# Scope & Sequence

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| Course Name: Principles of Biosciences **TSDS PEIMS Code:** 13036300 | | | **Course Credit:** 1.0  **Course Requirements:** Recommended for students in Grades 9-10.  **Prerequisites:** None. |
| **Course Description:** Principles of Biosciences is a strong reinforcement of Biology content that provides an overview of biotechnology, bioengineering, and related fields. Topics include genetics, cell structure, proteins, nucleic acids, and the impact of immunological events in biotechnology. Students will further study the increasingly important agricultural, environmental, economic, and political roles of bioenergy and biological remediation; the roles of nanoscience and nanotechnology in biotechnology medical research; and future trends in biological science and biotechnology. | | | |
| **NOTE:** This is a suggested scope and sequence for the course content. This content will work with any textbook or instructional materials. If locally adapted, make sure all TEKS are covered. | | | |
| **Total Number of Periods**  **Total Number of Minutes**  **Total Number of Hours** | 175 Periods  7,875 Minutes  131.25 Hours | \*Schedule calculations based on 175/180 calendar days. For 0.5 credit courses, schedule is calculated out of 88/90 days. Scope and sequence allows additional time for guest speakers, student presentations, field trips, remediation, extended learning activities, etc. | |
| **Unit Number, Title, and Brief Description** | **# of Class Periods\***  (assumes 45-minute periods)  Total minutes per unit | **TEKS Covered**  **130.403. (c) Knowledge and skills** | |
| **Unit 1: Introduction to Biotechnology**  This Principles of Biosciences unit introduces students to a strong reinforcement of Biology content that provides an overview of biotechnology, bioengineering, and related fields. Students will identify various biotechnology industry sectors by researching through professional publications. The culmination activity for this unit will have students report on their general findings of career opportunities in the biotechnology industry. | 10 Periods  450 Minutes | (5) The student demonstrates knowledge of the business climate for biotechnology industry sectors in the current market. The student is expected to:  (A) identify professional publications;  (B) identify the various biotechnology industry sectors; and  (C) investigate and report on career opportunities in the biotechnology industry sectors. | |
| **Unit 2: Exploration of the STEM Biotechnology Career Opportunities**  In this unit, students will further their knowledge of the biotechnology careers by conversing with biotechnology professionals and other reliable sources of career information. Students will identify requirements for biotechnology-related occupations. The unit culminates with an activity in which students summarize the respective characteristics, skills and education necessary for success in these careers. | 15 Periods  675 Minutes | (2) The student explores biotechnology career opportunities. The student is expected to:  (A) determine interests and aptitudes through conversations with biotechnology professionals;  (B) identify career options in the field of biotechnology;  (C) identify reliable sources of career information;  (D) research interests, knowledge, educational level, abilities, and skills needed in a biotechnology-related occupation; | |
| **Unit 3: Regulations in Biotechnology**  In this unit, students will research regulations in biotechnology. Students will identify and define terms related to biotechnology while identifying local, state and federal agencies responsible for the regulating biotechnology industry. The culminating activity will have students describe the implications of not following regulations. | 15 Periods  675 Minutes | (4) The student examines federal, state, local, and industry regulations as applied to biotechnical processes through library research and Internet research. The student is expected to:  (A) identify local, state, and federal agencies responsible for regulating the biotechnology industry;  (B) identify professional organizations participating in the development of biotechnology policies;  (C) identify and define terms related to biotechnology regulations; and  (D) outline the methods and procedures used in biotechnology laboratories to follow and enforce local, state, and federal regulations such as those in the agricultural and health areas. | |
| **Unit 4: Research Applications in Biotechnology**  In this unit, students will research biotechnology topics and applications of biotechnology and biomaterials in areas such as medicine, the environment and pharmaceutical. The unit will culminate with a formal research paper elaborating upon findings. | 15 Periods  675 Minutes | (2) The student explores biotechnology career opportunities. The student is expected to:  (G) research applications of biotechnology and biomaterials such as the areas of medicine and the environment and pharmaceutical, agricultural, and industrial settings; and  (H) use technology to research biotechnology topics, identify pertinent scientific articles, obtain articles of interest, and write a formal research paper in the format used by academic and professional journals and magazines. | |
| **Unit 5: Biotechnology Effects on Waste Management**  In this unit, students will investigate the impacts of waste on the environment. Students will analyze the results of manufacturing refuse and explain the negative impacts of waste as it effects the world. | 15 Periods  675 Minutes | (7) The student investigates the origins of waste and examines the relationship of biotechnology to resource recovery. The student is expected to:  (A) investigate at least three end products from biotechnology manufacturing processes;  (B) investigate the effects of waste on environmental and biological life cycles;  (C) investigate the impacts of waste on the environment;  (D) analyze the results of manufacturing refuse;  (E) explain the negative impacts of waste with respect to the individual, society, and the global population; | |
| **Unit 6: Biological Waste Solutions**  In this unit, students research solutions to biological waste based upon commercial applications. Students will investigate biotechnology as it relates to health and evidence the outcomes as it relates to the environment. | 15 Periods  675 Minutes | (7) The student investigates the origins of waste and examines the relationship of biotechnology to resource recovery. The student is expected to:  (F) research solutions to biological waste with respect to commercial applications through investigation of various pollution waste treatments using natural organisms;  (G) investigate biotechnology as it relates to health and well-being; and  (H) cite evidence regarding regulations, patents and public policy, design development and testing, and safety. | |
| **Unit 7: Genetic Engineering**  In this unit, students will be introduced to genetic engineering and the applications of nanotechnology in biotechnology. Students will elaborate upon findings at the conclusion of the unit. | 15 Periods  675 Minutes | (8) The student examines the relationship of biotechnology to the development of commercial products. The student is expected to:  (A) identify the ability to change or enhance genetic characteristics;  (B) identify applications of genetic engineering;  (C) identify applications of nanotechnology in biotechnology; | |
| **Unit 8: Bioinformatics and Biotechnology**  In this unit, students will identify bioinformatics and applications in medicine, forensics, and law enforcement. The culminating activity will have students report on ethical considerations, laws and regulations governing genetic engineering and nanotechnology. | 15 Periods  675 Minutes | (8) The student examines the relationship of biotechnology to the development of commercial products. The student is expected to:  (D) identify applications of bioinformatics in biotechnology;  (E) identify the applications of biotechnology in fields such as medicine, forensics, and law enforcement; and  (F) research ethical considerations, laws, and regulations governing genetic engineering and nanotechnology. | |
| **Unit 9: Is this Field the Right Fit for You?**  In this unit, students will seek a mentor to review career opportunities and determine if they align with personal interests and aptitudes. Students will elaborate upon findings at the end of this unit. | 15 Periods  675 Minutes | (2) The student explores biotechnology career opportunities. The student is expected to:  (E) seek a mentor in the biotechnology area;  (F) identify conventional and non-conventional career opportunities that match interests and aptitudes; | |
| **Unit 10: Communication Skills in the STEM Field**  Students willnowapply technical skills and knowledge of Science, Technology, Engineering, and Mathematics to analyze, evaluate, and communicate problems and solutions in this unit. Students will develop and demonstrate communication skills to relay this information to others both verbally and written. | 15 Periods  675 Minutes | (6) The student researches and exhibits employability skills that support a career in the biotechnology industry. The student is expected to:  (A) demonstrate verbal, nonverbal, written, and electronic communication skills;  (B) demonstrate skills used to secure and maintain employment;  (C) demonstrate appropriate workplace etiquette; and  (D) display productive work habits and attitudes. | |
| **Unit 11: Employability Skills**  This unit offers students basic technical skills necessary to fulfill careers in the workforce.  Through group activities, students will demonstrate interpersonal skills, such as: communication, professionalism, decision-making, leadership, and conflict resolution. The unit culminates with a peer review evaluation and reflection upon skills needed for success in the workforce. | 15 Periods  675 Minutes | (1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:  (A) demonstrate knowledge of how to dress, speak, and conduct oneself in a manner appropriate for the profession;  (B) show the ability to cooperate, contribute, and collaborate as a member of a group in an effort to achieve a positive collective outcome;  (C) present written and oral communication in a clear, concise, and effective manner;  (D) demonstrate time-management skills in prioritizing tasks, following schedules, and performing goal-relevant activities in a way that produces efficient results; and  (E) demonstrate punctuality, dependability, reliability, and responsibility in performing assigned tasks as directed. | |
| **Unit 12: Extended Learning Experience**  In this unit, students are encouraged to expand their learning experiences through avenues such as STEM organizations and other leadership or extracurricular organizations. By connecting with these networks, students will be able to research and document trends, issues and job forecasts, as well as predict possible changes caused by the advances of technology. | 15 Periods  675 Minutes | (3) The student evaluates ethical and legal issues in biotechnology. The student is expected to:  (A) identify current ethical and legal issues;  (B) describe the history of biotechnology and related current issues;  (C) discuss legal and technology issues for at least two biotechnology related areas; and  (D) compare and contrast examples of objective and subjective scientific, economic, and political data and positions used to defend biotechnology views. | |