Pre-Engineering Syllabus

**Mr. Wingerter – Room 270**

 

**CONTACT INFORMATION**

**Mr. Wingerter** Email jwingerter@eriesd.org Phone 814-874-6200 Ext. 1517

**COURSE OBJECTIVES**

1. Students will develop an understanding of the core concepts of electronics, power systems, manufacturing processes, and design.
2. Students will use engineering concepts of design and problem solving skills to develop products for manufacturing.
3. Students will be able to write technical documents and build communication with professional personnel.
4. Students will build desired skills and understand tools associated with engineering and manufacturing in preparation for college and post-graduation careers.

# TOPICS

|  |  |  |
| --- | --- | --- |
| * Engineering Safety
* Engineering Disciplines
* Electronics
* Engineering Design Process
 |  | * Engineering Design/Drawing (CAD)
* Manufacturing Prototypes
* Power systems
 |

**STANDARDS**

|  |
| --- |
| Engineering Technologies/Technicians CIP 15.9999 |
| 100 ENGINEERING SAFETY  | 600 ENGINEERING GRAPHICS |
| 101 | Implement a safety plan.  | 601 | Proper use of graphics equipment and tools.  |
| 102 | Operate lab equipment according to safety guidelines. | 602 | Describe various types of drawings. |
| 103 | Use appropriate personal protective equipment. | 603 | Perform metric-U.S. system conversions. |
| 104 | Comply with OSHA and EPA regulations for a safe work site. | 604 | Use engineer’s and architect’s scales. |
| 105 | Identify emergency first aid procedures. | 605 | Prepare freehand sketches. |
| 106 | Maintain safe working practices around tools and equipment. | 606 | Apply line conventions. |
| 107 | Participate in classroom and laboratory management and cleanup activities. | 607 | Prepare orthographic projection drawings. |
| 108 | Demonstrate a professional attitude toward classroom and laboratory activities. | 608 | Prepare additional views to clarify the design. |
| 200 KNOWLEDGE OF ENGINEERING | 609 | Apply principles of dimensioning and annotation. |
| 201 | Demonstrate knowledge of the history of engineering.  | 610 | Prepare drawings for product assembly, fabrication, or construction. |
| 202 | Investigate engineering careers, training, and associated opportunities. | 611 | Create schematics. |
| 203 | Explain the purpose and functions of an engineering team. | 612 | Revise an existing drawing to meet modifications or changes. |
| 400 PROBLEM SOLVING IN ENGINEERING | 700 ENGINEERING DESIGN PROCESS |
| 401 | Identify the engineering problem. | 701 | Identify the steps of an "iterative" design process.  |
| 402 | Gather information about problems and solutions. | 702 | Create an engineering solution for a real world problem. |
| 403 | Identify information resources. | 703 | Determine whether design is safe for a given user. |
| 404 | Apply steps in the problem solving method. | 704 | Generate a design improvement to address specific flaws/failures. |
| 500 TEAMWORK | 705 | Create a proposal for an engineering project. |
| 501  | Actively participate as a member of an engineering project team. | 706 | Participate in a design review. |
| 502 | Apply constructive feedback. | 707 | Prepare a schedule for a design project. |
| 503 | Resolve conflict within the team. | 800 MODELING |
| 504 | Demonstrate active listening techniques. | 802 | Create a scale model or working prototype.  |
| 505 | Demonstrate formal and informal speaking skills. | 803 | Evaluate a scale model or a working prototype. |
| 506 | Explain the importance of selling a project idea to team members. | 900 MANUFACTURING AND INDUSTRIAL SYSTEMS |
| 507 | Identify ways to motivate, coach, counsel, and reward individuals and teams. | 901 | Research the history of manufacturing and its milestones. |
| 508 | Perform a team peer review.  | 1000 MANUFACTURING PROCESSES |
| 509 | Perform evaluations (e.g., self-evaluation and management evaluation). | 1005 | Outline the product-development process.  |
| 2200 PRECISION MEASUREMENT FOR INDUSTRY | 1006 | Plan steps of production for a manufactured product. |
| 2202 | Make linear measurements accurately to 1/16”. | 1007 | List tools needed for a manufactured product. |
| 2203 | Use a micrometer to measure accurately to .001". | 1008 | Make a list of the production processes in manufacturing. |
| 2204 | Use a dial caliper to measure accurately to .001". | 1009 | Apply manufacturing systems to develop and produce a prototype for a product. |
|  |  | 1010 | Evaluate a product prototype and the processes used in its manufacture. |
|  |  | 1011 | Write a step by step procedure for an assembly |

## CAREER READINESS & SAFETY

Students will use the online program Smartfutures ([www.smartfuters.org](http://www.smartfuters.org)) to research careers and obtain career ready artifacts for graduation requirements.

* 9th Grade – 3 artifacts completed
* 10th Grade – 6 artifacts completed
* 11th Grade – 9 artifacts completed
* 12th Grade – 5 Year Plan

## CLASSROOM EXPECTATIONS

Students are expected to:

* Be prepared (pen/pencil, flash drive, completed assignments).
* Complete class assignments and homework, maintain a notebook and prepare for assessments.
* Be on time for class and participate in class discussions and projects.
* Complete work missed due to an absence.
* Follow school and district policies.
* Attend extra help (Thursday Morning) when class material needs additional explanation.

## MATERIALS

1. Pen/pencil
2. Flashdrive

## ABSENCES

* Students are responsible for all work missed during an absence (this includes notes). Work missed due to an unexcused absence will receive a “0”. (Refer to the discipline policy.)

## GRADING

* Quarter grades will be comprised of tests, class assignments, class notes, homework, clean up, projects, career & safety portfolio, Do Nows, and quizzes.
* Quarter grades will be determined by dividing the number of points earned by the number of points possible.
* The final grade is computed by averaging the percentages earned for each of the four quarters. (Note: An actual earned grade will be reflected on the report card.)

### ERIE SCHOOL DISTRICT GRADING SCALE

 **A 90% - 100%**

 **B 80% - 89%**

 **C 70% - 79%**

 **D 65% - 69%**

 **F 0% - 64%**

**TESTS**

* Tests are announced at least **two** classes in advance.

# CLASS ASSIGNMENTS

* Class assignments are to be completed in class. Any assignment not completed in class will receive a “0”.Absent students must be “excused” to make up the missed work.
* Class assignments should include student’s name, date, and assignment.

# PROJECTS

* All Projects will need to be completed by a desired deadline.
* Projects will be graded depending on the overall completeness and efforts towards the finished product.
* Any project unfinished by the deadline will result in a reduced grade.

**MANUFACTURING**

* Students are responsible to acquire training on the various manufacturing equipment (CNC Router, Laser Engraver, 3D Printer, etc.) in the lab.
* Students will participate in engineering design reviews that will encompass the process as which a finished product will be manufactured

# EXTRA HELP

* Extra help is available Thursday Mornings (prior notification needed). Additional times can be scheduled if necessary (Request from the instructor for additional times).

Classroom Rules

1. When I Am Talking You Are Not.
2. Keep The Brakes On The ***UFO’S ![C:\Users\mbeiter\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\WJLQF3G3\MC900057496[1].wmf]()***.
3. Be Cooperative And Remain And Task
4. Demonstrate Respect For Yourself, Fellow Students, And Property.
5. You Are To Stay In Seats Unless Directed Otherwise
6. Allow Your Phones To Be Recharged While You Learn.
7. All Rules Delineated In The 2023-2024 Discipline Handbook Are In Effect In This Room.

# LAB / SAFETY Rules

1. No Horseplay, Running or wrestling in the lab
2. Must complete Safety test prior to using any piece of equipment
3. Immediately report any malfunctioning equipment ( i.e. Feels hot, Smoke, odor etc.)
4. Use of Appropriate PPE ie. safety glasses are required
5. use of Engineering equipment is only for authorized projects (only Mr. Beiter, Mrs. McCorkle or Mr. Wingerter authorize)
6. All rules delineated in the 2023-2024 discipline Handbook are in effect in this lab