

NAME OF DEPARTMENT:

COURSE OUTLINE FOR 2009-2010

Teacher: Linda Simmons

Course: Biotechnology

Course ID: SC 1130

Text: Biotechnology: Science for the New Millennium

Author: Daugherty, Ellyn

Edition: 2007

Additional Texts/Workbooks/Etc.:

Biotechnology Laboratory Manual
Composition notebook with sewn in pages for labs only

Place of Course in Kennedy Curriculum: _____ Required _____ x _____ Elective

I. ACADEMIC AREA:

A. Content Description: Listing of MAJOR UNITS, ENDURING KNOWLEDGE (Key Concepts) and ALIGNMENT per quarter:

MAJOR UNITS	ALIGNMENT W/ STANDARDS* Washington State revised Science Standards for Grades 9-12 National Science Education Standards	QUARTER
Ch. 1 What is Biotechnology/Introduction to Biotechnology Methodologies	<p>9-12 INQA Scientists generate and evaluate questions to investigate the natural world.</p> <p>9-12 INQB Scientific progress requires the use of various methods appropriate for answering different kinds of research questions, a thoughtful plan for gathering data needed to answer the question, and care in collecting, analyzing, and displaying the data.</p> <p>9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge.</p> <p>9-12 INQD The methods and procedures that scientists use to obtain evidence must be clearly reported to enhance opportunities for further investigation.</p> <p>9-12 INQE The essence of scientific investigation involves the development of a theory or conceptual model that can generate testable predictions.</p> <p>9-12 INQF Science is a human endeavor that involves logical reasoning and creativity and entails the testing, revision, and occasional discarding of theories as new evidence comes to light.</p> <p>9-12 INQG Public communication among scientists is an essential aspect of research. Scientists evaluate the validity of one another's investigations, check the reliability of results, and explain inconsistencies in findings.</p> <p>9-12 INQH Scientists carefully evaluate sources of information for reliability before using that information. When referring to the ideas or findings of others, they cite their sources of information.</p> <p>9-12 APPA Science affects society and cultures by influencing the way many people think about themselves, others, and the environment. Society also affects science by its prevailing views about what is important to study, and by deciding what research will be funded.</p> <p>9-12 APPB The technological design process begins by defining a problem in terms of criteria and constraints, conducting research, and generating several different solutions.</p> <p>9-12 APPC Choosing the best solution involves comparing alternatives with respect to criteria and constraints, then building and testing a model or other representation of the final design.</p> <p>9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.</p> <p>9-12 APPE Perfect solutions do not exist. All technological solutions involve trade-offs in which decisions to include more of one quality means less of another. All solutions involve consequences, some intended others not.</p> <p>9-12 APPF It is important for all citizens to apply science and technology to critical issues that influence society.</p>	1

	<p>Math connections: A1.6.B Make valid inferences and make valid inferences based on data. A1.8.G Synthesize information to draw conclusions and evaluate the arguments and conclusions of others. A1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret it in the context of the original problem.</p>	
Ch. 2 The Raw Materials of Biotechnology/ Basic Biology for the Biotechnician	<p>9-12 INQA; INQB; INQC; INQD; INQE; INQF; INQH 9-12 APPA; APPB; APPC; APPD; APPE; APPF</p>	2
Ch. 3 The Basic Skills of the Biotechnology Workplace/Basic Chemistry for the Biotechnician	<p>9-12 INQA; INQB; INQC; INQD; INQE; INQF; INQG; INQH 9-12 APPA; APPB; APPC; APPD; APPE; APPF 9-11 PS2H Solutions are mixtures in which particles of one substance are evenly distributed through another substance. Liquids are limited in the amount of dissolved solid or gas that they can contain. Aqueous solutions can be described by relative quantities of the dissolved substances and acidity or alkalinity (pH). 9-11 PS2I The rate of physical or chemical change may be affected by factors such as temperature, surface area, and pressure. Math Connections: 7.2.E Represent proportional relationships, using graphs, tables, and equations, and make connections among the representations. Math Connections: A1.6.B; A1.8.C; A1.8.G</p>	2
Ch. 4 Introduction to Studying DNA/DNA Isolation and Analysis	<p>9-12 INQA; INQB; INQC; INQD; INQE; INQF; INQG; INQH 9-1 PS2H; PS2I</p>	3
Ch. 5 Introduction to Studying Proteins/Protein Isolation and Analysis	<p>9-12 INQA; INQB; INQC; INQD; INQE; INQF; INQG; INQH</p>	3
Ch. 6 Identifying a Potential Biotechnology Product/Assay Development	<p>9-12 INQA; INQB; INQC; INQD; INQE; INQF; INQG; INQH 9-11 PS2H; PS2I Math Connections: A1.6.B; A1.8.G</p>	3
Ch. 7 Spectrophotometers and Concentration Assays/Using the Spectrophotometer for Protein Assays	<p>9-12 INQA; INQB; INQC; INQD; INQE; INQF; INQG; INQH 9-12 APPB; APPC; APPD; APPE; APPF Math Connections: A1.8.A Analyze a problem situation and represent it mathematically. A1.8.C A1.3.B Represent a function with a symbolic expression, as a graph, in a table, and using words, and make connections among these representations.</p>	3 & 4
Ch. 8 The Production of a Recombinant Biotechnology Product/Recombinant Protein Production	<p>9-12 INQA; INQB; INQC; INQD; INQE; INQF; INQG; INQH 9-12 APPA; APPB; APPC; APPD; APPE; APPF Math Connections: A1.8.A; A1.8.C; A1.3.B; A1.8.G</p>	4
Ch. 9 Bringing a Biotechnology Product to Market/Protein Product Purification and Analysis	<p>9-12 INQA; INQB; INQC; INQD; INQE; INQF; INQG; INQH 9-12 APPA; APPB; APPC; APPD; APPE; APPF Math Connections: A1.8.A; A1.8.C; A1.3.B; A1.8.G</p>	4
Ch. 14 Advanced Biotechnology Techniques/Advanced Protein Studies	<p>9-12 INQA; INQB; INQC; INQD; INQE; INQF; INQG; INQH 9-12 APPA; APPB; APPC; APPE; APPF Math Connections: A1.8.A; A1.8.C; A1.3.B; A1.8.G</p>	4

ENDURING KNOWLEDGE	QUARTER
*Key Concepts / What student has to know *	
What biotechnology is	1
How to design an experiment	1, 2, 3, 4
Cells and their role in biotechnology	2
Synthesis of genetically engineered products	3
Study and manipulation of DNA	3 & 4
Production of a marketable biotechnology product	4

B. Skills: What the student will have to do and how these skills are to be evaluated.

SKILLS	METHODS OF EVALUATION/ASSESSMENT	FREQUENCY OF EVALUATION
Scientific method as a way of problem solving	This is the standard for/of presentation and evaluation	Daily
Note-taking	Observation and grading of notebooks kept by each student	At end of each lab
Vocabulary development	Targets Oral quizzing	Daily/several times a week
Growth in conceptual scientific knowledge	Daily work	Each lab as it is recorded
Science awareness	News and magazine articles as they occur Science in the news component of the extra credit	When they occur Twice each semester
Use of sterile technique	Most labs	Daily
Develop proficiency in using lab equipment	During each lab	Daily
Professional lab techniques	During each lab	Daily
Preparation of solutions and materials to be used in lab	During each lab	Daily

C. Methods of Instruction: Instructional methods used to present course content:

There will be background information given during lecture and discussion prior to each lab.

Each lab activity is to be recorded in proper format in the legal lab notebook.

Labs will be done in groups of two to four students.

After each lab there will be a seminar to discuss the lab and its outcome.

This course goes beyond the Washington State minimum requirements for biological science.

D. Career Application: Indicate how the content of this course is relevant / connected to real life / authentic / ties in with a related vocation.

This course will prepare the student to take an entry level job in the biotechnology field.
This course is a good start for the student considering a career in the biotechnology field.

II. POLICIES:

A. Grading Policies:

GRADING SCALE

Same as grading scale used in the school system and listed in the Student Handbook
 Different scale (If different scale, please indicate below):

GRADING CRITERIA / VALUE / WEIGHTING

All grades are determined on a basis of points earned divided by points offered.

B. Policies on late work, tests and attendance

If work is late due to an excused absence, most work may be made up within a reasonable length of time.
Some labs involve borrowed equipment and so cannot be made up.

C. Discipline Policies

I follow the policies in the Kennedy handbook.

D. Statement on School Cheating Policy:

I follow the policies in the Kennedy handbook.
Copying another student's lab write-up to make up the lab is considered cheating.

E. Policy on Extra Credit

Twice each semester, over school vacations of four or more days, a list of approved extra credit opportunities, with the maximum number of points for each, will be distributed.

All extra credit is academic in nature and pertains directly to the subject matter.

The extra points will be posted at the end of the semester.

F. Listing Daily Assignments

(Indicate how you will post daily assignments for parents and students)

___ JFK NETCATHOLIC

__x__ JFK Website

___ Both

G. Open Gradebook Report to Web Postings

- **Postings:**

Official postings will be done according to the published schedule.

There will be several interim postings between each official time.

- **Anticipated number of NEW entries per quarter:**

25

H. Support for Student Learning

This is a lab oriented course. Therefore almost all of the instruction is "hands on".

I. Teacher Availability to Students for Extra Help

I am available for extra help and make-up work before zero hour, at first lunch, and after school.

J. Major Movies/Films (Video/CD/DVD) Shown as Part of this Course:

MAJOR MOVIES/FILMS (Video, CD, DVD) SHOWN AS PART OF THIS COURSE:	UNIT OR CHAPTER	QUARTER
Medicine Man	Chapter 6	3