

Date Submitted: June 2015



**Cerritos College
ARTICULATION TEMPLATE**

Cerritos College Course:

ENGT 103: Introduction to Engineering Design Using Inventor (3 units)
Cerritos College
11110 Alondra Blvd.
Norwalk, CA 90650

Artesia High School Course:

Introduction to Engineering Design (Project Lead the Way)
Artesia High School
12108 Del Amo Blvd
Lakewood, CA 90715

General Course Description:

This course introduces the student to the design process in engineering technology by the use of activities-based learning, project-based learning, and problem-based learning. The student will learn about the design process, geometric relationships, visualization, technical sketching, modeling, model documentation, and assemblies.

College Prerequisite(s):

None

HS/ROCP Prerequisite(s): Recommended students have completed Math 1 or Advanced Math 8, or be concurrently enrolled in Math 1 Plus Honors.

Advisories/Recommendations: This course is taught at the 9th or 10th grade level. Although there are no specific prerequisites or co-requisites, most student are expected to be taking a college prep curriculum. Although geometry is not a prerequisite, it makes an excellent co-requisite for this course.

Course Content:

- Engineering Career Awareness
- Social responsibility and ethics
- Introduction to safety practices and standards in the engineering design environment
- Communication, presentation skills and teamwork
- Historical review of engineering design
- Visualization and sketching techniques
- Engineering components, symbols, drawings and measurement standards used in engineering design
- Research skills using Internet
- Engineering units, measurement instruments and construction/assembly tools
- Introduction to engineering design tools used in engineering design
- Data Collection Analysis and Documentation
- Use of Engineering Design Software such as Autodesk Inventor

- Introduce techniques to be used to investigate problems and use meaningful activities to arrive at a solution
- Self management skills
- Coordinate systems
- Geometric relationships
- Isometric, orthographic, perspective, and other engineering drawing types
- Properties of various 2D and 3D geometric shapes
- Use of teamwork and brainstorming to solve problems in the shortest time
- Development of 2D and 3D sketching skills use to communicate ideas
- Use of Powerpoint and Excel presentations
- Use of industry-standard solid Modeling programs
- Use design briefs to define problems and identify solutions within design constraints
- The design process in an engineering environment
- Reverse engineering
- Sketching techniques for use in engineering design
- Determination of system properties using 3D solid-modeling tools
- Drawing constraints
- Proper dimensioning and annotation standards for engineering drawings
- Use of supplemental views to clarify drawing intent
- Creating assemblies using assembly constraints
- Editing drawings and assemblies
- Fundamentals of engineering fasteners
- Revision control
- Bills of Materials
- Use of lighting, color and animation to create a realistic display of system operation

Competencies and Skill Requirements (Use additional pages as necessary.) Where appropriate, please incorporate standards being used (e.g. CTE standards).

At the conclusion of this course, the student should be able to:

- Define various careers available and terminology used in the fields of engineering design
- Demonstrate an understanding of social, economical, environmental and ethical impacts of Engineering
- Demonstrate safety practices and standards in an engineering design environment
- Use the internet to find EPA (Environmental Protection Agency) and OSHA (Occupational safety and Health Administration) rules and regulations
- Demonstrate ability to effectively communicate verbally, visually and in written format
- Collaborate in a diverse environment
- Apply visualization and sketching techniques in solving engineering design problems
- Create and interpret engineering design drawings utilizing industry standards
- Use Internet search to determine technical specifications of components
- Use Internet search to determine safety and environmental codes
- Understand, explain and use software such as Autodesk Inventor to design, edit, model and test 3D designs
- Demonstrate proper use of dimensions
- Explain and demonstrate all the various basic procedures required to create solid models using an industry-standard, 3D solid-modeling program, such as Autodesk Inventor (i.e. drawing constraints, work features, extrusions, hole features, sweeps, lofts, assembly constraints, sub-assemblies, bill of materials, etc.)
- Reverse engineer an assembled product and use 3D solid-modelling software to generate a complete set of design drawings (Parts, 3d Assembly, 3d Animated Assembly and 3D Animated Exploding views)
- When given a paper design problem, use hand-made pictorial sketches to present the concept of a solution.
- Given paper design sketches, use 3D software to formulate a solution

- Given a design problem, organize a team effort to put together an engineering design solution and create a complete set of engineering drawings that define the solution.
- As a team effort; develop, build, test and prepare a Capstone Project supported with both written and oral presentations

Measurement Methods (include any industry certification or licensure):

- Homework
- Sketches
- Worksheets
- Engineer Notebook
- Portfolio
- Employable Skills
- Work ethic
- Tests
- Final Examination

Textbooks or Other Support Materials (including Software): The entire curriculum is supplied in electronic format by Project Lead the Way along with all required support and evaluation materials.

- Autodesk Inventor Pro
- Microsoft Word
- Microsoft Excel
- Microsoft PowerPoint
- Portfolio
- Engineer's notebook
- USB flash drive

Procedures for Course Articulation:


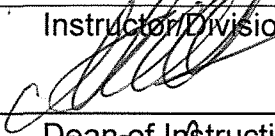

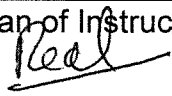
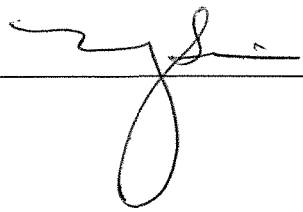
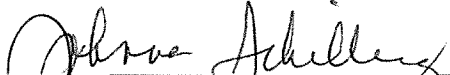
Cerritos College credit for the articulated course listed above may be received when the following criteria are met:

1. The student has completed the articulated course listed above with a "B" grade or higher in *Introduction to Engineering Design Using Inventor*
2. The student must enroll at Cerritos College within two (2) years from the semester date in which the course was completed.
3. The student will present verification of successful completion of the articulated course by presenting a *Cerritos College Articulation Card* to a Cerritos College Counselor. The *Cerritos College Articulation Card* should be completed and signed by the student's high school counselor or teacher.
4. No more than 12 units of credit may be accepted for credit by examination.

This Agreement will be reviewed annually and will remain in effect until cancelled by either party giving 30 days written notice.

High School/ROP District Signatures

Cerritos College Signatures

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|---|-----------------|--|-----------------|
| Faculty/Department Chair  | Date | Instructor/Division Chair  | Date 8/13/15 |
| Principal  | Date | Dean of Instruction  | Date 6/22/15 |
| Superintendent  | Date 8/13/15 | Vice President  | Date 6/22/15 |