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Prepared by the Department of Engineering Sciences and Applied Technology

Date of Departmental Approval: August 28, 2017

Date approved by Curriculum and Programs: October 11, 2017

Effective: Fall 2017

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1. **Course Number:** ENR107  
**Course Title:** 3D Design and Analysis II
  
2. **Description:** This is the second of a two course 3D mechanical design series for students interested in careers as product engineers, architects, and designers using computer aided design (CAD) software. This course prepares students for the Certified SolidWorks Associate Exam (CSWA) and the Certified SolidWorks Professional Exam (CSWP). A research paper that addresses an advanced topic in 3D solid modeling is required.
  
3. **Student Learning Outcomes** (instructional objectives, intellectual skills):  
Upon successful completion of this course, students are able to do the following.
  - Exhibit proficiency in advanced solid modeling techniques
  - Exhibit proficiency in surface modeling techniques
  - Exhibit proficiency in top-down (in-context) assembly modeling techniques
  - Exhibit proficiency in bottom-up assembly modeling techniques
  - Teach finite element approaches for analyzing structural integrity of a part or assembly.
  - Conduct a demonstration on how additive manufacturing techniques such as 3D printing can be used to rapidly prototype a design to facilitate evaluation and incorporate design changes to improve the product design.
  - Justify using 3D CAD software as a tool in solving a wide variety of engineering design problems.
  - Create a complex product design using 3D CAD software that optimizes the full life cycle sustainability of the product.
  - Lecture on the positive impact CAD solid modeling has had on the modern world.
  - Differentiate between the roles and responsibilities of the most common design engineering disciplines.
  - Exhibit an understanding of professional ethics and the application to real-life product design situations.
  - Succinctly elucidate why the design engineer is a team worker who needs to design a 3-dimensional computer model, write a design report, and justify the design.
  - Differentiate between technical writing and business or creative writing.
  - Lecture on the content and process for creating a technical research paper.
  
4. **Credit(s):** 3 credits (3 class hours)
  
5. **Satisfies General Education Requirement:** No
  
6. **Prerequisite(s):** ENR106 (3D Design and Analysis I)
  
7. **Semester(s) Offered:** Spring
  
8. **Suggested General Guidelines for Evaluation:** The course grade is based on homework assignments; class work and participation; exam(s); a final examination and research paper.
  
9. **General Topical Outline** (Optional):
  1. Certified SolidWorks Associate (CSWA) Exam Overview
  2. Parametric Modeling Fundamentals
  3. Constructive Solid Geometry Concepts
  4. Feature Design Tree
  5. Geometric Relations Review
  6. Geometric Construction Tools
  7. Part Drawings and Associative Functionality
  8. Reference Geometry and Auxiliary Views
  9. Symmetrical Features in Designs
  10. Advanced 3D Construction Tools
  11. Assembly Modeling - Putting it all Together
  12. Design and Sustainability Analysis
  13. Design Library and Basic Motion Study
  14. Product Data Management
  15. Product Lifecycle Management
  16. CSWA & CSWP Exam Preparation