Delaware STEM Academy

Course Selection Handbook

2015-2016

New Tech Network

Delaware STEM Academy
Curriculum and Course Selection Handbook

The Delaware STEM Academy will provide students in grades 9 through 12 with the opportunity to learn science, technology, engineering and mathematics (STEM) through an engineering and environmental sciences platform and an ethically-based environmental stewardship program. The school will prepare students for college placement and workforce entry in engineering, environmental science and energy technology.

The Delaware STEM Academy will provide a dynamic learning environment through the New Tech Network, a school design which will guide the academic program with "teaching that engages, technology that enables, and culture that empowers." The New Tech instructional design emphasizes deeper learning which fundamentally re-imagines teaching and learning, through using project-based learning, 1:1 technology, and integrated coursework. In their junior and senior years, students will have the potential to participate in internships in the community and in college courses. Students will also work toward a senior capstone project that is based around their interests and requires them to complete an in-depth research project. Through the Delaware STEM Academy education program, students will acquire skills in leadership development, service learning, technology, citizenship, emotional intelligence, communication skills, life skills, and career skills.

Delaware STEM Academy Graduation Requirements

No public school student shall be granted a State of Delaware Diploma unless such student has successfully completed a minimum of 24 credits in order to graduate including: 4 credits in English/language arts, 4 credits in mathematics, 3 credits in science, 3 credits in social studies, 2 credits in world language, 1 credit in physical education, 1/2 credit in health, 3 credits in a career pathway, and 3 1/2 credits in elective courses. Requirements at the **Delaware STEM Academy** will go beyond the state requirements as shown below. Students who successfully complete the minimum of 28.5 credits that includes the above courses are eligible for graduation and will receive a diploma.

English	4.0 credits
Social Studies	4.0 credits
Mathematics	4.0 credits
Science	4.0 credits
World Language	3.0 credits
Physical Education	1.0 credits
Health	.5 credits
STEM pathway-Environment, Energy and Engineering	4.0 credits
Electives/Visual & Performing Arts	4.0 credits
Total:	**28.5 credits**

Granting Credit
Granting course credit to a student requires a passing final grade and the satisfactory completion of all major course requirements. At the beginning of each course, teachers will provide students with a course syllabus which includes a list of all major requirements.

Grading Policy
Delaware STEM Academy will use the following grading scale.

Grading Scale				
A+ 98-100	B+ 90-92	C+ 82-84	D+ 75-76	F 60-69
A 95-97	B 87-89	C 79-81	D 72-74	
A - 93-94	B - 85-86	C – 77-78	D - 70-73	

Grade point averages will be computed by assigning the following point equivalency to each letter grade.

Grade Point Equivalency				
A+ 4.33	B+ 3.33	C+ 2.33	D+ 1.33	F 0.00
A 4.0	B 3.00	C 2.0	D 1.00	
A - 3.67	B - 2.67	C – 1.67	D - 0.67	

College courses that are taken for dual credit or AP coursework will be weighted as the grade point equivalent listed in the table plus 1.0, so an A- in an AP or college course would equal 4.67.

Transcripts for the students from the Delaware STEM Academy will reflect the course titles listed in the course sequence above and the letter grade that the students earned in the course. Transcripts will also include information about how each letter grade was comprised – 70% on content skills and knowledge, 30% on school-wide, 21st-century learning outcomes such as active collaboration, critical thinking/problem solving, presentation skills, research skills, social and cross-cultural skills, technology literacy, work ethic and effort, and writing skills.

Course Descriptions
Delaware STEM Academy

English Language Arts Integrated Coursework

CaGE – Grade 9 **1.0 ELA/1.0 Social Studies** **Required**
Civics, Geography, English Language Arts Integration
Students will be challenged to use the tools of geography to view, analyze, and understand the world around them. Students will be presented with contemporary problems encountered in local communities and asked to solve them. Then they will compare their solutions with the solutions developed by the community leaders. Students will also use literature to study perspectives and differences. Beyond geography, students will also study the structure of the US Government and the roles and responsibilities of citizens as independent thinkers and conscientious citizens. Through literature, students will contrast what happens in a government when citizens are fearful to speak out or are uninformed. In both the social studies and ELA portions of the class, students will consider political trends and behavior which citizens consider to be relevant to the most pressing issues of the day.

BioLit – Grade 10 **1.0 ELA/1.0 Biology** **Required**
Biology and English Language Arts
In this course, students will explore the nature of science and the theory of evolution by natural selection, understand the chemical basis of many life processes, and investigate the storage of genetic information in DNA, its transmission and its expression during protein synthesis. Students will also investigate the application of these topics to biotechnology. Inquiry and technology-based experiences will prepare students with the skill and processes needed for college and/or the work environment. Through the integration of various genres of literature, students will examine how writers portray scientific themes and call into question the ethics of scientific discoveries and project, through science fiction, what life in the future might be like, based on the scientific discoveries of today. Laboratory work will allow the students to explore fundamental chemical relationships and become more familiar with basic chemical laboratory techniques and procedures.

American Studies – Grade 11 **1.0 ELA/1.0 Social Studies** **Required**
US History and American Literature Integration
Students will study the chronological and thematic development of American literature while linking thematically to American literature. Students are expected to trace and analyze chronological periods and examine the significant themes and concepts in U.S. History while considering how events were viewed by various people and portrayed through literature. Students will develop historical thinking and research skills and use primary and secondary sources to explore topical issues and to understand the cause for changes in the nation over time. As an integrated course, students will study various authors and diverse genres, such as short stories, novels, plays, poetry, non-fiction, literary essays, and drama. Students will complete a significant research project and begin to develop their Senior Capstone Project and do preliminary research to collect information to guide the project.

World Powers, World Voices – Grade 12 **1.0 ELA/1.0 Social Studies** **Required**
World History and World Literature Integreation
World History emphasizes events and developments in the past that greatly affected large numbers of people across broad areas and that significantly influenced peoples and places in subsequent eras. Literature integration will emphasize the theme of "Conflict and Community." Key events and literary texts related to this theme are examined in this course as students read and study a broad range of literature from the Americas, Africa, Europe, Southwest and South Central Asia, China, and the Pacific. Through the integrated study and close reading of these texts, students will deepen their understanding of

how culture and context shape the writing and how writers craft language to provide meaning and entertainment for the reader. The themes of continuity and change, universality and particularity, and unity and diversity among various peoples and cultures from the past to the present will emerge. As part of this course, students will complete the significant research required in their Senior Capstone Project.

Mathematics

The Interactive Mathematics Program (IMP) is a problem based mathematics curriculum with the rigor required for college-bound students. Each unit in the IMP curriculum is designed around a central problem or theme. Motivated by this central focus, students solve a variety of smaller problems that develop the underlying skills and concepts needed to solve the central problem in that unit

IMP I **1.0 Credit** **Required**
The first-year curriculum contains an introduction to problem-solving strategies, the use of variables, and the meaning and use of functions and graphs, as well as concepts from statistics, geometry, and trigonometry. These mathematics ideas are set in varied contexts, such as the settlement of the American West, games of chance, Edgar Allan Poe's *The Pit and the Pendulum,* and measurement of shadows.

IMP II **1.0 Credit** **Required**
Students work with powerful mathematical ideas, including the chi-square statistic, the Pythagorean theorem, and linear programming, and learn a variety of approaches to solving equations. Problem contexts include statistical comparison of populations, the geometry of the honeycomb, and maximization of profits from a cookie store.

IMP III **1.0 Credit** **Required**
Students extend their understanding of material studied in preceding years of the curriculum, while learning about and applying new topics such as combinatorics, derivatives, and algebra of matrices. A baseball pennant race, population growth, and decision-making on land use provide some of the contexts for the mathematical concepts.

Pre-Calculus **0.5 HS Credit** **Required**
Pre-Calculus extends the course of study in algebraic reasoning past Algebra II (or Integrated Math III). The foundations of algebra and functions developed in previous courses will be extended to new functions, including exponential and logarithmic functions, and to higher-level sequences and series. This course will allow students to more accurately model real-life phenomena that are regular topics of discussion in college-level STEM courses. Students pursuing non-STEM careers will benefit from an increased understanding of mathematical modeling and data analysis, both of which are increasingly used in nearly all career fields.

Statistics **0.5 HS Credit** **Required**
Statistics includes the concepts and skills needed to apply statistical techniques in the decision-making process. Topics include: (1) descriptive statistics, (2) probability, and (3) statistical inference. Practical examples based on real experimental data are used throughout. Students plan and conduct experiments or surveys and analyze the resulting data. The use of graphing calculators and computer programs is encouraged.

BC Calculus **1.0 HS Credit** **Required**
Calculus BC is primarily concerned with developing the students' understanding of the concepts of calculus and providing experience with its methods and applications. The course emphasizes a multi-

representational approach to calculus, with concepts, results, and problems being expressed graphically, numerically, analytically, and verbally. The connections among these representations also are important. Topics include: (1) functions, graphs, and limits; (2) derivatives; (3) integrals; and (4) polynomial approximations and series. Technology will be used regularly by students and teachers to reinforce the relationships among the multiple representations of functions, to confirm written work, to implement experimentation, and to assist in interpreting results.

Social Studies

CaGE – Grade 9 **1.0 ELA/1.0 Social Studies** **Required**
Civics, Geography, English Language Arts Integration

See description in the integrated courses section.

Enhanced Economics **1.0 Credit** **Required**
Enhanced Economics examines the allocation of resources and their uses for satisfying human needs and wants. The course analyzes economic reasoning used by consumers, producers, savers, investors, workers, voters, and government in making decisions. Key elements of the course include study of scarcity and economic reasoning, supply and demand, market structures, role of government, national income determination, and role of financial institutions, economic stabilization, and trade. The functions of government in a market economy and market structures will be examined. Additionally, the behavior of people, societies and institutions and economic thinking is integral to this course. Enhanced Economics will also include a personal finance unit.

American Studies – Grade 11 **1.0 ELA/1.0 Social Studies** **Required**
US History and American Literature Integration

See description in the integrated courses section.

World Powers, World Voices – Grade 12 **1.0 ELA/1.0 Social Studies** **Required**
World History and World Literature Integration

See description in the integrated courses section.

Science

Earth/Physical Science **1.0 Credit** **Required**
This challenging course provides students with important insights into the physical environment of the earth. An overview of the chemical properties and the physical forces of motion that shape the earth's features will be investigated in a logical sequence. Emphasis will be on addressing state standards through an integrated curriculum that relates energy, alchemy – chemistry, and the earth's systems to the fields of geology, meteorology/climatology, astronomy, and oceanography.

BioLit – Grade 10 **1.0 ELA/1.0 Biology** **Required**
Biology and English Language Arts

See description in the integrated courses section.

Chemistry **1.0 Credit** **Required**

This chemistry course focuses on the chemistry is all around each of us, every day. Our bodies use chemistry: we eat and drink chemistry. Chemistry is the complex choreography of atoms and molecules that sustains life. Chemistry is both how we create the materials of human technology, and also how the natural world builds and renews itself. The beginning of the course will present a comprehensive overview of the main ideas in chemistry such as the atomic nature of matter, systems, temperature and energy. Next, students will study in-depth all major topic areas of chemistry. They develop a usable understanding of the big ideas laid out during the introduction. This course of study includes strong conceptual development as well as algebra-based quantitative problem solving. The end of the course provides extension and deeper exploration of significant areas of interest in chemistry.

Physics **1.0 Credit** **Required**

This is a college prep class designed for the students who want to learn about the forces of the physical world. Emphasis is placed on understanding the concepts and principles concerning matter and energy through the laboratory study of mechanics, wave motion, heat, light, electricity, magnetism, electromagnetism, and atomic and nuclear physics. Students will apply the ideas of physics to technology and developing an awareness of the impact of physics on society.

World Languages

Spanish I **1.0 Credit** **Required**

Spanish I introduces students to the Spanish language, the people who speak Spanish, and the geography and culture of the lands where Spanish is spoken. Emphasis is placed upon developing understanding in speaking, reading, and writing the language. Oral practice is reinforced through dialogue, scenarios, presentations, and games. Aspects of Spanish culture is researched and presented in written form and orally to the class.

Spanish II **1.0 Credit** **Required**

Spanish II is designed to further develop the language skills of listening, speaking, reading, and writing Spanish. There is still much emphasis placed on oral practice through dialogues, scenarios, "how-to" presentations and teacher/student generated games. Considerable time is spent developing reading skills and applying them to Spanish literature. Aspects of Spanish culture is researched and presented in written form and orally to the class.

Spanish III **1.0 Credit** **Elective**

Spanish III builds upon effective strategies for Spanish language learning by facilitating the use of the language and cultural understanding for self-directed purposes. This course encourages interpersonal communication through speaking and writing; exchange detailed information in oral and written form; and write cohesive information with greater detail. Students will also continue to develop their reading and listening comprehension skills, such as using cognates, synonyms and antonyms to derive meaning from written and oral information, and comprehending detailed written or oral directions. Students will address the presentational mode by presenting student-created material on a variety of topics, as well as reading aloud to practice pronunciation and intonation.

Physical Education and Health

Physical Education **1.0 Credit** **Required**

Through a variety of instructional strategies, students practice skills that demonstrate: competency in motor skills and movement patterns needed to perform a variety of physical activities; understanding of movement concepts, principles, strategies, and tactics as they apply to the learning and performance of physical activities; regular participation in physical activity to achieve and maintain a health-enhancing

level of physical fitness; responsible personal and social behavior that respects self and others in physical activity settings; value for physical activity for health, enjoyment, challenge, self-expression, and/or social interaction; and physical activity as critical to the development and maintenance of good health.

Health **0.5 Credit** **Required**
Health provides students with a study of personal health, physical activity, healthy eating, promoting safety and preventing unintentional injury and violence, promoting mental and emotional health, a tobacco-free lifestyle and an alcohol- and other drug-free lifestyle and promoting human development and family health. Through a variety of instructional strategies, students practice the development of functional advanced health information (essential concepts); determine personal values that support health behaviors; develop group norms that value a healthy lifestyle; develop the essential skills necessary to adopt, practice, and maintain health-enhancing behaviors and wellness advocacy skills.

Visual and Performing Arts

Art Appreciation **0.5 Credit** **Elective**
Students will engage in sequential learning experiences that encompass art history, art criticism, aesthetics, and production. Students study works of art and artifacts from world cultures, engage in historically relevant studio activities; utilize research skills to discover social, political, economic, technological, environmental, and historical trends and connections; analyze, interpret, theorize, and make informed judgments about artwork and the nature of art; relate art to other disciplines and discover opportunities for integration; and incorporate literacy and presentational skills. Students utilize the resources of art museums, galleries, and studios, and identify art-related careers.

Drawing **0.5 Credit** **Elective**
Students will create drawings utilizing processes such as sketching, rendering, contour, gesture, and perspective drawing and use a variety of media such as pencil, chalk, pastels, charcoal, and pen and ink. They reflect upon and refine their work; explore cultural and historical connections; analyze, interpret, theorize, and make informed judgments about artwork and the nature of art; relate art to other disciplines and discover opportunities for integration; and incorporate literacy and presentational skills. Students utilize the resources of art museums, galleries, and studios.

Introduction to Music **0.5 Credit** **Elective**
Students receive instruction designed to explore music and major musical styles and periods through understanding music in relation to both Western and Non-Western history and culture. The course exposes students to a broad spectrum of music, ranging from classical and modern western traditions to the music of other regions and cultures, balancing the creative and practical aspects of music with the theoretical or academic. Activities include analyzing and describing music; evaluating music and music performances; and understanding relationships between music and the other arts, as well as disciplines outside of the arts.

Music Theory **0.5 Credit** **Elective**
This course is designed for students who want to develop a deep understanding of music. The course will integrate aspects of melody, harmony, texture, rhythm, form, musical analysis, elementary composition, and history, and style. The student's ability to read and write musical notation is fundamental to this course, and it is also assumed that the student has acquired at least basic performance skills in voice or on an instrument so that the elements of musical theory may be practiced and exhibited.

STEM Pathway-Environment, Energy and Engineering

The State of Delaware requires all students to graduate with three credits in a career pathway. The Career Pathways Program provides the students with an opportunity to concentrate their study in courses that will add to their success in their chosen career field. The Delaware STEM Academy pathway has the major goal of preparing students for college placement and workforce entry in engineering, environmental science and energy technology.

Exploration in STEM **1.0 Credit** **Required**

This full year course will introduce 9th grade students to STEM fields while providing students with a foundation for future STEM courses. The major focus of the course is to introduce students to engineering standards, research, analysis, global impacts, and technical documentation. Students will have a basic introduction of engineering that introduces scientific and mathematic principles to develop, produce, use, and assess products related to renewable energy and the environment. Activities will include hands-on learning opportunities that enhance problem-solving skills, teamwork and collaboration. Students will apply their knowledge of research and design to create solutions to various challenges, documenting their work and communicating solutions to peers and members of the professional community.

STEM Pathway Electives: 2.0 credits required

Energy Systems Pathway

Energy Systems and Engineering **1.0 Credit** **Elective**

This is an introductory course that explores the relationship between force, work, energy, and power. Students will study the characteristics, availability, conversion, control, transmission, and storage of energy and power. The principles of electrical, fluid, and mechanical power will be explored through hands-on learning experiences. Students will also develop an awareness of careers that exist in energy systems related to engineering and related technologies.

Alternative Energy Technologies **1.0 Credit** **Elective**

This course will help students develop an understanding of the differences between nonrenewable, renewable, and inexhaustible energy sources and how these energy sources affect their world. Through the framework of project based learning, alternative energy sources will be researched to include the regional implications and economic, environmental, and sustainability issues. Students will explore future trends of energy, power, and transportation. Students will research and develop an alternative energy system that will demonstrate their understanding of an alternative approach to energy generation.
Prerequisite: Energy Systems and Engineering

Robotics Pathway

Introduction to Robotics **1.0 Credit** **Elective**

This course introduces the fundamentals of robotics. Students will learn the basics of programming and building robots as it applies to science, technology, engineering and math (STEM) concepts. Students completing this course will learn about scientific method and inquiry, the basic physics and physical science concepts, and programming and engineering concepts related to robotics. Through the use of project based learning, students will participate in activities related to the robotics industry. Students will learn teamwork and collaboration through projects that include designing robots, building robots and studying robotics as a renewable energy source.

Advanced Robotics **1.0 Credit** **Elective**

The objective of this course is to use a hands-on approach to introduce the advanced concepts in robotics, focusing on micro controllers, autonomous mobile robots and real world applications. Students will work in teams to build and test increasingly more complex mobile robots through lab experiments and project based learning opportunities. Students will apply what they have learned through participation in local, regional and/or national competitions.
Prerequisite: Introduction to Robotics

Engineering Design Pathway

Introduction to Engineering Design **1.0 Credit** **Elective**

Introduction to Engineering Design is an introductory course which enhances student problem solving skills using the design process. Students will experience an overview of engineering design based on hands-on experiences with real-world projects. The course includes an introduction to computer tools and lab techniques used in an engineering design project. Students are required to use technical documentation to track progress of solutions as they move through the design process.

Principles of Engineering **1.0 Credit** **Elective**

This course focuses on the process of applying engineering, technological, scientific and mathematical principles in the design, production, and operation of products, structures, and systems. This is a hands-on course designed to provide students interested in engineering careers to explore experiences related to specialized fields of engineering. Working in teams, students will participate in research, development, planning, design, production, and project management to present solutions to engineering related problems and topics.
Prerequisite: Introduction to Engineering Design

TECHNOLOGY

Keyboarding and Writing On-Line **0.5 Credit** **Elective**

Using computers quickly and effectively is an essential life skill. In this course, students will train their fingers to type quickly to make all of their work on the computer a bit smoother and faster. Students will also practice their keyboarding skills by creating and maintaining a blog to which other students can respond. Students will be required to both create the blog and write on other's blogs to keep the fingers flying.

Computer Applications **0.5 Credit** **Elective**

This course will introduce students to the integrated MS Office program, which is widely used in business. Students will learn basic and advanced functions of MS Word, MS Excel, and MS Power Point. MS ACCESS will be introduced. This course will take on a workshop approach as students complete projects to learn to use the MS Office program. Computer word terminology is a component as this course will help students acquire the skills needed to pass the computer literacy examination.

Publications, Power Point, and Applied Technology **0.5 Credit** **Elective**

This course is a nature extension of Computer Applications as students will learn the process of combining text and graphics using the computer to create attractive, stimulating publications and presentations. They will learn to create documents such as newsletters, invitations, letterheads, and advertising materials. They will also learn to combine text, graphics, photos, and videos in Power Point to meet the needs of a listening audience.