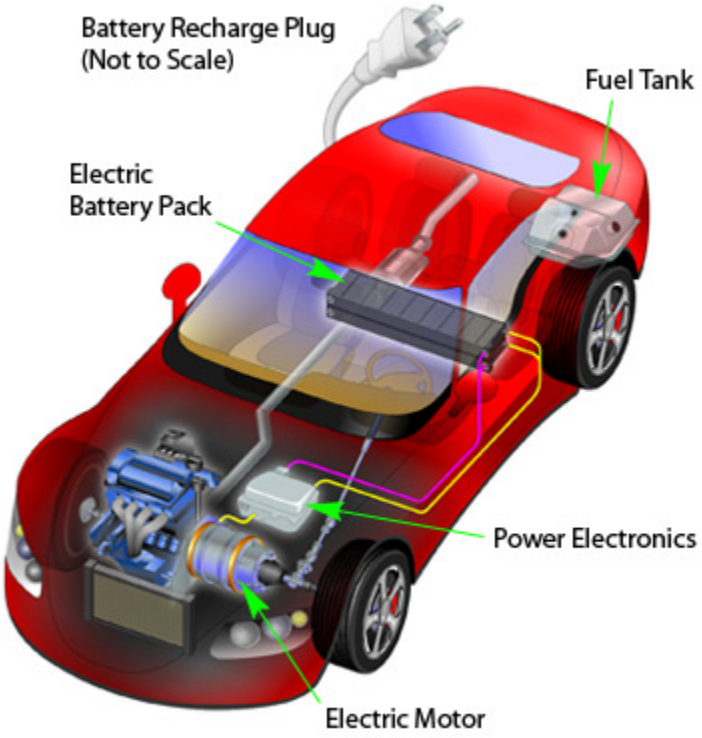
RTCC

Power & Sustainable Technology



Program Syllabus 2011-2012

Randolph Technical Career Center
17 Forest Street
Randolph, VT 05060

Power & Sustainable Technology

Instructor: Ian Blackmer **Embedded Credit:** Science

Program Description:

The Power & Sustainable Technology program provides students with the traditional background skills associated with mechanics, welding and fabrication. It couples these skills with the study of alternative energy systems, efficiency and sustainability.

These skills and knowledge allow students to explore the career connections with:

- Renewable energy production
- Biomass and sustainable forest practices
- Energy crops and sustainable farm practices
- Alternative vehicle fuels
- Engine performance
- Welding and fabrication
- Waste management and materials reuse
- Water conservation
- Green economics
- Home performance and energy efficiency
- Environmental compliance

The students will utilize scientific and practical methods to gain insight into the solutions for pressing local and global environmental concerns.

The Power & Sustainable Technology program provides foundational skills and knowledge coupled with co-operative work experience, job shadow opportunities, and college exploration. This program enables students to gain the necessary background to obtain entry-level employment in these fields and/or pursue post-secondary education.

Unit areas of study include:

- Alternative/Renewable Energy Systems
- Earth/Solar System Science
- Energy Efficiency and Conservation
- Exploring Energy
- Fundamentals of Electricity
- Industrial Shop Safety
- Technical Math
- Technical Reading
- Welding and Fabrication
- Work Place and Career Skills

Program of Studies Components:

Recommended courses and activities students should complete prior to enrolling in this program:

- 2 English credits
- 2 math credits (embedded math available in program for 3rd math credit)
- 2 social studies credits (3rd social studies available at RTCC)
- 2 science credits
- Physical education requirements
- Arts requirement should be completed
- Health requirement should be completed

Credit available through program:

- Embedded science
- Practical art, if required and approved by sending school
- English
- Other graduation requirements are available through companion courses at RUHS
- Community service hours

Tech project (replaces senior project for sending school)

Articulation Agreements and Dual Enrollment Courses available:

There are currently no articulation agreements or dual enrollments available.

Students completing the "Introduction to College Studies" can earn a voucher for three college credits accepted at any Vermont State College. Additionally students whose academic skills qualify them for the "Fast Forward" program provides a voucher for three college credits accepted at any Vermont State College.

Post-secondary Educational Opportunities:

Advanced Welding Institute, S. Burlington, Vermont
Clinton Community College, Clinton New York
Community College of Eastern Maine
Community College of Vermont
Kennebec Valley Community College
New Hampshire Technical College
Ohio Technical College
Suny Cobleskill
Vermont Technical College
Universal Technical Institute

The Power and Sustainable Technology program provides a foundation for application to any colleges and universities with programs related to renewable energy production, sustainable diversified agriculture, electrical systems, vehicle repair, welding and fabrication

Industry Recognized Credentials:

- The Power and Sustainable Technology program is in the process of, under the guidance of a Certified Weld Inspector (CWI) implementing a Entry-Level Welder Qualification and Welder Certification

- Students are required to participate in a VOSHA 8 hour jobsite safety-training program.

Course Objectives:

1. Learn and practice safety skills associated with an industrial shop setting

2. Learn and practice organizational and workplace skills and employability traits

3. Learn and practice technical skills associated with vehicle and equipment maintenance and repair, welding and fabrication

4. Gain a fundamental understanding of alternative energy systems, efficiency, and renewable resources

5. Learn and practice the technical skills associated with installing solar thermal and photovoltaic energy systems

6. Develop an understanding of sustainability as applied on a local and global scale

7. Gain a fundamental understanding of economics of "being Green" on a personal and global scale

Course Expectations:

1. Students will act in a safe manner and practice workplace safety

2. Students will exhibit respect for self, instructor, team, and others. Be nice and express differences of opinion in a respectful manner!

3. Instructor will encourage and expect independent thinking and curiosity

4. Instructor will expect student self-initiative and motivation

5. Students are expected to be willing to learn!

Grading protocol is as follows:

Area of Responsibility & Learning	**Weight Towards Grade**
Quizzes, tests, presentation projects, and homework	40%
Demonstration of positive career skills: safety, curiosity, willingness to learn, initiative and motivation, positive attitude, problem solving, team work	40%
Practical application of technical skills	20%

Total	100%

You can expect, on average, for every interim and quarter marking period:

(40) Work assignments @ 2.5 points each = 100 point
Check + 2.5
Check 2.0
Check - 1.5

(5) Quizzes @ 20 points each = 100 point

(2) Tests @ 50 points each = 100 point

(2) Presentation projects @ 50 points each = 100 point

Workplace Skills Assessment: **(4)** for every interim and quarter marking period

Workplace Skills Weekly Check Sheet

Student: _____ Week Ending: _____

1=not there yet 2=improving 3=average 4= proficient 5=excelling!

Workplace Competency	Assessment	Teacher's Feedback
Treats others with respect	1 2 3 4 5	
Follows safety rules	1 2 3 4 5	
Focuses on classroom and lab activities and minimizes distractions	1 2 3 4 5	
Follows instructor's directions/cooperative and asks for instruction when not busy or when needing assistance	1 2 3 4 5	
Is self motivated and requires little supervision, responsible	1 2 3 4 5	
Friendly attitude and disposition-works well with others	1 2 3 4 5	
Organized and prepared for class and shop	1 2 3 4 5	
Utilizes computers and cell phones appropriately as workplace tools.	1 2 3 4 5	
Stays on task, completes tasks **and cleans up**	1 2 3 4 5	
Avoids inappropriate language.	1 2 3 4 5	
TOTAL	/=50 x 2wt =100	

Technical Skills Assessment: **(4)** for every interim and quarter marking period

Technical Skills Weekly Check Sheet

Student: _____ Week Ending: _____

1=not there yet 2=improving 3=average 4= proficient 5=excelling!

Workplace Competency	Assessment	Teacher's Feedback
Follows safety rules and uses appropriate PPE	1 2 3 4 5	
Focuses on lab / work activities	1 2 3 4 5	
Well organized, tidy and **CLEAN** workspace	1 2 3 4 5	
Takes care not to damage materials and/or tools	1 2 3 4 5	
Utilizes service manuals and resources to gather information	1 2 3 4 5	
Uses correct tool for the job	1 2 3 4 5	
Uses a well thought out troubleshooting process	1 2 3 4 5	
Uses correct fasteners and appropriate torque	1 2 3 4 5	
Keeps accurate records of work performed and parts used (Work Order)	1 2 3 4 5	
Devotes adequate time for thorough clean up in shop area	1 2 3 4 5	
TOTAL	/50 =	

Scope and Sequence:

Administrative and Business skills

1. work with customers to obtain information needed for service work
2. transfer data to Repair orders
3. estimate costs of work needed (materials & labor)
4. locate materials using computers, catalogs and parts stores
5. maintain records
6. make and receive phone calls
7. complete communication with customer from beginning to end of projects

Perform Workplace Safety Skills

1. use all protective attire including glasses, clothing, shields, apron, ear protection and all safety equipment
2. understand unsafe working conditions/actions and correct reporting procedures
3. understand hazardous materials and how to handle (MSDS)
4. understand emergency and fire procedures
5. understand first aid/CPR procedures
6. understand shop & equipment safety procedures/rules

Perform Computer Technology Applications

1. use correct computer applications
2. use parts inventory programs
3. enter data into computer programs
4. perform word processing
5. use service related computer programs

Perform General Shop Skills

1. perform metric and English measuring and conversions
2. select proper fasteners for specific projects
3. perform threading and thread repairing
4. use portable and stationary grinders
5. use all types of pneumatic tools
6. use and understand use of hand drills as well as stationary drill presses
7. use and understand torque wrenches, feeler gauges, micrometers and dial indicators

Perform Oxy-fuel and Arc Welding Skills

1. understand proper use and adjustments of oxy-fuel torches and welders
2. understand layout and preparation of metal for cutting and welding
3. weld, heat and braze with torches
4. understand identification of metals
5. test weld for strength

Equipment Operation Specialization

Operate and Adjust Powered Equipment

1. perform correct and safe operations of equipment
2. perform pre checks

Agricultural Power Mechanics Specialization

1. understand gasoline and diesel engine systems
2. diagnose engines
3. disassemble and reassemble engines
4. perform reconditioning of major engine components
5. make correct engine adjustments to specifications

Gas, Diesel and LP Gas Fuel Systems

1. understand location and operation of components
2. bleed fuel systems
3. perform maintenance of systems
4. perform repairs on systems
5. perform diagnosis of systems

Cooling and Lubrication System

1. understand cooling and lubrication systems
2. understand procedures involved in repairing both systems and using correct fluids in systems
3. perform, maintain, ace and repair procedures for systems including diagnosing systems

Power Train Systems

Transmissions and Power Drive Systems

1. understand procedures and adjustments for clutches
2. understand torque converters
3. understand linkage maintenance and adjustments
4. perform hydrostatic transmission repairs
5. diagnose and repair CV and universal joints
6. adjust and repair chains, sprockets and belts

Tire and Tracks

1. make tire pressure adjustments
2. repair/replace tire tubes
3. inspect, adjust, lubricate and repair tracks

Brake Systems

1. understand air and hydraulic brake systems
2. diagnose, repair and adjust brake systems

Hydraulic Systems

1 understand hydraulic systems
2 understand fluids and correct uses
3 understand components and correct repair procedures
4 diagnose and repair hydraulic systems

Small Engine

1 understand two and four stroke engines
2 understand the internal engine systems (lubrication, compression, governor, fuel, cooling and ignition)
3 understand correct fluids in 2/4 stroke engines
4 understand and perform adjustments on engine systems according to specifications
5 perform engine overhaul and use correct tools/devices.
6 understand service and repair procedures for all engine systems

Electrical Systems

1 understand polarity, Ohms, Amps, Volts, AC and DC
2 inspect/correct electrical systems (lighting, warning, starting, charging)
3 repair and adjust electronic systems

Sensing and Electric Controls

1 understand basic principles of all electronic devices
2 repair/replace electronic devices