CAREER & TECHNICAL EDUCATION

HIGH SCHOOL APPLICATIONS OF BIOTECHNOLOGY

ACADEMIC & PROFESSIONAL SKILLS STANDARDS

CATALINA FOOTHILLS SCHOOL DISTRICT
Approved by the Governing Board
June 23, 2020

CATALINA FOOTHILLS SCHOOL DISTRICT
HIGH SCHOOL APPLICATIONS OF BIOTECHNOLOGY OVERVIEW

High School Applications of Biotechnology is a dual enrollment laboratory course that emphasizes the role that biotechnology plays in research and industry. Students will apply previously developed knowledge and skills in biotechnology to an industry-based laboratory setting. The course includes topics such as recombinant DNA technology, bacterial transformations, protein identification and isolation, the human genome project, genetic ethics, and laboratory techniques in an industry-based biotechnology lab. Students will also get hands-on experiences working through experimental design and critical analysis using physics-based concepts such as motion and stability, wave phenomena, energy and matter interactions, and electricity and magnetism. Students are expected to apply these concepts to real-world phenomena to gain a deeper understanding of causes, effects, and solutions for physical processes in the real world. Students will create an individual research project that will tie together the skills from the classroom with an investigation of their choosing, and will be given the opportunity to share their projects in a scientific environment. There is an emphasis on collaborative learning and industry-based laboratory skills. Optional summer internship opportunities are available for students who wish to continue performing scientific research. Students who are interested in earning college credit for UA MCB 101 must register and pay reduced tuition to the University of Arizona. Scholarships are available from Pima JTED. See course instructor for more information.

Applications of Biotechnology is a third-year science course and students will have been taught the full set of "essential" standards upon completion of the course. The "essential" standards are those that every high school student is expected to know and understand (see "coding of the standards" below). Two topics from the standards in the Earth and Space Sciences, have been integrated into the course. This is to ensure that students have been taught the full set of "essential" science standards by their third year of high school (see "coding of the standards" below). Because students have some flexibility in the pathway they select to meet the graduation requirements for science, specific "essential" standards were integrated into some of the high school science courses to meet this Arizona State Board of Education requirement.

The standards for high school Applications of Biotechnology are categorized according to the topics listed below. The list does not imply the instructional sequence or how the standards will be organized for instruction. Educators will make decisions about instructional sequence and how standards will be grouped by units for classroom instruction and assessment to best meet student needs.

High School Applications of Biotechnology Topics:

- Biotechnology
    - Industry Safety Standards
    - Bioscience Research and Ethical Conduct
    - Investigative and Laboratory Skills
    - Protein Techniques: Isolation and Analysis
    - Agricultural Biology
    - Bacteria/Microbiology
    - Nucleic Acid Techniques and Bioinformatics
    - Research Project
- Physical Science: Physics
    - Motion & Stability – Forces & Interactions, Energy & Waves
- Earth and Space Sciences
    - Weather and Climate, Earth and the Solar System, The Universe and its Stars
- Arizona Professional Skills

Note: While some of the core content of the course aligns with the "essential" Physics standards, the application of the content through labs and related activities is focused on the biotechnology domain.

BIOSCIENCE

STANDARDS FOR APPLICATIONS OF BIOTECHNOLOGY

INDUSTRY SAFETY PROCEDURES

- Adhere to health practices and industry safety standards in the classroom and laboratory setting for personal health and safety and the health and safety of others *(i.e., SOPs for biological, biohazardous, and chemical materials, appropriate personal protective equipment [PPE] for the situation, emergency equipment).*
- Safely operate and perform care and routine maintenance of equipment *(e.g., maintain equipment log, report unsafe and nonfunctioning equipment, storage of chemicals, reagents and compounds, and maintenance of equipment).*
    - manufacturing practices pertaining to quality control (QC)
    - control inventory process for materials and supplies
- Apply compliancy procedures for state, local, and industry regulations *(e.g., OSHA [occupational safety and health administration] SDS [safety data sheets], EPA [Environmental Protection Act], FDA [Federal Drug Administration], NIH [National Institute for Health], AZDEQ [Arizona Department of Educational Quality], safety data sheets [SDSs])* for chemicals.
    - Comply with safety signs and symbols and utilize appropriate lab attire and protective equipment *(e.g., safety glasses, gloves).*
    - Interpret safety data sheets (SDS) and apply practices for the safe use of hazardous chemicals according to standards from the Occupational Safety and Health Administration, Environmental Protection Agency, Federal Drug Administration, National Institute for Heath, and the Arizona Department of Educational Quality.
    - Identify appropriate emergency contacts and perform drills for emergency protocols *(e.g., fire procedure, evacuation protocol, hazardous chemical contact).*
    - Explain appropriate handling of biological and biohazardous materials and distinguish between the biosafety levels (BSL-1 to BSL-4).
    - Perform and document tests for quality control *(i.e., accuracy of balances, concentration of chlorine in bleach, pH, spectrophotometry).*

BIOSCIENCE RESEARCH AND ETHICAL CONDUCT (CTE Correlation: 2.2, 4.1-4.4, 5.0-5.6, 7.2, 7.3)

- Summarize findings from scientific and technical literature *(e.g., patents, peer-reviewed articles, white papers, and technical bulletins*).
    - evaluate the scientific merit and commercial viability of prior work and its relevance to experimental design
- Critically analyze the interaction between biotechnology research and society *(e.g., genetically modified foods, cloning, bioterrorism, gene therapy, stem cells, and animal research).*
    - compare and contrast attitudes about the use of biotechnology regionally, nationally, and internationally
    - differentiate between moral, ethical, and legal biotechnology issues
- Describe codes of ethics and protocols used by various organizations that apply to confidentiality and security.
- Adhere to standards for harassment, labor, and employment laws as well as other legal and regulatory codes *(e.g., EPA, FDA, OSHA, NIH, AZDEQ).*
    - Identify and access scientific and technical literature, including patents, peer-reviewed articles, white papers, and technical bulletins.
    - Concisely summarize findings from scientific papers using relevant terminology while taking care to prevent plagiarism.

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- Determine the features of experimental design in prior scientific research that led the research to be successful.
- Explain the implications of bioethical issues for society *(e.g., GMOs and HeLa privacy issue).*
- Describe local, state, and federal standards of practice for treatment, care, and maintenance of living organisms.
- Describe practices (including negligence) that could result in liability and how these situations can be avoided *(i.e., risk management and incident reporting).*

INVESTIGATIVE AND LABORATORY SKILLS

- Apply industry-recognized scientific methods to develop knowledge and understanding of scientific ideas and how scientists study the natural world.
    - ask or respond to scientifically-oriented questions
    - develop a testable question or hypothesis based on evidence of scientific principles, probability and/or modeling appropriate to the scientific domain being investigated
    - identify independent and dependent variables and controls
    - select appropriate tools to collect, record, analyze, and evaluate data
    - analyze data using statistics and graphs *(e.g., Excel and other software)*
    - formulate explanations based on evidence and connect explanations to prior scientific knowledge
    - communicate results and justify explanations
- Apply standard operating procedures (SOPs) in the laboratory.
- Operate lab equipment properly and safely *(i.e., centrifuges, gel electrophoresis apparatus, autoclave, glassware, balances, micropipettes, spectrophotometer, fume hoods, incubators, hot plates, water baths, pH meter, etc.*).
    - Develop and test a research question (scientific process).
    - Design experiments using best practices *(i.e., control groups, constants, multiple trials, adequate sample size, detailed procedure*).
    - Make observations and collect data using industry-recognized methods *(i.e., contemporaneous notebook).*
    - Demonstrate reproducibility from an SOPs (Standard Operating Procedures).
    - Operate lab equipment properly and safely.
    - Analyze data (graphs and statistical analyses) using spreadsheet software *(e.g., Excel).*
    - Explain the implications of the research and how it connects with prior scientific knowledge.
    - Communicate results of experiments with others using representations that include graphs, pictures, and written descriptions.

PROTEIN TECHNIQUES: ISOLATION AND ANALYSIS

- Evaluate the role of proteins within a biological system.
- Isolate and purify proteins for identification and function.
- Use SDS Gel electrophoresis to identify proteins in purified fractions.
- Create laboratory enhanced proteins using recombinant DNA methods and cultures.
- Perform a Western Blot analysis to learn immunoassays.
- Use multiple techniques to isolate protein from cell cultures including salting out and dialysis.
    - Use a centrifuge to physically separate a substance.
    - Compare and contrast methods to detect specific proteins *(e.g., Western Blot and ELISA*).
    - Extract and precipitate proteins from cells.
    - Perform protein assays and use standard curves to determine protein of interest.

- Perform column chromatography using a variety of different column materials.
- Separate and characterize proteins using chromatography and SDS-PAGE.

AGRICULTURAL BIOLOGY

- Propagate plants used as models.
- Use hydroponics to grow plants and understand their role in food generation.
- Debate the implication of bioethical issues such as genetically modified organisms (GMOs).
- Clone cells of plants using tissue culture.
- Describe proper use and limitations of living organisms for biotechnology and determine if alternatives are available.
    - Use plants as a model system for growing plants *(e.g., Arabidopsis or Wisconsin Fast Plants*).
    - Describe techniques used to propagate plants *(e.g., plant cutting and grafting).*
    - Grow plants using alternative methods to traditional soil systems.
    - Evaluate the ethical issues related to genetically modified organisms (GMOs).
    - Use a sterile technique to clone an organism.
    - Describe the benefits and risks of using of living organisms in scientific research.

BACTERIA/MICROBIOLOGY

- Demonstrate microbiology skills such as culturing bacteria and preparing microscopic specimens.
- Explain the differences in types of cultures *(i.e., bacterial, mammalian, tissue vs. cell).*
- Transform and maintain hosts *(e.g., E. coli).*
- Determine what types of living organisms are used in biotechnology research (model organisms, cell lines) and conduct experiments with selected organisms.
- Illustrate different types of microorganisms based on morphology, color, and edge margins.
    - Prepare microscopic specimens and observe using a microscope *(i.e., dissecting, compound, digital*).
    - Maintain lab equipment and practice appropriate hygiene (aseptic technique) in the lab environment.
    - Identify, prepare, sterilize, dispense, and store media.
    - Identify, propagate, and quantify microorganisms and cells.
    - Identify techniques for short and long-term cultures *(e.g., stabs, slants, liquid nitrogen, glycerol stocks).*
    - Isolate, maintain, and store pure cultures.
    - Perform transformation of bacteria.
    - Compare and contrast mammalian cell culture, bacterial cell culture, and culture of tissues.
    - Determine the best cell lines and/or model organism for experiments and the proper use and limitation of living organisms.

NUCLEIC ACID TECHNIQUES AND BIOINFORMATICS

- Access bioinformatics databases and tools to analyze DNA and proteins (e.g., NCBI, BLAST, FlyBase, geno.org, DNA subway, MEGA, RCSB PDB).
- Perform basic molecular biology techniques (i.e., nucleic acid isolation, transformation, optimized protein production, polymerase chain reaction (PCR), vertical and horizontal gel electrophoresis).
- Explain gene regulation (e.g., lac operon or trp operon, introns and exons, alternative splicing).
- Design PCR primers for use with recombinant DNA strategies.

- Interpret gene and genome maps (FlyBase, NCBI, geno.org) and predict the origin and function of unknown sequences (NCBI).
- Determine relationships among multiple sequences (DNA subway, MEGA).
- Explain the types of BLAST searches, compare homologous sequences using BLAST, and interpret E-values and scores.
- Utilize protein data bank (RCSB PDB) for protein structure analysis *(e.g., structure data for Cn3D, RCSB).*
- Identify sources of genetic variation (e.g., SNP, inversion, translocation, copy number variant).
- Isolate nucleic acids and explain the structure of DNA.
- Perform PCR in the lab using a thermocycler *(i.e., design primers, optimize and perform protocols*).
- Compare and contrast PCR to the cellular process of DNA replication.
- Perform and explain the process of vertical and horizontal gel electrophoresis.
- Prepare a standard curve based on a DNA or protein ladder to estimate DNA length or protein size.
- Identify and troubleshoot common gel electrophoresis errors from a gel image.
- Describe DNA sequencing methods, including basic and next-generation, and compare and contrast the advantages and disadvantages of each method.
- Explain gene regulation in prokaryotes and eukaryotes.

RESEARCH PROJECT (CTE Correlation: 3.2, 3.3, 3.4, 3.5, 3.6, 4.1-4.4,14.1-14.4)

- Design and carry out a research project related to biotechnology.
- Synthesize scientific literature to produce a literature review.
    - Evaluate the scientific merit and viability of prior work and its relevance to science.
- Present the research project with other scientists at a conference or other appropriate science venue *(e.g., SARSEF, school science fair).*
    - Identify a research project.
    - Find and analyze scientific literature.
    - Produce a credible literature review that is appropriately cited.
    - Develop a research question to formulate testable conditions.
    - Design experiments using best practices *(e.g., control groups, constants, multiple trials, adequate sample size, detailed procedure).*
    - Collect data and make observations using industry recognized methods.
    - Analyze the data and explain the implications of the research and how it connects with prior scientific knowledge.
    - Maintain a scientific notebook of research that shows how legal and ethical guidelines are utilized.
    - Create a plan to share the research in a formal setting.
    - Present my research at a scientific conference or venue.

PHYSICAL SCIENCE: MOTION & STABILITY – FORCES & INTERACTIONS

- Essential HS.P1U1.1 Develop and use models to explain the relationship of the structure of atoms to patterns and Essential HS.P2U1.5 Construct an explanation for a field's strength and influence on an object (electric, gravitational, magnetic).
    - Construct an explanation based on evidence to explain observations of electric, gravitational, and magnetic field phenomena:
        - Explain the structure of fields and how they allow forces to act at a distance.
        - Quantitatively determine the strength of various fields (gravitational, electric, or magnetic) based on the relationships between variables *(i.e., distance, mass, charge, etc.).*

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    - Apply scientific knowledge to predict how objects *(e.g., orbiting bodies, electrons, and magnets)* are influenced by an external field.
    - Revise explanations based on evidence obtained from a variety of sources and peer review.

- Essential HS.P3U1.6 Collect, analyze, and interpret data regarding the change in motion of an object or system in one dimension, to construct an explanation using Newton's Laws.
  - Collect data *(e.g., from investigations, demonstrations, scientific texts, data sets, simulations, etc.)* regarding the change in motion of an object or system in one dimension:
    - Ask questions to frame data collection, analysis, and interpretation.
    - Decide on types, how much, and accuracy of data needed to construct an explanation using Newton's Laws.
    - Select appropriate tools to collect and record data.
  - Use tools, technologies, and models to analyze and interpret data measuring changes to an object's motion in relation to mass and forces:
    - Identify and describe patterns in data.
    - Compare and contrast various types of data sets to *(e.g., self-generated, archival*) to examine observations about the change in motion of an object or system in one dimension.
    - Interpret data, applying concepts of statistics and probability, to describe how forces can change the motion of objects, as predicted by Newton's Laws of Motion.
  - Construct an explanation using Newton's Laws:
    - Construct or adapt an explanation of changes to an object's motion using momentum and the Law of Conservation of Momentum.
    - Use data to make claims regarding the motion of objects in terms of kinematic variables such as position, velocity, and acceleration.

- Essential HS.P3U2.7 Construct an explanation to demonstrate how Newton's laws are used in engineering and technologies to create products to serve human ends.
  - Construct explanations based on evidence *(e.g., scientific principles, models, theories, simulations)* to describe how Newton's laws are used in engineering and technologies to create products and solutions that meet human needs:
    - Apply scientific knowledge and evidence to explain how Newton's laws have provided engineers with physical, mathematical, and computer models to use in the construction of products.
    - Evaluate designs and models based on their environmental and societal impacts.
    - Revise explanations based on evidence obtained from a variety of sources and peer review.

PHYSICAL SCIENCE: ENERGY & WAVES

- Essential HS.P4U1.8 Engage in argument from evidence that the net change of energy in a system is always equal to the total energy exchanged between the system and the surroundings.
  - Construct, use, and present oral and written arguments regarding the law of conservation of energy:
    - Make and defend a claim about the law of conservation of energy.
    - Use quantitative and qualitative scientific evidence to develop and support the claim.
    - Describe the transfer of energy between different parts of a system, including its surroundings.

- Essential HS.P4U3.9 Engage in argument from evidence regarding the ethical, social, economic, and/or political benefits and liabilities of energy usage and transfer.
  - Evaluate arguments regarding the ethical, social, economic, and/or political benefits and liabilities of energy usage and transfer:
    - Evaluate the claims, evidence, and reasoning of oral and/or written arguments to determine merits of

arguments and elicit elaboration from peers.
    - Evaluate ethical, social, economic, and/or political perspectives of energy use and transfer.
    - Critique and evaluate competing arguments about the benefits and liabilities of energy usage and transfer.
    - Evaluate the evidence and reasoning behind currently accepted methods of energy usage and transfer.
- Construct, use, and present oral and written arguments regarding the ethical, social, economic, and/or political benefits and liabilities of energy usage and transfer:
    - Make and defend a claim about the benefits and liabilities of energy usage and transfer.
    - Develop and support a claim with analysis of the positive and negative economic, social, and/or political implications of the demand for energy usage.
    - Construct a counter-argument that is based on data and evidence that challenges another proposed argument.
    - Use scientific evidence to develop and support the claim.
    - Describe the transfer of energy between different parts of a system, including its surroundings.

Essential HS.P4U1.10 Construct an explanation about the relationships among the frequency, wavelength, and speed of waves traveling in various media, and their applications to modern technology.

- Construct explanations based on evidence obtained from a variety of sources *(e.g., scientific principles, models, theories, simulations*):
    - Apply scientific reasoning, theory, and models to compare the processes by which waves *(i.e., light, sound, vibration, etc.)* propagate through various media.
    - Draw connections between observed properties and associated quantities of a wave. *(e.g., how color is associated by the wavelength of a light wave or pitch is associated with the frequency of a sound wave).*
    - Explain how changes in a wave's medium and/or speed will affect its properties or direction *(e.g., refraction, reflection, the Doppler effect, redshifts, talking through helium or sulfur hexafluoride).*
    - Apply scientific knowledge and evidence to explain how waves are used in applications of modern technology to meet human needs.
    - Revise explanations based on evidence obtained from a variety of sources and peer review.

EARTH AND SPACE SCIENCE: WEATHER AND CLIMATE

- Essential HS.E1U1.11 Develop and use models to explain how energy from the Sun affects weather patterns and climate.
    - Develop a model to explain how energy from the Sun affects weather patterns and climate:
        - Use design criteria to create representations of weather patterns and climate based on energy from the Sun.
        - Evaluate the merits and limitations of model types in order to select or revise a model that best fits the evidence or design criteria.
        - Design a test of a model to ascertain its reliability.
    - Revise models based on results of tests and design criteria to more appropriately represent weather patterns and climate based on energy from the Sun.

EARTH AND SPACE SCIENCE: EARTH AND THE SOLAR SYSTEM

- Essential HS.E2U1.16 Construct an explanation of how gravitational forces impact the evolution of planetary motion, structure, surfaces, atmospheres, moons, and rings.
    - Construct explanations based on evidence obtained from a variety of sources *(e.g., scientific principles, models, theories, simulations*):
        - Apply scientific reasoning to explain how Kepler's Laws show the formation and evolution of planetary motion.

- Apply scientific reasoning to explain how Newton's Law of Universal Gravity predicts the formation of planetary structure, moons, and rings.
- Apply scientific reasoning to explain how Newton's Law of Universal Gravity predicts the evolution of planetary surfaces and atmospheres.
- Revise explanations based on evidence obtained from a variety of sources and peer review.

EARTH AND SPACE SCIENCE: EARTH AND THE SOLAR SYSTEM

- Essential HS.E2U1.17 Construct an explanation of the origin, expansion, and scale of the universe based on astronomical evidence.
  - Construct explanations based on astronomical evidence obtained from a variety of sources *(e.g., scientific principles, models, theories, simulations*):
    - Apply scientific reasoning to explain the origin and expansion of the universe.
    - Apply scientific reasoning to explain distances between planets, stars, moons, and other bodies in the universe (*e.g., next nearest star, furthest planet of Neptune*) using different scales (*e.g., lightyears*).
    - Use valid and reliable empirical evidence to quantify and estimate the scale and size of the universe.
    - Assess the extent to which the reasoning and evidence about the origin and expansion of the universe support the explanations.

PROFESSIONAL SKILLS: PROFESSIONALISM & ORGANIZATIONAL CULTURE

- Demonstrate professionalism in the workplace (being on time, proper dress, courteousness).
- Represent the school [organization] in a positive manner, demonstrating the school's [or organization's] mission and core values.
- Demonstrate respect for personal and professional boundaries (distinguish between personal and work-related matters).
- Interact respectfully with others; act with integrity.
- Produce high quality work that reflects professional pride and contributes to organizational success.
- Take initiative to develop skills and improve work performance.
  - Communicate the mission and core values of the school [or organization].
  - Follow protocol(s) related to behavior, appearance, and other expectations.
  - Perform my work with a positive attitude.
  - Explain the importance of "dress for success."
  - Demonstrate proper etiquette for introductions with clients.
  - Create work products in a timely manner that are high quality and positively represent the organization.
  - Identify and apply strategies to improve my performance.

PROFESSIONAL SKILLS: COMPLEX COMMUNICATION (TRADITIONAL AND DIGITAL)

- Communicate effectively in a diverse work environment *(i.e., style, format, and medium appropriate to audience/culture/generation, purpose and context; accuracy; use of appropriate technical/industry language; to resolve conflicts; address intergenerational differences/challenges; persuade others).*
- Use documentation *(e.g., itineraries and schedules)* to plan and meet client needs.
- Use appropriate technologies and social media to enhance or clarify communication.

- Use a variety of interpersonal skills, including tone of voice and appropriate physical gestures (for example: eye contact, facing the speaker, active listening) during conversations and discussions to build positive rapport with others.
- Pose and respond to questions, building upon others' ideas in order to enhance the discussion; clarify, verify, or challenge ideas and conclusions with diplomacy.
    - Use appropriate verbal and nonverbal modes of communication.
    - Proof and edit all communications based on [organizational] standards.
    - Verify the accuracy of information and authority of sources.
    - Respond in a timely manner to communications.
    - Address communications in a style that is appropriate to the audience and situation.
    - Use professional etiquette and follow applicable laws and regulations for web-, email-, and social media-based communications.
    - Demonstrate appropriate active listening skills.
    - Ask questions to obtain accurate information.

PROFESSIONAL SKILLS: INITIATIVE AND SELF-DIRECTION

- Apply the skills and mindset of self-direction/self-regulation to accomplish a project.
- Adapt to organizational changes and expectations while maintaining productive and cooperative relationships with colleagues.
- Select and use appropriate technologies to increase productivity.
- Employ leadership skills that build respectful relationships and advance the organization *(e.g., recognize and engage individual strengths, plan for unanticipated changes, pursue solutions/improvements).*
    - Establish priorities and set challenging, achievable goals.
    - Create a plan with specific timelines for completion to achieve the goals.
    - Take initiative to select strategies, resources and/or learning opportunities to accomplish the task(s) in the plan.
    - Identify the success criteria/metrics to determine the effectiveness of the outcome for each goal.
    - Monitor my progress/productivity and self-correct during the learning process.
    - Persist when faced with obstacles or challenges.
    - Reflect upon my learning (strengths and weaknesses) and use feedback to modify work or improve performance.
    - Use appropriate technology tools and resources to create and deliver a product.

PROFESSIONAL SKILLS: CRITICAL THINKING AND INNOVATION

- Identify problems and use strategies and resources to innovate and/or devise plausible solutions.
- Take action or make decisions supported by evidence and reasoning.
- Transfer knowledge/skills from one situation/context to another.
    - Use relevant criteria to eliminate ineffective solutions or approaches and select those that are plausible; put selected alternatives through trials to determine their helpfulness or benefit.
    - Evaluate sources of evidence, the accuracy and relevance of information, and the strengths of arguments.
    - Demonstrate ethical reasoning and judgment by clearly sharing multiple perspectives on why the proposed course of action is ethically the best decision.
    - Identify factors that affect one's objectivity or rationality *(e.g., prejudices, disposition, etc.).*
    - Apply my knowledge and skills in new contexts.

PROFESSIONAL SKILLS: COLLABORATION

- Take responsibility for any role on a team and accurately describe and perform the duties of each role, including leadership.
- Integrate diverse ideas, opinions, and perspectives of the team and negotiate to reach workable solutions.
- Prioritize and monitor individual and team progress toward goals, making sufficient corrections and adjustments when needed.
- Submit high-quality products that meet the specifications for the assigned task.
- Utilize technologies that promote collaboration and productivity, as appropriate.
    - Assess project needs and work with a team in a positive manner to create a final project.
    - Contribute personal strengths to a project.
    - Respect contributions of others.
    - Build team relationships.
    - Proactively solicit feedback; accept and show appreciation for constructive feedback.
    - Act upon feedback to achieve team goals.
    - Critique and reflect on individual and collaborative strengths and weaknesses.
    - Develop a plan for improving individual participation and group productivity.

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