the components of the problem in a way that leads to the construction of a solution.

d. show that they can apply engineering principles and mathematics to find the unknowns and arrive at appropriate solutions to the problem;

e. respond positively, after they have been on the job, to the training and guidance they received at NC State in solving engineering problems;
f. achieve a positive rating from their employers regarding their ability to solve engineering problems.

6. To demonstrate that graduates have an understanding of professional and ethical responsibility, they should:
a. show that they can apply an understanding of ethical responsibility to a design project. This means demonstrating that they can
   i. identify the ethical issues pertinent to a project,
   ii. generate ethical criteria related to the project,
   iii. incorporate those criteria in the justification of the final outcome of the project, and
   iv. argue effectively for the responsibility of the project engineer in maintaining the optimal balance between the contending forces of utility, cost, and risks.
b. respond positively, after they have been on the job, to the preparation in professional and ethical responsibility they received at NC State;
c. achieve a positive rating from their employers regarding their professional and ethical responsibility.

7. To show that graduates have an ability to communicate effectively, they should:
   a. exhibit a mastery of the forms of discourse appropriate to the profession of engineering: laboratory report, oral and written progress report, technical report, technical presentation, etc. Depending on the form that is used, students should demonstrate that they can:
      i. describe the context (institutional and/or technological) of a problem and the significance of that problem within that context (introduction);
      ii. describe clearly and precisely the procedures used to solve the problem (methods);
      iii. report both verbally and visually the findings (results);
      iv. interpret the findings in a way that is appropriate to the audience (discussion); and
      v. propose recommendations for a solution to the problem and justify that solution persuasively (conclusion).
   b. show that they can summarize technical material in way that is appropriate to a particular audience. Graduates should demonstrate that they can synthesize their own work and the work of others in the form of abstracts, executive summaries, and literature surveys.
   c. show that they can communicate successfully for obtaining and maintaining productive employment. For obtaining employment, graduates should show that they can write résumés and letters of application and perform capably in a job interview situation. For maintaining employment, graduates should show that they can write competent memos, letters, e-mail messages, proposals, and various reports (progress, personnel, maintenance, sales, trip, etc.) and give effective oral presentations to a variety of audiences.
   d. express confidence, upon graduation, of their ability to communicate effectively in their engineering careers and satisfaction with the guidance and instruction they received in writing and speaking;
   e. respond positively, after they have been on the job, to the usefulness and appropriateness of the preparation they received at NC State in oral and written communication;
   f. achieve a positive rating from their employers regarding their ability to communicate effectively.
8. To demonstrate that graduates have the broad education to understand the impact of engineering solutions in a global and societal context, they should:
   a. express satisfaction, upon graduation, that their education at NC State has helped them to understand the impact of engineering solutions in a global and societal context;
   b. respond positively, after they have been on the job, to the broad education they received at NC State and the way it has helped them to understand the impact of engineering solutions in a global and societal context.

9. To demonstrate that graduates recognize the need for and possess the ability to engage in life-long learning, they should:
   a. show that they can use the critical information-seeking tools that enable engineers to continue to stay up to date in their profession: internet resources, engineering journals, U.S. and foreign patent materials, standards, etc.
   b. show that as long as they continue to be employed as engineers, they are actively involved in the profession: membership in an engineering society, achievement and maintenance of technical registration for engineers, involvement in continuing education, etc.
   c. express, upon graduation, both a full appreciation for the need for and the motivation to pursue further education and training, both engineering and otherwise, over their lifetimes;
   d. show that after graduation they have continued to seek opportunities for further education and training, both engineering and otherwise.

10. To demonstrate that graduates possess a knowledge of contemporary issues, they should:
    a. show that they have taken and performed adequately in a variety of university courses that are concerned with contemporary issues and/or the context for understanding those issues, including courses in the humanities, arts, and social sciences, and those that combine one or more fields of study, such as science, technology, and society;
    b. respond positively, after they have been on the job, to the quality of education in contemporary issues they received at NC State.

11. To demonstrate that graduates have an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice, they should:
    a. show that they possess skills in time management and interpersonal communication and techniques for gathering information critical to effective engineering practice: World Wide Web, library, patent literature, etc.
    b. show that they can use modern engineering tools, such as CAD, engineering graphics literacy, presentation skills and graphical displays, and computer literacy.

Assessment Activity during the 2005-2006 Academic Year:
The ABET committee within the Biological and Agricultural Engineering Department consists of Dr. David Beasley (chair) and Drs. Andy Hale and Larry Stikeleather. Dr. Hale is the Undergraduate Coordinator in BAE.

As noted last Fall (2005), the Biological Engineering program is planning a major review
of its curriculum. The outcomes assessment efforts that have been conducted in our
department for almost 10 years are generally producing very positive results. However,
the last time we made major changes in our undergraduate programs was in 1998 and,
before that, in 1994. Since that time, significant changes have occurred in the department,
the discipline, and the profession, with biologically-based engineering definitely coming
to the forefront. Our faculty have met pretty much annually to discuss where we are and
what is going on, but we’ve not embarked on a major curriculum review for some time.
We have no doubt that our program can meet the accreditation requirements for
Biological Engineering. However, we also feel that our program, as a leader in
biologically-based engineering, should be on the leading edge and should be preparing
students for future challenges, rather than those of today or yesterday.

On June 8 and 9, the BAE Department will have a retreat to discuss both of our
undergraduate programs (biological engineering and agricultural and environmental
technology), as well as future staffing directions. The June retreat will be the first of at
least two brainstorming sessions that will look at what our graduates should know
(educational objectives) and what kinds of course offerings we would need to have to
achieve those objectives. Eventually, we will define both program and course outcomes
that will meld to address our objectives.

We met with our Advisory Committee at the end of March, and received some very good
input on the directions and emphasis areas that our overall profession is exhibiting. That
information, combined with surveys of graduates and employers, has convinced us that
there are probably some opportunities to deemphasize some of the more “traditional”
areas and add emphasis to some of the emerging areas within the biological engineering
spectrum. Our department will be replacing a number of faculty in the next 5 years, and
we should be able to make some significant changes in the direction and configuration of
our undergraduate programs.
**Degree Program:** B.S. in Biological Sciences

**Department:** Biological Sciences

**Curriculum Code(s):** BLS

**Objectives of the Degree Program:**
Students will be able to:
1. Demonstrate an understanding of biological systems and processes at all levels of organization.
2. Apply critical thinking skills to solving problems in biology and related fields.
3. Communicate scientific information effectively.

**Goals of the Degree Program:**
The goals of the Biological Sciences Program are to prepare graduates who are proficient in biological sciences as well as communication and to foster in students an understanding and appreciation of the complexity of the world in which we live. Biologists study many different facets of life from the molecules that make up individual cells to the behavior and ecology of animals and plants. The Biological Sciences Program at NC State University educates students who desire to enter this interesting, challenging, and rewarding field.

A Research/Work Experience is required of each student in the Biological Sciences Program. This requirement may be met in one of several ways, including completion of a project while enrolled in either BIO 492 (External Learning Experience), BIO 493 (Special Problems in Biological Sciences), or BIO 495 (Special Topics in Biology). Students develop a plan of work/contract in consultation with their adviser and research mentor for approval by the Biological Sciences Program. Upon completion of the research/work experience, the students prepare and submit a project report that is reviewed by faculty for evidence of comprehension and appreciation of biological concepts, the ability to apply knowledge and skills gained in coursework to problem-solving in biology and related fields, and facility in communication.

**Outcomes of the Degree Program:**
Upon completion of the Bachelor of Science (B.S.) degree in Biological Sciences, students will be able to:
1. Demonstrate the ability to:
   a. a) utilize critical thinking skills in problem-solving and
   b. b) apply their knowledge and understanding of biological systems to the effective solution of biologically-related problems.
2. Communicate biological science-related information effectively to experts as well as non-experts.
3. Succeed in securing employment or admission to graduate and professional schools.
Assessment Activity during the 2005-2006 Academic Year:

The Biological Sciences Program is currently in a dynamic transition characterized by careful review and assessment of the mission and goals of the program. Additionally, ongoing efforts are focused on development of a challenging, relevant curriculum that addresses effectively the educational needs of students in the life sciences. Efforts are also underway to develop and/or enhance courses that provide an appropriate foundation in biology for students in the agricultural sciences as well as students from non-science disciplines.

Development of recommendations to enhance the Biological Sciences Program has been the responsibility of two task forces comprised of faculty from several departments in the College of Agriculture and Life Sciences (CALS): 1) Teaching Biology Task Force, appointed by the Dean of CALS on April 1, 2005 and that submitted its report on July 31, 2005 and 2) Task Force on Courses and Curricula in the Life Sciences, appointed by the Dean of CALS on March 17, 2006, and whose ongoing work incorporates several findings of the initial task force as a basis for development of a relevant, effective curriculum and course offerings for this portion of the 21st Century.

The Task Force on Courses and Curricula in the Life Sciences is committed both to development and recommendation of an effective curriculum that promotes the education of students and the realization of the above-listed objectives and outcomes. Thus, the Task Force will also develop an assessment plan to ensure appropriate instruction and evaluation in the biological sciences.

While the above-mentioned Task Forces have been engaged in considerations of curriculum development and a comprehensive assessment plan, Biological Sciences Program faculty members have, in the short term, utilized the student research/work project reports described under “Goals of the Degree Program” as one method to gauge effectiveness. Faculty reviewed the reports to assess students’ ability to apply knowledge and critical thinking skills to problem-solving in biology and related fields. Students indicated that their coursework prepared them well for research/work experiences. They also noted that the research/work experiences were valuable to their development of technical and problem-solving skills, leadership ability, and interpersonal skills. Comments by employers/supervisors and research mentors were also positive in this regard.
**Degree Program:** B.S. in Botany

**Department:** Botany

**Curriculum Code(s):** SBO

**Objectives of the Degree Program:**
As the basic plant science department in the College of Agriculture and Life Sciences (CALS), Plant Biology has high priorities in teaching and research with only a peripheral extension commitment. The departmental faculty, by design, currently encompasses an array of interests and expertise directed toward the study of plant structure, developmental processes, functions, and interactions with other organisms and abiotic factors. A significant part of our mission is to convey knowledge concerning the aforementioned areas to students at both the undergraduate and graduate levels, the latter to include international students. Teaching is directed at stimulating students to ask scientific questions and at sharing basic concepts and current knowledge to enable them to answer these questions. Undergraduate and graduate student clientele enrolling in our courses include both science majors and non-science majors. The primary objective of research conducted by the faculty is to generate new knowledge, which may have immediate, long-term, or unknown application. Interaction with other NCSU departments and programs occurs with regard to both academic and research activities as opportunities become apparent. Further opportunities for research interactions occur at local, state, national, and international levels. These constitute important components of our overall mission.

**Goals of the Degree Program:**
The botany curriculum provides students the opportunity for training both in the laboratory and in field experiences in all aspects of the biology of plants including basic cellular and molecular biology, morphology, physiology, ecology, and classification. The curriculum focuses mainly on flowering plants, but also addresses plant and non-plant types such as algae, fungi, and other non vascular plants. The curriculum allows students flexibility in choosing a more laboratory-related experience or a more field-oriented experience depending on their personal preferences or career objectives. Students also are required to have either (some choose both) a research or teaching experience to help them develop skills in these areas and to make decisions about potential career opportunities.

**Outcomes of the Degree Program:**
Upon completion of the Bachelor of Science degree in Plant Biology, graduates will be able to:

1. Understand science-related issues and communicate these to scientific and nonscientific audiences in an understandable way in both written and oral form
2. Have the qualifications to enter graduate schools or to obtain employment in their chosen specialty or field of interest
3. Have basic written and oral communication skills and interpersonal skills that are necessary for success in employment and in their personal life
Assessment Activity during the 2005-2006 Academic Year:
See following  http://www.cals.ncsu.edu/botany/UAPR/UAPR.html
Degree Program: B.S. in Criminology

Department: Sociology and Anthropology

Curriculum Code(s): ACR

Objectives of the Degree Program:
The objectives of the faculty in Sociology are to:
1. provide instruction to enable students to understand human behavior within a social context.
2. help students achieve competence in understanding, critically assessing, and using major sociological concepts.
3. make students knowledgeable consumers and producers of research applicable to social problems or issues.
4. introduce students to the varied theoretical perspectives of sociology.
5. encourage in their students an appreciation and respect for cultural diversity in societies.

Goals of the Degree Program:
Our objectives provide the means to achieving the goals of the two colleges (CAL and CHASS) as they relate to social science knowledge, understanding and application. Keys to effective service and engagement include an ability to examine the roles and responsibilities of individuals, groups, and institutions in larger society while displaying an understanding of the complex relationships between human behavior and the social context, as well as the ability to analyze human behavior within a social context. Our students must be knowledgeable producers and consumers of social science information as citizens, no matter what career paths or educational directions they may take.

Outcomes of the Degree Program:
Students should be able to demonstrate:
1. An understanding of human behavior within a social context. Specifically, students should be able to demonstrate that they:
   a. can examine the roles and responsibilities of individuals, groups, and institutions in larger society, displaying understanding of the complex relationships between human behavior and the social context.
   b. can analyze human behavior within a social context from different perspectives.
2. Competence in understanding, critically assessing, and using major sociological concepts. Specifically students should be able to demonstrate that they:
   a. can define major sociological concepts involved in understanding social behavior, interaction and organization.
   b. can apply major sociological concepts to specific situations, showing that they are able to (1) use the concepts to organize and make sense of what they find in specific situations and (2) use specific situations to exemplify, amplify, and critique major sociological concepts.
3. That they are knowledgeable consumers and producers of research findings applicable to sociological problems or issues. Specifically, students should be able to demonstrate that they:
   a. can critique sociological research reported in popular or scholarly publications by describing the research problem, methodology, and results and making persuasive cases for the strengths and weaknesses of each.
   b. can propose a plan of research for a sociological problem or issue, including conceptualization of the problem, review of pertinent literature, design of a research study, and identification of methods appropriate for exploring the problem or issue.

4. Familiarity with various theoretical perspectives of sociology. Specifically, students should be able to demonstrate that they:
   a. articulate what are several key attributes of various theoretical perspectives of sociology.
   b. can describe and critically analyze the assumptions that underlie particular theoretical perspectives.
   c. can apply various theoretical perspectives to issues in society, showing how a perspective frames each issue, i.e., how we understand the issue, the kinds of questions we can ask about it, and the kinds of research methods we can apply to answering the questions.

5. An appreciation and respect for cultural diversity in societies. Specifically, students should be able to demonstrate that they:
   a. are aware of and comprehend the diversity of views within and across various social groups.
   b. understand social groups in various societies in terms of differences in sociocultural resources and outcomes

Assessment Activity during the 2005-2006 Academic Year:
Section 1–Evidence

The 2005-2006 Sociology and Criminology Assessment Report is based on our evaluation of a sample of seniors’ papers. These senior papers are used as a measure of our Outcome 3.a. as outlined in the original 2003 Program Assessment Report for Sociology and Criminology which states:

Students should be able to demonstrate:

3. That they are knowledgeable consumers and producers of research findings applicable to sociological problems or issues. Specifically, students should be able to demonstrate that they:
   a. can critique sociological research reported in popular or scholarly publications by describing the research problem, methodology, and results and making persuasive cases for the strengths and weaknesses of each.

Section 1– Discoveries and Patterns
Summary of the senior paper evaluations: The overall assessment of our seniors’ paper is that the papers are mediocre at best. The judgement of these papers is comparable to recent years’ assessments. Based on recent survey results of those who teach 400-level classes, it seems fair to say that students do not appear to be well prepared for their upper-level writing assignments (based on the sample of papers that were assessed).

The assessment procedure, senior paper evaluation report, and evaluation rubric for this evaluation are available upon request. This assessment process represents the most carefully scrutinized of our majors’ efforts.

Section 2 – Actions

In addition to summarizing these evaluations, this report includes a discussion of the Undergraduate Committee’s related efforts toward reviewing our undergraduate program. These efforts along with the evaluation of senior papers are developed in tandem in an iterative process.

For example, last fall our department established guidelines for first time instructors of our Introduction to Sociology course – a course which has recently been made a requirement of all our majors. Our goal is to ensure that this course will provide the fundamental background for our majors by exposing our students to the discipline’s core concepts and theoretical perspectives.

As we discover strengths and weaknesses in our program, we explore ways to rectify problems and take advantage of the department’s strengths to do so. For example, we surveyed our faculty to determine the extent to which our students were being assigned major writing assignments in their senior-level courses. We found that 80% of faculty teaching senior level courses assigned a major research or term paper, and that the remaining 20% described the major writing experience for their students as ‘a series of papers’ or ‘several short reaction papers.’ This survey instrument helped us assess the nature of writing assignments our students were receiving. In addition, this survey sought to assess students’ preparedness for their senior-level course work. The results of our senior paper evaluations were somewhat explained by the survey responses by the faculty who reported their students were not well prepared for senior-level course work.

Our committee is addressing these shortcomings not only with our work with SOC202 instructors; but, also, it is preparing guidelines for courses at each 200-, 300-, and 400-level to provide faculty with tools to facilitate their students’ writing and research skills. These guidelines will comprise our committee’s major assessment efforts during the 2006-2007 academic year.
Degree Program: B.S. in Extension Education

Department: Agricultural and Extension Education

Curriculum Code(s): AEC/AEX

Objectives of the Degree Program:
The objectives of the degree program are essentially the outcomes listed as sub-components of the goals.

Goals of the Degree Program:
1. Demonstrate appropriate pedagogical and androgogical skills in non-formal educational settings.
2. Develop a broad base of agricultural knowledge to be communicated to learners.
3. Apply appropriate instructional technology for specific learning situations.
4. Apply critical thinking to solving educational and agricultural problems.
5. Demonstrate professional dispositions consistent with employer expectations.

Outcomes of the Degree Program:
The specific outcomes of the program are related to the goals listed above. The numbering system will identify the association between goals and outcomes.

Graduates of the Extension Education degree program will be able to:
1.a. select appropriate teaching techniques for specific situations.
1.b. motivate learners to learn.
1.c. adapt instruction to learners with varying learning styles, academic abilities, and cultural backgrounds.
1.d. evaluate learning and provide appropriate feedback to clientele.
1.e. evaluate educational program outcomes and make appropriate revisions for program improvement.

2.a. demonstrate technical knowledge in agriculture.
2.b. demonstrate the ability to guide learners in the solution of agricultural problems.
2.c. communicate agricultural information to learners.

3.a. use a variety of instructional tools to communicate agricultural information.
3.b. use state-of-the-art instructional technology to aid instruction to learners of various abilities and cultural backgrounds.
3.c. use appropriate technology in the agricultural discipline.

4.a. synthesize information from courses and educational experiences to arrive at appropriate solutions to problems.
4.b. develop learning activities to promote problem solving and critical thinking in clientele groups.

5.a. demonstrate fair and ethical treatment of clientele groups they serve.
5.b. participate in professional development and professional improvement activities.
5.c. become involved in professional organizations.

Assessment Activity during the 2005-2006 Academic Year:
The following assessment activities have been conducted for the Extension Education degree program:

1. Exit survey of students upon completion of their internship (capstone) program, allowing feedback on the value of the program components.
2. Personal interviews with internship supervisors (field supervisors) to identify strengths and weaknesses of our graduates.
3. Assessment of a major project completed by the students to demonstrate competency in both subject matter and educational techniques.
4. The findings from the assessment activities did not indicate major problems with the curriculum. There does seem to be some need to improve instructional techniques for teaching adults. The faculty, in reviewing these findings decided to collect more data and determine if this is a trend that we need to address.
**Degree Program:** B.S. in Food Science

**Department:** Food Science

**Curriculum Code(s):** SFS/TFS

**Objectives of the Degree Program:**

The objectives are similar to our outcomes.

1. Students should demonstrate the ability to engage in clear and careful scientific inquiry.
2. Students should demonstrate the ability to apply critical thinking skills to solve problems and generate designs related to food science and technology.
3. Students should demonstrate the ability to understand, manage, and communicate source materials related to food science and technology.
4. Students should be able to work effectively in teams.
5. Students should be able to give effective oral presentations.
6. Students should develop and utilize the personal and professional attributes that mark a successful Food Science graduate.

**Goals of the Degree Program:**

1. Prepare students for careers in food science and allied fields through instruction in basic sciences and technologies applicable to the food industry.
2. Encourage growth and development in communication skills.
3. Stimulate students to develop skills in critical thinking and the use of judgement in the decision making process.
4. Provide one curriculum that meets the minimum standards for the Institute of Food Technologists (IFT) undergraduate curriculum.

**Outcomes of the Degree Program:**

1. Students should demonstrate the ability to engage in clear and scientific inquiry.
2. Students should demonstrate the ability to apply critical thinking skills to solve problems and generate designs related to food science and technology.
3. Students should demonstrate the ability to understand, manage, and communicate source materials related to food science and technology.
4. Students should be able to work effectively in teams.
5. Students should be able to give effective oral presentations.
6. Students should develop and utilize the personal and professional attributes that mark a successful Food Science graduate.

**Assessment Activity during the 2005-2006 Academic Year:**

1. The curriculum was reviewed by the Institute of Food Technologists Committee on Higher Education in the spring semester 2006. This is a review process scheduled at five year intervals and uses an outcome based assessment procedure for both individual food science courses and the curriculum. The science (SFS) curriculum was approved by this organization.
2. Assessment methods:
a. Faculty surveys to evaluate students abilities to meet outcomes and teaching coverage of outcomes (opportunity for practice, direct instruction, and guided practice),
b. Graduating senior survey (conducted by the university with questions related to the department included,
c. exit interviews for graduates conducted by department head or associate head, and
d. industry interviewer survey for permanent and internship positions.

3. Brief summary of results:
   a. Faculty surveys indicated a general trend of an overall decrease in students problem solving abilities and an increase in students ability to manage and communicate source material and give effective oral presentations,
   b. Graduating senior survey indicated that students were moderately or very satisfied with their educational experience in Food Science, and interviewer survey "benchmarked" our students against students from other food science departments, our students were evaluated to be acceptable or very suitable.
Degree Program: B.S. in Horticultural Science

Department: Horticultural Science

Curriculum Code(s): SH/THG/THL

Objectives of the Degree Program:
To offer students basic and applied educational opportunities that will prepare them both personally and professionally for various activities in horticulture.

To create an environment where students can develop skills and attributes they will need as horticultural professionals.

Goals of the Degree Program:
To develop attributes that mark a successful horticultural professional in the field including:

1. a knowledge base in horticultural science that allows them to communicate and solve problems related to basic horticulture;
2. the self-confidence in their professional expertise that gives them the ability to make decisions and to carry out those decisions;
3. the values that lead them to use their educational experience to become good citizens of their communities;
4. the desire to continue to seek out educational opportunities and to grow both professionally and personally;
5. the drive to develop, hone, and exercise leadership potential; and
6. the ability to make evaluative judgments and both give and graciously receive constructive criticism.

Outcomes of the Degree Program:
1. Students should demonstrate the ability to understand and communicate information from the horticultural sciences in oral and written form, and communicate these to scientific and nonscientific audiences.

2. Students should demonstrate the ability to engage in clear and careful scientific inquiry.

3. Students should demonstrate the ability to apply critical thinking to solving problems and generating designs related to Horticultural Science.

4. Students should have the qualifications to enter graduate schools or to obtain employment in their chosen specialty or field of interest.

5. Graduating seniors should be satisfied with the education they received from the Department of Horticultural Science.
Assessment Activity during the 2005-2006 Academic Year:
1. Graduating senior exit interviews were conducted at the end of each semester and information was summarized and reported to the Undergraduate Program Committee.

2. Student performance was evaluated through class exams and assignments. Specific issues were discussed in the Undergraduate Program Committee.

3. Employers and alumni were informally contacted during various commodity meetings and trade shows during the year. Specific feedback regarding curriculum was obtained and summerized.

4. Teaching faculty met monthly to discuss student performance, exit interview data, and information obtained from other sources.

5. Student course and instructor evaluations, University Sophomore and Senior Survey data were consulted and evaluated.
Degree Program:  B.S. in Microbiology

Department:  Microbiology

Curriculum Code(s):  SMB

Objectives of the Degree Program:
Graduates should be able to:
1. demonstrate a sound working knowledge of the field of microbiology.
2. demonstrate a command of the skills necessary to perform effectively and safely in a microbiology laboratory.
3. understand, manage, and apply information about microbiology from both scholarly and popular sources and to communicate their understanding clearly and coherently for different audiences.

Goals of the Degree Program:
The goals of the program include the prepare students for further study in professional or graduate school or for employment that utilizes their skills in microbiology. We seek to encourage the continued development of students' communication skills, and to stimulate critical and ethical thinking. We also intend to provide a curriculum that meets the recommendations of the American Society for Microbiology.

Outcomes of the Degree Program:
Upon graduation, microbiology majors should be able to:
1. demonstrate a sound working knowledge of the field of microbiology.
   Subsets of this objective are:
   a. to show that they have acquired a foundational knowledge of microbiology that allows them to continue to grow in the field.
   b. to show that they can apply their foundational knowledge in microbiology when challenged with new situations by asking intelligent questions that lead to an understanding of the new situations.
   c. to show that they can synthesize from the answers to those questions new knowledge about microbiology.
2. demonstrate a command of the skills necessary to perform effectively and safely in a microbiology laboratory.
   Subsets of this objective are:
   a. to show that they have mastered the techniques essential to sound laboratory practice.
   b. to show that they can apply deliberate and thorough observational skills to conduct experiments and collect data.
   c. to show that they can organize and summarize data and present them in a way that is accurate and comprehensible in both verbal and graphical modes.
   d. to show that they can interpret data and draw conclusions that allow the students to support or refute hypotheses and make a case for alternative hypotheses.
3. understand, manage, and apply information about microbiology from both scholarly and popular sources and to communicate their understanding clearly and coherently for different audiences. Subsets of this objective are:
   a. to show that they can effectively explain information related to microbiology in the popular press to non-scientific audiences.
   b. to show that they can summarize the important information from scientific articles.
   c. to show that they can make a critical judgment of scientific material, using as support their analysis of its research questions and hypotheses, the appropriateness and precision of its research methods, the effectiveness of its presentation of results, and the interpretation and conclusions it draws from the results insofar as they answer the research questions.
   d. to show that they can effectively organize and make sense of scientific information from multiple sources, raise pertinent questions about that information, and draw appropriate and useful conclusions from it.
   e. to show that they can find suitable scientific sources for answering questions about microbiology, evaluate the pertinence, value, and credibility of those sources, and make a convincing case for their answers using evidence from the sources.

Assessment Activity during the 2005-2006 Academic Year:

A. Item being assessed:
   II. demonstrate a command of the skills necessary to perform effectively and safely in a microbiology laboratory.
   a. to show that they have mastered the techniques essential to sound laboratory practice.

Basis of Assessment:
We have continuously monitored student performance on a standard set of laboratory skills through a set of common laboratory practical exam tasks at the end of MB 352 and MB 412. Student performance has been at a constant acceptable level for the last 2 years. Alumni Survey: Preparation in the area of Technical Skills and Knowledge were rated at 4.28 on a 5 point scale (5 being the best).

B. Item being assessed: III. understand, manage, and apply information about microbiology from both scholarly and popular sources and to communicate their understanding clearly and coherently for different audiences.
   d. to show that they can effectively organize and make sense of scientific information from multiple sources, raise pertinent questions about that information, and draw appropriate and useful conclusions from it.
   e. to show that they can find suitable scientific sources for answering questions about microbiology, evaluate the pertinence, value, and credibility of those sources, and make a convincing case for their answers using evidence from the sources.

Basis of Assessment:
Alumni survey: The following items are related to these learning outcomes
Access/use information needed in profession life: 4.42
Construct clear, precise, accurate arguments: 4.2
Understand current literature in my field: 4.15
Public speaking skills: 4.0
Writing skills: 4.03
Performance in courses such as MB 455 and MB 490 where writing and speaking about microbiology are practiced.
The department is satisfied that this learning outcome is being met. We will continue to offer courses with writing and speaking requirements.
Degree Program:  B.S. in Natural Resources

Department:  Soil Science

Curriculum Code(s):  NRS/NRW

Objectives of the Degree Program:
Integrate a strong basic science background with an understanding of soil properties to prepare graduates to apply a scientific approach to land management for maintaining or enhancing environmental quality.

Goals of the Degree Program:
see objectives

Outcomes of the Degree Program:
1. Understand the basic physical, chemical and biological properties of soil
2. Apply the principles of science in soil and land management for maintaining or enhancing environmental quality
3. Communicate proficiently and in a manner required of soil scientists

Assessment Activity during the 2005-2006 Academic Year:
A majority of the graduating seniors completed the National Fundamentals of Soil Science Examination prepared by the Soil Science Society of America. All but one student taking the exam achieved a passing score. The specific exam results revealed some weakness in 2 of the 6 skill areas. These weaknesses in soil chemistry and soil biology are common to all students across the nation taking the exam. While the results in these areas were somewhat low, they were actually above the national average in many cases. These weaknesses are being addressed with the inclusion of more quantitative skill requirements in our soil fertility course and with the first time offering of a new soil microbiology course in the spring 2006 semester.
**Degree Program:** B.S. in Poultry Science

**Department:** Poultry Science

**Curriculum Code(s):** SPS/TPS

**Objectives of the Degree Program:**
Objective 1: Poultry Science students and graduates will have a fundamental understanding of biology, physiology, nutrition, genetics, toxicology, and pathology as they relate to the life sciences in general and the various species of poultry in particular. In addition they will have a fundamental understanding of the emerging social and environmental issues associated with animal production agriculture.

Objective 2: Graduates will succeed in obtaining professional or management employment positions in the poultry industry and/or related animal production agriculture discipline areas or entry into graduate or professional school.

**Goals of the Degree Program:**
The goals of the Poultry Science undergraduate degree program are to meet and to document that the objectives described above are met on a year to year basis and are modified as necessary based on evolving needs of society.

**Outcomes of the Degree Program:**
After completing the B.S. in Poultry Science, students will be able to:
1. Effectively and efficiently identify and apply relevant appropriate knowledge to address societal and industrial needs and problems associated with the sustainability and growth of poultry production agriculture.
2. Effectively and efficiently prepare written materials and communicate (verbally and otherwise) using resources, methods, and media that are state-of-the-art and effective for the appropriate target audience.
3. Effectively and efficiently work with colleagues, peers, and others, as related to addressing identified objectives.

**Assessment Activity during the 2005-2006 Academic Year:**
Assessment activity will primarily focus on:
1. Evaluating student performance through class exams, assignments, internships and special topic projects.
2. Success of career placement of graduates.
3. Solicited input from the poultry industry to determine how well the graduates are prepared for the work place.
4. Peer review (internal and external evaluators) of the undergraduate program to evaluate class content relevant to meeting the short and anticipated long term needs of society and agribusiness as related to poultry science.
Degree Program: B.S. in Zoology

Department: Zoology

Curriculum Code(s): SZO

Objectives of the Degree Program:
1. Graduates should have strong skills in writing and speaking.
2. Graduates should have a firm grounding of knowledge in broad areas of the zoological sciences (animal diversity, cell and developmental biology, animal anatomy and physiology, and ecology/evolution/behavior), and also specialized advanced knowledge in at least one area of their choosing.
3. Depending on their career goals, graduates should be competitive for (a) admission to post-graduate study and/or (b) employment upon completion of the B. S. degree.

Goals of the Degree Program:
Our goal is to have graduates that communicate well, have a strong knowledge of zoology at the Bachelor’s degree level, and who are competitive in pursuing their subsequent career goals.

Outcomes of the Degree Program:
Outcomes addressing Objective 1

Desired Outcome 1: Graduates’ self-assessment indicates satisfaction with their overall writing skills. Assessment and data: Senior survey, Question 1. In addition, Questions 2-8 give information on contribution of parts of the curriculum judged effective in affecting this outcome.

Desired Outcome 2: Graduates will
(a) clearly state the main argument or purpose of a given written exercise, as appropriate for that particular writing sample,
(b) use generally accepted grammatical construction and spelling,
(c) show clear organization of thoughts or arguments in writing, as appropriate for the writing assignment.
Assessment materials: Writing samples from courses in zoology. For each of the above outcomes a-c, writing samples will be appraised on a 1-4 scale (1 = strongly disagree the desired outcome is demonstrated, to 4 = strongly agree the desired outcome is demonstrated).

Desired Outcome 3: Graduates’ self-assessment indicates satisfaction with their overall speaking skills. Assessment and data: Senior survey, Question 9. In addition, Questions 10-17 give information on contribution of parts of the curriculum judged effective in affecting this outcome.

Desired Outcome(s) 4: Graduates will
(a) clearly state the main argument or purpose of a given speaking exercise,
(b) use generally accepted grammar in oral communication,
(c) show clear organization of thoughts or arguments in speaking, as appropriate for the speaking assignment.
Assessment materials: Speaking assignments in zoology courses. The instructor of the courses will use rubrics to appraise at least the above outcomes a-c. The Assessment Officer and/or another faculty member may also attend the speaking events.

Outcomes addressing Objective 2

Desired Outcome 5: Graduates’ self-assessment indicates satisfaction with their overall level of general knowledge of zoology. Assessment and data: Senior survey, Question 18.

Desired Outcome 6: Graduates demonstrate a broad base of knowledge about zoology. Assessment materials: A sample of final examinations completed in ZO 150, 160, 250, and 260 by graduates in a current year. Data: Using particular questions applicable to this outcome, the assessor will rate each examination (1 = strongly disagree to 4- strongly agree) on the following statements:
(a) This student demonstrates strong knowledge of animal diversity
(b) This student demonstrates strong knowledge of cellular and developmental zoology
(c) This student demonstrates strong knowledge of animal anatomy and physiology
(d) This student demonstrates strong knowledge of ecology, evolution, and behavior

Desired Outcome 7: Graduates’ self-assessment indicates satisfaction with their advanced knowledge in at least one advanced area of their choosing. Assessment and data: Senior Survey, Question 19.

Desired Outcome 8: Graduates demonstrate knowledge of at least one advanced area of their choosing. Assessment materials: A sample of final examinations of graduates in advanced courses. Data: Using particular questions applicable to this outcome, the assessor will rate demonstration of knowledge in each examination (1 = strongly disagree, etc.)

Outcomes addressing Objective 3

Desired Outcome 9: Graduates applying to graduate and professional schools show acceptance rates about equal, at least, to the national average (when known). Materials and data: Senior survey, indicating percent acceptance to the following programs:
(a) Medical school
(b) Dental school
(c) other schools related to human health (Optometry, Physical therapy, Pharmacy, etc.)
(d) Veterinary Medicine school
(e) Graduate school (Masters and Doctorate, combined)
(f) other post-graduate programs of study (e.g., law school)

Desired Outcome 10: Graduates entering the workforce find jobs satisfactory to them. Materials and data: Senior survey, percent of graduates who say they have actively
sought a job who have found a job satisfactory to them.

Open-ended assessment

We will continue an exit interview with each graduating Fall and Spring class, in which the Head and the Undergraduate Coordinator, only, meet with the graduates to engage in a frank and open-ended conversation with the students. That interview also has a written questionnaire regarding the strengths and weaknesses of our program. That interview session complements ongoing, daily, formal and informal assessment via conversations with students in advising events, written course evaluations, and other settings.

Assessment Activity during the 2005-2006 Academic Year:

Our curriculum and assessment team has been active, concentrating on attempts to implement coordinated improvements in the Zoology and BioSci curricula arising from earlier, ongoing assessment activities conducted when the administration of the BioSci program was assigned to the Department of Zoology. Our overall goal in a joint Zoology/BioSci curriculum task force begun in 2003 was (a) to remove redundancies between the Zoology and BioSci introductory curricula, and (b) to implement enhancements to the BioSci degree during 2004 and 2005 to give clear credibility to an advertising campaign touting the CALS BioSci degree program as the first “program of choice” among this state’s Research I Universities. In part, we aimed to increase the yield of high-quality applicants into CALS. While we have envisioned the BioSci degree as the initial portal for many of these students, coordination with all interested life science and agricultural departments for attractive upper-level teaching and research opportunities for such students could, we felt, enhance undergraduate and other programs across departments through involvement and potential transfer of such students into other degree programs.

The following is a partial list of our vision for such a program:

1. Establishment of a large commons area for BioSci majors, with seating, tables, and wireless access for laptop computers. This commons area (or ‘lounge”) would address an issue of group identity among those majors, providing a common study and social area. It would also proactively address the perceived shift of computer access from dedicated workstation labs to students with their own laptops, working individually or in groups.  
STATUS: The targeted space in N. Gardner was found to be better reallocated by CALS to other priorities. However, a small area in Bostian Hall is currently being renovated as a positive step towards this need. A need continues for a larger commons area within existing space, or in new construction.

2. Establishment of a stand-alone Human Health Advising Office, directed by a vigorous advocate for health professions advising and teaching programs. That office might, for example, implement a Health Professions Fair, akin to Ag Awareness Days or the CALS Career Day, highlighting our programs and external opportunities. The director can also serve on curriculum committees to bring new ideas to strengthen and advertise offerings in human biology.

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STATUS: Accomplished. Anita Flick has been hired to act in that post, pending final employment arrangements, plus an assistant has been hired. Renovation of a section of Bostian Hall to house that office is occurring.

3. Redesign of the introductory BioSci courses with three key elements. First, we proposed that the courses be taught solely or primarily by research active, ‘world-class’ tenured or tenure-track faculty. Second, the BioSci 181/183 material would be repackaged to allow such instructors, possibly newly hired, to design and teach those courses within their specialty. Third, laboratory exercises should be upgraded and enhanced with cutting edge technology and active learning techniques. We successfully implemented a similar program in the introductory Zoology courses, by hiring a talented cohort of Assistant Professors in the mid-1990’s, demonstrating that it is feasible to go that way. Present teachers employed in BioSci could participate in this enhanced offering where qualified, and/or teach BIO 105/106 or new, attractive specialty courses for non-science majors. STATUS: CALS established a task force in 2005 and a second task force in 2006 to study such issues. Outcomes pending.

4. Move GN 411 or its successor to the sophomore year of BioSci and, ideally, other CALS majors, to introduce students to a rigorous and in-depth genetics course taught by specialists. That course should not be “dumbed down” because it is moved to an earlier time in the curriculum. Rather, it should be a fully rigorous, cutting-edge course taught earlier in the curriculum that presently done (GN 411 has a restriction of JR standing). We see that course in the sophomore year, or even the freshman year for some students with advanced standing, as a key way to get students involved in top-level research projects and advanced courses in the junior and senior years. STATUS: Genetics is receptive to the idea. Idea pending.

5. Consideration of a 2-semester “biomath” calculus course targeted towards BioSci majors that may pursue research careers, dealing with topics in ordinary and partial differential equations, and explicit attention to biological modeling, including physiological systems. MA 131/231 could be a template, but with new consideration of modern needs. Our idea is that the effort should include discussions with faculty in the cross-disciplinary, existing Program in Biomathematics, which currently operates only at the graduate level. STATUS: discussion in progress.

6. Exposing students to a course in Biostatistics at the sophomore level, and discussions with Chemistry or other parties about re-thought offerings in general and organic chemistry with an eye towards more biochemical approaches and examples. STATUS: discussions projected to commence in July 2006.

7. Upgrading the quality and continuity of BioSci and Zoology TA’s by addressing the unusually low stipend level. With enhancement to competitive levels, such TA’s can be a recruiting tool for top students that stay on the TA’s longer, rather than what we see as employment of last resort with high turnover. With competitive stipends, they can also be a recruiting tool for graduate students working in strong research labs. STATUS: issue discussed; outcome uncertain.
8. Establishment of a Department of Biology, with a Head and a faculty with tenure and responsibilities in that new department. We feel that the interdepartmental model has failed for several structural reasons, and that the best path is creation of that department with research faculty and responsibility for teaching at the freshman/sophomore, junior/senior, and graduate level, as in other departments. Initial staffing and facilities could be formed from one or more willing, present departments, in addition to present Bostian space. Given the large number of students interested in animal biology and especially human biology, we feel it makes sense to staff the new department with, at least, some or all of the faculty of the present Zoology department. The Department of Biology would be further strengthened if faculty from other life science and/or agricultural departments also joined that new department, via selective transfers or migration of one or more entire departments, at the discretion of the dean and the present departments. It would be crucial that the new Biology department be research-active, and not treated by departments as a place to transfer unproductive faculty. Otherwise, the mistakes of the past could be recreated. STATUS: under consideration by the deans, the 2005 task force, and possibly discussed by the 2006 task force. Two positive steps are (a) appointment of Damian Shea of the Head of the Bio Sci Program, albeit presently without tenured or tenure-track research faculty with that program as their homes, and (b) expression of willingness of most of the present Zoology faculty to staff the new department, assuming a feasible vision for its success. Assays of interest and participation by other departments has not been systematically broached.

9. Establishment of named Concentrations within the BioSci degree, with a faculty associated with and dedicated to each concentration. Our initial thought is that there should be five such concentrations: MCD (Molecular, Cellular, and Developmental Biology); Integrative Physiology (dealing with plant, animals, and microbes, integrating across levels of organization); Ecology, Evolution, and Conservation Biology; Human Biology; and Biology Teaching, with Biology Teaching aimed at addressing needs identified and emphasized by UNC GA. Faculty associated with each Concentration could be drawn not only from the Dept of Biology, but also from other remaining departments in CALS, and from outside CALS as appropriate. There are many other potential concentrations, including Zoology if the BS Zoology were discontinued in favor of integration with the BioSci degree, and various concentrations not necessarily with large enrollments but addressing aspirations, such as Systematics, Biomathematics, or Biotechnology. That structure also provides a hypothetical route for establishment of Concentrations in strengths of CALS that may not justify an undergraduate major but could be a conduit by students to some careers and/or graduate study, e.g., a concentration in Entomology, Plant Physiology, or Plant Pathology. STATUS: under discussion. In the hope of such reform in the BioSci degree, 2003 plans for such concentrations in the BS Zoology degree remain on hold, and should be implemented now if a merger does not occur.

10. Consideration of challenging the 12-cell funding matrix, on the fundamental question of why education of modern students in biology should be funded at a lower level
than students in engineering. Needs for technology, modern facilities, top faculty, and research experience would seem to be as high, or higher, in the modern life sciences as in engineering. Whatever the historical reasons for that matrix, and especially in light of stated industrial and educational priorities of President Bowles, we feel that intentionally underfunding the life sciences makes no sense.

11. Pre-emptive, visionary, aggressive planning for a massive new life sciences building on the north campus as a top priority of the college. Present facilities are not adequate for even modest growth of student numbers and research faculty, and provisions for future growth must be aggressively sought. We envision a building with a large ground-floor atrium addressing the need for the commons area and student identity, a ground floor large classroom, teaching laboratories on second and third floors, and research laboratories on upper floors. Smaller classrooms, meeting rooms, administrative offices, and faculty offices would be situated in ways inviting student use. The building needs to have some sense of inspiration, with biological themes and large bright areas. It should be built to function as a recruiting tool and gathering place.

12. Once this program is some alternative or derivative is implemented, an aggressive advertising campaign starting with high school guidance counselors and science teachers, touting our new program and why we feel we can honestly say it’s the best offering among Research I universities locally and, ideally, beyond.

(Disclaimer – this document was prepared by the Jim Gilliam, Undergraduate Coordinator, Dept of Zoology. While I believe it represents the current consensus views of most of the Dept of Zoology, it has not been circulated among the faculty, nor reviewed or approved by the Interim Head. As the chair of the first, 2003 departmental task force, I have attempted to summarize action items advocated by that committee. As a member of the subsequent CALS-level 2005 and 2006 task forces, I have attempted to report what I believe to be the current status of deliberations).