DEPARTMENT OF TECHNOLOGICAL STUDIES

PROGRAM OF STUDY

High Point Regional High School
Academic Year 2016-2017

ITEEA National Program of the Year
2006 & 2014

"If we all did the things we are really capable of doing, we would literally astound ourselves…"

Thomas A. Edison

Table of Contents

Our Department

Our Philosophy:

Our Department of Technological Studies has been recognized as one of the leading programs on both the state and national level. Our distinguished teachers and rigorous curriculum provide a comprehensive education to our students, preparing them for a variety of options after high school including four and two year colleges, technical schools, and work. As the national momentum towards STEM Education and STEM Occupations thrive, our department continues to revise our curriculum to offer the most beneficial learning opportunities ***FOR ALL STUDENTS.***

Our Staff: Two Sussex County Teachers of the Year….Three High Point Teachers of the Year

- Mr. Brian Drelick (Supervisor of STEM) – bdrelick@hpregional.org
- Mr. Kevin Fenlon – kfenlon@hpregional.org
- Mr. Benjamin Kappler – bkappler@hpregional.org
- Mr. Stephen Peltier – speltier@hpregional.org
- Mr. Alex Gonzalez – agonzalez@hpregional.org
- Mr. Paul Cardinal – pcardinal@hpregional.org
- Mr. Matthew Garrera – mgarrera@hpregional.org

Our History:

- Recognized at the state and national level as a leader in Technology Education
  - Two time National Program of the Year from ITEEA
  - Two time State Program of the Year from NJTEEA
  - NJTEEA Five Star Program Recipient
  - Home of our nation's first Women in Engineering program

NJTEEA
New Jersey Technology and Engineering Educators Association

ITEEA

Our Students

Their Successes:

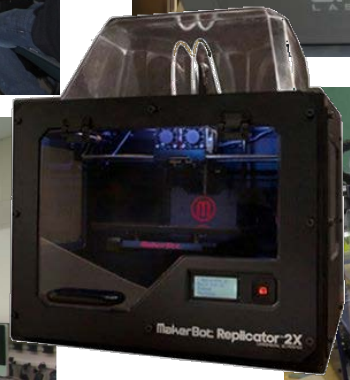
- 33 New Jersey State TSA Championships and **3 TSA National Championships** since 2006
- National Recognition from Synergis for Architectural Innovations
- United States Patent for innovation developed in Engineering Design Technology II
- Media Program featured on local television and provides concurrent enrollment with local colleges

Their Future:

- Recent graduates are majoring in our related disciplines at these distinguished universities.

PENNSTATE 1855 · NJIT New Jersey's Science & Technology University · STEVENS INSTITUTE of TECHNOLOGY THE INNOVATION UNIVERSITY 1870 · THE UNIVERSITY of WISCONSIN MADISON · MILLERSVILLE UNIVERSITY OF PENNSYLVANIA of the State System of Higher Education 1855 · R·I·T · CORNELL UNIVERSITY FOUNDED A.D. 1865 · TCNJ The College of New Jersey · RUTGERS · VirginiaTech 1872 · NYU · NYIT NEW YORK INSTITUTE OF TECHNOLOGY · RENSSELAER POLYTECHNIC INSTITUTE 1824 · INSTITUTE OF WENTWORTH TECHNOLOGY FOUNDED 1904 · Pratt · UNIVERSITY OF MASSACHUSETTS AMHERST 1863 · PHILADELPHIA UNIVERSITY 1884 · Rowan University · LAFAYETTE · ITHACA · EMERSON COLLEGE 1880 · MANHATTAN COLLEGE 1853 · DAVE SCHOOL DIGITAL ANIMATION & VISUAL EFFECTS

Our Facilities



1: Material Processing Lab
2: Engineering Lab
3: Engineering Lab
4: CAD/Architecture Lab
5: Media Studio

Pictured to the right:
Our department is home to four 3D Printers, an industry quality laser engraver, and a CNC ShopBot.

Semester Offerings for All Freshman

Scheduling Tip:

All 9th graders entering High Point are now required to take a one semester, technology elective that will be scheduled with their seminar class. ***Although we also encourage interested students to take a full year elective as well****, the department has developed four semester courses which we feel will address the interests of ALL students.*

Principles of Engineering Design Technology (TEC656)

- Intro to Engineering Design Process
- Core structures and robotics concepts
- *Could serve as prerequisite for Engineering Design Technology II OR Power, Energy, Transportation Technology II*

Principles of Engineering Drawing (TEC658)

- Intro to Computer Aided Drafting and Design
- Extensive focus on Autodesk Inventor
- 2D and 3D Drawing
- 3D Modeling
- *Could serve as a prerequisite for CADD II*

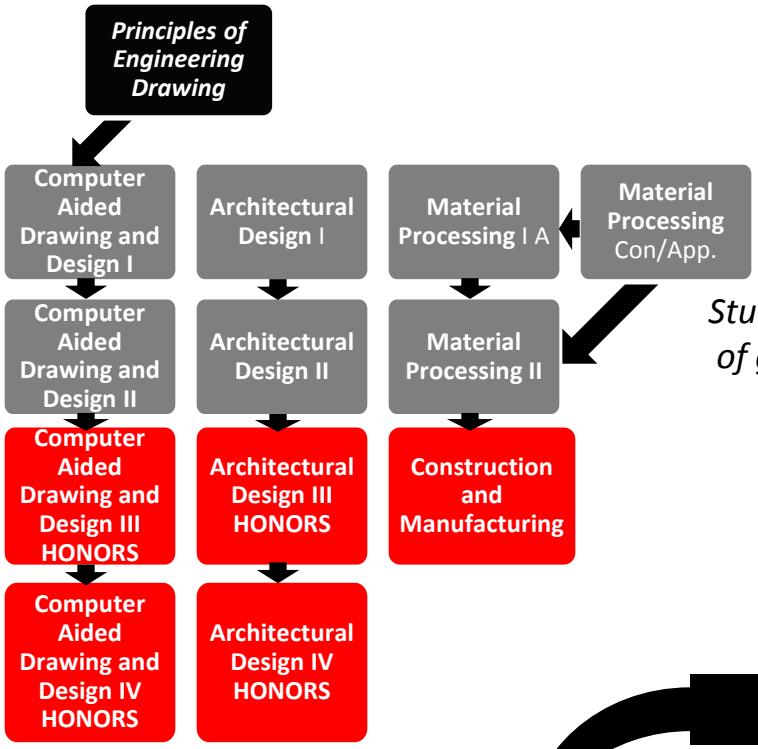
Principles of Mechanical Movement (TEC655)

- Intro to Engineering Design Process
- Core electronics and mechanics concepts
- *Could serve as prerequisite for Engineering Design Technology II OR Power, Energy, Transportation Technology II*

Principles of Media Technology (TEC657)

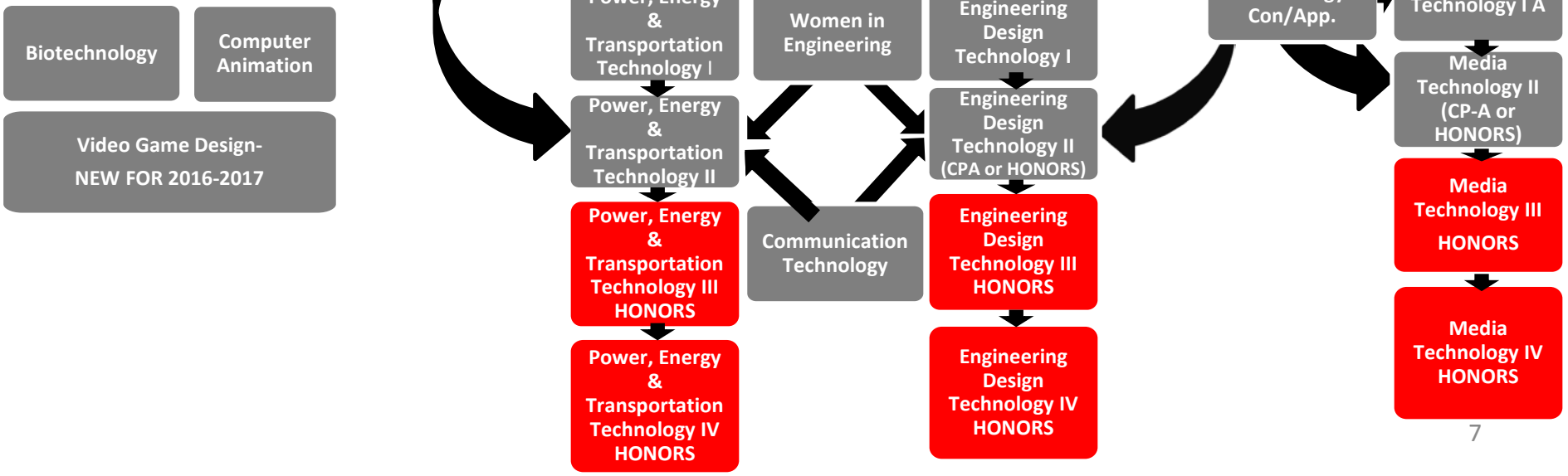
- Hands – on approach to producing digital videos
- Extensive use of Apple's iLife Studio
- *Could serve as prerequisite for Media Technology II*

OUR COURSE SEQUENCE



Scheduling Tip:

Students are encouraged to enroll in multiple first level classes as a means of garnering greater exposure to multiple STEM areas. Enrollment in the higher levels of each sequence will enhance focus and complexity.

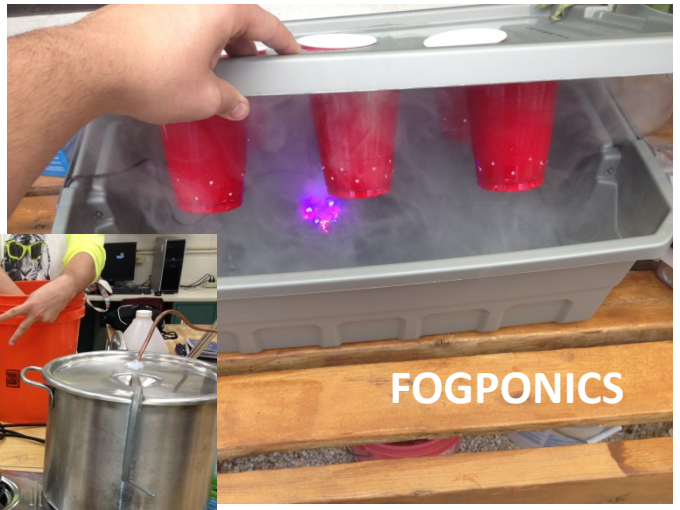


BIOTECHNOLOGY I

TEC611 – CP-A – Gr. 9-12 – 5 Credits

The Content:

- Intro To Engineering Design Process
- Horticulture
- Biometrics
- Biofuels
- Environmental Remediation



The Experiences:

- Design, develop, and monitor a hydroponics system
- Design, develop, and test the functionality and versatility of prosthetic limbs
- Design, develop, and analyze a water purification system
- Generate alternative fuels

The Real World Value:

- Strong connection to real world problems
- Appreciation for environmental sustainability
- Real world application of STEM concepts with hands on exposure to science principles

COMMUNICATION TECHNOLOGY

TEC625 – CP-A – Gr. 9-12 – 5 Credits

The Content:

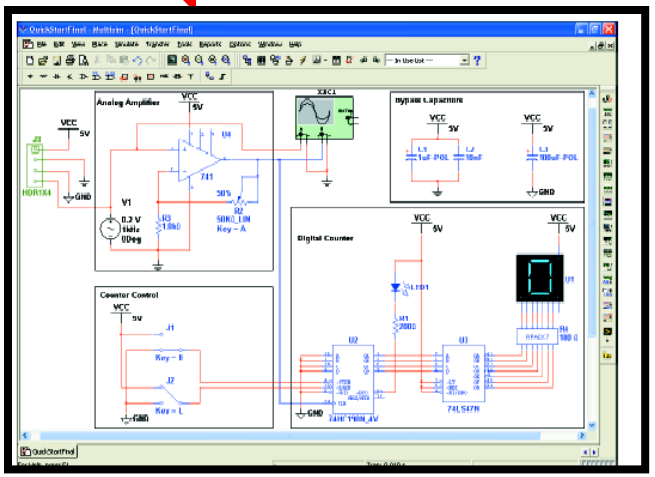
- Video Game Design
- Geographic Information Systems (GIS) and Geographic Positioning Systems (GPS)
- Communication Systems
  - Radio, Telephone, Electronics
- Graphic Communication
  - Billboard Design

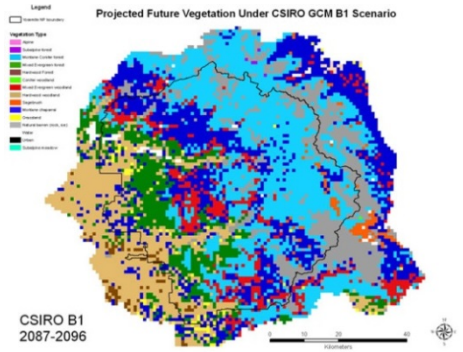
The Experiences:

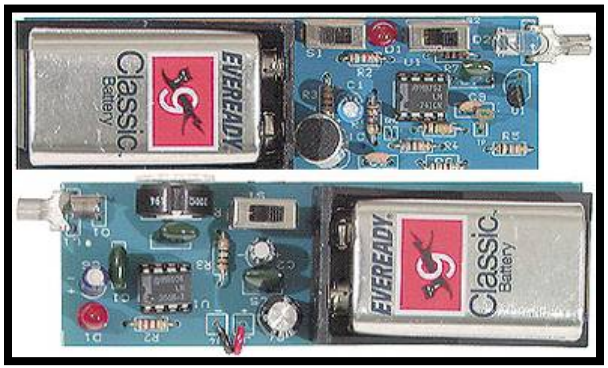
- Develop a simple video game
- Build electronic communication systems
- Develop GIS maps and use GPS outside
- Geocaching
- Exposure to careers and higher ed.

The Real World Value:

- Exposure to a rapidly changing and highly paid career area of the designed world





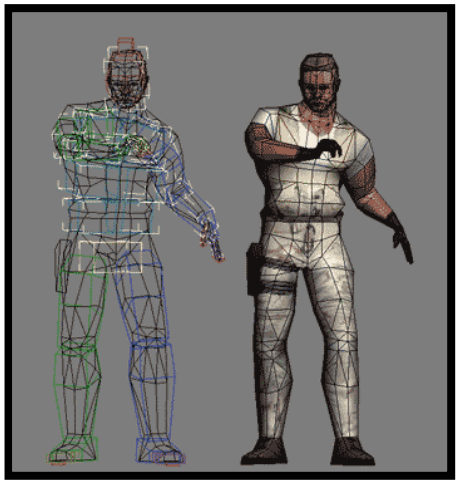


COMPUTER ANIMATION

TEC629 – CP-A - Gr. 9-12 – 5 Credits

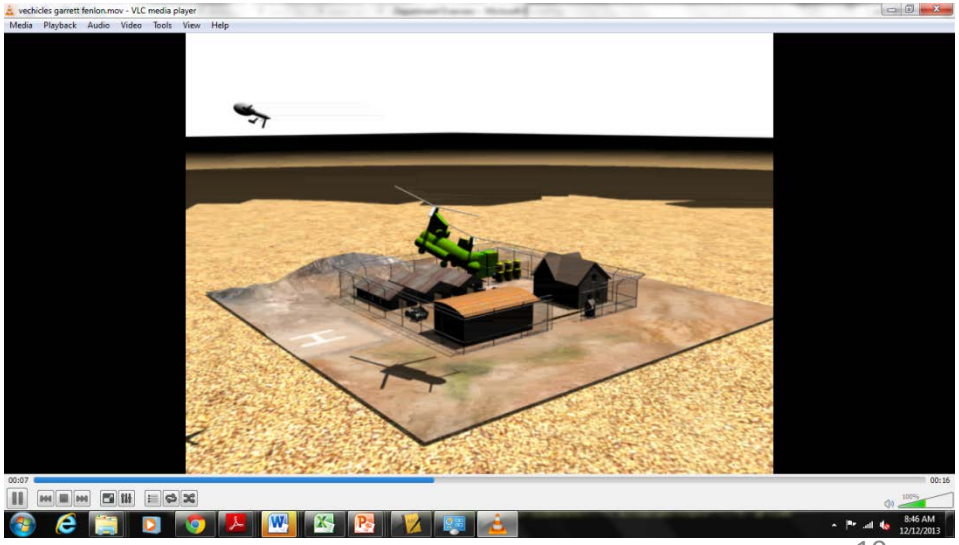
The Content:

- History of 3-D Computer Animation
- Distinguishing between concept and technical skills
- Basic computer function and management



The Experiences:

- Create the illusion of motion
- Create 2D Art
- Fully render 3-D characters and environments



The Real World Value:

- Industry Preparation

ARCHITECTURAL DESIGN

SEQUENCE AND SUMMARY

Department of Technological Studies

ARCHITECTURE I

TEC601 – CP-A – Gr. 9-12 – 5 Credits

The Content:

- Green & Sustainable Architecture
- Reading Architectural Plans
- Site Design
- Residential Planning
- The Architectural Design Process

The Experiences:

- Create Building Information Models
- Design a passive solar structure.
- Design a green home for a set of clients.

The Real World Value:

- Introduction to Design
- Use real world architectural modeling software.
- Home planning and design

ARCHITECTURE II

TEC602 – CP-A – Gr. 10-12 – 5 Credits

The Content:

- Elevations- Building forms and massing, buildings in elevation, fenestration, building proportions and people, materials and color.
- Building Sections – Reading and drawing sections, forces and structures, construction materials,
- Visualization – Architectural animation & rendering
- Individual & collaborative design projects

The Experiences:

- Utilize advanced architectural software
- Compete in architectural design competitions

The Real World Value:

- Prepare for architectural related career paths.

DISCOVER DESIGN: A Student Design Experience

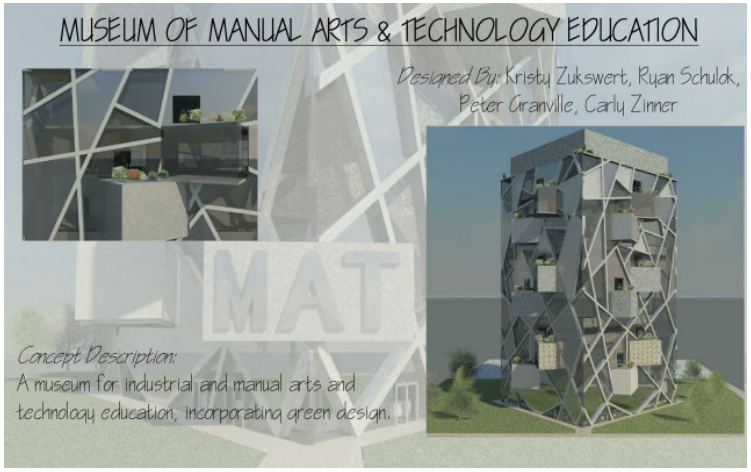
SYNERGIS
Engineering Design Solutions

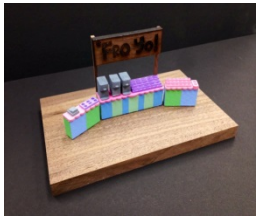
ARCHITECTURAL DESIGN III

TEC603 – Honors – Gr. 11-12 – 5 Credits

The Content:

- Model making- hand, 3D printer, laser
- Design, planning, research, documentation, time management, group work & presentation skills
- Studio style setting
- Students work both independently and collaboratively on design projects





The Experiences:

- New Software
  - 3DStudio Max 2014
  - Sketchbook Designer
  - Adobe CS6 Photoshop, Illustrator
- Architectural competitions (different from prior year)

The Real World Value:

- Prepare for architectural related career paths.

TECHNOLOGY STUDENT ASSOCIATION ®

ARCHITECTURAL DESIGN IV

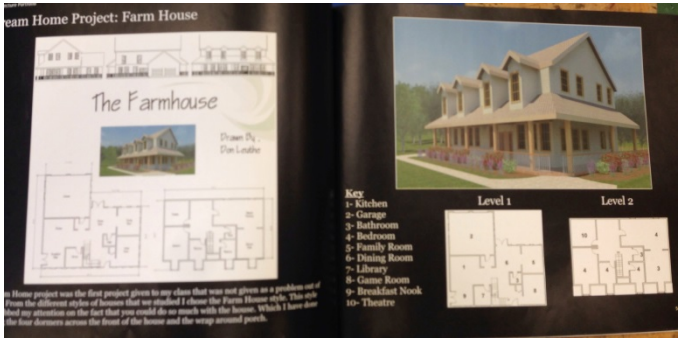
TEC604 – Honors - Gr. 12 – 5 Credits

The Content:

- Plan for life after High School (Trade School, College, University)
- Portfolio Development
- Real Life Projects
- Possible Independent Study

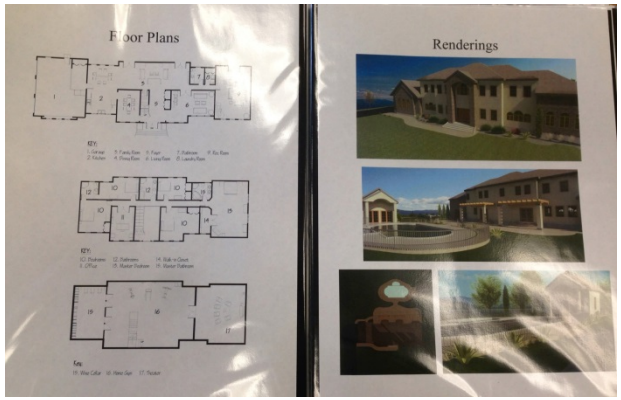
The Experiences:

- New Software
  - Adobe CS6 InDesign
  - Illustrator
- Real world design projects



The Real World Value:

- Prepare for architectural related career paths.



COMPUTER AIDED DRAFTING AND DESIGN

SEQUENCE AND SUMMARY

Department of Technological Studies

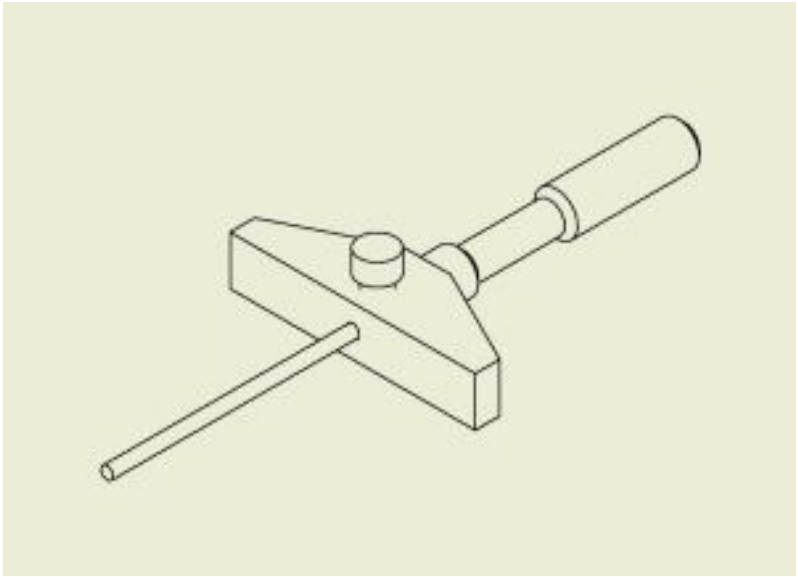
PRINCIPLES OF CADD (2.5 CREDITS)
COMPUTER AIDED DRAFTING AND DESIGN (CADD) I

9th graders interested in ½ year option should take Principles of Engineering Drawing

TEC620 – CP-A – Gr. 10-12 – 2.5 Credits
TEC621 – CP-A - Gr. 9-12 – 5 Credits

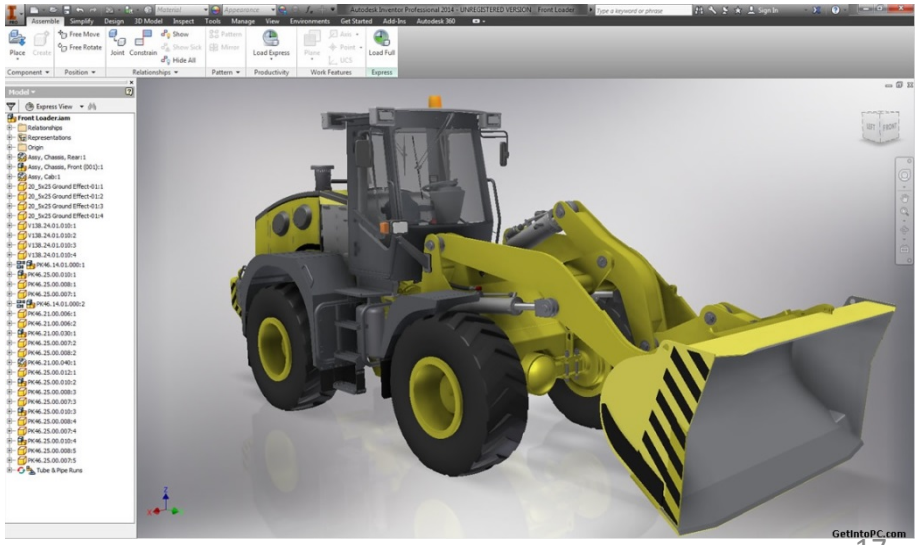
The Content:

- Intro to CAD Software
- Intro to Hand Drafting techniques
  - Care and use of tools and instruments
- Multi-view drawings



The Experiences:

- Completion of several, multi-view hand and CAD drawings



The Real World Value:

- Intro to essential component of most industrial and engineering careers

COMPUTER AIDED DRAFTING AND DESIGN (CADD) II

TEC622 – CP-A - Gr. 10-12 – 5 Credits

The Content:

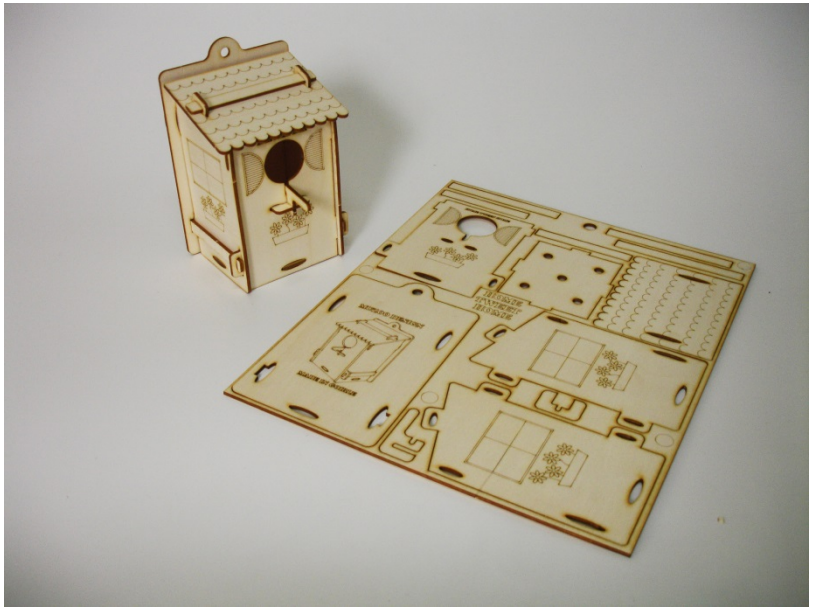
- Mechanical design
- Rapid Prototyping
- Pattern Development
- Solid modeling techniques

The Experiences:

- Continue development of CAD skills
- Rendering and animation of models
- Rapid Prototyping of designs

The Real World Value:

- Draw connections between CAD and industry



COMPUTER AIDED DRAFTING AND DESIGN (CADD) III

TEC623 – HONORS - Gr. 11-12 – 5 Credits

The Content:

- Enhance knowledge in 3D modeling and animation

The Experiences:

- Expand skills in drawing in both an individual and team setting

The Real World Value:

- Potential participation in state, regional, and national competitions

COMPUTER AIDED DRAFTING AND DESIGN (CADD) IV

TEC624 – HONORS – Gr. 12 – 5 Credits

The Content:

- Increased drawing efficiency
- Work with line types, hatch patterns, scripts, slide shows, macros, and shapes

The Experiences:

- Exposure to customizable features of CADD software

The Real World Value:

- Portfolio development for higher education and job interviews

ENGINEERING DESIGN TECHNOLOGY

SEQUENCE AND SUMMARY

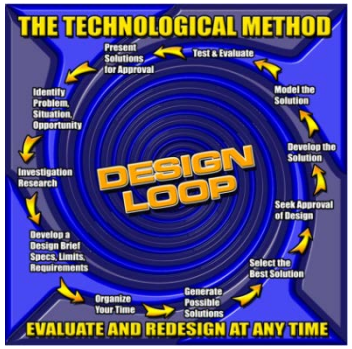
Department of Technological Studies

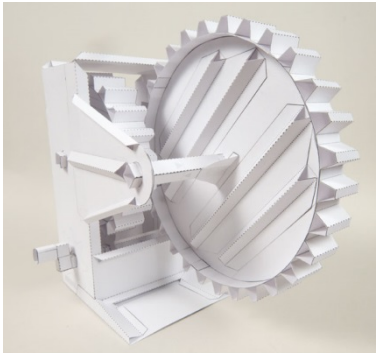
PRINCIPLES OF MECHANICAL MOVEMENT

TEC655 – CP-A - Gr. 9 ONLY – 2.5 CREDITS

The Content:

- Intro to Engineering Design Process
- Paper Engineering
- Mechanical Systems
- Automata
- Structures and Mechanisms





The Experiences:

- Prototyping and modeling with multiple materials
- Students will design and create a mechanical toy/sculpture/device
- Extensive machine and tool usage

The Real World Value:

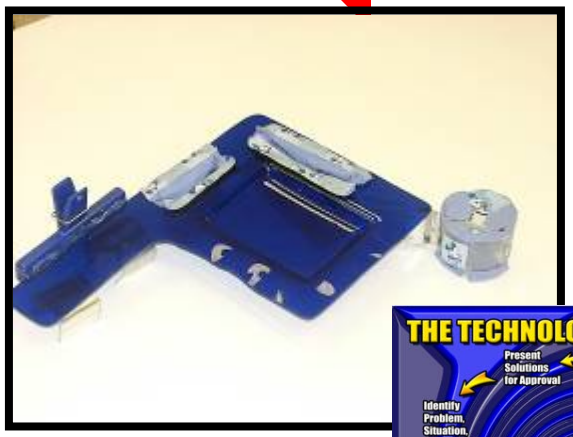
- Focused introduction to machines and tools
- Emphasis on art, design, craftsmanship, repeatability, and mechanical systems
- Exposure to many concepts vital to success within the department

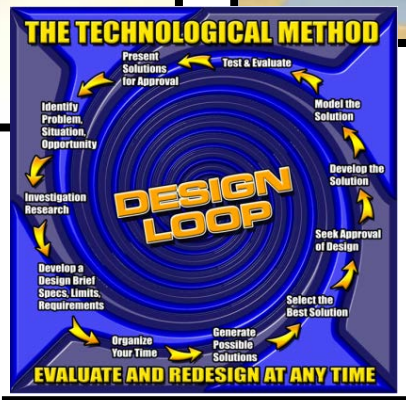
WOMEN IN ENGINEERING

TEC619 – CP –A - Gr. 9-12 – 5 Credits

The Content:

- Intro to the Engineering Design Process
- Structural Systems
- Invention and Innovation
- Interior Design





The Experiences:

- Design and invent a solution to a problem of your choice.
- Field trips: companies and colleges
- Design a home and design the interior
- Multiple design challenges

The Real World Value:

- Enhance problem solving, design, and creative thinking skills
- Connection to industry and professionals in the field
- Opportunity to compete at the state/national level

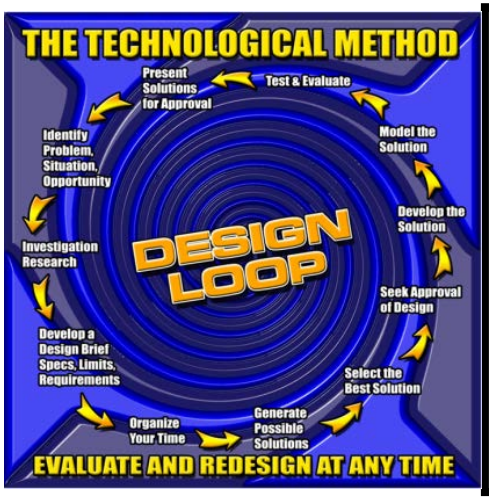
ENGINEERING DESIGN TECHNOLOGY I

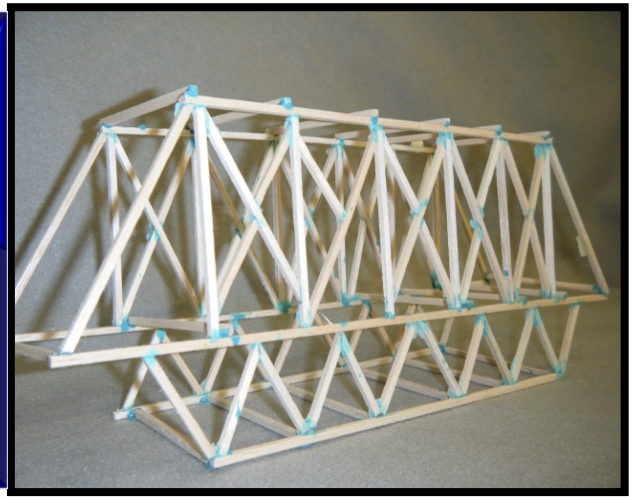
Interested 9th Graders should take Principles of Engineering Design Technology or Principles of Mechanical Movement

TEC631 – CP-A - Gr. 10-12 – 2.5 Credits

The Content:

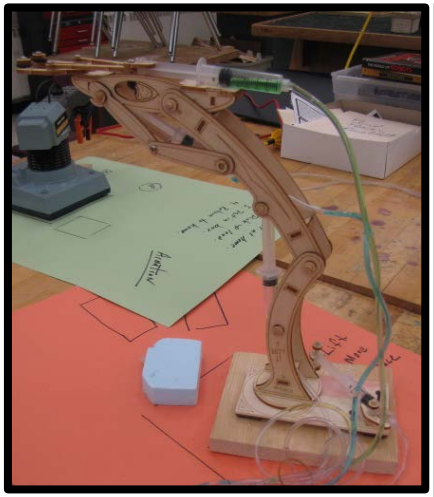
- Intro. To the Engineering Design Process
- Structural Design
- Fluid Power
- Robotics
- Teamwork





The Experiences:

- Design, build and test a bridge for strength
- Design, build and test a fluid controlled robot arm to solve a problem
- Work in teams
- Tools and machines



The Real World Value:

- Acquisition of core STEM principles
- Hands on, minds on learning
- Experience of working with others

ENGINEERING DESIGN TECHNOLOGY II

TEC632 – CP-A / H – Gr. 10-12 – 5 Credits

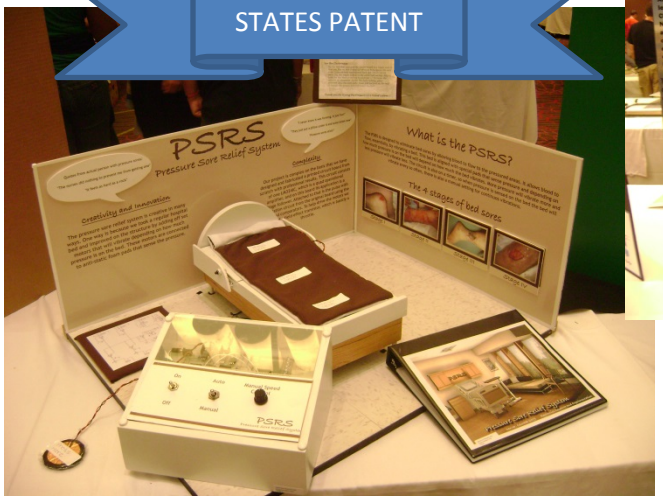
The Content:

- Electronic Systems Design
  - Component identification and manipulation
- Mechanical Advantage / Gear Ratio
- Intro. To Robotics Programming and Design

The Experiences:

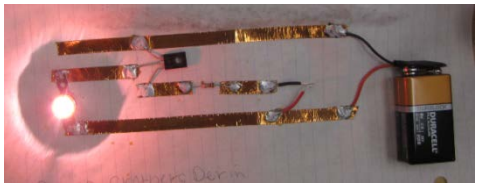
- Design and develop of series of electronic circuits using a variety of components
- Design and develop a working sign applying electronic, structural, and mechanical concepts
- TSA – Engineering Design
- Program, design and develop a driver controlled robot to complete an obstacle course

EARNED A UNITED STATES PATENT



The Real World Value:

- Begin development of a graduation portfolio
- Core understanding of electronics
- Long term commitment to the design and problem solving process
- More time to apply core concepts
- Exposure to robotics and programming languages



ENGINEERING DESIGN TECHNOLOGY III

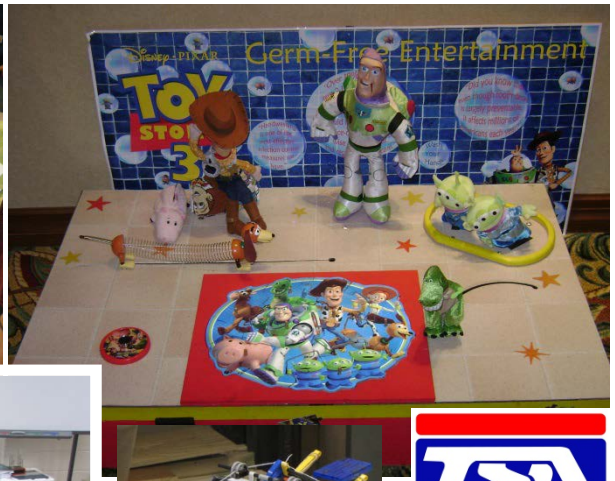
TEC633 – Honors - Gr. 11-12 – 5 Credits

The Content:

Make:

- Individual Accountability
- Advanced robotics programming and design
  - Intro to Autonomous Robotics
  - Intro to Arduino Technology
- Extensive application of mechanical, structural, electronic, and robotics concepts

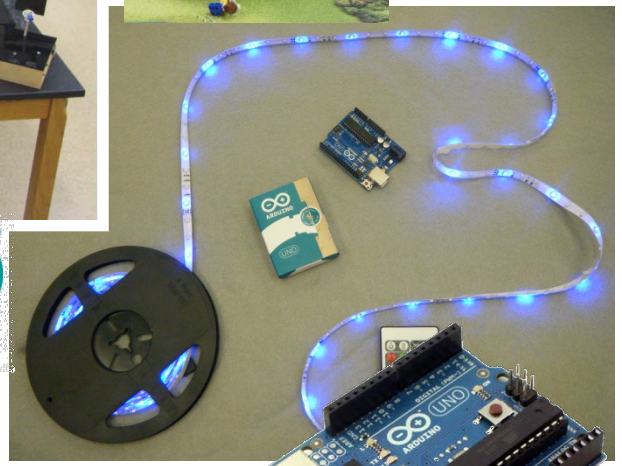
instructables



TSA

The Experiences:

- Design, develop, and PUBLISH a working prototype that reflects your individual personality
- Program, design, and evaluate the autonomous function of multiple robotic devices.
- TSA – Animatronics
- TSA – System Control Technology



ARDUINO

The Real World Value:

- Diverse learning opportunities
- Participation in state and national competitions
- College level STEM experiences
- Extensive experience with robotics and programming languages

ROBOTC

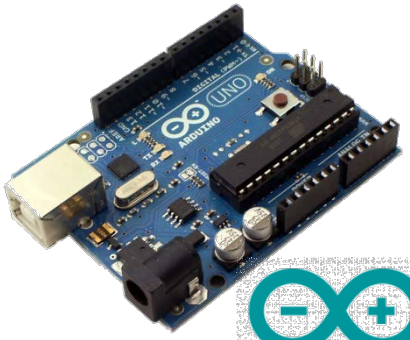
ENGINEERING DESIGN TECHNOLOGY IV

TEC634 – Honors - Gr. 12 – 5 Credits

The Content:

ROBOTC

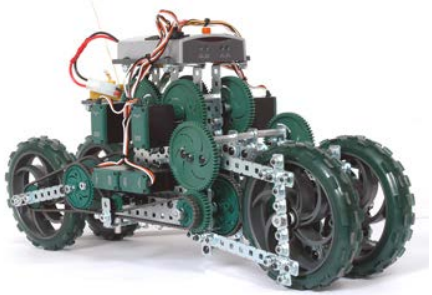
- Leadership and Mentoring Skills
- Career discussions and college application support
- Advanced robotics
- Arduino application and design



ARDUINO

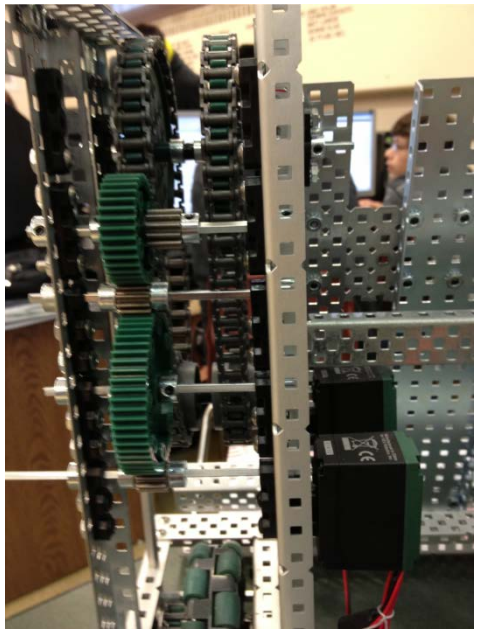
HIGH POINT REGIONAL HIGH SCHOOL
VEX ROBOTICS TEAM
VEX ROBOTICS COMPETITION
TSA
2012-2013
NEW JERSEY
STATE CHAMPIONS

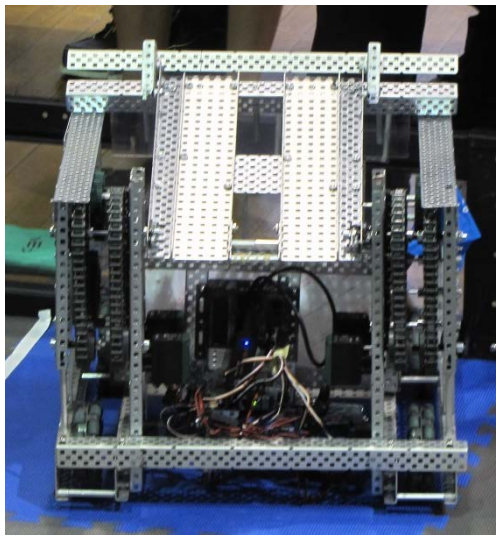
VEX ROBOTICS COMPETITION



The Experiences:

- Design and introduce learning experience for EDT III Students
- VEX Robotics
- Arduino and advanced Computer Programming
- Improving medical robotics through robotics
- Independent study opportunity





instructables

The Real World Value:

- Portfolio of all work completed upon graduation
- Opportunity to serve in leadership capacity
- Mastery of STEM skills in high school
- Potential to acquire industry certifications

Make:

MATERIAL PROCESSING / MANUFACTURING

SEQUENCE AND SUMMARY

Department of Technological Studies

MATERIAL PROCESSING

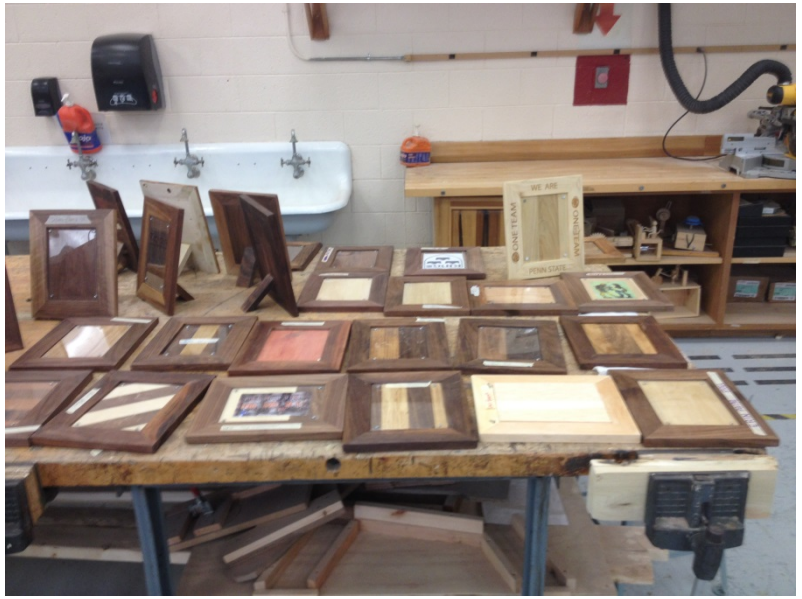
TEC639 – Gr. 9-12 – 5 Credits

The Content:

- Machine Operation
- Craftsmanship
- Accurate Measurement

The Experiences:

- Using multiple materials:
  - Construct an interactive tabletop game.
  - Construct a picture frame.
- Design and produce an age appropriate puzzle.



The Real World Value:

- Hands on problem solving
- Appreciation of diverse materials
- Safety awareness
- Collaboration in an industry setting

MATERIAL PROCESSING I CP-A

TEC638 - Gr. 9-12 – 5 Credits

The Content:

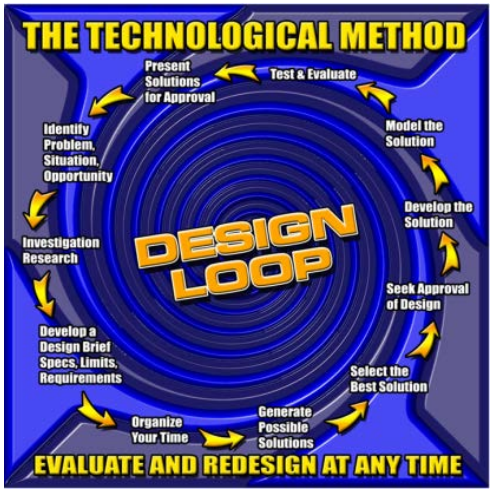
- Introduction to Engineering Design Process
- Machine Operation
- Rapid Prototyping Systems
- Materials Properties
- Elements of Product Design
- Foundations of Manufacturing

The Experiences:

- Using multiple materials:
  - Construct an interactive tabletop game.
  - Construct a picture frame.
- Design, produce, and market an age appropriate puzzle to national retailer.

The Real World Value:

- Exposure to a variety of machines and materials
- Concentration on precision, craftsmanship, and planning



MATERIAL PROCESSING II

TEC640 – CP-A - Gr. 10-12 – 5 Credits

The Content:

- Complex machine operations
- CNC Machine Operations
- Mass Production Techniques
- Industry manufacturing techniques

The Experiences:

- Students will utilize multiple materials to model and prototype solutions to different challenges
- Students will utilize CNC machines for mass production.
- Students will learn the quickest and efficient ways to construct a project.

The Real World Value:

- Exposure to multiple materials and their properties
- Exposure to industry techniques and machines.
- Manufacturing Job Opportunities.

CONSTRUCTION AND MANUFACTURING

TEC643 – CP-A – Gr. 11-12 – 5 Credits

The Content:

- Design a product to sell and make profit.
- Entrepreneurship
- Staining a company within the school
- CNC Manufacturing
- Home Construction Skills

The Experiences:

- Students working together as a group
- Design and creating a company to make profit
- Product Design
- Marketing

The Real World Value:

- Manufacturers in New Jersey account for nearly 8 percent of the total output in the state, employing 6.7 percent of the workforce.

MEDIA TECHNOLOGY

SEQUENCE AND SUMMARY

Department of Technological Studies

MEDIA TECHNOLOGY

TEC72 – Gr. 9-12 – 5 Credits

The Content:

- Intro to the iLife Suite
- Video editing techniques

The Experiences:

- Will combine video, sounds, pictures and text in digital movies

The Real World Value:

- Prepares student with 21st Century Skills in small class size environment

MEDIA TECHNOLOGY I

Interested 9th Graders should take Principles of Media Technology

TEC630 – CP-A – Gr. 10-12 – 2.5 Credits

The Content:

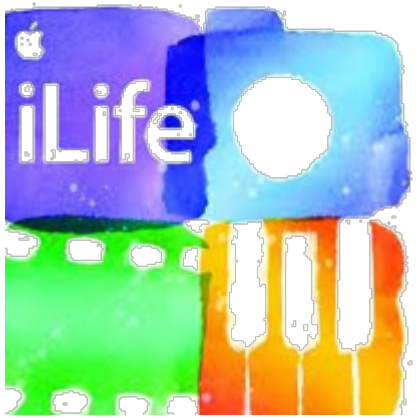
- Processes and operations necessary to produce videos.
- Proper camera operation, script writing, lighting, editing, and directing
- iLife suite applications

The Experiences:

- Moving still images into moving dynamic images
- Work with the core iLife applications
- Create films, publish blogs, web albums, and podcasts

The Real World Value:

- Media rich environment ideal way to connect with young learners
- Cross platform exposure to new technologies



iDVD

MEDIA TECHNOLOGY II

TEC635 – CP-A / H – Gr. 10-12 – 5 Credits

The Content:

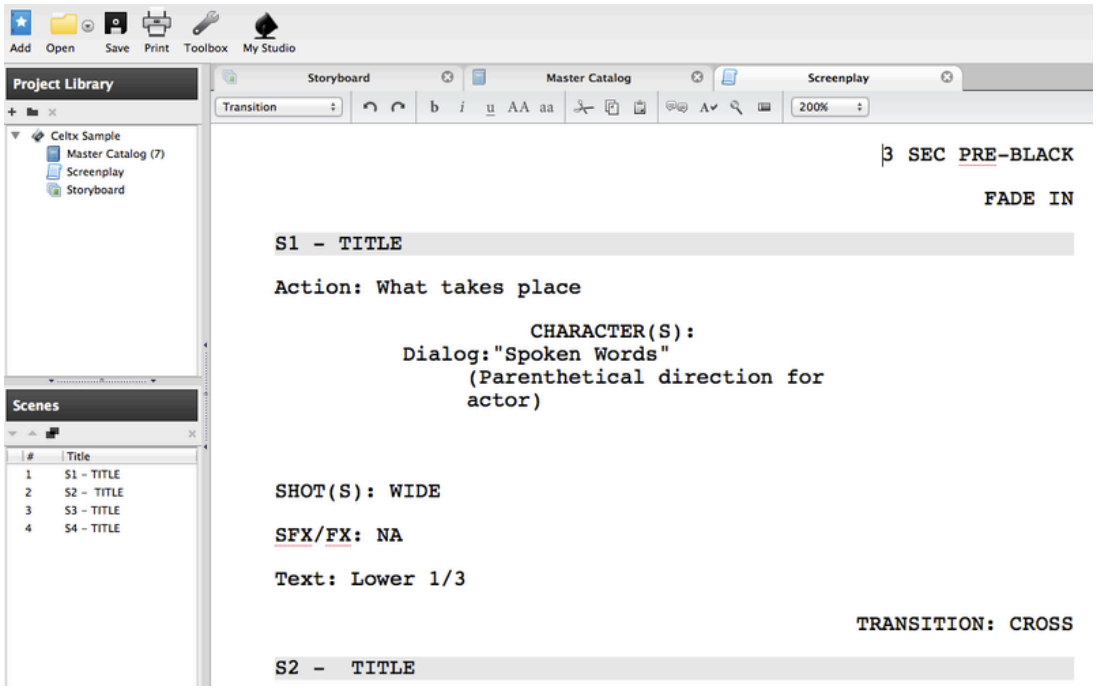
- Advanced techniques of digital video production
  - Three phases of the production process
  - Proper use of equipment
  - Processes used in digital video industry

The Experiences:

- Will produce monthly segments for the “Wildcat Report”
- Will produce music videos, sports highlights films, PSAs, commercials, contest, and various school and community based projects.

The Real World Value:

- Real world production meeting rigid deadlines and client needs



MEDIA TECHNOLOGY III

TEC636 – HONORS - Gr. 11-12 – 5 Credits

The Content:

- Continue development of iMovie and Final Cut Pro skills
- Based on Apple's Official Training Series
- Fundamental concepts and features for Apple's premier editing program

The Experiences:

- Part of the production crew for daily, morning announcements
- Several school and community projects
- Adherence to high standards and rigid deadlines

The Real World Value:

- Customized learning environment with rigor and relevance for the self motivated student

MEDIA TECHNOLOGY IV

TEC637 – HONORS – Gr. 12 – 5 Credits

The Content:

- Opportunity to master skills such as script writing, segment planning, storyboarding, crew and equipment familiarization, producing, researching a topic, keyboarding, writing, editing, teamwork and public speaking.

The Experiences:

- On-going development of high quality, full length video programs for public information broadcasting on cable television
- Students will direct and edit their own productions

The Real World Value:

- Strong teamwork
- Strict adherence to deadlines
- Self discipline

POWER, ENERGY & TRANSPORTATION

SEQUENCE AND SUMMARY

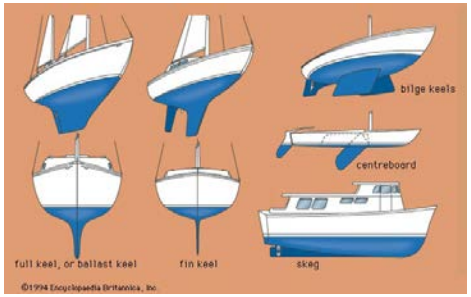
Department of Technological Studies

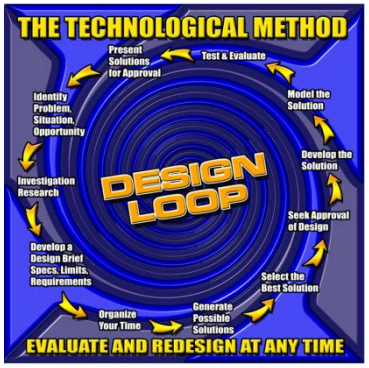
POWER, ENERGY, and TRANSPORTATION I

TEC651 – CP-A – Gr. 9-12 – 5 Credits

The Content:

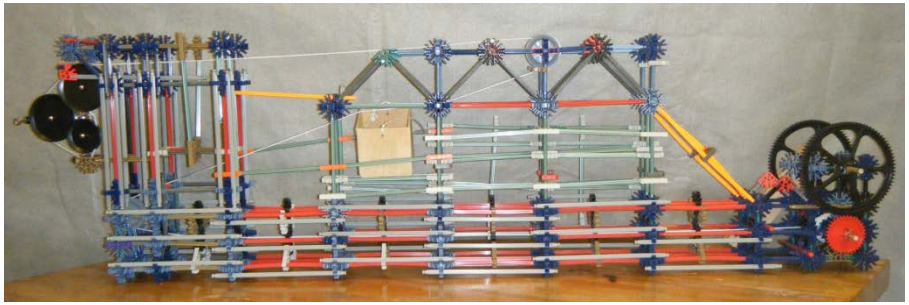
- Intro. To the Engineering Design Process
- Power Systems / Gear Ratio
- Land Transportation
- Alternative Energy – Solar Energy
- Internal Combustion Engines
- Marine Transportation





The Experiences:

- Design and develop a power system that will move the most weight the farthest distance in the shortest period of time
- Design, develop, and evaluate a hybrid vehicle that will travel a specified distance in the shortest period of time over multiple terrains
- Diagnose and run an internal combustion engine
- Design, develop, and evaluate a marine transportation vessel



The Real World Value:

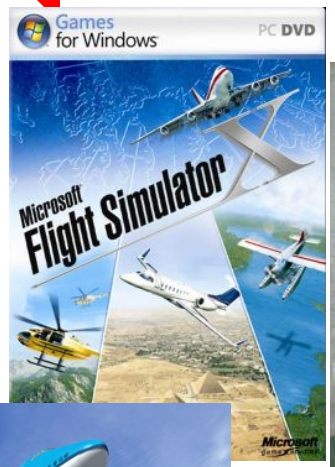
- Acquisition of core STEM principles
- Diverse, expansive curriculum
- Experience of working with others in a collaborative manner
- Hands on, minds on learning

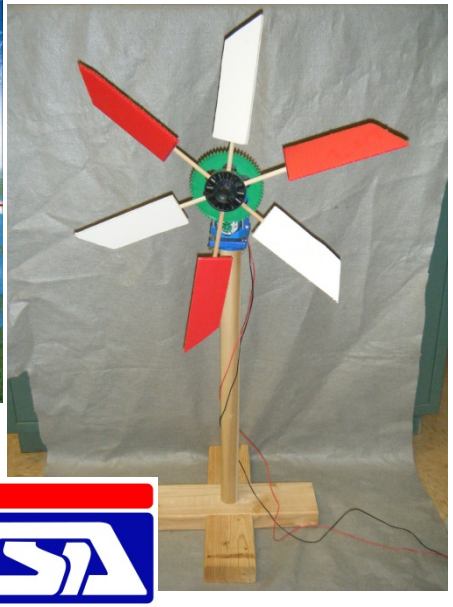
POWER, ENERGY, and TRANSPORTATION II

TEC652 – CP-A – Gr. 10-12 – 5 Credits

The Content:

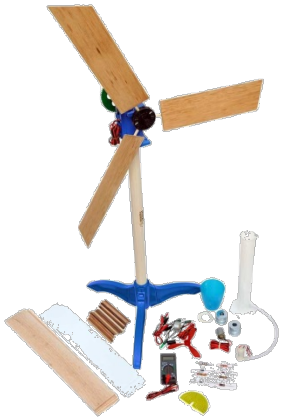
- Principles of Flight
- Aviation Systems and Aircraft Design
- Alternative Energy – Wind and Solar Power
- Structures and Mechanisms





The Experiences:

- Design, develop, control, and evaluate multiple aircraft from diverse materials.
- Immersion in aircraft simulation software
- Design and develop a working prototype that addresses a real world problem applying solar and wind power.
- TSA – Flight Endurance
- Preliminary Trials – Panasonic Design Challenge



The Real World Value:

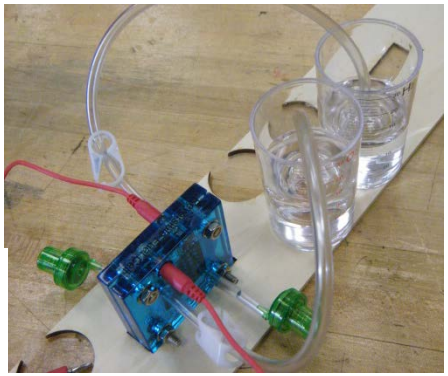
- Reinforcement of core STEM principles
- Unique, focused curriculum with opportunity to complete at state/national level
- Emphasis on aviation and Aerospace Engineering careers
- Begin work on graduation portfolio of all work

POWER, ENERGY, and TRANSPORTATION III

TEC653 – Honors – Gr. 11-12 – 5 Credits

The Content:

- Individual Accountability
- Complex transportation system development
- Alternative Energy – Solar, Wind, and Hydrogen Fuel Cell Power
- Competitive, Statewide Design and Problem Solving Challenges



The Experiences:

- Design, develop, and PUBLISH a working prototype that reflects your individual personality
- Design and develop a Hydrogen Fuel Cell Vehicle for a regional competitive event
- Participate in the Panasonic Creative Design Challenge
- Participate in the Edison Innovation Challenge

Panasonic Creative Design Challenge

Make:

instructables

The Real World Value:

- Diverse learning opportunities
- Participation in regional and state competitions
- College level STEM experiences
- Extensive interaction and feedback from experts in the field
- Enhanced focus on written and oral communication skills; continue work on portfolio

THOMAS EDISON INVENTION CHALLENGE

POWER, ENERGY, and TRANSPORTATION IV

TEC654 – Honors – Gr. 12 – 5 Credits

The Content:

- Leadership and Mentoring Skills
- Career discussions and college application support
- Design opportunities with multiple alternative energies
- Competitive, Statewide Design and Problem Solving Challenges

The Experiences:

- Independent study opportunities
- Using experience from PET III:
  - Design and develop a Hydrogen Fuel Cell Vehicle for a regional competitive event
  - Participate in the Panasonic Creative Design Challenge
  - Participate in the Edison Innovation Challenge

The Real World Value:

- Portfolio of all work completed upon graduation
- Opportunity to serve in leadership capacity
- Mastery of STEM skills in high school
- Mastery of written and oral communication skills
- Networking with colleges and experts in the field

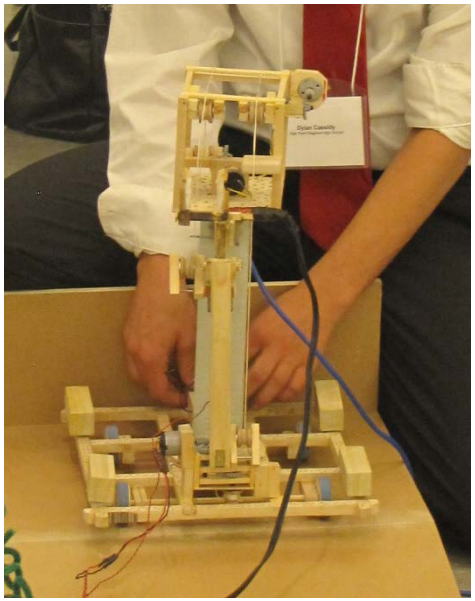
Make:

instructables

THOMAS EDISON INVENTION CHALLENGE

Panasonic Creative Design Challenge

TransOptions



PSE&G