Course Description

The major focus of the IED course is to expose students to the design process, research and analysis, teamwork, communication methods, global and human impacts, engineering standards, and technical documentation. IED 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 understanding of the design process. It also allows students to develop strategies to enable and direct their own learning, which is the ultimate goal of education.

The course assumes no previous knowledge, but students should be concurrently enrolled in college preparatory mathematics and science. Students will employ engineering and scientific concepts in the solution of engineering design problems. In addition, students use a 3D solid modeling design software package to help them design solutions to solve proposed problems. Students will develop problem-solving skills and apply their knowledge of research and design to create solutions to various challenges that increase in difficulty throughout the course. Students will also learn how to document their work, and communicate their solutions to their peers and members of the professional community.

Introduction to Engineering Design™ is a foundation course in the Project Lead The Way® high school pre-engineering program. The course applies and concurrently develops secondary level knowledge and skills in mathematics, science, and technology.

This course is part of the Engineering Academy here at Omaha North High School.

Major Units of Study

Unit 1: Design Process
Unit 2: Technical Sketching and Drawing
Unit 3: Measurement and Statistics
Unit 4: Modeling Skills
Unit 5: Geometry of Design
Unit 6: Reverse Engineering
Unit 7: Documentation
Unit 8: Advanced Computer Modeling
Unit 9: Design Teams
Unit 10: Design Challenges
Course Expectations

General Rules: Participate daily. Always clean up after yourself or your group. Follow the handbook.

Late Work: All assignments given will include a due date. The work is expected to be completed by this date. At grade report time, all incomplete or missing assignments will be recorded as a 0. If you are falling behind on class work, see me to resolve the situation.

Absence: Honors IED is a project-based class. It is vital to your success that you are present in class each day we meet. Please communicate when an absence has or will occur so that I can make sure that you have the information needed during your absence.

Tardies: Any amount of tardiness will not be tolerated.

Technology Use: Students in this class will spend 75% of class time with access to computers. Abuse of this privilege will result in removal from some or all computer access at North High School. Use of email, internet, or games will not be tolerated and will have detrimental effects on your grade in the class. Efficient use of your time is required to complete assignments on time. I strictly follow the district policy on computer and email use, and will not hesitate to apply the consequences for its misuse.

Service Learning: We will have several opportunities to participate in Service Learning activities through UNO, Habitat for Humanity, and others. We expect all Engineering students to participate in at least one activity over the course of the school year.

Resources

LMS- https://pltw.instructure.com/login

Engineering Notebook

Redoing/Revising Student Coursework*
1. Students are responsible for completing all coursework and assessments as assigned.
2. Students will be allowed redos and revisions of coursework for full credit as long as they are turned in during that unit of study while a student still has an opportunity to benefit from the learning.
3. Students are expected to complete assessments when given to the class, or if a student was justifiably absent, at a time designated by the teacher.
4. Redoing, retaking or revising will be done at teacher discretion in consultation with the student and parent(s). Teachers may schedule students before, during, or after school to address needed areas of improvement if not convenient during class. The time and location for redoing, retaking or revising will be done at the teacher’s discretion in consultation with the student and parent(s).

OPS Secondary Grading Practices*
All coursework and assessments are judged based on the level of student learning from “below basic” to “advanced.” This course will provide multiple opportunities to achieve at the “proficient” to “advanced” levels. Students are evaluated based on a proficiency scale or project rubric. Proficiency scales for this course are available upon request (teacher will identify location such as portal, teacher website, attached, etc.)

There are three types of coursework*
• Practice – assignments are brief and done at the beginning of learning to gain initial content (e.g., student responses on white boards, a valid sampling of math problems, keyboarding exercises, and diagramming sentences, checking and recording resting heart rate). Practice assignments are not generally graded for accuracy (descriptive feedback will be provided in class) and are not a part of the grade. Teachers may keep track of practice
work to check for completion and students could also track their practice work. Practice work is at the student’s instructional level and may only include Basic (2) level questions.

- **Formative (35% of the final grade)** – assessments/assignments occur during learning to inform and improve instruction. They are minor assignments (e.g., a three paragraph essay, written responses to guiding questions over an assigned reading, completion of a comparison contrast matrix). Formative assignments are graded for accuracy and descriptive feedback is provided. Formative work may be at the student’s instructional level or at the level of the content standard. Formative assessments/assignments will have all levels of learning – Basic (2), Proficient (3), and Advanced (4), which means that for every formative assessment/assignment, students will be able to earn an Advanced (4). Teachers will require students to redo work that is not of high quality to ensure rigor and high expectations. The students score on a formative assessment that was redone will be their final score.

- **Summative (65% of the final grade)** – assessments/assignments are major end of learning unit tests or projects used to determine mastery of content or skill (e.g., a research paper, an oral report with a power point, major unit test, and science fair project). Summative assignments are graded for accuracy. Summative assignments assess the student’s progress on grade level standards and may not be written at the student’s instructional level. Summative assessments/assignments will have all levels of learning – Basic (2), Proficient (3), and Advanced (4), which means that for every formative assessment/assignment students, will be able to earn an advanced (4).

To maintain alignment of coursework to content standards, which is a key best practice for standards-based grading, teachers will utilize a standardized naming convention for each of the standards within a course. The content standard will be marked on each assignment entered into Infinite Campus (District Grading Program) using all capital letters followed by a colon. After the colon will be the title of the coursework.

<table>
<thead>
<tr>
<th>OPS Grading Scale</th>
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<tbody>
<tr>
<td><strong>A</strong></td>
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<tr>
<td><strong>B</strong></td>
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<td><strong>C</strong></td>
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<td><strong>D</strong></td>
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<td><strong>F</strong></td>
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## Secondary Proficiency Scale

<table>
<thead>
<tr>
<th>Level of Performance</th>
<th>Score</th>
<th>Description</th>
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</table>
| Advanced                  | 4     | The student consistently demonstrates a thorough understanding of course content/grade level standard by making in-depth inferences and showing extended applications of the course content/grade level standard(s). The student performs consistently at a high level of difficulty, complexity, or fluency that is above the expected course content/grade level standard.  
  - Exceeds expected course content/grade level standard  
  - Applies skills and strategies in new and unfamiliar situations |
| Proficient + (Approaching Advanced) | 3.5   | The student demonstrates partial success at showing a thorough understanding of course content/grade level standard by making in-depth inferences and applications of the course content/grade level standard(s). The student performs with partial success at a high level of difficulty, complexity, or fluency that is above the expected course content/grade level standard.  
  - Demonstrates success toward exceeding course content/grade level standard  
  - Applies skills and strategies consistently in familiar situations, and at times, in unfamiliar situations |
| Proficient                 | 3     | The student demonstrates a proficient understanding of the expected course content/grade level standard(s). The student performs at the level of difficulty, complexity, or fluency that is at the expected course content/grade level standard.  
  - Meets expected course content/grade level standard  
  - Retains information and applies skills and strategies in familiar situations |
| Basic + (Approaching Proficient) | 2.5   | The student demonstrates an adequate understanding of the information for the course content/grade level standard(s). The student performs with partial success at the level of difficulty, complexity, or fluency that is at the expected course content/grade level standard.  
  - Partially meets expected course content/grade level standard  
  - Retains information and at times applies skills and strategies in familiar situations |
| Basic                     | 2     | The student demonstrates a basic understanding of the information expected for the course content/grade level standard(s). The student performs the skills required for the course content/grade level standard at a basic level of difficulty, complexity, or fluency.  
  - Partially meets expected course content/grade level standard  
  - Retains information and simple processes in familiar situations |
| Approaching Basic          | 1.5   | The student demonstrates some basic understanding of the information expected for the course content/grade level standard(s). The student struggles to perform the skills required for the course content/grade level standard at a basic level of difficulty, complexity, or fluency.  
  - Partially meets some of expected course content/grade level standard  
  - Retains some information and simple processes in familiar situations |
| Below Basic                | 1     | The student demonstrates difficulty in understanding the information and performing the skills expected for the course/grade level standard(s).  
  - Performs below expected course content/grade level on the standard.  
  - Has difficulty retaining information and applying skills and strategies |
| Failing                    | 0     | The student demonstrates little or no evidence of understanding the information or skills required for the course content/grade level standard(s). |
Engineering Academy

National studies have shown that students in career academies are more likely to graduate with the skills and academic requirements to pursue college or career opportunities. A career academy is a small, safe, and supportive learning environment that is contained within a larger high school. An academy has a career and college theme, preparing students for both post-secondary schooling and work.

It is the constant goal of Omaha North High Magnet School and the Omaha Public Schools to keep our curriculum fresh and innovative while preparing our students for future experiences in the workplace and the collegial atmosphere. The Engineering Career Academy at North High will be a cooperative effort between your child’s engineering, English and math instructors. We have chosen to pair engineering and English because it is imperative for engineers to be efficient writers, communicators and presenters. Additionally, a strong foundation in mathematics is essential for students interested in pursuing a degree in engineering. Our outstanding instructors can help your child develop the necessary skills to take their interest in engineering to the next level.

This academy will affect you in the engineering, English and math classroom. Your instructors have worked hard to find opportunities for cross-curricular instruction without changing the standards that are currently being taught in the classroom. The curriculum will mirror learning strategies and align critical thinking through writing and design, presentation/speaking skills, and formulation of ideas.

The table below outlines a typical student’s minimum requirements for Career Academy Courses. Students that enter above grade level in math will remain on the accelerated path.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Engineering Course – All Courses Honors</th>
<th>Math Course – All Courses Honors</th>
<th>English Course</th>
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<tbody>
<tr>
<td>9</td>
<td>Foundation Course • Required</td>
<td>Introduction to Engineering &amp; Design 171001/171002 Required Course</td>
<td>NCOT Honors Algebra 1-2 Minimum Requirement Prerequisite Counselor Recommendation</td>
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<tr>
<td></td>
<td>Foundation Course • Required</td>
<td>Principles of Engineering 171011/171012 Required Course</td>
<td>NCOT Honors Geometry 1-2 Minimum Requirement Prerequisite: Honors Algebra 1-2, Teacher Recommendation</td>
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<tr>
<td>10</td>
<td>Specialization Courses • Elective</td>
<td>Digital Electronics 171021/171022 Computer Science and Software Engineering 171081/171082 Computer Integrated Manufacturing 171111/171112 Environmental Sustainability &amp; Bioengineering 171101/171102</td>
<td>NCOT Honors Algebra 3-4 Minimum Requirement Prerequisite: Honors Geometry 1-2, Teacher Recommendation</td>
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<tr>
<td></td>
<td>Specialization Courses • Elective</td>
<td>Civil Engineering &amp; Architecture 171071/171072 Digital Electronics 171021/171022 Computer Science and Software Engineering 171081/171082 Computer Integrated Manufacturing 171111/171112 Environmental Sustainability &amp; Bioengineering 171101/171102</td>
<td>NCOT Honor Pre-Calculus/Trigonometry Minimum Requirement Prerequisite: Honors Algebra 3-4, Teacher Recommendation</td>
</tr>
<tr>
<td>11</td>
<td>Capstone Course • Required</td>
<td>Engineering Design &amp; Development 172011/172012 Prerequisite: 2 years of Engineering coursework</td>
<td>NCOT English 5-6 OR NCOT AP Language &amp; Composition</td>
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<tr>
<td></td>
<td>Specialization Courses • Elective</td>
<td>Civil Engineering &amp; Architecture 171071/171072 Digital Electronics 171021/171022 Computer Science and Software Engineering 171081/171082 Computer Integrated Manufacturing 171111/171112 Environmental Sustainability &amp; Bioengineering</td>
<td>NCOT English 7-8 OR NCOT AP Literature &amp; Composition OR Honors Technical Communication</td>
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