

Riverside University High School

Course: PLTW Principles of Engineering Room: 021

Instructor: Ms. Steinhorst

School wide Mission: Riverside University High School is committed to being a diverse multicultural urban high school with a primary emphasis on the preparation of students for success in post-secondary educational settings. The shared efforts of students, parents, and staff will result in lifelong learners and productive citizens in the global community.

COURSE DESCRIPTION:

Principles Of Engineering (POE) is a high school-level survey course of engineering. The course exposes students to some of the major concepts that they will encounter in a post-secondary engineering course of study. Students have an opportunity to investigate engineering and high tech careers. POE gives students the opportunity to develop skills and understanding of course concepts through activity-, project-, and problem-based (APPB) learning. Used in combination with a teaming approach, APPB learning challenges students to continually hone their interpersonal skills, creative abilities, and problem solving skills based upon engineering concepts. It also allows students to develop strategies to enable and direct their own learning, which is the ultimate goal of education.

To be successful in POE, students should have a strong base in mathematics and science or be willing to work to catch up (including staying for tutoring). Students will employ engineering and scientific concepts in the solution of engineering design problems. Students will develop problem-solving skills and apply their knowledge of research and design to create solutions to various challenges. Students will also learn how to document their work and communicate their solutions to their peers and members of the professional community.

MATERIALS:

Students need to have the following supplies daily:

- ✓ 3 ring binder divided for each standard
- ✓ Pencils and pens
- ✓ Erasers
- ✓ Engineering Notebook or gridded composition notebook
- ✓ Calculator (at least a scientific calculator), preferred: TI-83, TI-84, or Casio Graphing Calculators
- ✓ USB drive (must be large enough to hold all the projects and pictures of the semester)
- ✓ Earbuds, headphones, etc. (ONLY for educational use)

EXPECTATIONS:

Be responsible:

- In class and ready to learn before bell rings
- Put away educational distractions (phones, etc.)
- Have materials needed for learning
- Participate and be on task
- Work to potential
- Put garbage in trash
- No food, candy, or drink in classroom (except water)

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Be Respectful:

- Use appropriate language
- Treat all property with care (do not vandalize, steal, misuse, and pick up after yourself)
- Demonstrate appropriate school behavior, including academic integrity

Be Safe

- Follow safety policy
- Follow staff directives
- Keep all body parts to yourself
- Properly store belongings (out of aisles, in your bag, etc.)
- Follow school and classroom dress code
- Follow all school and classroom rules

ELECTRONICS POLICY: Students are NOT to plug in their electronics (except when curriculum requires) into any outlet, computer, etc. in Room 21. Students are also not permitted to use their electronics during class (unless asked to my school employee). If there is an emergency, please contact the office (414) 906-4900. If a student fails to follow this policy, they will be...

1. Warned and asked to securely store in their bag or locker
2. Confiscation of electronic device for class period
3. (if chronic) Confiscation for school day
4. Contact parent for meeting

COMPUTER AND SHOP LAB RULES:

To participate in the shop portion of this course, student MUST have a signed Shop Safety Contract

- **No** food, drinks, or gum
- Classroom phone is **not** for student use
- **No** gaming of any type or going on sites that do not pertain to this course
- **No** Bullying
- Do **NOT** insult another students thoughts or ideas
- Do **not** write on furniture, equipment, or materials at any time!

CONSEQUENCES:

If a student fails to meet any of the above expectations, any of the following can occur:

- ✓ Verbal warning
- ✓ One on one conference with student
- ✓ Written assignment based on offense
- ✓ Phone call to parent or guardian
- ✓ Office referral
- ✓ Meeting with parent or guardian to discuss the situation and remedies

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CLASSROOM ROUTINES:

Homework/Class Work Turn-in: Place classroom work in bin at the front of the room. Unfinished work may be taken home to finish, unless other-wise noted.

Engineer Notebook Turn-in: Turn-in your Engineer's Notebooks in black crate in front of room. Teacher will grade them frequently throughout the school year. This is a large portion of your grade. Teacher may or may not announce a reminder to turn-in notebook. It is the student's responsibility to know when and where to turn it in. Write down homework from white board daily.

Hall Pass: Ask for permission, fill out the clip board at the front of the room, fill in appropriate blanks on hall pass form, give to teacher to initial. Go to destination on pass and return to class quickly.

Questions or Comments: Always raise hand unless other-wise noted.

Stop Work and Look Up: When teacher tells you to stop working, students are to stop working immediately and look up at the teacher. It is often times hard to stop work, but it has to be done in a timely manner.

Shop/Lab: In the shop, students are to be on their best behavior. There are many tools and equipment in the lab and "horse-play" is not acceptable at any time. Shop rules will be presented when we move into the shop for an activity.

In the Computer Lab, students are also to be on their best behavior and stay on task. Since each student is assigned to a specific computer, any damage to assigned computer will be added to your school fees. Therefore, if you see damage to the computer or area near the computer, report it to the teacher immediately.

ASSIGNMENTS: Students will be expected to participate in class and outside of class in practice assignments and lessons. These can range from watching a video on YouTube to book work. Students are expected to complete all out of class assignments since they help to formulate knowledge and are part of their project based grade. Out of class practice assignments can be expected at least three times a week.

GRADING:

The content of this course will be broken down into main content standards with sub-standards or objectives. Within each standard, assessments will be used to create evidence of understanding level of each substandard or objective. Three evidence pieces comprise a substandard or objective. These objectives will be graded using the proficiency scale below (AD, PR, BA, MI, O). As new pieces of evidence in each standard are collected through tests, projects, portfolios, presentations, etc., grades can be replaced. This ensures that the final grade reflects the current knowledge of the student.

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Grade	Meaning of Grade: The student...
Advanced (AD)	<ul style="list-style-type: none">• Exhibits exceptional MASTERY or above expectations of the objectives consistently.• Understands and can extend knowledge past what is learned in class• Understands and solves problems with no errors• EXCEEDS expectations• Equal to A (90-100%)
Proficient (PR)	<ul style="list-style-type: none">• Provides evidence of mastery of objectives• Understands at learned level or makes errors when extending knowledge past learned level• MEETS expectations• Equal to B or C (70-89%)
Basic (BA)	<ul style="list-style-type: none">• Provides evidence of understanding of the objectives at the beginning level• Almost understands the objectives• Makes many conceptual errors due to the level of understanding• Just BELOW expectations• Equal to D (60-69%)
Minimal (MI)	<ul style="list-style-type: none">• Attempts task but provides little or no evidence of understanding of the objectives.• Emergent understanding of the objectives• Makes major conceptual errors due to the level of understanding• BELOW expectations• Equal to U (50-59%)
No Evidence (O)	<ul style="list-style-type: none">• Makes NO attempt to provide evidence of understanding of the objectives• (or) Plagiarized or cheated (demonstrating NO evidence or little to show understanding of their own)• (or) did not provide evidence due to being absent

Since each standard is equally weighted and all sub standards average together as the standard, the average of all of the standards converted into a letter grade by Infinite Campus, will constantly be in flux and until the end of each semester, all grades are “in progress.” Therefore, evidence recorded into a standard with less sub standards will create a larger impact upon the overall grade.

REDO or REVISION: To retake or revise evidence, students must show evidence of completion of practice assignments, because practice is how students improve their understanding. Redoing a test or quiz must be done during after school office hours or on an “Amnesty” day.

AMNESTY DAYS: (Semester 1) September 29, December 11; (semester 2) February 22, May 10

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STANDARDIZED TESTING: Star Testing will take place sometime during the following windows of time. (Fall) 8/21-9/8, (winter) 1/8-1/26, (Spring) 4/16-5/4. The STAR test provides information about student growth and achievement with automatic scoring for instant feedback. ACT Aspire will take place during the window of 4/9-5/11. ACT Aspire assesses student readiness and connects student growth to college and career readiness.

FINAL EXAMS: All students take course final assessments at the end of semesters 1 and 2. Students that have demonstrated proficiency (letter grade of 'B' or higher) in a course and have met the following criteria will be exempt from the final assessment for the course.

The criteria for students to exempt from the Course Final Assessment are:

1. Must demonstrate proficiency (Letter grade of 'B' or higher)
2. Have 95% attendance or higher in the course (No more than 4 excused absences)
3. No unexcused absences
4. Off the Unfinished Business List (fees and fines)

ACADEMIC DISHONESTY: Whether practice or evidence, academic dishonesty (cheating or plagiarism) is not tolerated. Students are expected to do their own work. Therefore, the consequence of dishonesty is a zero or no credit AND a written statement (with supporting arguments) about why academic dishonesty is not tolerated, as well as (if evidence) a meeting with parent/guardian to remedy the situation. Additionally, if a student is academically dishonest for any evidence piece, their only opportunity to redo/ replace their "O" is to take a test with the teacher during office hours.

Additionally, if during test or quiz (even when they are done) a student:

- Has an **electronic device**, other than a calculator
- Is taking or disrupting the testing environment
- Is using another student's work/notes

They will be referred to administration, earn NO CREDIT on that test or quiz, and will need to make it up on their own time.

ABSENCES or TARDIES: After an absence, it is the responsibility of the student to request any make-up assignments after an absence, while most assignments will be conveniently located in the file cabinet or online on google classroom, assessments may require the student to take more initiative. If a student misses an assessment due to an EXCUSED absence, then the assessment may be made up during office hours or by appointment. However, an UNEXCUSED, including not being granted entry due to excessive tardiness (more than 10 minutes), student will need to schedule a student-teacher conference to discuss a solution to skipping or being tardy to class before being issued the assessment.

If a student is more than 5 minutes late to class on a non-assessment day without teacher permission or a pass, then the student will be directed towards the tardy room and marked absent.

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STANDARDS AND COMPETENCIES COVERED:

Unit 1 – Energy and Power/Mechanisms	Unit 2 – Materials and Structure/Statics	Unit 3 – Control Systems/Machine Control	Unit 4 – Statistics and Kinematics/Statistics
<ul style="list-style-type: none"> • Differentiate between engineering and engineering technology. • Conduct a professional interview and reflect on it in writing. • Identify and differentiate among different engineering disciplines. • Measure forces and distances related to mechanisms. • Distinguish between the six simple machines, their attributes, and components. • Calculate mechanical advantage and drive ratios of mechanisms. • Design, create, and test gear, pulley, and sprocket systems. • Calculate work and power in mechanical systems. • Determine efficiency in a mechanical system. • Design, create, test, and evaluate a compound machine design. 	<ul style="list-style-type: none"> • Create free body diagrams of objects, identifying all forces acting on the object. • Mathematically locate the centroid of structural members. • Calculate moment of inertia of structural members. • Differentiate between scalar and vector quantities. • Identify magnitude, direction, and sense of a vector. • Calculate the X and Y components given a vector. • Calculate moment forces given a specified axis. • Use equations of equilibrium to calculate unknown forces. • Use the method of joints strategy to determine forces in the members of a statically determinate truss. 	<ul style="list-style-type: none"> • Create detailed flow charts utilizing a computer software application. • Create control system operating programs utilizing computer software. • Create system control programs that utilize flowchart logic. • Choose appropriate inputs and output devices based on the need of a technological system. • Differentiate between the characteristics of digital and analog devices. • Judge between open and closed loop systems in order to choose the most appropriate system for a given technological problem. • Design and create a control system based on given needs and constraints. 	<ul style="list-style-type: none"> • Calculate the theoretical probability that an event will occur. • Calculate the experimental frequency distribution of an event occurring. • Apply the Bernoulli process to events that only have two distinct possible outcomes. • Apply AND, OR, and NOT logic to probability. • Apply Bayes’ theorem to calculate the probability of multiple events occurring. • Create a histogram to illustrate frequency distribution. • Calculate the central tendency of a data array, including mean, median, and mode. • Calculate data variation, including range, standard deviation, and variance.
<p>II. Energy Sources</p> <ul style="list-style-type: none"> • Identify and categorize energy sources as nonrenewable, renewable, or inexhaustible. • Create and deliver a presentation to explain a specific energy source. • Summarize and reflect upon information collected during a visit to a local utility company. • Define the possible types of power conversion. • Calculate work and power. • Demonstrate the correct use of a digital multimeter. • Calculate power in a system that converts energy from electrical to mechanical. • Determine efficiency of a system that converts an electrical input to a mechanical output. • Calculate circuit resistance, current, and voltage using Ohm’s law. • Understand the advantages and disadvantages of parallel and series circuit design in an application. 	<p>II. Material Properties</p> <ul style="list-style-type: none"> • Investigate material properties related to a common household product. • Conduct investigative non-destructive material property tests on selected common household products. Property testing conducted to identify continuity, ferrous metal, hardness, and flexure. • Calculate weight, volume, mass, density, and surface area of selected common household product • Identify the manufacturing processes used to create the selected common household product. • Identify the recycling codes. • Promote recycling using current media trends. specific 	<p>II. Fluid Power</p> <ul style="list-style-type: none"> • Identify utilize fluid power. • Identify and explain basic components and functions of fluid power devices. • Differentiate between the characteristics of pneumatic and hydraulic systems. • Distinguish between hydrodynamic and hydrostatic systems. • Design, create, and test a hydraulic device. • Design, create, and test a pneumatic device. • Calculate values in a fluid power system utilizing Pascal’s Law. • Distinguish between pressure and absolute pressure. • Distinguish between temperature and absolute temperature. • Calculate values in a pneumatic system, utilizing the perfect gas laws. • Calculate flow rate, flow velocity, and mechanical advantage in a hydraulic system. devices that 	<p>II. Kinematics</p> <ul style="list-style-type: none"> • Calculate distance, displacement, speed, velocity, and acceleration from data. • Design, build, and test a vehicle that stores and releases potential energy for propulsion. • Calculate acceleration due to gravity given data from a free fall device. • Calculate the X and Y components of a projectile motion. • Determine the angle needed to launch a projectile a specific range given the projectile’s initial velocity.

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<p>III. Energy Applications</p> <ul style="list-style-type: none"> • Test and apply the relationship between voltage, current, and resistance relating to a photovoltaic cell and a hydrogen fuel cell. • Experiment with a solar hydrogen system to produce mechanical power. • Design, construct, and test recyclable insulation materials. • Test and apply the relationship between R-values and recyclable insulation. • Complete calculations for conduction, R-values, and radiation. 	<p>III. Material Testing</p> <ul style="list-style-type: none"> • Utilize a five-step technique to solve word problems. • Obtain measurements of material samples. • Tensile test a material test sample. • Identify and calculate test sample material properties using a stress strain curve. 	<p>III Control Systems/Design Problem</p> <ul style="list-style-type: none"> • Brainstorm and sketch possible solutions to an existing design problem. • Create a decision-making matrix for a design problem. • Select an approach that meets or satisfies the constraints provided in a design brief. • Create a detailed pictorial sketch or use 3D modeling software to document the best choice, based upon the design team's decision matrix. • Present a workable solution to the design problem. 	
<p>IV. Energy and Power/Design Problem</p> <ul style="list-style-type: none"> • Brainstorm and sketch possible solutions to an existing design problem. • Create a decision-making matrix for a design problem. • Select an approach that meets or satisfies the constraints provided in a design brief. • Create a detailed pictorial sketch or use 3D modeling software to document the best choice, based upon the design team's decision matrix. • Present a workable solution to the design problem. 	<p>IV Materials and Structures/Design Problem</p> <ul style="list-style-type: none"> • Brainstorm and sketch possible solutions to an existing design problem. • Create a decision making matrix for the design problem. • Select an approach that meets or satisfies the constraints given in a design brief. • Create a detailed pictorial sketch or use 3D modeling software to document the best choice, based upon your team's decision matrix. • Present a workable design solution. 		

LITERACY DAYS: All students are expected to actively participate in all literacy opportunities from Khan Academy to special periods where other content areas with an arts focus. Students who actively participate have shown more academic growth on standardized assessments than those that do not. Doing well on standardized assessments or improving academic skills is beneficial in terms of being more knowledgeable, having more career opportunities, getting scholarships, etc.

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Contact Information:

School Telephone #: 414.906.5195

Email (best method): steinhjy@milwaukee.k12.wi.us

Please sign up for: Remind (see attached paper) or

Period 5: remind.com/join/pltwPOE5

Period 7: remind.com/join/pltwPOE7

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Guardian Contact Form

All students are required to return this form!

Print Student's Full Name and Period

Father's Name and Phone #: _____

Mother's Name and Phone #: _____

Guardian of Student (if not parents and Phone #: _____

E-mail Address: _____

I have read and understand the classroom rules and know what is expected.

Parent Signature and date

Student Signature and date

Any comments the instructor should know:

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Photo Release Form

All students are required to return this form!

Print Student's Full Name

I hereby grant the Riverside High School's Project Lead the Way (PLTW)® Engineering Program permission to use my child's photograph in any and all of its publications, including website entries, without payment or any other consideration. I understand and agree that these materials will become the property of Riverside High School's Project Lead the Way (PLTW)® Engineering Program and will not be returned.

I hereby irrevocably authorize Riverside High School's Project Lead the Way (PLTW)® Engineering Program to edit, alter, copy, exhibit, publish or distribute photos for purposes of publicizing and marketing the program or for any other lawful purpose.

In addition, I waive the right to inspect or approve the finished product, including written or electronic copy, wherein my likeness appears. Additionally, I waive any right to royalties or other compensation arising or related to the use of the photograph.

I hereby hold harmless and release and forever discharge Riverside High School's Project Lead the Way (PLTW)® Engineering Program from all claims, demands, and causes of action which I, my heirs, representatives, executors, administrators, or any other persons acting on my behalf or on behalf of my estate have or may have by reason of this authorization.

I have read this release before signing below and I fully understand the contents, meaning, and impact of this release. (Please check below and sign bottom of release form).

___ Riverside High School's Project Lead the Way (PLTW)® Engineering Program **MAY** use my child's photo.

___ Riverside High School's Project Lead the Way (PLTW)® Engineering Program **MAY NOT** use my child's photo.

I hereby certify that I am the parent or guardian of _____, named above, and do hereby give my consent without reservation to the foregoing on behalf of this person.

(Parent/Guardian's Signature) (Date)

(Parent/Guardian's Printed Name)

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Safety/Medical Release Form

All students are required to return this form!

Print Student's Full Name

In the Riverside High School's Project Lead the Way (PLTW)[®] Engineering Program, students will be exposed to many different forms of technology. Some of which include, but are not limited to: hand tools, power tools, knives (box/craft), saws, scissors, hot glue, soldering irons, lead, nails, screws, bolts, cutting tools of all kinds, hammers, wire, electronics, sharp objects, and moveable parts.

There will be a safety lecture and test at the beginning of the school year which must be passed with a 100%. There will also be a safety lecture on tools and materials used before each project and/or activity. Safety glasses will be provided and must be worn throughout the entire class period when any student is working with any tools and/or materials for mentioned about.

In order to participate, in the Riverside High School's Project Lead the Way (PLTW)[®] Engineering Program, guardians/parents must give their child permission to use the above and any non-listed tool or device in the classroom to complete projects/problems.

I grant my child permission to use and/or participate in the classroom with the above mentioned and any non-listed tools and devices in the classroom.

(Parent/Guardian's Signature) (Date)

(Parent/Guardian's Printed Name)

Please list any medical conditions that might be irritated by smoke, dust, sawdust, wood, lead, or any other chemical or material. Or list anything that you feel the instructor should know about your child in the lab environment.