

VoCATS

Course Blueprint

Agricultural Education

6872- Biotechnology & Agriscience Research II

Revised 8/05

*Public Schools of North Carolina
State Board of Education • Department of Public Instruction
Curriculum and School Reform Services
Division of Instructional Services*

*Raleigh, North Carolina
Summer 2005*

Special thanks to the following educators who developed this blueprint.

*Cathy Berrier – Ledford High School
Frankie Farbotko – Lumberton Senior High School
Gradie Hartley – Smithfield-Selma High School
Michael Johnson- Wakeforest- Rolesville High School
Amy Kidd- Eastern Randolph High School
Misty Lambert- Southern Guilford High School
Devon Lewis- Rosman High School
Jimmy Roberts – Lumberton Senior High School
James E. Sheffield- Southwest Randolph High School
Jodi Songer- Wakefield High School
Rick Seipel- Starmount High School
Christy Thornton- North Mecklenburg High School
Christian Wilson- Southern Guilford High School
Dr. Elizabeth Wilson- Ag & Extension Education, NC State University*

This blueprint has been reviewed by business and industry representatives for technical content and

appropriateness for the industry. Contact
horace_johnson@ncsu.edu *for more information.*

VoCATS Course Blueprint

A course blueprint is a document laying out the framework of the curriculum for a given course.

Shown on the blueprint are the units of instruction, the core competencies in each unit, and the specific objectives for each competency. The blueprint illustrates the recommended sequence of units and competencies and the cognitive and performance weight of the objective within the course.

The blueprint should be used by teachers to plan the course of work for the year, prepare daily lesson plans, construct instructionally valid interim assessments. Statewide assessments are aligned directly with the course blueprint.

For additional information about this blueprint, contact program area staff. For additional information about VoCATS, contact program area staff or VoCATS, Career-Technical Education, Division of Instructional Services, North Carolina Department of Public Instruction, 6358 Mail Service Center, Raleigh, North Carolina 27699-5358, 919/807-3876, email: rwelfare@dpi.state.nc.us.

Interpretation of Columns on VoCATS Course Blueprints

No.	Heading	Column information
1	Comp# Obj.#	Comp=Competency number (two digits); Obj.=Objective number (unique course identifier plus competency number and two-digit objective number).
2	Unit Titles/Competency and Objective Statements	Statements of unit titles, competencies per unit, and specific objectives per competency. Each competency statement or specific objective begins with an action verb and makes a complete sentence when combined with the stem "The learner will be able to. . ." (The stem appears once in Column 2.) Outcome behavior in each competency/objective statement is denoted by the verb plus its object.
3	Time Hrs	Space for teachers to calculate time to be spent on each objective based on the course blueprint, their individual school schedule, and analysis of students' previous knowledge on the topic.
4&5	<u>Course Weight</u> Cognitive Performance	Shows the relative importance of each objective, competency, and unit. Weight is broken down into two components: cognitive and performance. Add the cognitive and performance weights shown for an objective in columns 4 and 5 to determine its total course weight. Course weight is used to help determine the percentage of total class time that is spent on each objective. The breakdown in columns 4 and 5 indicates the relative amount of class time that should be devoted to cognitive and performance activities as part of the instruction and assessment of each objective. Objectives with performance weight should include performance activities as part of instruction and/or assessment.
6	Type Behavior	Classification of outcome behavior in competency and objective statements. (C=Cognitive; P=Performance)
7	Integrated Skill Area	Shows links to other academic areas. Integrated skills codes: A=Arts; E=English Language Arts; CD=Career Development; CS=Information/Computer Skills; H=Healthful Living; M=Math; SC=Science; SS=Social Studies.
8	Core Supp	Designation of the competencies and objectives as Core or Supplemental. Competencies and objectives designated "Core" must be included in the Annual Planning Calendar and are assessed on the statewide assessments..

Career-Technical Education conducts all activities and procedures without regard to race, color, creed, national origin, gender, or disability. The responsibility to adhere to safety standards and best professional practices is the duty of the practitioners, teachers, students, and/or others who apply the contents of this document.

Agricultural Education
COURSE BLUEPRINT for 6872 Biotechnology & Agriscience Research II
(Recommended hours of instruction: 135-180 of hours)

Comp # Obj #	Unit Titles/Competency and Objective Statements (The Learner will be able to:)	Time Hour s	Course Weight		Type Behavior	Integrated Skill Area	Core Supp
			Cognitive	Performance			
1	2		4	5	6	7	8
			100%				
	Total Course Weight		68%	32%			
A	Leadership Development		5%	4%			
BB01.00	Demonstrate the major components of leadership involved in successful employment.		2%	1%	C3P	CD/E	Core
<i>BB01.01</i>	<i>Identify leadership qualities desired by the agriscience biotechnology industry.</i>		2%		<i>C1</i>	<i>CD/E</i>	<i>Core</i>
<i>BB01.02</i>	<i>Demonstrate leadership in the biotechnology agriscience instructional program.</i>			1%	<i>C3P</i>	<i>CD/E</i>	<i>Core</i>
BB02.00	Adapt public speaking techniques to address the audience and purpose of communication.		2%	1%	C3P	CD/E	Core
<i>BB02.01</i>	<i>Describe the major types of speeches and the variables to be considered when presenting the speeches.</i>		2%		<i>C1</i>	<i>E</i>	<i>Core</i>
<i>BB02.02</i>	<i>Use public speaking principles to develop a technical presentation.</i>			1%	<i>C3P</i>	<i>CD/E</i>	<i>Core</i>
BB03.00	Apply <u>Robert's Rules of Order</u> to conduct business meetings of biotechnology organizations.		1%	2%	C3P	E/SS	Core
<i>BB03.01</i>	<i>Analyze the role that <u>Robert's Rules of Order</u> plays in properly disposing of business in a group.</i>		1%		<i>C3</i>	<i>E/SS</i>	<i>Core</i>
<i>BB03.02</i>	<i>Demonstrate correct usage of parliamentary procedure abilities (as stated in <u>Robert's Rules of Order</u>) in a formal discussion.</i>			2%	<i>C3P</i>	<i>E/SS</i>	<i>Core</i>
B	Supervised Agricultural Experience Program		4%	3%			
BB04.00	Design a school-to-work employment plan based upon career objectives.		2%	1%	C3P	CD/E	Core
<i>BB04.01</i>	<i>Describe the procedures to follow in planning and implementing a school-to-work employment plan.</i>		2%		<i>C1</i>	<i>CD/E</i>	<i>Core</i>
<i>BB04.02</i>	<i>Use career objectives to create an individualized written school-to-work employment plan.</i>			1%	<i>C3P</i>	<i>CD/E</i>	<i>Core</i>

Comp # Obj #	Unit Titles/Competency and Objective Statements (The Learner will be able to:)	Time Hour s	Course Weight		Type Behavior	Integrated Skill Area	Core Supp
			Cognitive	Performance			
1	2		4	5	6	7	8
BB05.00	Develop a financial record system for use in the agriscience biotechnology industry.		2%	2%	C3P	CD/M	Core
<i>BB05.01</i>	<i>Identify the elements of standard financial statement.</i>		<i>2%</i>		<i>C1</i>	<i>CD/M</i>	<i>Core</i>
<i>BB05.02</i>	<i>Use the principles of accounting to develop a financial statement for an experimental SAE.</i>			<i>2%</i>	<i>C3P</i>	<i>CD/M</i>	<i>Core</i>
C	ADVANCED AGRICULTURAL LAB TECHNIQUES & PROTOCOL		4%	6%			
BB06.00	Use advanced laboratory techniques and procedures in agriscience research.		4%	6%	C3P	CD/M/SC	Core
<i>BB06.01</i>	<i>Use principles of record keeping to develop and maintain an accurate / detailed laboratory notebook.</i>			<i>2%</i>	<i>C3P</i>	<i>CD/SC</i>	<i>Core</i>
<i>BB06.02</i>	<i>Identify data analysis and statistical models utilized in biotechnology and agricultural research.</i>		<i>1%</i>		<i>C1</i>	<i>CD/SC/M</i>	<i>Core</i>
<i>BB06.03</i>	<i>Discuss the identification, function, maintenance, and proper use of advanced laboratory equipment..</i>		<i>2%</i>		<i>C2</i>	<i>SC</i>	<i>Core</i>
<i>BB06.04</i>	<i>Explain the guidelines for, and limitations of research on humans and other animal subjects.</i>		<i>1%</i>		<i>C2</i>	<i>CD/SS/S C/M</i>	<i>Core</i>
<i>BB06.05</i>	<i>Demonstrate aseptic technique and proper handling of hazardous lab materials, including disposal of biologicals.</i>			<i>2%</i>	<i>C3P</i>	<i>CD/SC</i>	<i>Core</i>
<i>BB06.06</i>	<i>Apply laboratory skills to manage a research greenhouse or field trial.</i>			<i>2%</i>	<i>C3P</i>	<i>CD/SC</i>	<i>Core</i>
D	ADVANCED GENETIC MANIPULATION IN AGRICULTURE		11%	2%			
BB07.00	Outline the development of genetically modified organisms (GMO's).		5%		C3P	CD/SC	Core
<i>BB07.01</i>	<i>Outline the stages in the development of genetically modified organisms.</i>		<i>2%</i>		<i>C2</i>	<i>CD/SC</i>	<i>Core</i>
<i>BB07.02</i>	<i>Discuss genetically modified organisms and their impact on agriculture.</i>		<i>1%</i>		<i>C2</i>	<i>CD/SC</i>	<i>Core</i>
<i>BB07.03</i>	<i>Explain considerations in the selection and isolation of genes for use in modifying an organism.</i>		<i>2%</i>		<i>C2</i>	<i>CD/SC</i>	<i>Core</i>
<i>BB07.04</i>	<i>Test genetically modified organisms for successful expression of engineered genes.</i>			<i>2%</i>	<i>C3P</i>	<i>CD/SC</i>	<i>Core</i>

Comp # Obj #	Unit Titles/Competency and Objective Statements (The Learner will be able to:)	Time Hour s	Course Weight		Type Behavior	Integrated Skill Area	Core Supp
			Cognitive	Performance			
1	2		4	5	6	7	8
BB08.00	Examine the various methods of genetic manipulation in plant and animal cells.		6%		C3	SC	Core
BB08.01	<i>Explain methods of inserting vectors containing recombinant DNA into plant cells.</i>		2%		C2	SC	Core
BB08.02	<i>Discuss techniques for the creation of transgenic animals.</i>		2%		C2	SC	Core
BB08.03	<i>Analyze the development of genetically modified plant and animal cells after insertion of recombinant DNA.</i>		2%		C3	SC	Core
E	PLANT SCIENCE & BIOTECHNOLOGY		11%	6%			
BB9.00	Discuss biological processes in plant science related to biotechnology.		11%		C2	CD/SC	Core
BB09.01	<i>Summarize the chemical and physical needs of plants for optimal growth.</i>		3%		C2	CD/SC	Core
BB09.02	<i>Discuss how plants respond to environmental stimuli.</i>		2%		C2	CD/SC	Core
BB09.03	<i>Explain the fundamentals of plant disease and infestation.</i>		2%		C2	CD/SC	Core
BB09.04	<i>Outline biological, chemical and physical methods of plant pest management.</i>		2%		C2	CD/SC	Core
BB09.05	<i>Discuss the development and utilization of virus, herbicide and insect resistant crops.</i>		2%		C2	CD/SC	Core
BB10.00	Use biotechnology protocol in horticulture and crop science research.			6%	C3P	CD/SC/M	Core
BB10.01	<i>Apply proper experimental design techniques related to field plot design and management.</i>			1%	C3P	CD/SC/M	Core
BB10.02	<i>Apply integrated pest management including biological / genetic controls and pest population monitoring.</i>			2%	C3P	CD/SC/M	Core
BB10.03	<i>Demonstrate proper techniques in the micropropagation of various plant tissues.</i>			3%	C3P	CD/SC	Core
F	ANIMAL SCIENCE & BIOTECHNOLOGY		10%	4%			
BB11.00	Examine biological processes in animal science related to biotechnology.		8%		C3	CD/SC	Core
BB11.01	<i>Summarize the physiological needs of animals for growth and reproduction.</i>		2%		C2	CD/SC	Core
BB11.02	<i>Analyze the impact of biotechnology on animal disease prevention, diagnosis, and management.</i>		2%		C3	CD/SC	Core
BB11.03	<i>Discuss the role of genetic engineering and biotechnology techniques on improving animal breeding.</i>		2%		C2	CD/SC	Core
BB11.04	<i>Evaluate the function of hormones in animal growth and body regulation.</i>		2%		C3	CD/SC	Core

Comp # Obj #	Unit Titles/Competency and Objective Statements (The Learner will be able to:)	Time Hour s	Course Weight		Type Behavior	Integrated Skill Area	Core Supp
			Cognitive	Performance			
1	2		4	5	6	7	8
BB12.00	Perform biotechnology protocol related to animal science.		2%	4%	C3P	CD/SC/M	Core
<i>BB12.01</i>	<i>Practice biotechnology techniques utilized in animal breeding.</i>			4%	<i>C3P</i>	<i>CD/SC/M</i>	<i>Core</i>
<i>BB12.02</i>	<i>Trace the process of cloning in animals.</i>		2%		<i>C2</i>	<i>CD/SC</i>	<i>Core</i>
G	FOOD SCIENCE & BIOTECHNOLOGY		7%	2%			
BB13.00	Examine techniques and biological processes in food science related to biotechnology.		7%	2%	C3P	CD/SC	Core
<i>BB13.01</i>	<i>Explore food borne pathogens and spoilage organisms in relation to agricultural biotechnology.</i>		2%		<i>C2</i>	<i>CD/SC</i>	<i>Core</i>
<i>BB13.02</i>	<i>Summarize enzyme activities and fermentation processes that are useful in the food processing industry.</i>		2%		<i>C2</i>	<i>CD/SC</i>	<i>Core</i>
<i>BB13.03</i>	<i>Discuss the impact of genetic engineering on food preservation, food quality and nutritional value.</i>		3%		<i>C2</i>	<i>CD/SC</i>	<i>Core</i>
<i>BB13.04</i>	<i>Demonstrate proper food preservation and sterilization techniques.</i>			2%	<i>C3P</i>	<i>CD/SC</i>	<i>Core</i>
H	ENVIRONMENTAL SCIENCE & BIOTECHNOLOGY		5%	2%			
BB14.00	Examine techniques and biological processes in environmental science related to biotechnology.		5%	2%	C3P	CD/SC	Core
<i>BB14.01</i>	<i>Summarize the use biotechnology applications in the field of environmental science.</i>		3%		<i>C2</i>	<i>CD/SC</i>	<i>Core</i>
<i>BB14.02</i>	<i>Discuss the impact of biotechnology on sustainability.</i>		2%		<i>C2</i>	<i>CD/SC/S</i> <i>S</i>	<i>Core</i>
<i>BB14.03</i>	<i>Use scientific principles to conduct a simple experiment in contained bioremediation.</i>			2%	<i>C3P</i>	<i>CD/SC/M</i>	<i>Core</i>
I	BIOTECHNOLOGY & AGRIMEDICINE		6%	2%			
BB15.00	Explain biotechnology concepts related to agrimedicine and “pharming”.		6%		CP3	CD/SC	Core
<i>BB15.01</i>	<i>Define vocabulary related to agrimedicine and biotechnology.</i>		2%		<i>C1</i>	<i>CD/SC</i>	<i>Core</i>
<i>BB15.02</i>	<i>Outline biomedical applications of agricultural products and processes.</i>		2%		<i>C2</i>	<i>CD/SC</i>	<i>Core</i>
<i>BB15.03</i>	<i>Discuss the practice of “pharming” and the creation of genetically altered organisms to produce medical substances.</i>		2%		<i>C2</i>	<i>CD/SC</i>	<i>Core</i>
<i>BB15.04</i>	<i>Conduct a basic experiment in the area of agrimedicine.</i>			2%	<i>CP3</i>	<i>CD/SC</i>	<i>Core</i>

Comp # Obj #	Unit Titles/Competency and Objective Statements (The Learner will be able to:)	Time Hour s	Course Weight		Type Behavior	Integrated Skill Area	Core Supp
			Cognitive	Performance			
1	2		4	5	6	7	8
J	BIOTECHNOLOGY ETHICS		5%	1%			
BB16.00	Discuss ethical and practical issues surrounding biotechnology.		5%	1%	C3P	CD/SC/S S	Core
<i>BB16.01</i>	<i>Discuss regulatory organizations and issues concerning genetically modified organisms.</i>		3%		C2	CD/SC/S S	Core
<i>BB16.02</i>	<i>Examine ethical issues concerning the use of genetic manipulation to improve the agricultural productivity of living organisms.</i>		2%		C2	CD/SC/S S	Core
<i>BB16.03</i>	<i>Critique ethical issues arising from the use of biotechnology and genetic engineering techniques in human health care.</i>			1%	C3P	CD/SC/S S	Core