Introduction to Biotechnology BIOL

1414-4 credit hours

**Instructor: Jennifer Lazare**

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***Course Description:*** An introduction to biotechnology including career exploration, history and applications of DNA/RNA technology molecular biology, bioethics, and laboratory safe practices. The course is supplemented with laboratory exercises, demonstrations and field trips that illustrate the basic techniques of biotechnology including laboratory topics and finally the course concludes with a consideration of bioethical issues relating to this powerful new technology.

***Supplies:***

**Textbook: Biotechnology Science For the New**

**Millennium, Ellyn Daugherty, 20012**

o I have a class set of textbooks. Students will have to purchase their own textbook if they would like to keep one at home, but it is not required.

**Lab Binder for this class ONLY**-small is fine but I will be collecting them for grades so it may not contain ANY OTHER SUBJECTS!

* Internet Access outside of class
* 1 role of paper towels
* 1 ream of paper

***COST/FEES:***

**ACC Tuition:** NONE-Paid for by the district

**Textbook:** NONE –Class set PAID for by Mrs.

Houser

***Grades:***

Test-50%

Labs, homework, everything else-50%

***Enrollment:***

* Everyone will receive a 4th year Science Credit- Honors
* You may also enroll in this course for DUAL CREDIT (college and high school credit)
* I will help you enroll in Early College Start in the Fall and BIOL 1414 in in the Spring

***Class SetUp/Rational:***

***CLASS RULES:***

\*Don’t be upset by the results you get from the work you didn’t do.

\*If it’s important to you, you will make it

happen. If not, you will make excuses.

Consequences: Treat you like a high school freshman

This is a college workforce course that is career prep/student centered meaning you will do the information gathering, lab setups, lab execution and lab clean up.

You will be able to create a resume with various lab skills upon completion of the course and be

overqualified for a lab technician position.

All test are open lab notebook and or project based which means they will not be easy, but you should do fine if you pay attention in class, record everything you observe or conclude and ask questions when you don’t understand.

If you take care of business during class, homework should be rare with the exception of

studying for test.

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| **TEA CTE**  **Advanced Biotechnology**  **Student Resources** | | Power Point Project Share | [eBook](https://www.dropbox.com/sh/3lqts7fmwk1zbri/DTMx60hxkq) | [Lesson Activity](https://www.dropbox.com/sh/mo4zu7728n6f7it/YCFcsLX0iN) | | [Lab](https://www.dropbox.com/sh/mo4zu7728n6f7it/YCFcsLX0iN) | [PODCAST](http://vimeo.com/user16474220/videos) |
| Module 1 1st/2nd 6 weeks | | 1.1 Overview of Biotechnology | Chapter 1 | 1.1A Biotech Timeline  1.1C Movie Maker  1.1D Current Events | | 1.1B Root Beer | Introduction to Biotechnology |
|  | | 1.2 Cell Structure and Function | Chapter 2 | 1.2A Cells Alive  1.2 C Virtual Electron Microscope | | 1.2B Microscope | Cell Structure and Function |
|  | | 1.3 DNA Structure and Function | Chapter 3  Chapter 4 | 1.3C DNAi Timeline  1.3D DNA Replication  1.3BDNA origami | | 1.3A DNA Extraction | DNA Replication |
|  | | 1.4 Protein Synthesis | Chapter 4 | 1.4A Transcription and Translation | |  | Protein Synthesis: Translation  Protein Synthesis: Transcription |
|  | | 1.5 Protein Structure and Function | Chapter 5 |  | | 1.5A DNA to Disease  1.5B Mapping the Human Genome | Protein Structure  Control of Gene Expression  Mutations |
|  | | 1.6 Math for the Scientist | Chapter 6 | 1.6A Math Skills  1.6B Excel Tutorial | | 1.6C Making Solutions and Dilutions |  |
|  | | 1.7 Lab Basics | Chapter 7 | 1.7B Keeping a Lab Notebook | | 1.7A Training Lab Tech: Safety  1.7C Micropipette  1.7D Calibrating Lab Equipment | Using the Electric Balance  Using the pH Meter  Using the Micropipettor  Using the Centrifuge  Preparing an Agarose Gel  Electrophoreis |
| Module 2 3rd/4th 6 weeks | | 2.1 Recombinant DNA Technology |  | 2.1C DNA Sequencing  2.1D Making Recombinants | | 2.1A Dye Electrophoresis  2.1B Restriction Enzymes  2.2E GFP Transformation |  |
|  | | 2.2 DNA Analysis |  | 2.2C PCR Web  2.2A PFLP Web | | 2.2C PCR  2.2B VNTR  2.2A RFLP |  |
|  | | 2.3 Therapeutic Proteins (column, SDS) |  | 2.3A Module organisms | | 2.3C SDS GFP  2.3BColumn Chromatography |  |
|  | | 2.4 Bioinformatics |  | 2.4A Bioinformatics: The Basics  2.4B Bioinformatics: Understanding Disease | |  |  |
| Module 3 5th 6 weeks | | 3.1 Cloning Methods |  | 3.1A History of Cloning  3.1B Cloning methods  3.1C Cloning in the Movies | | [STEM CELL Module](http://learn.genetics.utah.edu/content/tech/stemcells/) |  |
|  | | 3.2 Advancements in Animal BT |  | \*RNAi  \*SNPs | | 3.2A Transgenics  3.2C RNAi  3.2B SNPs |  |
|  | | 3.3 Plant Biotechnology |  | [Harvest of Fear](http://www.pbs.org/wgbh/harvest/) | | 3.3A Plant Tissue Culture  3.3B GMO Ethics |  |
|  | | 3.4 Environmental Biotechnology |  |  | | 3.4A Bioremediation |  |
| Module 4 6th 6 weeks | | 4.1 Regenerative Medicine |  | 4.1A Future in Biotech  [EXPLORAVISION](http://www.exploravision.org)  [Biogenius Challenger](http://www.biotechinstitute.org/go.cfm?do=page.view&pid=2) | | STEM CELLS |  |
|  | | 4.2 Molecular Diagnostics |  |  | | 4.1B ELISA  4.1A Microarrays |  |
|  | | 4.3 Pharmaceuticals |  | [Epigenetics](http://learn.genetics.utah.edu/content/epigenetics/)  4.3 A Careers in Biotech | |  |  |
| Extensions Explorasvision: <http://www.exploravision.org>   * Entries due late January   DNA Day Essay: <http://www.ashg.org/education/dnadaycontest.shtml>  Biogenius Challenge: <http://www.biotechinstitute.org/go.cfm?do=Page.View&pid=2>   * Entries due mid March   Citizen Science: <https://www.zooniverse.org>  Citizen Science: <http://www.scientificamerican.com/citizen-science/>  Siemens Competition: <http://www.siemens-foundation.org/en/competition.htm> | | | | | | | |
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