

Secondary Course Description

Course descriptions are
updated and reviewed with
all new text adoptions.

COVER PAGE

1. Course Title: Principles of Biomedical Sciences	13. Subject Area: <input type="checkbox"/> History/Social Science <input type="checkbox"/> English <input type="checkbox"/> Mathematics <input checked="" type="checkbox"/> Science <input checked="" type="checkbox"/> CTE <input type="checkbox"/> Language other than English <input type="checkbox"/> Visual & Performing Arts <input type="checkbox"/> DJUSD Graduation Elective <input checked="" type="checkbox"/> College Prep Elective (will seek UC/CSU approval)									
2. Transcript Title / Abbreviation:										
3. Transcript Course Code / Number (Office Use Only):										
4. School: Davis Senior High School										
5. District: Davis Joint Unified School District										
6. Department: Science, CTE										
7. Graduation Requirement it meets: Science, CTE, Elective										
8. Length of Course: 1 year	14. Grade Level(s): 10-12									
9. Graduation Credits: 10	15. UC/CSU Requirement:									
10. School / District Web Site: http://www.djUSD.net	16. Seeking "Honors" Distinction? <input type="checkbox"/> Yes <input type="checkbox"/> No									
11. CBEDS Course Code:	17. GPA Types:									
12. School Contact: Name: Helke Farin Title/Position: Teacher Phone: 530-757-5400 Ext.: Fax: E-mail: hfarin@djUSD.net	18. Credit Value: <input type="checkbox"/> 0.5 (half year or semester equivalent) <input checked="" type="checkbox"/> 1.0 (one year equivalent) <input type="checkbox"/> 2.0 (two year equivalent) <input type="checkbox"/> Other: _____									
19. Was this course previously approved by UC? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If so, in what year? _____ Under what course title? _____										
20. Pre-Requisites: Biology Co-Requisites:										
21. <u>Preliminary Approval</u> - Secondary Site Principal Signature (<u>Must</u> be signed before proceeding to Step 22): _____										
22. Date Course Proposal with Preliminary Approval (Step 15) sent to Associate Superintendent, Educational Services: _____										
23. Review & Approval: <table border="0"> <tr> <td>Date</td> <td></td> <td>Signature</td> </tr> <tr> <td>_____</td> <td>Site Curriculum and Instruction Leadership Team</td> <td>Signature/Title _____</td> </tr> <tr> <td>_____</td> <td>Secondary Department Articulation/Collaboration</td> <td>Signature/Title _____</td> </tr> </table> Secondary Principal Signatures: _____ Date: _____		Date		Signature	_____	Site Curriculum and Instruction Leadership Team	Signature/Title _____	_____	Secondary Department Articulation/Collaboration	Signature/Title _____
Date		Signature								
_____	Site Curriculum and Instruction Leadership Team	Signature/Title _____								
_____	Secondary Department Articulation/Collaboration	Signature/Title _____								

BACKGROUND INFORMATION

Brief Course Description:

Students walk into the classroom and are immersed into the mysterious death of Anna. They are asked to investigate, document, and analyze evidence to solve the case. The course provides an introduction to biomedical science through exciting hands-on projects and problems. Students investigate concepts of biology and medicine as they explore health conditions including heart disease, diabetes, sickle-cell disease, hypercholesterolemia, and infectious diseases. They determine the factors that led to the death of a fictional woman as they sequentially piece together evidence found in her medical history and autopsy report. Students investigate lifestyle choices and medical treatments that might have prolonged the woman's life and demonstrate how the development of disease is related to changes in human body systems.

Context for Course:

List the State/District Standards addressed in this course.

With an aging population and an advancing biotechnology, the healthcare industry has quickly become one of the fastest growing industries in today's world. As the demands for a wide of variety of health-related skills increases, so does the need for trained and able professionals. With this need, comes equity in access to and use of medical education. This is an absolute must as the ever-diversifying population rightfully insists on no less. The medical field is filled with careers that span the educational spectrum from high school graduate to doctorate. The core courses of life and physical sciences weave together to meld with the health sciences to produce an exciting pathway that students can use to both explore and accelerate their preparation for a career in the medical field. The courses of this pathway target all students with an interest in the health sciences and demonstrate that a career in such is a real possibility for those of all educational levels and skill sets. This inclusive pathway through real-life scenarios and practical problem-solving, will help students not only learn the important health-related information, but will also help to build their caring nature, their self-confidence and their resilience. List the State/District Standards addressed in this course. In addition to the CTE Anchor Standards, this course will address the standards identified by the Project Lead the Way Biomedical Science Course Pathway Program. Please see the Principles of Biomedical Sciences Standards by Lessons attached to the back of this document.

History of Course Development:

The development of the first course of the Bio-Medical Explorations (BIOME) has finally come to fruition. Course developers have worked with and reflected upon the input of community members, science educators, parents, industry leaders, school counselors, and school administrators to ensure that all students with an interest in health-related careers have an understanding of as well as access to this new pathway. Inspired by trailblazing scientists, empathetic caregivers, and the mantra of the medical world to prevent and treat illness, this course will demonstrate that there is a place for any student who has a related interest in the medical field. With major healthcare, pharmaceutical, and biotech companies nearby, students will be exposed to careers that would fit a wide range of skill sets and educational levels. The practicalities and needs of the real world made the development of this course an absolute necessity for future health professionals.

COURSE GOALS AND/OR MAJOR STUDENT OUTCOMES

- Ensure accessibility to health science for all students who show interest
- Provide students with the tools and support to learn hands-on medical techniques
- Empower students to view themselves as problem-solvers and solution finders
- Increase student comfort level in the expression of ideas and suggestions
- Impart the importance of collaboration among individuals for the good of the patient
- Prepare students for the basics of careers related to the health sciences so that they are knowledgeable and ready to function effectively and efficiently in a work environment

COURSE OBJECTIVES

Laboratory Skills:

- Aseptic technique
- Bacterial plating and identification
- Gram staining
- Micropipetting
- DNA gel electrophoresis

Clinical Skills:

- Blood pressure measurement and analysis
- EKG analysis
- Pedigree analysis
- Bloodwork analysis

Equipment and Software Proficiencies:

- Microsoft Office (Excel, Word, PowerPoint)
- Vernier probes and sensors
- Data Acquisition Software (Vernier Logger Pro)
- Microscope

Scientific Experimentation Skills:

- Design and conduct reliable scientific experiments
- Analyze and interpret laboratory data
- Construct graphs (by hand and using graphing software)
- Interpolate and extrapolate data from a graph
- Draw conclusions based on experimental data
- Thoroughly and clearly communicate results and conclusions both orally and in writing

Professional Skills:

- Group collaboration
- Planning and organizing
- Time management
- Problem-solving
- Technical writing
- Verbal and written communication
- Decision making
- Creative thinking

Course Knowledge:

- Over-arching Themes: biomedical science careers; bioethics; interrelationship between body systems and health/disease
- Forensic Investigation and Cause of Death: crime scene investigation; HIPAA legislation and implications
- Autopsy and Cause of Death: diabetes and biochemistry; pathology, treatment and complications of Type 1 and 2 diabetes; homeostasis and positive and negative feedback mechanisms; structure and function of macromolecules; calorimetry; nutrition
- Sickle Cell Anemia and Molecular Biology: structure of DNA; restrictions fragment length polymorphism (RFLP) analysis; hematocrit and anemia; pathology, treatment and complications of sickle cell disease; relationship between genes, chromosomes and DNA; protein synthesis; relationship between DNA, mutations, protein structure, and disease or dysfunction; mitosis and meiosis; genotype and phenotype; Punnett squares, pedigree constructions and pedigree analysis
- Heart Disease: cardiovascular system anatomy and physiology; pathology, treatment, and complications of heart disease; hypercholesterolemia, HDL, LDL and the impact of abnormal cholesterol levels on the body
- Infectious Disease: infectious disease transmission; bacterial isolation and identification; immune system anatomy and physiology

COURSE OUTLINE

Content Standards	Key Assignments
Unit 1: The Mystery	Investigating the scene DNA Analysis The Findings
Unit 2: Diabetes	What is Diabetes? The Science of Food Life with Diabetes
Unit 3: Sickle Cell Disease	The Disease It's in the Genes Chromosomes Inheritance
Unit 4: Heart Disease	Heart Structure The Heart at Work Heart Dysfunction Heart Intervention
Unit 5: Infectious Disease	Infection
Unit 6: Post Mortem	Analyze Ann

TEXTS AND SUPPLEMENTAL INSTRUCTIONAL MATERIALS

Title, Author, Publisher, Edition:

Previously Adopted? ☐ Yes ☐ No (If no, provide information directly below)

Cost per book

Total Cost

Budget Source

Other:

PLTW Biomedical Sciences computer-based learning

DIFFERENTIATED INSTRUCTIONAL METHODS AND/OR STRATEGIES

The main objective of this course is to provide universal accessibility to learning about and potentially pursuing a career in the health sciences. Some of the strategies used include:

Collaborative Learning: Structured and unstructured group work allows students to support each other in problem solving and sense-making. Team projects provide opportunities for students to assign roles and adjust expectations based on student need.

Project Based Learning: PLTW case lessons will be used to allow for a variety of different learning types.

Think-Pair-Share: This protocol is used frequently in class discussions to provide students with adequate processing time as well as an opportunity to discuss ideas in small groups before sharing ideas with the class

Technology Integration: Text based readings and assignments allow students to use text-to-speech, speech-to-text, text translation, large text, and high contrast accessibility features to access curriculum.

Online tutorials for skill building: Much of the course material is online which can facilitate the use of online tutorials and learning management systems, allowing students to work at their own pace and take advantage of additional supports as needed. Additional resources will be provided for accelerated learners who wish to develop skills outside the scope of this curriculum, such as research into current associated topics.

Project Rubrics can be modified to meet the needs of individual students.

ASSESSMENT METHODS AND/OR TOOLS

Throughout the course, students will have to compile and continually update an Anna Garcia file with any information they will learn about her and her case. This file will be used to record information learned during workshops and lectures as well as provide a space for students to reflect on their learning. Students will investigate the structure and function of key human body systems and relate all of the ways Anna's various illnesses effected each body system, potentially resulting in her premature death. Students will receive one final autopsy report and will need to put together all they know to determine Anna's cause of death. The content of and the effort put into this file will contribute to the student's overall grade.

Even though many academic principles will be taught (and are necessary to the success of the projects), the most important criteria for success in the course will be similar to those required for success in a career. The best way to assess these criteria is to conduct periodic performance reviews of each student using a standardized rubric and provide guidance on how to improve. Performance reviews will be conducted at each grading period and the result of those reviews will contribute to the student's overall grade.

Quizzes will be used to assess learning of key conceptual ideas. General rubrics will be used to assess team and individual projects. Peer Evaluation Assessments using standardized rubrics will be used to evaluate collaboration skills.

EoC (end of Course) Assessment. EoCs serve as an indicator of a student's overall achievement in the course. PLTW 's assessment and curriculum experts collaborate with PLTW pilot teachers and use industry best practices to develop and test EoC assessments. This course has a total of 62 assessments items in the comprehensive EoC. All assessment items have two to four choices.

ASSESSMENT CRITERIA

Collaboration- grade will reflect student's ability to be a productive member of diverse teams through strong interpersonal communication, a commitment to shared success, leadership, and initiative

Critical Thinking – grade will reflect student's ability to perform higher order thinking skills including evaluation, synthesis, and problem solving; also, ability to think analytically and creatively, via logical reasoning and information interpretation

Curricular Literacy- The State of California and the University of California have identified key knowledge that students should have upon graduation from high school. This grade reflects the student's knowledge and understanding of the concepts included in the standards.

Learning Mindset- Students build intelligence and skills through effort, practice, solicitation of feedback, revision, and challenge seeking. Students are given feedback and growth in their capacity to "learn how to learn" and monitor their own progress to be successful in tasks, school, and life.

Professionalism- Students show the ability to submit complete and timely work that meets the expectations of academic and professional settings. Additionally, students demonstrate the ability to meet the behavioral and social standards required by a professional environment.

Written Communication- grade will reflect student's ability to effectively communicate knowledge and thought through writing. This is demonstrated by organizing and structuring ideas, using discipline appropriate language, and utilizing proper English language conventions.

Oral Communication– grade will reflect student's e ability to communicate knowledge and thought through effective oral presentations.

HONORS COURSES ONLY

Indicate how this honors course is different from the standard course.