Review and Assessment of Undergraduate Academic Programs

College of Agriculture and Life Sciences
North Carolina State University

Annual Report for the 2007-2008 Academic Year

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June 30, 2008
Introduction

The College of Agriculture and Life Sciences offers 22 B.S. degree programs in 15 departments. In addition there are 25 concentrations, one option, one certificate, and 24 minors at the undergraduate level offered through 20 of the 21 departments in the college.

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&CurrentLocation=13.

- Development of objectives, goals and outcomes for each of the 22-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 during that academic year and any changes that were made to the academic programs in the department.

The College of Agriculture and Life Sciences maintains a website devoted to departmental assessment activities and reporting requirements. The website is a collection place for comprehensive review documents, post-review action plans, degree-program objectives, goals and outcomes, and annual assessment reports. Annual assessment reports for each of the undergraduate degree programs are due following the spring semester. A college level report is prepared by accessing these reports on the website.

The 2007-2008 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 Departments and Degree Programs During the 2007-2008 Academic Year**

1. Comprehensive departmental reviews
   a. Department of Agricultural and Extension Education
   b. Department of Sociology and Anthropology

2. Changes in degree programs
   a. BS in Agronomy degree was changed to BS in Plant and Soil Sciences

3. New concentrations added
   a. Within the BS degree program in Plant and Soil Sciences
      i. Agroecology
      ii. Crop Biotechnology
   b. Within the BS degree program in Biological Sciences
      i. Ecology, Evolution and Conservation Biology
      ii. Human Biology
      iii. Integrative Physiology and Neurobiology
      iv. Molecular, Cellular and Developmental Biology

4. New minors added
   a. Plant Biosecurity and Regulatory Science (Department of Plant Pathology)
   b. Leadership in Agriculture and Life Sciences (Department of Agricultural and Extension Education)
5. Data were collected on admission statistics, student demographics, student credit hour production, academic performance and employment patterns to determine changes that could be made to enhance student access to programs, student success as students and student placement into appropriate positions after graduation. Appropriate admission decisions of perspective students and appropriate student support services were provided to enhance student retention and success.

6. Senior students who were graduating were interviewed to identify areas of program strengths and areas that could be improved or enhanced. Actions were taken based on this information including instructor assignments, curricular changes and improvements in student support services.

7. Faculty discussed degree requirements and made changes in syllabi within upper-level courses to provide a more relevant educational experience within the major.

8. Twenty-five new undergraduate courses were added and thirteen courses were revised during the 2007-2008 academic year reflecting the need to continually improve program curricula.

9. Departments conducted peer review of faculty. Formative and summative evaluations of faculty instruction were completed in a number of departments by peer faculty and department heads.

10. Faculty evaluated samples of papers submitted by seniors to determine effectiveness of the instruction within the curriculum and to access performance longitudinally.

11. Sophomore, senior and alumni surveys were used to ask specific question relative to courses, programs and departments, with the results serving as a resource for decisions regarding curriculum, course content, student evaluation and assessment processes.

12. 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.

13. 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.

14. Faculty discussed critical thinking skills and incorporated exercises into courses to improve the critical thinking skills of students.

15. Faculty committees reviewed student-learning outcomes in courses and in programs to collected sample student work and interviewed students to assess whether students were meeting stated objectives.
Examples of Changes Made During the 2007-2008 Academic Year as a Result of Assessment Activities

1. Change of degree name
2. Addition of new concentrations and minors
3. Addition of new courses and revision of others
4. Changes in degree requirements
5. Changes in pedagogical approaches
6. Changes in assessment criteria
7. Changes in program outcomes
8. Changes in student evaluation process
9. Addition of exercises to enhance student critical thinking skills

Specific Examples of Assessment Activities during the 2007-2008 Academic Year

In response to student and adviser concerns, minor course actions were submitted to the university for minor revisions to six courses so that the course content in the catalog listing more clearly reflects current course offerings. The goal is to help students do a better job of course planning and scheduling for future semesters. Department of Agricultural and Resource Economics, p. 11.

Revisions to our concentrations included adding more course selection flexibility and the requirement of an internship or research experience. We believe that these revisions are a vast improvement over the rigid structure of our former curriculum and will better prepare graduates to make significant contributions to the industry we serve. Department of Crop Science, p. 16

Additional information from the 2006/2007 Animal Science student Graduating Senior Survey related to outcomes 2 (organize/summarize information) and 3 (solving problems) states the following percentages were either very much or somewhat met for each of the following during the students' education: Applying scientific methods (98.0%), enhancing analytical skills (98.0%), critical analysis of ideas/information (91.8%), and the ability to plan and carry out projects independently (94.0%). Department of Animal Science, p. 21

This committee also addressed the various sections of BCH 451, our first lecture class. As this class not only serves our majors, it is a significant contributor to many curricula in and outside of our college. As a consequence, the department has offered multiple sections. The suggestion of the committee was to form a separate course for non-majors, which would cover less material than what is presented in the majors and honors sections. This suggestion was greeted with enthusiasm by the other departments within our college. The next course, which will be called BCH 351, will be developed this summer with the goal of the first offering to be in Spring 2009. Department of Molecular and Structural Biochemistry, p. 29
Evaluated systems for the establishment of a uniform system for laboratory notebooks, reports, and grading rubric. Department of Food, Bioprocessing and Nutrition Sciences, p. 41

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 4 years. Laboratory skills are also monitored routinely in MB 451, although not as part of standard skills testing, in which a comprehensive laboratory-based term project requires all of these skills. Department of Microbiology, p. 41

The department administered exit surveys to graduating seniors in order to assess graduates’ assessment of efficacy of student advising, overall satisfaction with research or teaching experiences, and how well they felt the undergraduate program prepared them for the future. On a 4-point scale, students rated the quality of advising at 3.9, quality of the teaching or teaching experience at 3.8, and how well the program prepared them for the future at 3.5. Department of Plant Biology, p. 63

Efforts to reduce redundancies in introductory courses in Zoology and Biological Sciences have resulted in a major revision of the content and sequence of topics in the lecture and laboratory components of BIO 181 and BIO 183 (Introductory Biology I and II, respectively). All students in Zoology and in Biological Sciences will take this two semester series as part of their first year of courses. These revisions were approved by the University Committee on Courses and Curricula (UCCC), effective Fall 2007. Department of Zoology, p. 70
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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 2007-2008 Academic Year:
In a comprehensive program review, conducted in May 2007, the review committee recommended that this program be phased out. After significant discussion, departmental faculty determined that inadequate information had been collected to permit a decision of this magnitude to be made. Efforts during the 2007-08 academic year concentrated on the collection of this information. Data collected include:
• A review of course content and enrollment trends;
• Demographic trends, academic performance and employment patterns of program graduates for the past 10 years;
• Demographic trends and academic performance patterns of currently enrolled students;
• Admissions statistics during the past 4 years;
• The number of student credit hours being generated annually;
• The potential number of student credit hours which can be generated;
• The student contact hours required for current and potential enrollment;
• A survey of current job trends for program graduates;
• A summary of resources involved in offering the program.

These data are currently being analyzed by the faculty.
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 2007-2008 Academic Year:

1. The department head conducted senior exit interviews at the end of each semester. This information was summarized and shared with the undergraduate coordinator and undergraduate curriculum committee and evaluated for areas of strengths or weaknesses in the program.

2. Course evaluations of every course and instructor were examined by the department head and undergraduate coordinator and discussed with individual faculty to identify items for improvement as appropriate.

3. Sophomore and Senior survey data were consulted and evaluated for consistency to prior years, to see if any new information, trends, or deviations in student performance and satisfaction are developing that should be studied further for possible changes in courses and/or curriculum content.

4. The undergraduate curriculum committee discussed specific issues that instructors identified through class exams and assignments. Of particular concern was the area of plagiarism and how faculty should or could professionally, ethically, and legally respond to perceived and actual plagiarism in their courses.

5. In response to student and adviser concerns, minor course actions were submitted to the university for minor revisions to six courses so that the course content in the catalog listing more clearly reflects current course offerings. The goal is to help students do a better job of course planning and scheduling for future semesters.

6. The distance education component of the undergraduate program received continuing evaluation during the year for quality and student satisfaction. The number of courses offered and the faculty available to sustain a distance education minor (which was
recently officially established) are part of an ongoing assessment of this area of the department’s undergraduate program.

7. The faculty held major discussions about the 400-level components of the degree requirements for the ABM major. ARE 433 and ARE 495G received particular focus, leading to decisions about how to structure the 400-level course requirement in the major. A decision was made to seek a permanent course number for ARE 495G. Development of future 400-level courses for the major are being explored, consistent with faculty available to teach such courses.

8. Enrollment patterns, especially for late juniors and seniors transferring into the major were examined to help determine changes to course scheduling, course enrollment restrictions, and requirements for intra-campus transfers.
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 2007-2008 Academic Year:**

The department underwent a comprehensive external review of its undergraduate programs, including the B.S. in Agricultural Education. In doing so, the faculty in the department conducted and wrote a self-study of the program and developed plans for improving undergraduate programs in the department.
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 2007-2008 Academic Year:

We continue to rely on and value input from students and industry professionals to evaluate our courses and programs. In 2007 – 2008 we extensively revised our Agronomy program including a new name for our program – Plant and Soil Sciences. Revisions to our concentrations included adding more course selection flexibility and the requirement of an internship or research experience. We believe that these revisions are a vast improvement over the rigid structure of our former curriculum and will better prepare graduates to make significant contributions to the industry we serve. In addition, we developed two new concentrations, Agroecology and Crop Biotechnology. The name change, revisions and additions are based on input from current and former students and potential employers of our graduates.
**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 2007-2008 Academic Year:**
During the past academic year a name change for the Agronomy curriculum was approved. It will become the Plant and Soil Sciences curriculum to more clearly reflect the focus of the major. Two new concentrations and more course selection flexibility were also initiated. The name change, revisions and additions are based on input from current and former students and potential employers of our graduates. Routine assessment of courses and peer review of selected courses/instructors by faculty review teams were completed. Exit interviews with graduating seniors and input from alumni and employers continue to provide important feedback on our program. The class evaluations by students reflect a difference between fall and spring courses. In the Soil Science teaching program the overall instructor effectiveness rating and the overall course ratings were 4.12 and 3.99 respectively for the fall 2007 semester but were 4.44 and 4.36 respectively for the spring 2008 classes. With the one close exception the evaluations were above our goal of 4.
**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 2007-2008 Academic Year:**

The Animal Science Undergraduate Education Committee (UEC) meets on a regular basis to address issues related to undergraduate courses, curricula, teaching, and advising. After discussion and approval of the minutes from a meeting, items requiring faculty approval are presented to the faculty with the background information and the recommendation from the UEC. The UEC met seven times during the 2007/2008 academic year. Changes that were made during the 2007/2008 academic year include creation of two new courses (ANS 330, Laboratory Animal Science; ANS 411, Management of Growing and Performance Horses), approval of requiring both BIO 181 and BIO 183 after ZO 160 is discontinued, and separation of lecture and lab in ANS 205 (now ANS 205, Physiology of Domestic Animals and ANS 206, Anatomy of Domestic Animals).

Faculty voted to support the separation of lecture and lab in ANS 150, Intro to Animal Science. This will be submitted to the college and university committees for implementation in January, 2009. Faculty also voted in support of replacing CH 201/202 (Quantitative Chemistry) with an Ag Business course and 1 credit of CALS ABC elective for students in the Industry (IAS) concentration; paperwork will be submitted for Fall 2009 implementation (to begin with the new General Education Program curriculum).

The faculty also voted to create an Accelerated Bachelor's/Master's program for qualified students in the Science Animal Science (SAS) concentration. The paperwork will be completed during Summer 2008 for submission to the university undergraduate and graduate committees with a requested implementation date of January, 2009.

Faculty voted unanimously to not offer ANS courses that have hands-on animal labs via Distance Education (DE) unless the appropriate committee (undergraduate or graduate) discusses the proposed change and faculty vote to support the change of granting laboratory credit from hands-on animal experience to DE experience. Animal Science courses offered via Distance Education during the 2007/2008 academic year were ANS 110 (Intro to Equine Science), ANS 225 (Principles of Animal Nutrition), ANS 324 (Milk
and Dairy Products), ANS 350 (Intro to HACCP), ANS 415 (Comparative Nutrition), ANS 425 (Feed Mill Management and Feed Formulation), ANS 530 (Applied Animal Reproduction lecture), and ANS 590S (Swine Reproductive Management).

The Department of Animal Science also underwent a Strategic Planning process during the 2007/2008 academic year. The subcommittee on Undergraduate and Graduate Education created a document with background information, projected changes in student enrollment, and proposed strategies for accommodating the anticipated changes. The document was submitted to the full Strategic Planning Committee (SPC), and revisions were made based on recommendations made at that meeting. The SPC will meet in July of 2008, and the Education Subcommittee report (along with the other subcommittee reports) will be presented to all faculty for discussion.

The Department of Animal Science has an ongoing Peer Review process. Six courses were peer-reviewed during the 2007/2008 academic year: ANS 105 (Intro to Companion Animals), ANS 110 (Intro to Equine Science), ANS 230 (Nutrition of Domestic Animals), ANS 404 (Dairy Cattle Management), ANS 410 (Equine Management), and ANS 702 (Reproductive Physiology of Mammals).

The SAS and IAS curricula and the Animal Science Minor were updated during the 2007/2008 academic year. Approval was granted by the university for June 2008 implementation.

Ongoing Assessment:

Outcome 1 (writing skills) is assessed on a continuous basis by teaching faculty in the Department of Animal Science through evaluation of coursework materials such as exams, term papers, and lab reports. 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 (outcomes 2 and 3). The ANS 150 (Intro to Animal Science) instructors spend considerable time working with new students to develop these skills and prepare students for future Animal Science courses. Faculty who teach the upper level Management and Discipline courses evaluated students utilizing projects, case studies, papers, and exams; results were evaluated as part of the departmental Peer Review process.

Outcome 4 states that 80% or more of graduates should be satisfied with their overall education in Animal Science, and this is assessed via the Graduating Senior Survey. The May 2007 survey results showed that 100% of Animal Science graduates said they were satisfied with the education they gained overall in Animal Science (69% very satisfied, 23% moderately satisfied, and 8% satisfied/acceptable). When asked in retrospect if they would choose the same major, only 8.8% indicated they would not choose Animal Science.

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 about our students. The survey showed that 98% of graduating seniors said the quality of instruction in Animal Science was either excellent (72.5%) or good (25.5%). Additional information from the 2006/2007 Animal Science student Graduating Senior Survey related to outcomes 2 (organize/summarize information) and 3 (solving problems) states the following percentages were either very much or somewhat met for each of the following during the students' education: Applying scientific methods (98.0%), enhancing analytical skills (98.0%), critical analysis of ideas/information (91.8%), and the ability to plan and carry out projects independently (94.0%).

Course and Instructor Evaluations for Spring and Fall of 2007 (Spring 2008 is not yet available) provided the following assessment data: In Spring 2007, the Animal Science Department average score for "Overall Instructor" was 4.46 and for "Overall Course" was 4.39. In Fall 2007, the Animal Science Department average score for "Overall Instructor" was 4.52 and for "Overall Course" was 4.44. Both semesters exceeded our objective of having the evaluations be above a 4.0 on the 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.

Five faculty members in Animal Science had their undergraduate courses peer-reviewed in the 2007/2008 academic years. They were Drs. Kimberly Ange (ANS 105, Intro to Companion Animals), Shannon Pratt (ANS 110, Intro to Equine Science), Joan Eisemann (ANS 230, Nutrition of Domestic Animals), Vivek Fellner (ANS 404, Dairy Cattle Management), and Paul Siciliano (ANS 410, Equine Management). 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.

The 2006/2007 Graduating Senior Survey included information on academic advising, and 90.2% of Animal Science students indicated academic advising was excellent or good. Advising evaluations for 2006/2007 were submitted electronically, and 126 Animal Science majors responded to the request from the College of Agriculture and Life Sciences to complete the online evaluation. Of the respondents, 89% said his/her advisor is effective and is recommended; 6% 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.
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.
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 2007-2008 Academic Year:**

Assessment Report for Applied Sociology and Applied Criminology 2007-2008
Department of Sociology and Anthropology
Bill Smith, Chair of Undergraduate Committee, Spring 2008
Patty McCall, Chair of the Undergraduate Committee, Fall 2007
Members: Ron Wimberley, Jerry Jacka, Eric Woodrum & Debbie Curran

Program Review
Department of Sociology and Anthropology
B.A. and B.S. in Sociology

Section 1–Evidence
The 2007-2008 Sociology and Criminology Assessment Report is based on our evaluation of a sample of seniors’ papers (relevant to Goal #3 above), on an analysis of the subsequent academic performance of students who took the introductory course SOC202 Principles of Sociology (relevant to Goal #2 above), and the alumni and senior surveys, which contains questions most relevant to Goal #4b and 4c above, but is also generally relevant to Goal #3 as well as Goal #5 in that educational elements encourage community organizational participation, which in turn is key to the development of an appreciation and respect for cultural diversity in society.

The senior papers are used as a measure of our Outcome 3.a, since students’ papers are a key mode for the production of sociological knowledge, as well as a sign that the student can “consume” such knowledge. Papers written for 400-level Sociology classes should constitute a good source of information to assess these abilities.

Additional evidence, specifically academic performance subsequent to taking the introductory Sociology course, SOC202 Principles of Sociology, will be assessed relative to Outcome 2 above. The assumption here is that basic competence in handling sociological concepts will be evident in the academic performance of students in their Sociology classes. A critical sub-issue here is whether students have chosen their Sociology and Criminology majors wisely. Their introduction to these fields is critical to enhancing their chances of making an appropriate choice of major and to becoming competent as users of sociological and criminological concepts.

Finally, Outcomes 4a and 4b, which pertain to the application of sociological concepts, as well as more generally Outcome 5 (on awareness and comprehension of the views of various groups), can be assessed in part through the subjective measures as found in the Alumni Survey.

Section 1– Discoveries and Patterns
Summary of the senior paper evaluations: The overall assessment of our seniors’ papers is that they are improved over earlier years’ papers (we have formal evaluations over a five year period). This corresponds with anecdotal information that some of the judges expressed to the effect that the papers “seem to be getting better”. Even though the procedure for the judgment of these papers is comparable to recent years’ assessments, it is unclear whether we can attribute this to recent efforts to improve our undergraduate program. Based on a 2005-06 survey of faculty 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). Perhaps, since that survey was conducted, faculty who are assigning senior research papers are working more closely with students on these papers to improve the quality; or, perhaps, the caliber of students is improving.

Below we list the average scores for the five years that we have done formal assessment evaluations. As can be seen in Table 1, the evaluations have generally risen over the five years. This could reflect improved ability of students to write research papers that meet the standards captured in the rubric used to evaluate the papers. Alternatively, the results
represent differences in the grading of the papers by the judges/instructors who have done the evaluations. Note that in 2007-8, the evaluations of the 39 papers were done by the instructors in the various courses in which the student participated, using the rubric in Appendix C, whereas in the previous years the UGC committee members themselves reviewed and evaluated each of the papers – again using the same rubric as in Appendix C.

The senior paper assessment procedure, senior paper evaluation report, and evaluation rubric are provided in Appendices A, B, and C, respectively. This assessment process represents the most carefully scrutinized of our majors’ efforts.

Table 1. Mean Ratings by Year
2002-3 2004 2005 2006 2007-8
Topic 3.50 3.41 3.48 3.84 4.00
Organization 3.35 3.60 3.18 3.82 3.95
Literature Rev 3.51 4.08 3.10 4.00 3.95
Evidence 3.47 3.91 3.05 3.96 4.00
Citations 3.13 3.52 3.35 3.73 4.45
Grammar 3.51 3.71 3.43 3.80 4.21
Overall* 3.41 3.67 3.09 3.82 4.08

*For 2002-4 “overall” based on average of 6 criteria, whereas in 2005 & 2006 “overall” is based on the specific category “overall, the quality of the paper is…”

Senior Survey
Some of the results of the senior survey are also relevant to the goal of our majors becoming “knowledgeable consumers and producers of research findings applicable to sociological problems or issues.” Specifically, in addition to the senior paper evaluations, there are two items on the graduating senior survey departmental insert that provide a further indication of our majors’ abilities with regard to senior papers. A review of the 2007 graduating senior survey shows a positive response to questions to our majors’ writing and research skills. Although these survey results are a more subjective tool for assessment purposes, these results provide another indicator of the department’s success in educating our students.

A review of the 2007 graduating senior survey complements the senior paper evaluations and reveals a positive response from seniors to questions regarding our majors’ writing and research skills—94 to 100% answering in the affirmative to their undergraduate training. Specifically, from the survey:

“Our department has several educational goals and expectations related to our sociology and anthropology majors. Some of these are listed below. Please indicate the extent to which you have attained each goal.”

Of the items related to research papers, the survey includes: “Gained expertise in writing papers” and “Research skills for gathering and evaluating evidence about social life/relationships”. The students could choose between the responses: “Great deal”, “Moderate amount”, “Fair amount”, “A little” and “Not at all”. Of the 36 respondents,
47% and 55.56%, respectively, chose the highest ranking response, “Great deal”, for these two survey items. An additional 47.22% and 44.44%, respectively, chose “Moderate amount” in response to these items. Therefore, approximately 94 to 100% of our graduating seniors indicate that they have greatly benefited from their coursework relative to developing writing and research skills.

Alumni Survey
In addition to the senior paper evaluations, there are items on the 2006 Baccalaureate Alumni Survey that are relevant to the department’s undergraduate performance (see goals above), based on information collected from the department’s “insert” questions. Here are some highlights of the findings:
1) 93.15% of the 73 responding alumni said that their education at NCSU “prepared me to critically analyze social issues.”
2) While 42.5% said their S/A major was not relevant to their job, 90.4% of those whose S/A major was relevant said that “Yes”, “the content of your S/A coursework [was] useful for what you do?”
3) To the extent that one would expect a S/A major to engage formally in the organizations of the community, specifically in “charitable, civic, recreational, or religious organizations in your community”, it is found that 52.05% said “Yes” to this question.
4) As for the question of whether the content of the S/A courses was useful for such organizational participation, 68.6% said “somewhat” or “yes” to this question.
5) When asked “Are there any skills or knowledge that you wish you had spent more time on in your major?” 67.12% said “No”.

Gate-keeping Function of Special Section of SOC202
In the Fall of 2005, a special section of the introductory sociology course, SOC202 Principles of Sociology, was taught to approximately 50 students who were incoming students who had declared Sociology or Criminology (including Applied) as a major. Note that the course is not designed to screen out students by imposing a difficult grading criterion, but rather one of the goals of the course is to encourage those students who perform well to continue in their Sociology or Criminology majors. At the same time, the course provides feedback as to performance that does not measure up, and communicates the message that perhaps other avenues need be explored by the student.
In Appendix D we report the results of an analysis done of the students in that course, using the grade in that course as a predictor of: a) Institutional Perseverance (present at NCSU 2.5 years later); b) Perseverance in Soc/Crim Major (present in the SOC/CRIM major 2.5 years later); c) Good Grades in Major (Having a GPA of 2.5 or higher in the major 2.5 years later); and d) Good Grades in Methods (Received a grade of B or higher in SOC300 Research Methods within 2.5 years).
The results of the analysis shows that the course grades in SOC202 in Smith’s class in Fall 2005 seem to be validated by the predictions of the four criteria discussed in the paragraph above, and served to justify the course in terms of some of the selective “gate-keeping” functions that it may serve.

Section 2 – Actions
The Undergraduate Committee’s related efforts toward improving our undergraduate program along with the evaluation of senior papers are developed in tandem in an iterative process. 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. Our committee has addressed past shortcomings by working more closely with SOC202 instructors to ensure our majors are receiving a solid foundation for subsequent coursework in the major.

Our plans are to develop basic writing and research skills for our majors at the various course levels. Our senior paper evaluation is the primary tool for assessing our majors’ educational experience this year. Our other sources of information that will be reviewed in our Departmental Comprehensive Review are the UPA reports on the alumni and graduating senior surveys. It should also be noted that we are considering doing some focus groups next year of graduating seniors, as this method has been found by others to be valuable for departmental performance evaluations.

Section 3 – Resources Required
We require no resources to continue our assessment efforts, other than possible help with the administration of focus groups next year. As we attempt to assess other program outcomes in the future, we may require additional resources. Although our efforts focus on writing outcomes and on the various success criteria used to evaluate our Principles of Sociology course, it is difficult to think of adding appreciably to our committee members’ time and energy. Nevertheless, even with this restricted assessment focus, we believe the work we have done is contributing to an improved undergraduate program.
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 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 2007-2008 Academic Year:
The graduating seniors for May 2008 were surveyed using both a written survey and verbal interview. Out of the 68 graduates, 65 students responded to the survey for a response rate of 96%. One new question which was asked was “How good do you judge your writing skills to be and where did you get your training?” This was followed upon in the verbal interview by examining the various courses in which the student felt that he or she received training. I also asked each student to report to what extent mechanics were emphasized or evaluated in each course. I defined mechanics to include grammar, spelling, and punctuation. While the analysis of these data is not complete, several generalizations are apparent. Approximately, 25% of these courses were taught by graduate students with the remaining 75% were taught by faculty. Approximately 25% of the respondents felt that other than ENG 101 and ENG 331/333, there were no other courses which emphasized writing within the CHASS area. Many students reported that they learned to write in high school and did not improve their writing skills at NCSU. Most of the CHASS courses other than ENG 101 and ENG 331/333 were not graded at all on mechanics. Even with ENG 101, students were usually evaluated more on content than mechanics. Interestingly, those students who earned credit for ENG 101 at other institutions had faculty who were in charge of the course and who emphasized mechanics over content! A significant number of students found that writing lab reports for the Biochemistry lab courses was the major writing opportunity. In terms of the self-reporting, most students felt that they were effective writers. However, examination of personal statements for professional schools would argue the opposite opinion.

In response to these interviews from previous semesters, a faculty committee addressed the question of overlap of material in the three undergraduate lecture classes. After some deliberation, revisions were developed in the three course syllabi, and these revisions were implemented in the Spring of 2008. This committee also addressed the various sections of BCH 451, our first lecture class. As this class not only serves our majors, it is a significant contributor to many curricula in and outside of our college. As a consequence, the department has offered multiple sections. The suggestion of the committee was to form a separate course for non-majors, which would cover less material than what is presented in the majors and honors sections. This suggestion was greeted with enthusiasm by the other departments within our college. The next course, which will be called BCH 351, will be developed this summer with the goal of the first offering to be in Spring 2009.
As part of an honors project, the exam questions in BCH 451 for the spring 2008 were classified according to Bloom’s taxonomy and the grades for the responses were recorded according to gender. The goal was to assess if there were any differences in ability to answer questions between men and women. The results demonstrated that women were able to better answer questions on memory whereas men performed better on the analytical questions. This study will be continued in the fall to determine if the results are reproducible and to record differences in study behavior.
**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:

(a) To demonstrate that graduates have an ability to apply knowledge of mathematics, science, and engineering, they should:
* 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:
1. define and describe the pertinent principles and appropriate assumptions, theories, concepts, and/or formulas;
2. explain how they are appropriate to the problem; and
3. demonstrate how they have been applied in the solution of the problem.
* 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;
* achieve a positive rating from their employers regarding their ability to apply general principles of mathematics, science, and engineering to particular engineering situations.

(b) To demonstrate that graduates have an ability to design and conduct experiments as well as analyze and interpret data, they should:
* 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;
* 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;
* 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.
* 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.

(c) To demonstrate that graduates have an ability to design a system, component, or process to meet desired needs, they should:
* 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:
1. 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;

2. 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;

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

4. 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;

5. 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;

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

7. 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;

8. 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.

* respond positively, after they have been on the job, to the training and guidance in design process they received at NC State;
* achieve a positive rating from their employers regarding their ability to engage productively and creatively in the process of design.

(d) To demonstrate that graduates have an ability to function on multi-disciplinary teams, they must:

* possess a conceptual understanding of group dynamics, that is, how to make groups work effectively. This conceptual understanding includes:
  1. how to create a group climate that encourages success,
  2. how to recognize and make effective use of power resources in group activities, and
  3. how to use communication and negotiation strategies for dealing productively with conflict.

* 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;

* 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:
  1. exhibit respect for these people and the diversity they bring to the group,
  2. accept and incorporate, where appropriate, ideas from people with different perspectives; and
  3. 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.
* 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;
* respond positively, after they have been on the job, to the training and guidance they received at NC State in working in teams;
* achieve a positive rating from their employers regarding their ability to work effectively in multi-disciplinary teams.

(e) To demonstrate that graduates have an ability to identify, formulate, and solve engineering problems, they should:

* show that they can identify engineering problems. Problem identification entails two procedures:
  1. 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
  2. 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.
* 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;
* 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.
* show that they can apply engineering principles and mathematics to find the unknowns and arrive at appropriate solutions to the problem;
* respond positively, after they have been on the job, to the training and guidance they received at NC State in solving engineering problems;
* achieve a positive rating from their employers regarding their ability to solve engineering problems.

(f) To demonstrate that graduates have an understanding of professional and ethical responsibility, they should:

* show that they can apply an understanding of ethical responsibility to a design project. This means demonstrating that they can
  1. identify the ethical issues pertinent to a project,
  2. generate ethical criteria related to the project,
  3. incorporate those criteria in the justification of the final outcome of the project, and
  4. argue effectively for the responsibility of the project engineer in maintaining the optimal balance between the contending forces of utility, cost, and risks.
* respond positively, after they have been on the job, to the preparation in professional and ethical responsibility they received at NC State;

* achieve a positive rating from their employers regarding their professional and ethical responsibility.

(g) To show that graduates have an ability to communicate effectively, they should:

* 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:
  1. describe the context (institutional and/or technological) of a problem and the significance of that problem within that context (introduction);
  2. describe clearly and precisely the procedures used to solve the problem (methods);
  3. report both verbally and visually the findings (results);
  4. interpret the findings in a way that is appropriate to the audience (discussion); and
  5. propose recommendations for a solution to the problem and justify that solution persuasively (conclusion).

* 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.

* 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.

* 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;

* 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;

* achieve a positive rating from their employers regarding their ability to communicate effectively.

(h) To demonstrate that graduates have the broad education to understand the impact of engineering solutions in a global and societal context, they should:

* 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;

* respond positively, after they have been on the job, to the broad education they received at NC State and they way it has helped them to understand the impact of engineering solutions in a global and societal context.

(i) To demonstrate that graduates recognize the need for and possess the ability to engage in life-long learning, they should:
* 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.
* 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.
* 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; * show that after graduation they have continued to seek opportunities for further education and training, both engineering and otherwise.

(j) To demonstrate that graduates possess a knowledge of contemporary issues, they should:

* 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;
* respond positively, after they have been on the job, to the quality of education in contemporary issues they received at NC State.

(k) To demonstrate that graduates have an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice, they should:

* 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.
* 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 2007-2008 Academic Year:**

The BE program has moved its direct measurement of outcomes data base to Microsoft Excel (away from the "less than obvious" data base that was constructed prior to the 2004 ABET visit). The use of Excel allows faculty to fill out their part of the overall assessment picture and allows the ABET Committee within the BE program to quickly determine where there are issues and also to format an annual assessment report for the ABET Self Study.

Additionally, the Program Educational Objectives (PEOs) for BE have been updated with the knowledge of and help by several constituent groups. The PEOs, which heretofore numbered 7, have been reduced to 5 which are more simply stated and which should be easier to measure.
**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) utilize critical thinking skills in problem-solving and 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 2007-2008 Academic Year:

The Biological Sciences Program continued efforts to enhance the educational experiences of our students. In 2007, the Biological Sciences Program and the Department of Zoology submitted a joint proposal to the Dean of the College of Agriculture and Life Sciences (CALS) to establish a Department of Biology by combining the Biological Sciences Program and the Department of Zoology. The proposal is under review.

In the meantime, our faculty and staff performed a major revision of the content as well as sequence of topics in both the lecture and laboratory components of BIO 181 and BIO 183 (Introductory Biology I and II, respectively). The revisions were approved by the University Committee on Courses and Curricula (UCCC) in May 2007. Current efforts are focused on implementation of the revised BIO 181 and BIO 183 and development of appropriate assessment procedures and instruments to gauge effectiveness.

The Biological Sciences curriculum was revised by placing early emphasis on breadth and the interrelationship of biology, mathematics, and the physical sciences, followed by opportunities for advanced study in selected areas of biology. All students in Biological Sciences will complete BIO 181 and BIO 183 as well as other core courses prior to enrollment in advanced courses. The revised Bachelor of Science (B.S.) degree in Biological Sciences was approved by the UCCC, effective fall semester 2008. The new degree program enables students either to focus on the breadth of biology by pursuing a general Biological Sciences degree or to achieve depth within one of four areas of concentration, namely: Molecular, Cellular, and Developmental Biology (MCD), Integrative Physiology and Neurobiology (IPN), Human Biology (HB), and Ecology, Evolution, and Conservation Biology (EEC).

Faculty in Biology and Zoology developed the following descriptions of the concentrations:

- **Molecular, Cellular, and Developmental Biology (MCD)**
  The Molecular, Cellular, and Developmental Biology concentration offers students in-depth studies of the molecular and cellular basis of life and the development of multicellular organisms. Students learn the processes that govern cellular structure and function; gene structure, function, and regulation; the molecular and cellular mechanisms controlling development; and modern molecular and cellular tools used in the study of living organisms.

- **Integrative Physiology and Neurobiology (IPN)**
  The Integrative Physiology and Neurobiology concentration provides a comprehensive grounding in basic principles of physiology and neuroscience, as well as in-depth
exposure to the application of these principles in understanding whole-organism function and the ways in which animals cope with challenges presented by their environments.

• Human Biology (HB)
The Human Biology concentration provides training in those areas of science most important to health-related professions, including biology and chemistry, as well as relevant aspects of the humanities and social sciences. It is designed to provide students with a solid education in the scientific and humanistic concepts that underlie modern health sciences and related areas of scientific research.

• Ecology, Evolution, and Conservation Biology (EEC)
The Ecology, Evolution, and Conservation Biology concentration offers students in-depth studies in areas of biology at the level of the whole organism and higher. It is designed for students who have an interest in whole organisms and their biodiversity – what maintains it, what environmental changes are causing its loss, and how to protect it in the face of environmental change.

New Courses
Several new courses have been approved that will enhance curricular offerings and are especially pertinent to selected concentrations. They include:
BIO 301, Human Anatomy and Physiology I
BIO 302, Human Anatomy and Physiology II
BIO 424, Endocrinology
BIO 460, Field Ecology and Methods

Ongoing Curricular Revision
Revision of the Biological Sciences degree program (including the four areas of concentration) will be resumed during summer 2008 to conform to the new General Education Program (GEP) guidelines. The revised curricula will be submitted for review and approval during fall semester 2008.

Assessment
Assessment procedures are presently in the formative stage. In-depth discussion and planning on assessment will occur during the 2008-09 academic year to develop methods for assessing the efficacy of our courses and curricula.
**Degree Program:** B.S. in Bioprocessing Science

**Department:** Food, Bioprocessing and Nutrition Sciences

**Curriculum Code(s):** BBS

**Objectives of the Degree Program:**

Students graduating from NC State with a degree in Bioprocessing Science should be able to:

- Engage in clear and thought provoking scientific inquiry
- Apply critical thinking skills to solve problems while designing solutions related to bioprocessing
- Manage and communicate source materials and data related to bioprocessing
- Work effectively and efficiently in teams
- Produce effective oral and written communications
- Develop and utilize the personal and professional skills associated with a successful graduate

**Goals of the Degree Program:**

**Outcomes of the Degree Program:**

- General preparedness in biology, chemistry, engineering and career skills relevant to bio-based industries
- Working knowledge of GMP principles, validation procedures and vocabulary and how to apply FDA regulations
- Experience designing and running a process, especially fermentation, cell culture, and downstream processing for biomolecule production
- Skills to analyze and integrate biomanufacturing unit operations and processing equipment for biomolecule production
- Experience with basic laboratory and aseptic techniques
- Knowledge of analytical instrumentation and techniques
- General knowledge of industrial safety practices and environmental regulations
- Working knowledge of those industries applying microbiology and biotechnology towards biomolecule production

**Assessment Activity during the 2007-2008 Academic Year:**

Monthly meetings of the departmental undergraduate committee were held to discuss assessment methods and procedures to improve students’ abilities to meet curricular outcomes. The committee was expanded to include instructors of required courses from all three departmental programs to maintain parity of expectations.

**Assessment Methods**

As a new degree program, the following measures will be considered when assessing the program:

- Faculty surveys to evaluate student abilities to meet curricular outcomes
• Graduating senior survey
• Exit interviews as conducted by departmental administration
• Industry interviewer surveys for internship positions
• Student transfers in and out of program
• Time to degree completion
• Post-baccalaureate plans upon graduation
• Departmental assessment plan (outcomes)
• Adequacy of the curriculum, advising, and instruction
• Monthly meetings of the departmental undergraduate committee to discuss procedures to continually improve students’ abilities to meet curricular outcomes. Minutes were maintained and approved by the committee.

Brief Summary of Results
• Undergraduate committee expanded to include instructors of all core undergraduate courses
• Provided restructured faculty evaluation survey of students’ abilities related to curricula outcomes on-line
• Encouraged use of inquiry-guided learning in expanded courses
• Evaluated systems for the establishment of a uniform system for laboratory notebooks, reports, and grading rubric
• Discussed procedures for the incorporation of critical thinking into all courses
• Modifications to various courses to improve any deficiencies in curricular outcomes:
  ? FS/BBS 231 - continued with the incorporation of additional writing assignments and the two-stage review process to improve teaching/learning
  ? FS/BBS 290 - expanded information to assist students in visual material preparation and oral presentations
  ? FS/BBS 475 - continued with additional weekly individual writing assignments and oral reports. Transitioned to increased emphasis on undergraduate research approach using inquiry-guided learning
**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 2007-2008 Academic Year:
Assessment Report for Applied Sociology and Applied Criminology 2007-2008
Department of Sociology and Anthropology
Bill Smith, Chair of Undergraduate Committee, Spring 2008
Patty McCall, Chair of the Undergraduate Committee, Fall 2007
Members: Ron Wimberley, Jerry Jacka, Eric Woodrum & Debbie Curran

Program Review
Department of Sociology and Anthropology
B.A. and B.S. in Sociology
Section 1–Evidence
The 2007-2008 Sociology and Criminology Assessment Report is based on our evaluation of a sample of seniors’ papers (relevant to Goal #3 above), on an analysis of the subsequent academic performance of students who took the introductory course SOC202 Principles of Sociology (relevant to Goal #2 above), and the alumni and senior surveys, which contains questions most relevant to Goal #4b and 4c above, but is also generally relevant to Goal #3 as well as Goal #5 in that educational elements encourage community organizational participation, which in turn is key to the development of an appreciation and respect for cultural diversity in society.

The senior papers are used as a measure of our Outcome 3.a, since students’ papers are a key mode for the production of sociological knowledge, as well as a sign that the student can “consume” such knowledge. Papers written for 400-level Sociology classes should constitute a good source of information to assess these abilities.

Additional evidence, specifically academic performance subsequent to taking the introductory Sociology course, SOC202 Principles of Sociology, will be assessed relative to Outcome 2 above. The assumption here is that basic competence in handling sociological concepts will be evident in the academic performance of students in their Sociology classes. A critical sub-issue here is whether students have chosen their Sociology and Criminology majors wisely. Their introduction to these fields is critical to enhancing their chances of making an appropriate choice of major and to becoming competent as users of sociological and criminological concepts.

Finally, Outcomes 4a and 4b, which pertain to the application of sociological concepts, as well as more generally Outcome 5 (on awareness and comprehension of the views of various groups), can be assessed in part through the subjective measures as found in the Alumni Survey.

Section 1–Discoveries and Patterns
Summary of the senior paper evaluations: The overall assessment of our seniors’ papers is that they are improved over earlier years’ papers (we have formal evaluations over a five year period). This corresponds with anecdotal information that some of the judges expressed to the effect that the papers “seem to be getting better”. Even though the procedure for the judgment of these papers is comparable to recent years’ assessments, it is unclear whether we can attribute this to recent efforts to improve our undergraduate program. Based on a 2005-06 survey of faculty 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). Perhaps, since that survey was conducted, faculty who are assigning senior research papers are working more closely with students on these papers to improve the quality; or, perhaps, the caliber of students is improving.

Below we list the average scores for the five years that we have done formal assessment evaluations. As can be seen in Table 1, the evaluations have generally risen over the five years. This could reflect improved ability of students to write research papers that meet
the standards captured in the rubric used to evaluate the papers. Alternatively, the results represent differences in the grading of the papers by the judges/instructors who have done the evaluations. Note that in 2007-8, the evaluations of the 39 papers were done by the instructors in the various courses in which the student participated, using the rubric in Appendix C, whereas in the previous years the UGC committee members themselves reviewed and evaluated each of the papers – again using the same rubric as in Appendix C.

The senior paper assessment procedure, senior paper evaluation report, and evaluation rubric are provided in Appendices A, B, and C, respectively. This assessment process represents the most carefully scrutinized of our majors’ efforts.

Table 1. Mean Ratings by Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Topic</th>
<th>Organization</th>
<th>Literature Rev</th>
<th>Evidence</th>
<th>Citations</th>
<th>Grammar</th>
<th>Overall*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002-3</td>
<td>3.50</td>
<td>3.35</td>
<td>3.51</td>
<td>3.47</td>
<td>3.13</td>
<td>3.51</td>
<td>3.41</td>
</tr>
<tr>
<td>2004</td>
<td>3.41</td>
<td>3.60</td>
<td>4.08</td>
<td>3.91</td>
<td>3.52</td>
<td>3.71</td>
<td>3.67</td>
</tr>
<tr>
<td>2005</td>
<td>3.48</td>
<td>3.18</td>
<td>3.10</td>
<td>3.05</td>
<td>3.35</td>
<td>3.43</td>
<td>3.09</td>
</tr>
<tr>
<td>2006</td>
<td>3.84</td>
<td>3.82</td>
<td>4.00</td>
<td>3.96</td>
<td>3.73</td>
<td>3.80</td>
<td>3.82</td>
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<tr>
<td>2007-8</td>
<td>4.00</td>
<td>3.95</td>
<td>3.95</td>
<td>4.00</td>
<td>4.45</td>
<td>4.21</td>
<td>4.08</td>
</tr>
</tbody>
</table>

*For 2002-4 “overall” based on average of 6 criteria, whereas in 2005 & 2006 “overall” is based on the specific category “overall, the quality of the paper is…”

Senior Survey
Some of the results of the senior survey are also relevant to the goal of our majors becoming “knowledgeable consumers and producers of research findings applicable to sociological problems or issues.” Specifically, in addition to the senior paper evaluations, there are two items on the graduating senior survey departmental insert that provide a further indication of our majors’ abilities with regard to senior papers. A review of the 2007 graduating senior survey shows a positive response to questions to our majors’ writing and research skills. Although these survey results are a more subjective tool for assessment purposes, these results provide another indicator of the department’s success in educating our students.

A review of the 2007 graduating senior survey complements the senior paper evaluations and reveals a positive response from seniors to questions regarding our majors’ writing and research skills—94 to 100% answering in the affirmative to their undergraduate training. Specifically, from the survey:

“Our department has several educational goals and expectations related to our sociology and anthropology majors. Some of these are listed below. Please indicate the extent to which you have attained each goal.”

Of the items related to research papers, the survey includes: “Gained expertise in writing papers” and “Research skills for gathering and evaluating evidence about social life/relationships”. The students could choose between the responses: “Great deal”,
“Moderate amount”, “Fair amount”, “A little” and “Not at all”. Of the 36 respondents, 47% and 55.56%, respectively, chose the highest ranking response, “Great deal”, for these two survey items. An additional 47.22% and 44.44%, respectively, chose “Moderate amount” in response to these items. Therefore, approximately 94 to 100% of our graduating seniors indicate that they have greatly benefited from their coursework relative to developing writing and research skills.

Alumni Survey
In addition to the senior paper evaluations, there are items on the 2006 Baccalaureate Alumni Survey that are relevant to the department’s undergraduate performance (see goals above), based on information collected from the department’s “insert” questions. Here are some highlights of the findings:
1) 93.15% of the 73 responding alumni said that their education at NCSU “prepared me to critically analyze social issues.”
2) While 42.5% said their S/A major was not relevant to their job, 90.4% of those whose S/A major was relevant said that “Yes”, the content of your S/A coursework [was] useful for what you do?”
3) To the extent that one would expect a S/A major to engage formally in the organizations of the community, specifically in “charitable, civic, recreational, or religious organizations in your community”, it is found that 52.05% said “Yes” to this question.
4) As for the question of whether the content of the S/A courses was useful for such organizational participation, 68.6% said “somewhat” or “yes” to this question.
5) When asked “Are there any skills or knowledge that you wish you had spent more time on in your major?” 67.12% said “No”.

Gate-keeping Function of Special Section of SOC202
In the Fall of 2005, a special section of the introductory sociology course, SOC202 Principles of Sociology, was taught to approximately 50 students who were incoming students who had declared Sociology or Criminology (including Applied) as a major. Note that the course is not designed to screen out students by imposing a difficult grading criterion, but rather one of the goals of the course is to encourage those students who perform well to continue in their Sociology or Criminology majors. At the same time, the course provides feedback as to performance that does not measure up, and communicates the message that perhaps other avenues need be explored by the student.
In Appendix D we report the results of an analysis done of the students in that course, using the grade in that course as a predictor of: a) Institutional Perseverance (present at NCSU 2.5 years later); b) Perseverance in Soc/Crim Major (present in the SOC/CRIM major 2.5 years later); c) Good Grades in Major (Having a GPA of 2.5 or higher in the major 2.5 years later); and d) Good Grades in Methods (Received a grade of B or higher in SOC300 Research Methods within 2.5 years).
The results of the analysis shows that the course grades in SOC202 in Smith’s class in Fall 2005 seem to be validated by the predictions of the four criteria discussed in the paragraph above, and served to justify the course in terms of some of the selective “gate-keeping” functions that it may serve.
Section 2 – Actions
The Undergraduate Committee’s related efforts toward improving our undergraduate program along with the evaluation of senior papers are developed in tandem in an iterative process. 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. Our committee has addressed past shortcomings by working more closely with SOC202 instructors to ensure our majors are receiving a solid foundation for subsequent coursework in the major.

Our plans are to develop basic writing and research skills for our majors at the various course levels. Our senior paper evaluation is the primary tool for assessing our majors’ educational experience this year. Our other sources of information that will be reviewed in our Departmental Comprehensive Review are the UPA reports on the alumni and graduating senior surveys. It should also be noted that we are considering doing some focus groups next year of graduating seniors, as this method has been found by others to be valuable for departmental performance evaluations.

Section 3 – Resources Required
We require no resources to continue our assessment efforts, other than possible help with the administration of focus groups next year. As we attempt to assess other program outcomes in the future, we may require additional resources. Although our efforts focus on writing outcomes and on the various success criteria used to evaluate our Principles of Sociology course, it is difficult to think of adding appreciably to our committee members’ time and energy. Nevertheless, even with this restricted assessment focus, we believe the work we have done is contributing to an improved undergraduate program.
Degree Program: B.S. in Environmental Sciences

Department: Environmental Sciences

Curriculum Code(s): ESS

Objectives of the Degree Program:

Goals of the Degree Program:

Outcomes of the Degree Program:

Assessment Activity during the 2007-2008 Academic Year:

The interdisciplinary Environmental Sciences curriculum continues to be evaluated by a university wide committee. Until this evaluation and any proposed changes are completed, the Department of Soil Science will continue to administer and review its concentration in Environmental Soil Science. Activities this academic year included assessment of courses and peer review of selected courses/instructors by faculty review teams and exit interviews with graduating seniors. Input from alumni and employers continues to provide important feedback on our program. The class evaluations by students reflect a difference between fall and spring courses. In the Soil Science teaching program the overall instructor effectiveness rating and the overall course ratings were 4.12 and 3.99 respectively for the fall 2007 semester but were 4.44 and 4.36 respectively for the spring 2008 classes. With the one close exception the evaluations were above our goal of 4.

Some course changes included revision in content and in instructors for the SSC 361 class and change in instructor and new focus in the SSC 440 class. SSC 185, a GER course in the science, technology and society category, was substantially revised to include discussion of "student prioritized" current event topics that are integrated into the course. This year students voted to discuss the science behind climate change/global warming, genetically engineered foods/crops, and agricultural productivity. The purpose of the discussions is to help students discern differences in non-science, biased opinion in common popular press outlets versus science-based (unbiased) articles, learn how soils are important to these issues and recognize how individuals can have an impact on improving public understanding of science behind controversial issues related to natural resources, soils, and food.

Planning has also begun for a new course in soil biogeochemistry.
Degree Program: B.S. in Environmental Sciences

Department: Environmental Sciences

Curriculum Code(s): ESE

Objectives of the Degree Program:

Goals of the Degree Program:

Outcomes of the Degree Program:

Assessment Activity during the 2007-2008 Academic Year:

The ESE (and NRM) options of the ES and NR inter-disciplinary programs at NCSU are not being assessed by the department as such at this time. The university in 2005, 2006, 2007 has been conducting a thorough review of the ES and NR programs. Recommendations for restructuring all ES and NR degrees/programs came from the review/study group and were to be implemented for the 2008-2009 academic year. However, that process seems to have stalled. The ES programs, as currently structured, do not serve students well, particularly incoming freshmen. It is the opinion of this department that the ESE program should be suspended and that no new freshmen students be enrolled for the 2008-09 academic year. Also, in light of the inaction on the study groups recommendations and the lack of a workable inter-departmental governing mechanism, this department does not see how the new GER requirements can be implemented for the upcoming 2008-2009 year, which will lead to suspension of the major indefinitely.
**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 2007-2008 Academic Year:
The department underwent a comprehensive external review of its undergraduate programs, including Extension Education. The Office of Assessment also participated in the review. Faculty in the department conducted a thorough self-study of the undergraduate programs and produced a written document of the results. Recommendations for strengthening the Extension Education program resulted from this review.
Degree Program: B.S. in Food Science

Department: Food, Bioprocessing and Nutrition Sciences

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 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 2007-2008 Academic Year:

1. Assessment Activity during the 2007-2008 Academic Year

Monthly meetings of the departmental undergraduate committee were held to discuss assessment methods and procedures to improve students’ abilities to meet curricular outcomes. The committee was expanded to include all faculty who taught “core” or required courses at the undergraduate level. It also included faculty members representing the two new programs of the department (Bioprocessing Science and Nutrition Science) to have parity of expectations for all programs.

2. Assessment Methods

a. Faculty surveys to evaluate students’ abilities to meet curricular outcomes
b. Graduating senior student surveys conducted by the university with questions related to the department
c. Industry interviewer surveys for permanent and internship positions
d. Monthly meetings of the departmental undergraduate committee to discuss procedures to continually improve students’ abilities to meet curricular outcomes. Minutes were maintained and approved by the committee.

3. Brief Summary of Results

a. Undergraduate committee expanded to include instructors of all core undergraduate courses
b. Provided restructured faculty evaluation survey of students’ abilities related to curricular outcomes on-line
c. Encouraged use of inquiry-guided learning in additional courses
d. Evaluated systems for the establishment of a uniform system for laboratory notebooks, reports, and grading rubric
e. Discussed procedures for the incorporation of critical thinking into all courses
f. Discussed the potential for five year course content review of all undergraduate courses to coincide with the Institute of Food Technologists review of undergraduate programs.
g. Modifications to various courses to improve any deficiencies in curricular outcomes:
   • FS231 - continued with the incorporation of additional writing assignments and the two-stage review process to improve teaching/learning
   • FS290 - expanded information to assist students in visual material preparation and oral presentations
   • FS405 - continued homework and term paper assignments to increase writing and library research skills
   • FS475 - continued with additional weekly individual writing assignments and oral reports. Transitioned to increased emphasis on undergraduate research approach using inquiry-guided learning
**Degree Program:** B.S. in Horticultural Science

**Department:** Horticultural Science

**Curriculum Code(s):** SH/TH/G/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:

- a knowledge base in horticultural science that allows them to communicate and solve problems related to basic horticulture;
- the self-confidence in their professional expertise that gives them the ability to make decisions and to carry out those decisions;
- the values that lead them to use their educational experience to become good citizens of their communities;
- the desire to continue to seek out educational opportunities and to grow both professionally and personally;
- the drive to develop, hone, and exercise leadership potential; and
- 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 non-scientific 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 2007-2008 Academic Year:

1. Graduating senior exit interviews were conducted at the end of each semester and information was summarized and reported to the Department Head and the Undergraduate Program Committee.

2. A one-day departmental retreat was held at the end of the spring semester devoted to undergraduate programs in Horticultural Science. Strategic planning activities created focus areas where a sub-committee was formed to create a proposal for changes in the undergraduate program.

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

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.

6. Student Horticulture Club, Pi Alpha Xi, and PLANET Landscape competition team officers were consulted regarding the undergraduate program and given the opportunity to give input about courses, curriculum options and other departmental programs.
Degree Program: B.S. in Microbiology

Department: Microbiology

Curriculum Code(s): SMB

Objectives of the Degree Program:

Graduates should be able to:
I. demonstrate a sound working knowledge of the field of microbiology.
II. demonstrate a command of the skills necessary to perform effectively and safely in a microbiology laboratory.
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.

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:

I. 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.

II. 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.

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. 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 2007-2008 Academic Year:

A. Item being assessed:
1. demonstrate a sound working knowledge of the field of microbiology.

Basis of Assessment:
Performance in upper-level Microbiology required (MB 451, MB 490) and elective (MB 441, MB 455, MB 461). Success in these courses requires a solid working knowledge in Microbiology.

B. Item being assessed:
II. demonstrate a command of the skills necessary to perform effectively and safely in a microbiology laboratory.

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 4 years. Laboratory skills are also monitored routinely in MB 451, although not as part of standard skills testing, in which a comprehensive laboratory-based term project requires all of these skills.

C. 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.

Basis of Assessment:
Performance in MB 441, MB 451, MB 455, MB 461 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: Natural Resources

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 2007-2008 Academic Year:
The interdisciplinary Natural Resources curriculum continues to be evaluated by a university wide committee. Until this evaluation and any proposed changes are completed, the Department of Soil Science will continue to administer and review its two concentrations. Activities this academic year included assessment of courses and peer review of selected courses/instructors by faculty review teams and exit interviews with graduating seniors. Input from alumni and employers continues to provide important feedback on our program. The class evaluations by students reflect a difference between fall and spring courses. In the Soil Science teaching program the overall instructor effectiveness rating and the overall course ratings were 4.12 and 3.99 respectively for the fall 2007 semester but were 4.44 and 4.36 respectively for the spring 2008 classes. With the one close exception the evaluations were above our goal of 4.
Some course changes included revision in content and in instructors for the SSC 361 class and change in instructor and new focus in the SSC 440 class. SSC 185, a GER course in the science, technology and society category, was substantially revised to include discussion of "student prioritized" current event topics that are integrated into the course. This year students voted to discuss the science behind climate change/global warming, genetically engineered foods/crops, and agricultural productivity. The purpose of the discussions is to help students discern differences in non-science, biased opinion in common popular press outlets versus science-based (unbiased) articles, learn how soils are important to these issues and recognize how individuals can have an impact on improving public understanding of science behind controversial issues related to natural resources, soils, and food.
Planning has also begun for a new course in soil biogeochemistry.
Assessment Activity during the 2007-2008 Academic Year:
The NRM (and ESE) options of the NR and ES inter-disciplinary programs at NCSU are not being assessed by the department as such at this time. The university in 2005, 2006, 2007 has been conducting a thorough review of the ES and NR programs. Recommendations for restructuring all ES and NR degrees/programs came from the review/study group and were to be implemented for the 2008-2009 academic year. However, that process seems to have stalled. The NR programs, as currently structured, do not serve students well, particularly incoming freshmen. It is the opinion of this department that the NRM program should be suspended and that no new freshmen students be enrolled for the 2008-09 academic year. Also, in light of the inaction on the study groups recommendations and the lack of a workable inter-departmental governing mechanism, this department does not see how the new GER requirements can be implemented for the upcoming 2008-2009 year, which will lead to suspension of the major indefinitely.
Degree Program: B.S. in Nutrition Science

Department: Food, Bioprocessing and Nutrition Sciences

Curriculum Code(s): NTS

Objectives of the Degree Program:
Graduates should demonstrate:
1. A sound working knowledge of nutrition and its associated fields.
2. The ability to engage in scientific inquiry and problem-solving related to nutrition.
3. The ability to find, understand, evaluate, and communicate information from primary and secondary source material in both oral and written format.
4. Satisfaction with their education in Nutrition Science major relative to their ability to meet their own personal and professional goals.

Goals of the Degree Program:
The goals of the degree program are to provide:
1. A strong foundation in basic science.
2. Competency in the various areas of nutritional sciences, including nutritional and metabolic biochemistry, comparative nutrition, community and life cycle nutrition, global food production and distribution, and nutritional chronic disease impacts.
3. A broad general education in areas ancillary to nutritional sciences, such as public policy development, lay and technical writing, media presentations interpersonal communication, concepts of human and group dynamics, public speaking, psychology, needs of diverse populations, and economics.
4. Multiple opportunities to develop laboratory, computer, oral and written communication skills, knowledge of the scientific method, data analysis and evaluation, and critical thinking and problem-solving skills.
5. A curriculum that will enable students to be successful in a research, corporate, technical, governmental, or non-profit environment as a nutritionist or other human health-related professional.

Outcomes of the Degree Program:
1. Students will be able to write clear, accurate responses to exam and homework questions in Nutrition Science courses.
2. When presented with a problem relevant to Nutrition Science, students will be able to determine what information is appropriate to solving the problem and use it effectively.
3. Students will be able to find, evaluate the validity of, and summarize data/information from multiple sources and present it effectively in written and/or oral form.
4. Upon reflection on the education they received from their Nutrition Science major, 80% or more of the responding students will be Very or Moderately Satisfied with their overall education in the degree program relative to their ability to meet their own personal and professional goals.
Assessment Activity during the 2007-2008 Academic Year:

Our effort to develop an action plan for the evaluation of the new major was put on hold this past year as worked to try and recruit a new faculty member with significant teaching and advising responsibility. Not only did we want to include this individual in the planning process, we also wanted to work with him/her to re-evaluate the curriculum as a whole. The NTS major grew out of what was essentially a minor -- a collection of un-sequenced, nutrition-related courses taught by faculty from different departments who rarely interacted. In addition, many of the courses were designed to meet specific requirements within different curricula, and as a result had overlapping content.

Assuming that we successful in our second round of recruiting, our goal is to work together this fall to re-craft the nutrition curriculum once again with an eye towards creating a meaningful sequence of courses that both interconnect and build on each other, reinforced by courses from other departments across campus. This will most certainly require the re-working of several classes, as well as possible changes in the curriculum itself.

For outcomes 1-3:
Faculty responsible for teaching nutrition courses will meet twice each semester to discuss students’ abilities in these areas as documented by exams, homework assignments, research papers, and oral presentations, and consider changes in approaches both within the courses and across the curriculum to better meet those outcomes. Information from alumni and graduating senior surveys will also begin to be collected on items in the category of Knowledge, Skills and Personal Development, such as NCSU’s contribution to their ability to apply the scientific method, and critically analyze ideas and information.

We will also discuss the possibility of having the department head conduct graduating senior interviews, perhaps done in groups, as we are concerned about the low rates of return on the on-line survey instruments.

For outcome 4:
Data will be gathered from aggregate on-line instructor and advisor evaluation instruments as well as from the graduating senior and alumni surveys. We will also incorporate questions aimed at collecting information regarding this outcome as part of NTS 390 -- the sophomore level seminar class -- and NTR 493/3 -- the junior/senior level “capstone” independent study course.
**Degree Program:** B.S. in Plant Biology  

**Department:** Plant Biology  

**Curriculum Code(s):** PB  

**Objectives of the Degree Program:**  
1. Students will be competent in all core areas of plant biology while developing more in depth knowledge in one or more disciplinary specialty areas. As a part of this objective, students will engage in inquiry-based learning in plant biology courses and objectively answer fundamental questions in plant biology by practicing the scientific method in course laboratories.  

2. Graduates will be able to effectively communicate their knowledge of plant biology in both oral and written forms to both scientific and non-scientific audiences.  

3. Plant Biology students will have an operational understanding of the relationship between plant biology as a basic plant science discipline with associated disciplines relevant to their interest areas including but not limited to the physical and mathematical sciences, humanities and social sciences, and agricultural and natural resource disciplines.  

4. Students will get hands-on research, teaching, and internship experiences that allow them to apply coursework knowledge and engage in problem-solving and scientific inquiry outside of the classroom.  

5. Graduates will be competitive for admission into plant biology graduate programs or post-graduate employment relative to the discipline.  

**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 2007-2008 Academic Year:

Educational processes responsible for achieving the intended student outcomes:
1. Students take all General Education requirements including English, communication or language electives, 21 hrs of Social Sciences and Humanities, Math, Chemistry, Physics, Statistics, Biology, Genetics, and Physical Education. In the Plant Biology requirements, they take PB 101 (Perspectives on Plant Biology), PB250, and at least three additional courses, one of which must be from 300 level or above. An additional selection of courses, which include courses in Zoology, Biochemistry, Geology, Soil Science, Food Science, Agricultural Resources, Horticulture, Plant Pathology, and Entomology, provide students opportunities to broaden their plant biology perspective to include either more detail of plant functions, interaction of plants with other organisms, economics of plants, plants and their environment, etc. Students usually select courses that enhance their skills and give them potential for various career opportunities.

2. Students are required to fulfill a teaching or research experience. Teaching is accomplished by teaching one or more of our undergraduate laboratories, either in PB 200, 250, or 365. They may do research in a faculty member’s lab, in industry, or governmental arenas.

3. Students are provided opportunities to participate in the Plant Biology Club where leadership, social interactions, and organizational and interpersonal skills may be developed.

4. Many of our courses have laboratory experiences where students write reports, do hands-on experiments, learn to use certain instruments, interact with other students and faculty, communicate verbally.

Assessment Activity During the 2007-2008 Academic Year
1. The Department of Plant Biology uses various methods and tools to extensively assess the three primary program educational outcomes listed above. A table showing the methods of assessment and evidence of accomplishment for each program outcome can be found at the following:
   http://cals.ncsu.edu/plantbiology/UAPR/UAPR.html

2. The department administered exit surveys to graduating seniors in order to assess graduates’ assessment of efficacy of student advising, overall satisfaction with research or teaching experiences, and how well they felt the undergraduate program prepared them for the future. On a 4-point scale, students rated the quality of advising at 3.9, quality of the teaching or teaching experience at 3.8, and how well the program prepared them for
the future at 3.5.

3. The department underwent a comprehensive review in late 2006. Specific recommendations regarding the undergraduate program were made (see assessment report for 2006-2007). The departmental undergraduate program committee has addressed the recommendations put forth by the review team and has made recommendations to the departmental faculty to change the plant biology curriculum to better meet the educational goals, objectives, and program outcomes. Proposed changes to the undergraduate degree curriculum include the addition of a requirement for all undergraduate students to take a course in evolution, increasing number of semesters of organic chemistry from one semester to two, and requiring that students take additional upper-level electives courses in the major.

4. The departmental undergraduate program committee addressed the feasibility of planning and accelerated bachelors/masters degree program to meet the needs of freshmen who enter the program with advanced standing as well as students who would be more competitive for the job market having pursued this option.
**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 2007-2008 Academic Year:**

Assessment included student performance through class exams and assignments; internship joint assessments by faculty advisors and industry partners; course evaluations (by students); exit interviews (conducted by the Department Head) for all graduating seniors; input by peer faculty (with some representation by the food animal production industry). Concise results showed that 1) outcomes of the degree program were generally
met, 2) the number of graduates to meet industry demand is insufficient (a continuing
trend from previous assessments), 3) changes were necessary in some targeted course
contents, due in part to faculty retirements but also for efficiency, to better meet the
degree program outcomes.

Assessment action items included 1) organization of a faculty recruitment group including
the Department Head, Undergraduate Teaching Coordinator, Poultry 4-H Youth Programs
Coordinator, and a Poultry Instructor to specifically and systematically develop and
initiate recruitment activities as well as work with CALS recruitment programs with the
goal of increasing student applications to the degree program, 2) initiation of a “Poultry
Science Summer Institute” targeting prospective high school students with an interest in
this degree program at NCSU (the initial 2007 class included 19 graduates, some of which
applied to and have been accepted in NCSU Poultry Science beginning Fall 2008; the
Summer 2008 class is currently projected at approximately 20 students), 3) approved
course and curricula changes (effective 1/08) in which PO 420 and PO 423 were dropped
and PO 424 and PO 435 are new (these changes included a combination of courses for
efficiency); SPS and TPS curriculum revisions (also effective 1/08); in brief, these
university approved actions collectively merged the turkey production and broiler
production courses as well as the poultry incubation and breeding courses – the
curriculum revisions included providing additional options in the language and physical
and biological sciences and removing the requirement for CSC 200, thus reducing the
total required hours for the degree program from 126 to 123.
Degree Program: B.S. in Turfgrass Science
Department: Crop Science
Curriculum Code(s): TFG

Objectives of the Degree Program:

Goals of the Degree Program:

Outcomes of the Degree Program:

Assessment Activity during the 2007-2008 Academic Year:

Assessment of some of our goals will come from evaluating student performance through class exams and assignments. Other assessment tools 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. We had discussions with seniors and graduates from our programs during the academic year. Most agree that the senior seminar offers a good overview of professionalism and career preparation. However, all agree that the course content comes too late in their academic schedule and that students would be better prepared for internships and job interviews if this course were moved to the sophomore year. As a result, we will create a 1-hour Perspectives and Professional Development course for sophomores in the Agronomy and Turfgrass Science curricula.
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:
1. 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
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 2007-2008 Academic Year:

We will continue conducting exit interviews with students graduating in Fall or Spring. These interviews are conducted jointly by the Undergraduate Coordinator and the Department Head and involve a frank and open-ended conversation with the students. The exit interview process also has a written questionnaire regarding the strengths and weaknesses of our program. Exit interviews complement efforts to assess specific course offerings through written course evaluations and faculty peer evaluations.

Efforts to reduce redundancies in introductory courses in Zoology and Biological Sciences have resulted in a major revision of the content and sequence of topics in the lecture and laboratory components of BIO 181 and BIO 183 (Introductory Biology I and II, respectively). All students in Zoology and in Biological Sciences will take this two semester series as part of their first year of courses. These revisions were approved by the University Committee on Courses and Curricula (UCCC), effective Fall 2007.

The Biological Sciences curriculum was revised to include four areas of concentration from which students can pick (approved by the UCCC to be effective Fall 2008). We are currently working to revise the Zoology curriculum and the Biological Sciences curricula to conform to the new General Education Program (GEP) requirements, to reduce the minimum number of hours required for graduation to the 120-123 range, and to maintain a certain level of consistency (as appropriate) across our curricular offerings in terms of core courses and the distribution of credit hours across requirements. Assessment of these changes in curricula will be incorporated in the exit interview process.