

strong reliance upon their senses and logic to evaluate classes of livestock tend to make them more predictable in their class placings because they evaluate only what they see and use logic rather than feelings to place classes. But other personality types certainly may excel in the judging program. The authors have observed that intuitive or feeling students who have an extensive livestock background can effectively guide the N and/or F traits in making the correct decisions. Recognition of these personality differences among students can certainly enhance the communication between instructors and students so that greater success in the classroom as well as in competition may be attained.

## References

- Barrett, L.A., Sorensen, R. and Hartung, T. (1985). Personality Type Factors of Faculty and Students. Implications for Agricultural College Teaching. *NACTA Journal*, March.
- Barrett, L. A., Sorensen, R. and Hartung, T. (1987). Personality Types of Agriculture College Students, Implications for Teaching, Retention, and Recruitment. *NACTA Journal*, December.
- Keppel, G. (1982). *Design and Analysis: A Researcher's Handbook*. Printice-Hall, Inc. NJ.
- Myers, I.B. (1962). *The Myers-Briggs Type Indicator Manual*. Princeton, NJ. Educational Testing Service.
- Roberts, D. Y. and Lee, H. Y. (1977). Personalizing Learning Processes in Agricultural Economics. *Am. J. Agric. Econ.* 59:1022.
- Sorensen, R.C. and Hartung, T.E. (1987). Student Diversity and Personality Type. *NACTA Journal*, September.

# Globalization of a Course to Broaden a Curriculum And Attract Undergraduate Non-Majors

J. R. McKenna  
Abstract

*Courses taught in agronomy, like most other fields in agricultural higher education have tended to become more specialized and compartmentalized. Few courses are designed to offer a broad subject matter format, especially one with a global perspective. Declining enrollment is another concern in many agronomy departments. An active recruiting program is one answer to this problem, another is to attract additional students from other majors within the university into agronomy courses. One method to address these two concerns is to develop within the curriculum an offering that can benefit students already in the program, and also has an appeal for students who are not majors.*

*With the increasing emphasis on the global nature of markets and economy, a survey course with a global perspective can accomplish both goals; that of introducing an international component into the curriculum for agronomy majors, and providing a popular service course for others in the college community with a global interest. World Crops and Cropping systems has been taught for 5 years at Virginia Polytechnic Institute and State University. In that period of time an average of 133 students per year have taken this course. This course is only required in the agronomy department, and agronomy majors have only made up 10-15% of the enrollment. Therefore, 85-90% of the students are taking World Crops and Cropping Systems as an elective. During this same period, overall student evaluations for this course have averaged 3.8 on a scale with 4.0 as the highest evaluation.*

Courses taught in Agronomy at the college and university level have traditionally been discipline oriented within a department (Schweitzer, 1986).

McKenna, Dept. of Agronomy, Virginia Polytechnic Institute and State University, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061.

Courses using an integrated approach across discipline, department, and colleges are not common. With strong departmental structure current institutional emphasis tends to promote more specialized subject matter courses (Hoshmand, 1988). Agriculture, like most professional fields taught in higher education, is faced with problems of compartmentalization and over specialization (Ellerbock, 1987). Concerns about the inability of our education system to meet the challenges of an increasingly complex, interdependent world have led to calls for revisions in curriculum and teaching methods (Boyer, 1987). Few courses in agriculture are designed to present not only a broad subject matter, but also a regional and international perspective (Ryan et al. 1985). A course with a global perspective is a needed addition for many curricula to address the international nature of agriculture.

The need for an introductory agronomy course in view of the increasing proportion of students with non-farm backgrounds has been identified (Bentley, 1980; Hasslen, 1983; Ryan et al., 1985). The number of students studying plant and soil sciences has declined in recent years to a further extent than other agricultural fields of study (Bruen et al. 1985; Beyrouthy and Bacon, 1986). This decrease has left many agronomy departments laboring to find students to populate classes and thereby maintain teaching equivalents for departmental funding. Besides the obviously needed efforts to more vigorously recruit students, the development of a course which appeals to a broader segment of the university student body may be another successful approach for increasing enrollment in departmental courses.

The addition of a course with a global perspective, taught without prerequisites provides a vehicle to attract nontraditional students to a department, and an opportunity to internationalize the outlook of traditional agronomy majors. The objectives of this article are to describe an introductory agronomy course that was developed to present a global perspective, attract

more students into the agronomy teaching program, and provide traditional students with a broader international perspective.

### Course Description

World Crops and Cropping Systems has been taught at Virginia Polytechnic Institute and State University in its present format for 5 years. In the first 4 years it was offered as a two-quarter sequence, and in 1989 it was combined into a single course as the university moved to the semester system. Currently it is a three-credit hour, junior level course that can be taken without prerequisites. The enrollment in this course has averaged 133 students per year. The overall course objectives are:

- Introduce the primary regions of production for selected crops, and the factors that determine where they are grown, and their economic importance.
- Evaluate these crops for human food, animal feed, industrial products, and agronomic characteristics.
- Describe the morphology, genetics, origins, and growth and development of the 20 major world crops (Corn, sorghum, millet, wheat, rye, triticale, barley, oats, rice, soybeans, peanuts, dry beans, cow peas, cotton, flax, jute, sugarcane, sugarbeets, cassava, and white potato).
- Understand the various factors that can be managed to improve crop yields while conserving and protecting the basic soil and water resources associated with plant and animal production.
- Discuss the present and potential systems of farming for improved crop production in the major climatic and soil ecosystems of the world.
- Demonstrate the influence of geography and climate as they relate to international development.
- Illustrate the interrelated social, political, and environmental factors that influence crop production and marketing.

The course provides students with a broad understanding of the factors that influence crop plant growth. Included is a discussion of the centers of diversity, history, botany, production, and utilization of the most important food, feed, and fiber crops grown in the world. The 20 crops that are grown on 95% of the world's crop land are covered. These crops are then integrated into cropping systems representative of 12 distinct climatic zones. These zones are defined by temperature and rainfall as described by Thorn and Thorn (1979).

The course is divided into three units. The first unit deals with the green plant concept, constraints to plant growth and a survey of soil, soil water, nutrients, organic matter, and microbial activity as they relate to crop production. This material is taught in the first 20% of the course. The next unit, the middle 40% of the course, introduces the crops themselves, and includes the distribution, adaptation, use, and importance of the principal food, feed, and fiber crops. The final 40% introduces the climatic zones and addresses the strengths and weaknesses that each have relative to crop production. Then a typical cropping system is suggested for each zone using crops discussed in the course. The final emphasis for each geographical area

is a discussion of possible methods to improve existing systems and increase the productivity of each climatic zone.

### Course Structure

#### Staffing

One initial concern about this course was an integration of different disciplines which is difficult for a single faculty as the only instructor. However, there is much information in the literature on cropping systems, which can be used to illustrate the course objectives. Students taking this course have not possessed an extensive background in cropping systems and thus, a detailed approach to teaching this subject matter would be ineffective and in many cases, defeat the underlying purposes of the course. Involving a teaching assistant who has an international background has been a valuable addition. The international student can bring a global experience to the course as well as broaden the instructor's background. The primary need is an instructor who is willing and capable of reaching beyond his generally narrow area of expertise.

#### Format

A course structure had to be developed to address the course objectives. Since few of the students had first-hand knowledge of the crops covered in the course, methods to acquaint them with the appearance of the species and the placement of these crops within systems was important. This was addressed in several ways. A series of slides illustrating the major crop species were collected and the lecture on each species was preceded by a short slide show which focused on plant appearance, seed, and field views. Live plants were grown in the greenhouse and passed around the class for inspection along with seeds of the crop. Also, a crops garden was maintained close to campus where most of the major crop species were grown to provide examples of as many crops as possible for student observation.

The global perspective is illustrated by maintaining an updated series of visual materials addressing world crop distribution and production. Representative countries on each continent are featured using charts and graphs to show imports and exports. The relationship of agriculture to non-agricultural exports is stressed. This allows the student to make comparisons between developed and developing nations in such areas as diversity of production, food sufficiency, and importance in the world market.

In the systems portion of the course, a brief slide show illustrating representative areas of each major climatic zone precedes the lecture. Where possible crops covered in the course are integrated into system examples for that zone. Slides taken by faculty, with international experience, and international students can be invaluable additions.

#### Text

A major problem encountered with this approach was finding a text organized in the desired format of the

course. In the first years, two texts were used, Martin et al. (1976) and Thorn and Thorn (1979). The former is now out of date, and the latter is out of print. In any case, using the two texts was expensive for students, and less than desirable from the teaching perspective. From the original texts, a framework of notes was developed, and additional material from the literature was added over time. Updated systems information was added from many sources, as were articles to illustrate cropping systems added, updated world production figures, and a list of study questions. The notes and all readings are made available to the students at the university copy center at cost. These notes are punched to fit a three-ring notebook, thus additional material can be inserted during the semester. This allows the text to be updated each year with new information being inserted and older material deleted. This method not only solved the text problem, but also has provided an up-to-date reference for students at a comparatively low cost. By having all the notes, the students are able to become more involved in the lecture and in discussion, as they are not so involved in notetaking. They also have all the readings in one location at a relatively low cost.

#### **Term Paper**

A term paper is an important component of this course and has a two-fold purpose; writing to learn and learning to write. Parrish et al., (1985) reported that writing assignments can be used as valuable teaching tools. Brumback et al. (1985) suggested that writing was a skill that alumni need for successful careers. The term paper provides student's the opportunity to more closely study cropping systems, and to practice writing skills. The directions for the term paper are as follows:

- Select a particular climatic region and describe a novel multiple-cropping system for production.
- Write a paper of five to ten typewritten, double-spaced pages excluding references.
- Use at least five references from books, pamphlets, and/or professional journals. Use the author-year method of citing references. In the bibliography, simply alphabetize by authors last name. See "Crop Science" or "Agronomy Journal" for bibliography format.
- Include in your paper:
  - (a) A brief discussion of the goal of the paper.
  - (b) Information on the climatic region and specific conditions that exist in that location.
  - (c) A new or novel cropping system.
  - (d) Details of the crops, planting dates, harvest dates, special fertilizers, labor and machinery requirements, and any other factors that may affect your proposed cropping system (e.g. socioeconomic and marketing factors).

This papers allows the student to synthesize material from all components of the course and provides an excellent review of concepts. Another learning benefit for many students is exposure to literature of another discipline.

#### **Grading**

Grading of the course includes inputs from quizzes, examinations and the term paper. Three quizzes are administered which are evenly spaced between the three exams. The quizzes are counted as

16% of the grade. Three exams are administered, each covering the material presented since the last exam or start of class. The term paper is counted with the same weight as an exam and often allows a student to make up for a low exam grade. Part of the grading philosophy includes a 5% per day loss in grade for each day this term paper is late. This helps impress on students the value of meeting deadlines.

#### **Evolution, and Assessment**

World Crops and Cropping Systems has evolved over the years to meet the changes in student interest and an increasing emphasis on the international nature of agriculture. In a typical offering, only 10 to 15% of the students in the course are enrolled in the agronomy curriculum. The only students who are required to take this course are agronomy majors, thus 85 to 90% of the students are taking it as an elective. World Crops and Cropping Systems is now on the recommended elective list for students in the International Agriculture program and is gaining enrollment from that area. Over the years, this has been a popular elective for agricultural students from other departments, particularly agricultural economics. The advisors in that discipline have found the international approach valuable in that it helps their majors understand the global nature of markets. The newest additions to the student population have come from outside the College of Agriculture. They hail from the Arts and Science College, particularly the Geography Department and the Engineering College. Civil Engineering students interested in international development have discovered the course. Enrollment from these disciplines have increased to about 10% of the class. Based on student evaluation, this course has been very successful. Over the last five years these evaluations have averaged 3.3 for textbook adequacy, 3.7 for class administration, and 3.8 for an overall score based on a scale with 4.0 as the top value. World Crops and Cropping Systems is beginning to address the goals of globalizing our offerings, broadening the outreach of our department, and increasing the student populations in our course offerings.

#### **Summary**

World Crops and Cropping Systems has met both the goal of globalizing an agronomy course and also attracting students to an agronomy course from other departments within the college and from other colleges within the university. This course has consistently attracted 130 students per year with only 10 to 15% of them agronomy majors. World Crops and Cropping Systems provides an excellent vehicle to use the expertise of faculty with international experience and international graduate students in a positive way.

#### **Literature Cited**

Bently, O.C. 1980. Agricultural education and research in a changing society. *J. Agron. Educ.* 9:71-76.

Beyrouly, C.A. and R.K. Bacon 1986. Recruiting to halt the decline in undergraduate agronomy enrollments. *J. Agron Educ.* 15:101-104.

Boyer, E. 1987. *College: The Undergraduate Experience in America*. Harper and Row Publishing Co., New York, NY.

Bruen, R., S. Chapman, G. Conneman, L. Branen, and D. Mugler. 1985. Fall 1984 enrollment report national association of state universities and land grant colleges. *NACTA J.* 29(1):6-13.

Brumback, T.B. Jr., M. Squires, and D. J. Parrish. 1985. Learning to write in agronomy. *J. Agron. Educ.* 14(1):31-34.

Ellerbrock, M. J. 1987. "Campus academic reform movement: An analysis of problems, issues, and solutions facing agricultural faculty." *NACTA J.* 31(4):21-23.

Hasslen, H. 1983. (How) are agricultural colleges responding to needs of nonfarm students? *J. Agron. Educ.* 12:4-5.

Hoshmand, A.R. 1988. A direction for faculty development and curriculum revitalization. *NACTA J.* 32(4):25-28.

Martin, J.H., W.H. Leonard, and D. L. Stamp. 1976. *Principles of Field Crop Production*. Maxmillian Publishing Co. New York, NY.

Parrish, D.J., T.B. Brumback, Jr., and M. Squires. 1985. Writing to learn in agronomy. *J. Agron. Educ.* 14(1):27-29.

Ryan J., M. Baasiri, and A. R. Saghir. 1985. An introductory agricultural course with an international dimension. *J. Agron. Educ.* 14:7-10.

Schweitzer, L.E. 1986. "Management teams analysis of crop production systems: A course in problem identification and resolution." *J. Agron. Educ.* 15(1):34-37.

Thorn, D.W. and M. D. Thorn. 1979. *Soil, Water and Crop Production*. AVI Publishing Co. Westport, CN.

---

# Teaching Modular Courses in Agriculture

D. J. Cotter, J. G. Mexal  
and B. A. Buchanan

Agriculture Courses integrate a broad spectrum of disciplines and are of the greatest benefit to students when a balanced perspective of available knowledge is presented. Recently, many factors have combined to endanger this traditional instructional approach. Enrollments in colleges of agriculture have declined. For example, enrollment in the College of Agriculture at New Mexico State University has declined 45% since 1977. Horticulture and agronomy student numbers mirror this decline. Declining enrollment reduces resources allocated to agricultural teaching programs. In fact, college FTE has declined 26% since 1977. This reduction has been accomplished by not replacing retiring faculty. Reduction in the teaching pool diminishes flexibility in course offerings. Furthermore, credibility may be threatened when a broad course array is taught by few professors.

When a faculty member lacks the full complement of academic strengths and experiences, a sense of unease pervades while teaching in the deficient aspects of the course. This can be obviated by allowing faculty to teach only the areas of their respective competence in modular 1-credit courses. This has been successful in agricultural economics and agricultural business courses (Beck 1982; Lindahl and Nelson 1982).

## Experiences

This paper discusses our recent experiences in developing modular courses in an attempt to utilize more faculty with narrow specific assignments. The department developed two minicourses in response to perceived student's needs, and in an effort to more efficiently utilize faculty expertise. The restructured courses include Floriculture, a 3 credit course with a laboratory and Research Methods in Plant Science, 1-3 credit (credit option by student) course.

The Floriculture course was reformed into 4, 1-credit modules consisting of 3 lectures and one 2 hr.

---

Cotter is a professor emeritus, Mexal an associate professor and Buchanan an associate professor, respectively, Dept. of Agronomy and Horticulture, New Mexico State University, Las Cruces, NM 88003.

laboratory per week. It was renamed Greenhouses: with each unit subtitled respectively, Structure, Environments, Nursery and Bedding Plants, and Floriculture. The one-credit courses were taught sequentially for about one month each over the semester.

The Research Methods in Plant Science (3 credits) was redesigned and retitled Research Orientation and Perspectives. It was divided into three consecutive 1 credit modules. The first 5 week course, entitled Research Proposals, dealt with developing a hypothesis, creative thought and writing techniques for the biological sciences. The second unit (5 weeks), Results Presentation, covered oral communication skills, organization of data for visual aid presentation. The final unit (5 weeks), Results and Interpretation, dealt with sources of literature and the interpretation of research findings.

For both of these courses, one professor was officially assigned to teach each 1-credit unit. Students seemed to not only accept the rigors of the divided approach, but also preferred the modular course format. They understood each course was only 4-5 weeks in length. Furthermore, they accepted different instructors for modular courses, whereas they were adamantly opposed to more than one professor teaching one 3-credit course, which was attempted in the research methods course.

## Advantages

There are many advantages to modular courses. The most obvious is it provides a mechanism to utilize the strengths of faculty resulting in a more credible, integrated learning opportunity for the students. The modular approach also enables the departmental administration to assign faculty official credit for participation. Traditionally, the instructor of record gets full credit for a course. Guest lecturers or even team teachers get no credit for their efforts. With a modular approach, the distribution of credit is more equitable even though instructors may not get full credit for their informal contribution to the team effort. More administrators are moving toward greater accountability for the teaching faculty. Official