Mt. Everest Academy

SUBSIDIARY COURSE AGREEMENT AND SYLLABUS

Course: 8th Grade Science **Course Number:**
Subject Teacher: Mrs. Jennifer Ogo **Email: jogo@sandi.net**

DESCRIPTION OF SEMESTER COURSE

This **NGSS-aligned course** introduces students to the practices of science while exploring how inheritance, biological systems, engineering principles, chemistry, and emerging technologies influence individuals and society. Students develop foundational scientific skills through laboratory investigations, hands-on activities, engineering challenges, design projects, and evidence-based argumentation.

The course begins by building essential scientific practices including **lab safety, measurement using the metric system, experimental design, data collection, analysis, and scientific argumentation** through the use of claims, evidence, and reasoning.

Students investigate the **science of inheritance** through the study of **genetics**, exploring how traits are passed from one generation to the next and how variation contributes to diversity within populations. Students examine the structure and function of **DNA, chromosomes, and genes**, developing models to explain how genetic information is stored, transmitted, and expressed within organisms.

Building on this foundation, students investigate **mutations**, analyzing how changes in genetic material may result in beneficial, harmful, or neutral effects. Students examine the role of biotechnology through investigations of **genetically modified organisms (GMOs)** and explore ethical, scientific, and societal implications of bioengineering and modern genetic technologies.

The course continues with investigations of the **nervous system**, focusing on the structure and function of the **brain**, neural communication, and the relationship between the nervous system, **stress**, and homeostasis. Students examine how organisms respond to internal and external stimuli and investigate the biological effects of stress on body systems.

Students then explore public health concepts through investigations of **toxins and epidemiology**, examining disease transmission, environmental exposures, toxic substances, and the methods scientists use to study patterns of health and disease within populations.

Physical science and engineering concepts are introduced through the study of **simple machines and energy**, examining forces, work, energy transfer, and mechanical advantage. Students apply engineering design principles through the construction and analysis of **Rube Goldberg devices**, using chain reactions and energy transformations to solve design challenges.

The course concludes with investigations in **applied chemistry and nanotechnology**, exploring chemical interactions, material properties, and the development of emerging technologies at the nanoscale. Students examine how chemistry and nanotechnology contribute to medicine, engineering, environmental science, and future innovations.

Throughout the course, students engage in the **NGSS Science and Engineering Practices**, including asking questions, developing models, planning investigations, analyzing data, constructing explanations, engaging in argument from evidence, designing solutions, and communicating scientific information.

OBJECTIVES AND METHODS OF STUDY

Course Objectives

Upon completion of this course, students will be able to:

1. Demonstrate safe laboratory practices and proper use of scientific tools, equipment, and materials while following established laboratory procedures and safety protocols.
2. Apply the **metric system** to measure length, mass, volume, temperature, time, and quantitative data while collecting, recording, and analyzing scientific information.
3. Use scientific inquiry and experimentation to ask questions, develop hypotheses, design investigations, collect and analyze data, and communicate evidence-based conclusions.
4. Construct and defend scientific explanations using **argumentation practices**, including claims, evidence, and reasoning (CER).
5. Explain the **science of inheritance** and describe how traits are passed from one generation to the next.
6. Describe the structure and function of **DNA, chromosomes, and genes** and explain how genetic information is stored, transmitted, and expressed.
7. Apply principles of **genetics** to predict inheritance patterns and explain variation among organisms.
8. Investigate **mutations** and explain how structural changes in genetic material may result in beneficial, harmful, or neutral effects.
9. Analyze the scientific, ethical, and societal implications of **genetically modified organisms (GMOs)** and biotechnology applications.
10. Describe the structure and function of the **nervous system**, including the organization and role of the brain in receiving, processing, and responding to information.

11. Explain the relationship between the nervous system, **stress**, and homeostasis, and analyze the effects of stress on biological systems.
12. Investigate **toxins and epidemiology**, including environmental exposures, disease transmission, public health investigations, and methods used to study population health.
13. Explain the relationship between **forces, work, energy, and simple machines**, and analyze how simple machines improve efficiency and mechanical advantage.
14. Apply engineering design principles to design, build, test, and evaluate **Rube Goldberg devices** demonstrating energy transfer and chain reactions.
15. Investigate principles of **applied chemistry**, including chemical interactions, reactions, and properties of matter.
16. Explain the structure, applications, and emerging uses of **nanotechnology** in medicine, engineering, environmental science, and technology.
17. Apply **NGSS Science and Engineering Practices** by developing models, designing investigations, analyzing data, constructing explanations, engaging in evidence-based argumentation, and communicating scientific information.
18. Make connections between scientific concepts and real-world applications through STEM exploration and career pathways aligned with the school's **CLIMB initiative (Career Exploration, Leadership, Internships, Mentorship, and Building Pathways)**.
19. Demonstrate collaboration, problem-solving, and critical thinking skills through laboratory investigations, engineering challenges, projects, and presentations.
20. Evaluate the impact of science and technology on society, health, ethics, and future innovations.

Instruction in this course will utilize a variety of NGSS-aligned teaching strategies designed to support scientific inquiry, collaboration, and real-world application of concepts. Instructional methods may include:

1. **Direct Instruction and Guided Learning**
   Teacher-led instruction, demonstrations, mini-lessons, guided practice, and facilitated discussions to introduce scientific concepts and skills.
2. **Laboratory Investigations and Hands-on Activities**
   Students will participate in laboratory experiences, experiments, dissections or models (when appropriate), simulations, and investigations to explore scientific phenomena and apply concepts.
3. **Scientific Inquiry and Experimental Design**
   Students will engage in questioning, hypothesis development, experimental design, data collection, analysis, and interpretation using NGSS Science and Engineering Practices.
4. **Phenomena-Based and Problem-Based Learning**
   Instruction will utilize real-world phenomena and driving questions to support investigation, critical thinking, and application of scientific concepts.
5. **Modeling and Engineering Design Activities**
   Students will develop and use models, prototypes, and engineering solutions to explain systems and solve problems.

6. **Argumentation and Evidence-Based Reasoning**
   Students will engage in scientific discourse using **Claim, Evidence, and Reasoning (CER)** frameworks, debates, and evidence-based explanations.
7. **Collaborative Learning Activities**
   Instruction will include partner work, cooperative groups, peer discussions, and collaborative investigations.
8. **Interactive and Digital Learning Platforms**
   Students will utilize digital resources and learning platforms, including **Canvas**, **Kahoot!**, **Snorkl**, and **ExploreLearning Gizmos**, to reinforce learning through virtual labs, simulations, review activities, and interactive assignments.
9. **Multimedia and Visual Instruction**
   Students will engage with videos, animations, slide presentations, virtual simulations, scientific models, and visual representations to support understanding.
10. **Reading and Scientific Literacy Activities**
    Students will analyze scientific texts, articles, graphs, diagrams, and informational resources to build scientific literacy and communication skills.
11. **Project-Based and Performance-Based Learning**
    Students may demonstrate understanding through projects, presentations, models, videos, engineering challenges, and performance tasks.
12. **Career Exploration and CLIMB Integration**
    Instruction will incorporate real-world STEM applications and career connections aligned with the school's **CLIMB program (Career Exploration, Leadership, Internships, Mentorship, and Building Pathways)** through career exploration activities, guest speakers, pathway connections, and authentic applications of science.
13. **Independent and Hybrid Learning Activities**
    Students will complete monthly packets, digital coursework, asynchronous assignments, and weekly check-ins to support independent learning and reinforce classroom instruction.
14. **Reflection and Metacognitive Practices**
    Students will participate in reflection activities, self-assessment, journals, and progress monitoring to evaluate learning and set goals.

RESOURCES

Instructional materials and course content will primarily be delivered through the school's Learning Management System, **Canvas,** which serves as the central platform for course organization, communication, assignments, and instructional delivery.

Students will access content through **monthly digital slide decks** containing embedded instructional materials including videos, readings, teacher notes, procedures, activities, discussion prompts, links to virtual resources, and assignment directions. Digital resources may be updated periodically to reflect current scientific phenomena and NGSS-aligned instructional practices.

Students will also receive a **monthly printed packet** containing activities, guided notes, interactive notebook components, data collection sheets, practice assignments, graphic organizers, and written assessments designed for completion by hand. These materials support both in-person and independent learning experiences.

Instruction includes both hands-on and virtual interactive experiences to promote application of scientific concepts and practices. Digital learning platforms may include:

- Kahoot! for formative assessment, review, and interactive engagement activities
- Snorkl for student thinking, explanation, reflection, and discussion activities
- ExploreLearning Gizmos for simulations, virtual labs, modeling activities, and investigations

These platforms allow students to interact with scientific content in meaningful and applicable ways through simulations, experimentation, problem solving, visualization, and evidence-based reasoning.

Additional instructional resources may include laboratory materials, scientific models, teacher-created activities, multimedia resources, scientific articles, engineering materials, manipulatives, and NGSS-aligned instructional tools.

CRITICAL CONCEPTS PRACTICED AND NEXT GENERATION SCIENCE STANDARDS (NGSS) ADDRESSED

Science and Engineering Practices (SEPs) and **Cross-Cutting Concepts** embedded throughout the course	
Science & Engineering Practices (SEPs)	**Cross-Cutting Concepts (CCCs)**
1: Asking Questions and Defining Problems 2: Planning and Carrying Out Investigations 3: Analyzing and Interpreting Data 4: Constructing Explanations 5: Developing and Using Models 6: Mathematical and Computational Thinking 7: Engaging in Argument from Evidence 8: Obtaining, Evaluating and Communicating Information	**Patterns:** Students observe, identify, and analyze patterns in data and phenomena to recognize relationships and make predictions. Examples include weather patterns, climate trends, rock formations, and biological structures. **Cause and Effect:** Mechanism and Explanation Students investigate causal relationships and use evidence to explain why events occur, such as earthquakes resulting from plate movement or environmental factors influencing climate change. **Scale, Proportion, and Quantity:** Students examine phenomena at different sizes, time scales, and quantities, ranging from cells and tissues to Earth systems and climate processes, while applying

	measurement and the metric system. **Systems and System Models:** Students develop and use models to understand interactions within systems, including body systems, Earth systems, ecosystems, and energy systems. **Energy and Matter: Flows, Cycles, and Conservation:** Students investigate how energy and matter move through physical and biological systems, including thermodynamics, waves, climate systems, and living organisms. **Structure and Function:** Students examine how the structure of objects and organisms influences their function, including cells, tissues, bones, body organization, and Earth structures. **Stability and Change**: Students explore processes that maintain stability or produce change over time, such as climate change, geological processes, Earth movement, and growth and development.

Month	CRITICAL CONCEPTS (CONTENT FOCUS)	NGSS Science STANDARDS Disciplinary Core Concepts (DCIs)
1	Inheritance, Mendelian Genetics and Reproduction	**MS-LS3.A** **MS-LS3.B** **MS-LS1.B**
2	**USD- Project:** History of Eugenics DNA, Chromosomes and Genes	**MS-LS1.A** **MS-LS3.A** **MS-LS1.B**
3	PLTW Medical Detectives: Stress & Nervous System	**MS-LS1.A** **MS-LS1.D**
4	Mysterious Communications & The Brain	**MS-LS1.A** **MS-LS1.D**
5	PLTW Medical Detectives: Mysterious Toxin	**MS-LS1.A** **MS-LS1.D** **MS-LS2.C** **MS-PS1.B** **MS-ETS1.A** **MS-ETS1.B**

Month	CRITICAL CONCEPTS (CONTENT FOCUS)	NGSS Science STANDARDS Disciplinary Core Concepts (DCIs)
6	Energy & Simple Machines	**MS-PS3.A** **MS-PS3.B** **MS-ETS1.A** **MS-ETS1.B** **MS-ETS1.C**
7	Science of Motion	**MS-PS2.A** **MS-PS3.A** **MS-ESS1.B**
8	Applied Chemistry	**MS-PS1.A** **MS-PS1.B** **MS-ETS1.A** **MS-ETS1.B** **MS-ETS1.C**
9	Applied Chemistry (Nanotechnology)	**MS-PS1.A** **MS-PS1.B** **MS-ETS1.A** **MS-ETS1.B** **MS-ETS1.C**
10	**Reflection** (Presentation of Learning)	**SEPs/CCCs**

EVALUATION CRITERIA AND METHODS

Student achievement and progress will be evaluated using the district's **standard grading scale** and through a variety of **formative and summative** assessments designed to measure understanding of NGSS content, scientific practices, and application of knowledge.

Evaluation methods may include:

1. **Monthly Learning Packets**
   Students will complete monthly packets containing guided notes, written assignments, interactive activities, practice work, data analysis, and reflection activities completed by hand.
2. **Laboratory Activities and Investigations**
   Assessment of student participation and performance in laboratory experiences, including both **in-person and virtual investigations**, simulations, experiments, and engineering activities.

3. **Class Activities and Participation**
   Evaluation of student engagement in classroom discussions, collaborative learning activities, interactive notebooks, digital activities, and participation in instructional tasks.
4. **Formal Assessments**
   Assessment methods may include quizzes, tests, written responses, projects, research assignments, scientific explanations, presentations, CER writing, and performance tasks.
5. **Informal Assessments**
   Ongoing assessment through observations, class discussions, exit tickets, digital responses, student reflections, videos, demonstrations of learning, and teacher conferences.
6. **Projects and Presentations**
   Students may demonstrate learning through multimedia presentations, videos, models, engineering designs, investigations, and project-based learning experiences.
7. **Weekly Check-ins**
   Students will participate in **weekly online and in-person check-ins** to monitor progress, provide feedback, review learning targets, and support independent learning expectations.
8. **Digital Platform Activities**
   Completion and participation in online learning activities through instructional platforms and virtual tools used to reinforce and apply scientific concepts.

Assessment practices emphasize student growth, scientific reasoning, application of knowledge, communication skills, and mastery of course objectives.

<u>Earning Credit/Grade Evaluation</u>

1. Attendance credit for each month and all assignments will be based on submission of monthly work by due dates listed on assignment agreement.
2. Work submitted after the due date cannot earn full credit. **Assignments turned in late, but within one work month are subject to a 20%-point reduction from what is otherwise earned.**
3. Unless arrangements have been made, **work that is more than one work month late is not accepted** (e.g., work from Month 3 may be turned in during Month 4 for a 20%-point reduction and work from Month 3 is no longer accepted once Month 5 begins).
4. Academic grades will be based on the quality and quantity of work submitted on time according to directions and expectations above.
5. In keeping with SDUSD procedure #5121 the following grades will be used:

   "A" = Superior achievement.
   "B" = Above average achievement.
   "C" = Satisfactory achievement.

"D" = Below average achievement.
“F” = Failure (credit not granted).
"I" = Incomplete.
"IP" = In Progress.
“NC” = No Credit

ACADEMIC HONESTY

In all academic work, the ideas and contributions of others must be appropriately acknowledged and work that is presented as original must be, in fact, original. Copying work created by an AI-content generator (such as ChatGPT) and turning it in without proper attribution or authorization is a form of academic dishonesty and the student will not receive credit for the work. If you are unsure about whether something may be plagiarism or academic dishonesty, please contact your teacher to discuss the issue.

SCHOOLWIDE LEARNER OUTCOMES/STUDENT PROFILE

- Collaborative Communicators
- Emotionally Intelligent Thinkers
- Problem-Solving Innovators
- Socially Aware Agents of Change
- Critically-Thinking Digital Citizens

College, Career, and Community Ready Citizens (CLIMB Program Alignment)
Students will engage in learning experiences that support the school’s **CLIMB initiative: Career Exploration, Leadership, Internships, Mentorship, and Building Pathways** by making connections between science content and real-world careers, STEM pathways, health sciences, environmental studies, engineering, and workforce applications. Students will explore how scientific knowledge and skills apply to future educational and career opportunities.