

**MURRAY STATE UNIVERSITY  
COURSE SYLLABUS OUTLINE**

**SCHOOL OF AGRICULTURE**

**COURSE NUMBER:** AGR 645

**CREDIT HOURS:** 3

**I. TITLE:**

Biotechnology and Agriculture

**II. CATALOG DESCRIPTION:**

With the use of biotechnology, many new agricultural products are entering the market. This course is a descriptive study of biotechnology and its use in the production of these new products. The class would include basic information about this technology, current capabilities, current limitations, and future prospects. Field trip to Breathitt Veterinarian Center: lab on PCR and DNA electrophoresis. Note: We will have to leave Murray at 5 pm and will not be back until 10 pm on a Tuesday night. The date is to be arranged.

Prerequisites: AGR 100, AGR 240, BIO 199, 221, or 222

**\*To receive graduate credit for this course, a student must be admitted to graduate studies prior to registering for this course.\***

**III. PURPOSE:**

To provide students with a general understanding of biotechnology and its contribution to agriculture.

**IV. COURSE OBJECTIVES:**

- A. To understand the biology associated with genetic engineering.
- B. To acquaint the students with the techniques and tools of biotechnology.
- C. To develop an understanding of the various methods that foreign genes are transferred into agricultural crops.
- D. To cite examples of how biotechnology is being used to benefit the livestock industry.
- E. To understand the safeguards in the registration of transgenic organisms and the federal agencies responsible for this registration.

**V. CONTENT OUTLINE:**

- A. Introduction to Biotechnology
  1. Gene expression

2. Cloning and sequencing of genes
3. Genome projects
- B. Identifying Genes with Potential Benefit to Transgenic Organisms
- C. Transformation of Crop Plants
  1. *Agrobacterium* – mediated transformation
  2. Particle-gun transformation
  3. Other methods
  4. Plant tissue culture
  5. Selection of transformants
- D. Use of Biotechnology in Livestock Research and Production
- E. Biosafety and Registration of Transgenic Agricultural Organisms

**VI. INSTRUCTIONAL ACTIVITIES:**

- A. Lecture
- B. Discussion
- C. Class projects
- D. Lab experiments
- E. Demonstrations
- F. Field trips

**VII. FIELD AND CLINICAL EXPERIENCES:**

- A. Plant Tissue Culture Projects
- B. Field trip to Breathitt Veterinarian Center: lab on PCR and DNA electrophoresis. Note: We will have to leave Murray at 5 pm and not be back until 10 pm on a Tuesday night. The date is to be arranged.

**VIII. RESOURCES:**

- A. Plant tissue culture supplies
- B. Basic lab equipment
- C. MSU library journals
- D. Video: “Cotton, Exploring the Inner Frontiers”

**IX. GRADING PROCEDURES:**

Three mid-semester exams will be given with each being worth 100 points. The final exam will draw on all of the knowledge gained during the semester and be worth 150 points.

An eight page well-written, double-spaced research paper will be required that is on an approved topic relating to Biotechnology and Agriculture. This paper will be worth 150 points. Allowing for possible changes, the class will follow the following timetable in the development of this paper. By the third week, topics of interest must be selected and brought to class for discussion. By the

fifth week, each student must present a five to eight minute PowerPoint presentation on their topic. By the tenth week, rough drafts of your paper must be submitted for general suggestions. The instructor will give each work only a brief evaluation at this time. Works cited must include three referred journal articles. Part of the final grade will include whether or not reputable sources of information were utilized. Websites are OK, if they are from reputable sources; however, there are many questionable websites. By the fourteenth week, the final research paper must be submitted both as a hardcopy, and as a Microsoft Word computer file. To prevent past problems, all papers must be searched for plagiarism from the internet. Please write the papers in your own words!!! This research paper will be graded as following: selecting the topic and submitting it on time – 7 points, giving a PowerPoint presentation to class on topic at assigned time – 8 points, submitting the rough draft on time – 15 points, ideas clearly explained and topic adequately covered – 60 points, quality of writing – 30 points, and use of reputable sources or cited works and correct referencing of paper – 30 points.

Grading

Three Regular Exams	300 points
Final Exam	150 points
Research Paper	<u>150 points</u>
Total:	600 points

Students obtaining the following amounts of total points are guaranteed the following grades:

Grading Scale

≥ 540	A
≥ 480	B
≥ 420	C
≥ 360	D
< 360	E

The instructor reserves the right to lower this scale on a linear basis, as the need arises.

**X. ATTENDANCE POLICY:**

Please refer to the most current copy of the *Murray State University's Undergraduate Bulletin and Graduate Bulletin*.

\*Regular attendance is expected in this course. Because of the technical nature of this course, it will be difficult to do well with numerous absences.

**XI. ACADEMIC HONESTY POLICY:**

(Adopted by the MSU Board of Regents)

Cheating, plagiarism (submitting another person's material as one's own), or doing work for another person which will receive academic credit are all impermissible. This includes the use of unauthorized books, notebooks, or other sources in order to secure or give help during an examination, the unauthorized copying of examinations, assignments, reports, term papers, or the presentation on unacknowledged material as if it were the student's own work. Disciplinary action may be taken beyond the academic discipline administered by the faculty member who teaches the course in which the cheating took place.

NOTE: The School of Agriculture Faculty have adopted and implemented an Academic Honesty Policy in addition to the University Honesty Policy, which can be found in the current *Undergraduate Bulletin and Graduate Bulletin*. The policy sets guidelines regarding acts of dishonesty and the procedure to follow should an event occur. It is each Agriculture student's responsibility to obtain and read a copy of this document. The School's Academic Honesty Policy can be obtained by asking for a copy from any Agriculture Faculty member or the Secretary.

## **XII. TEXT AND REFERENCES:**

Text:                    *Biotechnology, An Introduction*, 2<sup>nd</sup> Ed. (2005) by S.R. Barnum. Thomson Brooks/Cole Publishing Company, Belmont, CA.

References:           *Recombinant DNA, A Short Course*. (1992) 2<sup>nd</sup> edition. by J.D. Watson, M. Gilman, J. Witkowski, and M. Zoller. W.H. Freeman and Company, NY.

*Plants, Genes, and Agriculture*. (1994) by M.J. Chrispeels and D.E. Sadava. Jones and Barlett Publishers, Inc.

*Agricultural Biotechnology, Introduction to Field Testing* (1990) by H.G. Purchase and D.R. MacKenzie. Office of Agricultural Biotechnology, USDA

## **XIII. PREREQUISITES:**

AGR 100, AGR 240, BIO 199, 221, or 222

## **XIV. STATEMENT OF AFFIRMATIVE ACTION AND EQUAL**

**OPPORTUNITY:** Murray State University does not discriminate on the basis of race, color, national origin, sex, religion, marital status, age, or disability in employment, admission, or the provision of services, educational programs and activities, and provides, upon request, reasonable accommodation including

auxiliary aids and services necessary to afford individuals with disabilities an equal opportunity to participate in all programs and activities. For information regarding nondiscrimination policies contact the Office of Equal Opportunity, 270-762-3155.