

WHEELER HIGH SCHOOL COURSE EXPECTATIONS

Innovations and Inventions
High School
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133/137

I. Course Overview:

This engineering course combines new and advanced technical concepts with design and invention. Problem solving, creativity, and thinking out of the box along with a strong knowledge base prepare students for engineering careers.

II. Overall Course Objectives: State of Connecticut CTE standards 2015 edition

A. Career Awareness: Identify and describe various careers in the engineering field, including educational requirements and ethical expectations.

1. Describe the following engineering fields: mechanical, chemical, civil, and electrical.
2. Identify the following job functions and responsibilities: research and development, design, production, supervision, management, testing, and analysis in mechanical, chemical, civil, and electrical engineering.
3. Identify the following educational requirements in engineering: associate, bachelor, master, and doctorate degrees.
4. Describe ethics related to engineering in the following situations: environmental, sustainable engineering, and corrupt practices.

B. Safety: Describe and apply safe practices in the lab environment.

5. Explain and demonstrate the proper use of personal protective equipment (PPE).
6. Describe and demonstrate the proper use of engineering laboratory equipment.

C. Teamwork: Explain the characteristics of an effective engineering design team.

7. Identify the roles and responsibilities of the following engineering design team members: team leader, designers, reporters, testers, and fabricators.
8. Identify the following characteristics of an effective design team: team norms, leadership, responsibility, respect, rapport, and time management.

D. Materials: Describe the process for selecting the appropriate materials based on product function.

9. Describe the following mechanical properties of steel, concrete, wood, and plastic: ductility/brittleness, tension, shear, and compression.
10. Explain the process used for selecting the correct materials for specific functions.
11. Test materials for specific characteristics.

E. Production Process: Describe the various material processes and equipment used in quality control.

12. Explain the following quality controls: geometric dimensioning and tolerances, and go-no go gauge.
13. Use the following measurement tools and instruments: rulers, micrometers, and vernier calipers.
14. Identify the following elementary statistical process controls: distribution curves, normal curves, and skew curves.

F. Software: Identify and demonstrate the use of various digital resources used in the engineering field.

15. Identify available digital resources for researching problem solutions.
16. Use word processing software to develop reports.
17. Use presentation software to develop oral presentation of findings.
18. Describe and demonstrate the process for using CAD in a design solution.
19. Use spreadsheet software to develop tables, graphs, charts, and to track data.

G. Engineering Principles: Identify and describe the various systems that are part of the engineering field, including static, mechanical, electricity, fluid power, and thermal principles.

20. Describe and apply the following statics principles: vectoring to predict resultant forces, equilibrium, trusses, and moment of inertia.
21. Describe and apply the following mechanical systems principles: Law of Conservation of Energy, six simple machines, mechanical advantage, efficiency, work, rate, and friction/resistance.
22. Describe and apply the following electricity principles: Ohm's, Watt's, series, parallel, combination circuits, AC/DC systems, and conductors/insulators.
23. Describe the following components and applications of fluid power principles: reservoir, fluid conductors, valves, pumps, actuators, Pascal's Law, and Bernoulli's Principle.
24. Describe the following principles and applications of thermodynamics: heat flow and transfer, convection, conduction, radiation, temperature scales, and conductors/insulators.

H. Design Process: Describe and apply the design process to identify and solve a problem.

25. Identify the components of the design process: define the problem, brainstorm, research, develop solutions, prototype, test/evaluate, and communicate results.
26. Identify the elements of a well-written problem statement.
27. Describe the process of brainstorming.
28. Describe the process for researching relevant information.
29. Describe the process of developing a solution.
30. Build a prototype from working drawings using appropriate materials.
31. Test prototype to defined criteria.
32. Use a variety of productivity software to explain the results of the design process, including, spreadsheets, word processing, data analysis, and presentations.

III. Material Required:

Nearly all of the classroom materials will be provided. Students are however, responsible for bringing to class a pencil.

IV. Class/Behavior Expectations:

Students are required to follow all school rules at all times. In addition, behavior expectations specific to this course must also be followed:

1. All safety rules are followed at all times
2. Students respect each other and the classroom
3. Students do not handle materials that are not theirs
4. Students comply with situation specific rules given by the teacher
5. Students will not destroy or vandalize school property

V. Attendance Policy (BOE Policy #5113) – as stated in handbook:

The learning experiences that take place in the classroom are considered to be meaningful and essential parts of the education process. Absences tend to disrupt the continuity of that process. The time lost from class is irretrievable, particularly in terms of opportunity for interaction and exchange of ideas between students and between students and teachers. Knowing and abiding by the attendance regulations and procedures are student and parent responsibilities. On January 2, 2008, the State Board of Education approved the following definition of attendance for public school districts:

A student is considered to be "in attendance" if present at his/her assigned school, or an activity sponsored by the school (e.g., field Trip), for at least half of the regular school day. A student who is serving an out-of-school suspension or expulsion should always be considered absent.

Students attending the North Stonington Public Schools must remain on school property during the normal school day, unless the building principal authorizes a student to leave school grounds. Exceptions to this rule may be approved by the building principal for those reasons which would justify an excused absence under this policy.

1. There shall be no penalty for an excused absence. Students must bring a note from their parent or guardian to the main office on the day of return to school. For an illness, the student should provide documentation from a doctor. This note must specify the reason(s) for the absence and must conform to the Board of Education Policy # 5113. Excused absences will be listed on the morning bulletin of the day the note is received, and students will be allowed to make up all work missed. Excused absences as defined by the Board of Education are:
 - a. Illness or injury,
 - b. Death in the immediate family,
 - c. Religious obligation,
 - d. Court appearance,
 - e. School sponsored activity,
 - f. College Visitation (prior approval needed from building principal)
 - g. An emergency, or
 - h. Other exceptional circumstances.
2. For every unexcused absence, the student will not be allowed to make up or receive credit for work missed.
3. Students who are absent from school should make every effort to obtain their assignments during their absence. When a student is absent for extended periods of time--more than three days-- parents may obtain assignments from the teachers through the guidance office. Failure to make up assignments may result in a grade of zero for each missing assignment. A student may expect to have one day for each day of absence in order to make up missed work.
4. If a student is absent from school, he/she may not be on school grounds. Extenuating circumstances will be dealt with on a case by case basis by the administration.
5. IF A STUDENT MISSES MORE THEN 15 MINUTES FROM CLASS, OTHER THEN BECAUSE OF A SCHOOL SACTIONED EVENT, THEY WILL BE CONSIDERED ABSENT FROM CLASS.

Limit on Total Number of Absences: No student will receive course credit for a full year course after having been absent from that course for more than 20 class periods (excused or unexcused) the school year for reasons other than school sponsored activities (i.e. field trips). The total number of absences will be pro-rated for less than full year courses and for courses which meet other than five times per week

Notification Procedures: When a student has accumulated one-half (ten (10) full year or five (5) half year) of the maximum allowed number of total absences for a particular course, excluding school functions, the teacher will notify the student, parent/guardian (by mail), administration, and the guidance counselor on a form designated for that purpose.

VI. *Grading Policy:*

Class assessment is based on class work and projects along with a midterm and final exam.

Class Work – 40%

Projects – 60%

VII. *Academic Integrity Statement*

The faculty and administration of Wheeler Middle/High School demand high standards of academic performance and academic honesty. Anything less would jeopardize quality education and allow our students to deny themselves needed skills and knowledge. For this reason students who cheat on their assigned work, reports, research papers, quizzes, tests or examination risk prompt and punitive action by both their teacher and the school. Examples of violations may include, but are not limited to:

- Giving or receiving aid on tests and graded assignments
- Unauthorized talking during tests
- Copying regular homework/exercises
- Unapproved discussion of examinations/assignments contents
- Cheating on peer reviews of student work

- Misuse of technology

Documentation of all sources is important to avoid plagiarism, which is the stealing of another's ideas, words, writing, or academic work, and implying that it is original. Both quoting and paraphrasing information from an outside source, including any technology without crediting that source is a form of plagiarism. Students who are found cheating or plagiarizing will be subject to the following guidelines:

First offense:

- Academic penalty up to and including zero.
- Parent contacted.
- Administration notified (by teachers completing a discipline form).

Subsequent offenses:

- Academic penalty up to and including zero.
- Parent contacted.
- Disciplinary action by administration which may include office detention or suspension

VIII. Wheeler High School Academic Expectations assessed by this course:

- Analysis