Township of Ocean Schools

Assistant Superintendent
Office of Teaching and Learning

SPARTAN MISSION:
Meeting the needs of all students with a proud tradition of academic excellence.

Curriculum Documents

School: Ocean Township High School

Course: Maker Space II

Department: Technology

Supervisor: Patrick O'Neill

Board Approval	Supervisor	Notes
August 2013	Mike Lambusta	Update Standards
July 2016	Mike Lambusta	Update Standards
December 2017	Patrick O'Neill	Update Standards

DEPARTMENT: APPLIED TECHNOLOGY COURSE: MAKERSPACE II

Week	Marking Period 1	Week	Marking Period 3
1	Course Intro and Pre-Testing	21	
2	Tools for Creativity and Presentation – Podcasting, Blogs and Prezi (ongoing)	22	
3	Tools for Creativity and Presentation – Podcasting, Blogs and Prezi (ongoing)	23	
4	Intermediate Robotics – Lego EV3 & TETRIX Design Challenges (ongoing)	24	
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9	Intermediate Robotics – Lego EV3 & TETRIX Design Challenges (ongoing)	29	
10	Intermediate Robotics – Lego EV3 & TETRIX Design Challenges (ongoing)	30	
Week	**Marking Period 2**	**Week**	**Marking Period 4**
11	Intermediate 3-D Design/Printing (ongoing)	31	
12	Intermediate 3-D Design/Printing (ongoing)	32	
13	Intermediate 3-D Design/Printing (ongoing)	33	
14	Intermediate 3-D Design/Printing (ongoing)	34	
15	Intermediate 3-D Design/Printing (ongoing)	35	
16	Protoyping with Arduino (ongoing)	36	
17	Protoyping with Arduino (ongoing)	37	
18	Protoyping with Arduino (ongoing)	38	
19	Protoyping with Arduino (ongoing)	39	
20	Protoyping with Arduino (ongoing)	40	

Time Frame	WEEK 1

Topic

Makerspace II Course Intro and Pre-Testing

Essential Questions

- What is Makerspace II and how has it evolved?
- What areas will be explored in this course?
- What projects will be accomplished in the course?
- What are the student requirements in the Makerspace II course?
- How is the course grade determined?
- What are the teacher expectations for student behavior in the course?
- What general safety measures should I be aware of in the classroom environment?
- What electrical safety measures should I be aware of when using computer equipment and printers in the classroom?
- What safety measures should I be aware of when using the 3-D printer, robotics kits and other electrical equipment?
- What physical responses should I conduct in the event of personal injury, peer injury, or school evacuation requirements

Enduring Understandings

- This course provides students with an understanding of the technological systems that extend the range of human communications, with an emphasis on the Engineering Design Process. The course is an overview of "maker" technologies and approaches. Students will complete this course knowing a little bit about a lot of things, but will not master any one area. If any topics are of particular interest to a student, the instructor will offer further opportunities.
- Students completing the course will describe, demonstrate, compare, analyze, integrate, and critique "maker" technologies related to: the principles of design; the ethical ramifications of current communications systems; the evolution of digital technologies and implications for the future; 3-D design and prototyping; fundamentals of robotics; the basics of digital storytelling via podcasting; multi-track audio.
- Makerspace II Course Outline
- Student responsibilities
- Following safety rules prevents personal injury.
- Use of electricity requires safe measures and awareness.
- Hazardous conditions require personal attention and typically require evacuation.
- Equipment associated with Makerspace II requires safe measures and awareness.

Alignment to NJSLS

8.1.12.A.3, 8.1.12.C.1, 8.1.12.D.5

Key Concepts and Skills

- Makerspace II Course Description
- Course Unit Outlines
- Course Requirements
- Proficiency Level
- Student Behavior Expectations
- Safety

Learning Activities

- Makerspace II Course Outline distribution and teacher presentation
- TOP 3 – Germany Study Tour presentation
- Teacher contact information
- Student use of school equipment policy

- Student behavior while using school computers, software, and peripheral equipment
- Extra Help Days
- Internet online website Edmodo.com acct. sign-up and Google DRIVE set-up for virtual classroom, course testing and project critique use
- Q&A period for students
- Web-based presentation/creative tools: Voki, Prezi, etc.

Assessments

- Student/Parent Signature Acknowledgement Form for course outline & requirements.
- OTHS Makerspace II Course Pre-Test/SGO (online via Edmodo)
- OTHS Applied Technology Safety Test

21st Century Skills

x	Creativity	**x**	Critical Thinking	**x**	Communication		Collaboration
	Skills	**x**	Information Literacy		Media Literacy		

Interdisciplinary Connections

Langauge Arts, Visual Arts

Technology Integration

Google suite of Apps, Edmodo, Prezi

Time Frame	WEEK 2-3 (and ongoing)

Topic

Tools for Creativity and Presentation – Podcasting, Blogs and Prezi

Essential Questions

- What are Web 2.0 tools and how did these technologies evolve?
- Identify uses for Web 2.0 in the classroom and industry
- What is a podcast and how can it be used in the design process?

Enduring Understandings

- Identify how the use of "Web 2.0 tools" and podcasting can deepen learning and increase audience engagement
- Identify how Web 2.0 tools support a student-centered environment
- Assess and apply best practices in the use of Web 2.0 tools and podcasting

Alignment to NJSLS

8.1.12.A.3, 8.1.12.C.1, 8.1.12.D.5

Key Concepts and Skills

- Participants will be able to demonstrate the ability to use and integrate various Web 2.0 tools, including podcasting
- It is expected that participants share their course reflections in a podcast and on the Edmodo classroom page.

Learning Activities

- Lecture presentation on key concepts
- Demonstration of various web-based tools and their possible applications
- Video tutorials
- Project design and presentation
- Use Audacity to create a podcast, and then post it
- Use Google Docs for collaboration
- Identify uses for Web 2.0 outside the classroom, for recruiting and fund raising (Kickstarter)

Assessments

- Project-based rubrics, deadlines
- Edmodo wall discussion
- Quiz
- Instructor anecdotal observation of student projects throughout the course

21st Century Skills

x	Creativity	**x**	Critical Thinking	**x**	Communication		Collaboration
x	Skills	**x**	Information Literacy	**x**	Media Literacy		

Interdisciplinary Connections

Langauge Arts, Visual Arts, Computer Science

Technology Integration

Google suite of Apps, Edmodo, Prezi, Audacity

Time Frame	WEEK 4-10

Topic

Intermediate Robotics – Lego EV3 & TETRIX

Essential Questions

- How is the field of robotics continuing to evolve?
- How do the disciplines of mechanical engineering and computer science interact in the creation of a robot?
- How can we use our understanding of Physics to improve robotic design?
- Which platforms are preferred for writing algorithms?
- How important is the Design Process when creating a robot for a specific task?
- How can robotics and automation be utilized to improve standards of living?
- What are ethical challenges related to the proliferation of robots?

Enduring Understandings

- How to collaborate in groups and teams
- How to design robots for specific activities and scenarios
- How to use LEGO/Labview programming software
- How to use Lego EV3/TETRIX hardware
- Gears, pulleys, torque, friction, timing, sensors, and program loops
- To design, develop and complete robotic activities and challenges

Alignment to NJSLS

8.1.12.A.3, 8.1.12.C.1, 8.1.12.D.5

Key Concepts and Skills

- 9 step Design Process
- Brainstorming
- Collaborative Design
- Project-based Learning
- Criteria/Constraints
- Labview programming
- Lego EV3/TETRIX kit materials

Learning Activities

- Lecture presentation on key concepts
- Video segments via Youtube
- Demonstration of advanced functions of LEGO EV3/TETRIX hardware, software
- Hands-on robotics projects
- Robotics competitions (FIRST Lego League/USA Skills)

Assessments

- Project-based rubrics, deadlines
- Podcast, Edmodo entries
- Quizzes
- Instructor anecdotal observation of student projects throughout the course

21st Century Skills

x	Creativity	**x**	Critical Thinking	**x**	Communication	**x**	Collaboration
x	Skills	**x**	Information Literacy	**x**	Media Literacy		

Interdisciplinary Connections

Langauge Arts, Visual Arts, Computer Science, Math

Technology Integration

Google suite of Apps, Edmodo, Prezi, Audacity, LEGO EV3/TETRIX

Time Frame	WEEK 11-15

Topic

Intermediate 3-D Design and Printing via Sketchup/Tinkercad and Makerbot Replicator 2/Orion Delta

Essential Questions

- How is 3-D artistic expression and visual communications linked?
- How is 3-D printing changing the nature of manufacturing?
- What are the ethical problems associated with 3D printing?
- How can we design and print functional objects to specific measurements?

Enduring Understandings

- 3-D design and printing is changing mass production to an additive process from a wasteful, subtractive one.
- While there are numerous beneficial applications for 3D printing, it also has some inherent ethical challenges that need to be addressed
- The digital revolution is forever changing industries and practices.
- Objects of both form and function (artistic/useful) can be designed and printed on a desktop

Alignment to NJSLS

8.1.12.A.3, 8.1.12.C.1, 8.1.12.D.5

Key Concepts and Skills

- 9 step Design Process
- Explanation of 3-D design and printing software (TinkerCAD/Sketchup) and hardware.
- 3-D design allowed two-dimensional artists to more accurately draw size and perspective.
- As a visual communications tool, 3-D can inform, educate, and persuade the viewer.
- Technological improvements brought 3-D design/printing to the masses of society, helping in the fields of science, manufacturing, art & medicine
- Electronics and computer technologies brought about the digital revolution in 3-D design

Learning Activities

- Lecture presentation on key concepts
- Video segments via Youtube
- Demonstration of Sketchup/TimkerCADsoftware, Makerbot hardware
- Hands-on 3-D design projects
- Exploratory research on future trends and inventions in the field of 3D Printing

Assessments

- Project-based rubrics, deadlines
- Blog, Edmodo entries
- Quiz
- Instructor anecdotal observation of student projects throughout the course

21st Century Skills

x	Creativity	**x**	Critical Thinking	**x**	Communication	**x**	Collaboration
x	Skills	**x**	Information Literacy	**x**	Media Literacy		

Interdisciplinary Connections

Langauge Arts, Visual Arts, Computer Science, Math

Technology Integration

Google suite of Apps, Edmodo, Prezi, Audacity, Sketchup, TinkerCAD, Makerware, MatterControl

Time Frame	WEEK 16-20

Topic

Protoyping with Arduino, Little Bits, 3D Printing, Laser Cutting and More

Essential Questions

- What is a protoype and what is its significance in product design?
- How do the disciplines of mechanical engineering, electrical engineering, art and computer science interact in the creation of a prototype?
- How important is the Design Process when creating a product for a specific task?
- How can product and system design be utilized to improve standards of living?

Enduring Understandings

- How to collaborate in groups and teams
- How to design prototypes for specific activities and scenarios
- How to use Scratch, Arduino, and other programming software
- How to use Arduino, Little Bits, breadboards, electronic components, and other hardware
- Gears, pulleys, torque, friction, timing, sensors, and program loops
- To design, develop and complete design challenges (video game systems, kiosks, toys, eco-monitors, and more)
- How to use Epilog laser in prototype construction.

Alignment to NJSLS

8.1.12.A.3, 8.1.12.C.1, 8.1.12.D.5

Key Concepts and Skills

- 9 step Design Process
- Brainstorming
- Collaborative Design
- Project-based Learning
- Criteria/Constraints
- Scratch, Arduino programming
- Arduino, Little Bits, electronics kit materials

Learning Activities

- Lecture presentation on key concepts
- Video segments via Youtube
- Demonstration of advanced functions of Arduino hardware, software
- Hands-on design projects

Assessments

- Project-based rubrics, deadlines
- Podcast, Edmodo entries
- Quizzes
- Instructor anecdotal observation of student projects throughout the course

21st Century Skills

x	Creativity	**x**	Critical Thinking	**x**	Communication	**x**	Collaboration
x	Skills	**x**	Information Literacy	**x**	Media Literacy		

Interdisciplinary Connections

Langauge Arts, Visual Arts, Computer Science, Math

Technology Integration

Google suite of Apps, Edmodo, Prezi, Audacity, Scratch, Arduino, Little Bits, Epilog Laser