Engineering 105, Introduction to Engineering  

Dr. Tate Wilson  

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Office: Charles Street Hall 208  
Office Hours: MWF, 9:20 - 10:30 AM in Rankin 101, or by appointment.  
Class Schedule: MWF, 10:40 - 11:50 AM  
Classroom: PT108  
Final Exam: Monday, December 18, 11:00 am, in EH110  
Credits: 4  
Required Materials:  
  - A strong interest in engineering  
  - The love of learning
Overview: This course provides an introduction to Engineering practice by presenting students with problems that require in-class collaborative solutions emphasizing visualization and graphic communication. Students will learn to work in teams and develop basic proficiency using Autodesk Inventor, Excel, Sage, Python, and LaTeX. Students will apply the skills developed in this course to explain and solve problems from their concurrent Mathematics and Physics courses as well as to complete a semester project.

Course/Learning Objectives:

- Students further develop their ability to acquire technical skills independently and to teach and communicate newly developed skills to their co-workers
- Students develop skills for collaboration and working in teams
- Students develop capability with software tools that they can use in subsequent courses and jobs
- Students develop capability to create sketches and technical drawings both manually and with CAD.
- Students gain familiarity with concepts addressed in future courses (Statics, Dynamics, Strength of Materials, ...)
- Students develop an understanding for the practice of engineering
- At conclusion of the course, for a passing grade a student must demonstrate the ability to:
  - Interpret elementary technical drawings used in manufacturing and construction
  - Distinguish between academic disciplines of engineering and various engineering roles or functions, and concisely explain their own academic plan
  - Express design ideas using graphics, sketches, and drawings produced by hand and computer tools
  - Organize a team problem solving session using frameworks such as seven-ways and six-hats
  - Solve elementary statistical and numerical problems using Sage, Python, and Excel and display results graphically
  - Solve elementary geometric problems in three dimensions using dot product and cross product

Schedule:

- Engineering practice and education (Week 1)
  - Academic disciplines and courses of study (i.e. Civil, Mechanical, Electrical...)
  - Areas of practice and roles (i.e. Application Engineer, Test Engineer, Design Engineer ...)
- Visualization of ideas, concepts, processes and objects (Weeks 1-2)
  - Sketching
  - Schematic drawings and diagrammatic representations of processes and systems
  - Data visualization
- Communication and collaboration (Weeks 1-3)
  - Brainstorming and teamwork
    * Six Hats, Seven Ways
  - Concepts in engineering process management
    * Design, development, production, and implementation
    * Testing and trouble shooting
    * Lean principles, PDCA, six-sigma
• Fail-fast, Scrum, and Agile development

• Engineering drafting (Weeks 3-8 and 10-12)
  – Manual drafting tools
  – Autodesk Inventor and AutoCAD software
  – Pictorial drawing
    * Oblique, isometric, and perspective views
    * Section and auxiliary views
    * Dimensioning, tolerances and preparation for assembly, fabrication, and 3D printing

• Engineering geometry (Weeks 6-10)
  – Points, lines, circles, curves
  – Planes, surfaces, solids
  – Vectors, projections, normal vectors
  – Dot product and cross product

• Computational tools (Weeks 2-3 and 7-12)
  – Sage, Python, and Excel
  – Software documentation

**Assessment:** Approximately every week both an in-class “lab” assignment and a homework assignment will be required. All assignments must be completed with a passing grade for the student to pass the course. Homework counts for approximately 25% of the total grade, in-class lab assignments count for approximately 25% of the grade, class participation and attendance counts for approximately 30%, and a final project counts for approximately 20% of the final grade. There will be no exams, but we will likely need to use the Final Exam period for presentations of the semester projects. Attendance at this final meeting is mandatory.

**Letter Grades:** All scores will be weighted and averaged and compared to this scale:
A (93-100), AB- (88-92), B (83-87), BC (78-82), C (70-77), D (60-69), F (<60)

**Academic Integrity:** The Carroll University Academic Integrity Policy is located in the student handbook:
https://my.carrollu.edu/ICS/icsfs/Student_Handbook_14-15_Updated
Please familiarize yourself with it. Carroll University emphasizes that students have an obligation to conduct their academic work with honesty and integrity. All acts of academic misconduct are serious. If you have any questions about appropriate citations, please ask.

**Accommodations:** Students with disabilities who may need accommodations or any student considering obtaining documents should make an appointment with the Walter Young Center (262-524-7621) no later than the first week of class.

The instructor and the University reserve the right to modify, amend, or change the syllabus (course requirements, grading policy, etc.) as the curriculum and/or program require(s).