INTRODUCTION:

Working drawings are often the final product of an engineering office. They are the means by which a design concept is communicated to those people who approve and manufacture the designed product. In your career as an engineer, you will be called upon to create, or supervise the creation of, drawings which will be used to make something. Errors made on a drawing often result in very expensive changes and a lot of scrap parts. Because of the cost or errors, the ability to create neat and accurate drawings is an essential talent employers require of an engineer. The primary goal for the students in this course is to learn how to create a set of working drawings for some product. All of the activities, readings and course lectures are meant to support this goal.

GOALS & OBJECTIVES:

After completing this course, students should be able to:

• Make a set of working drawings for a mechanical product;
• Create solid model assemblies using fully constrained components and check for interferences;
• Model new parts in the context of an assembly;
• Create assembly drawings of a mechanical product with a part list and item balloons;
• Use mathematical relations to drive solid models;
• Use family tables to create different configurations of solid models;
• Extract partial, auxiliary, and section views from solid models;
• Compute limits, allowance and fits for mating features;
• Represent geometric tolerances on a drawing and understand their meaning;
• Compute bonus tolerance associated with a position tolerance;
• Specify and represent threaded shafts and holes on detail drawings;
• Properly apply finish symbols to a drawing to indicate finished surfaces.

REQUIRED TEXT:


COURSE POLICIES AND PROCEDURES:

- Attendance is required although role will not be regularly taken. You are responsible for material covered during an absence from class.
- Please pay attention during class lectures and discussions. So that you are not distracted, please shut off your computer monitor during class discussions. If you have questions or comments during class, please address them to the instructor instead of disturbing those seated around you.
- Homework assigned during the week is due at the beginning of the first class of the following week unless noted otherwise. Late homework will be docked a letter grade (10%). Once grading begins for a particular assignment, late papers will not be accepted. Late assignments are to be completed on your own time, not during class.
- You may discuss homework activities with other students, but you may not copy one another’s work. Additionally, you may not look at another person’s work to “see how they did it” – this is really copying the work of another.
- Exams may be made-up at the discretion of the instructor upon presentation of a valid doctor’s excuse or University authorized justification for the absence. As a condition of being granted a make-up exam, you must contact the instructor prior to the absence. Students will not be permitted to share anything during the exams.
- Several quiz-like “in-class assignments” will be given throughout the semester. If missed, these assignments cannot be made up.
- You are expected to strive to produce neat and accurate work. There is no excuse for sloppy or poorly prepared assignments. A failing grade may be assigned for the course if all assigned work is not satisfactorily completed.
- I will be communicating with you between class via email and updates on the web pages. You are expected to regularly check for these communications.

ACADEMIC INTEGRITY:

Penn State Erie puts a very high value on academic integrity, and violations are not tolerated. Academic integrity is one of Penn State’s four principles to which all students must abide. This principle states:

I will practice academic integrity. Academic integrity is a basic guiding principle for all academic activity at Penn State University, allowing the pursuit of scholarly activity in an open, honest, and responsible manner. In accordance with the University’s Code of Conduct, I will practice integrity in regard to all academic assignments. I will not engage in or tolerate acts of falsification, misrepresentation, or deception because such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.

Any violation of academic integrity will receive academic and possibly disciplinary sanctions, including the possible awarding of an XF grade which is recorded on the transcript and states that failure of the course was due to an act of academic dishonesty. All acts of academic dishonesty are recorded so repeat offenders can be sanctioned accordingly.

RESOURCES AND MATERIALS:

- Course web site: http://engr.bd.psu.edu/rxm61/
- Handouts
- Textbook
- Penn State Erie Graphics Standards
- Pro/ENGINEER Help Files
- Other students
- Tutor
- Instructor
- Textbooks from the John Lilley Library (access to all PSU libraries)
- World Wide Web
STUDENT RESPONSIBILITIES:

Students are expected to:

• follow the Penn State Principles;
• come to class properly prepared, pay attention, take good notes, ask questions, and participate;
• behave in a professional manner;
• complete activities neatly and accurately in a timely fashion;
• commit the time necessary to master the material;
• seek help as soon as needed from list of Resources and Materials;
• strive to improve personal performance;
• accept responsibility for their own learning.

PERFORMANCE CRITERIA FOR FACULTY/FACILITATOR:

The instructor/facilitator will:

• present material and lead class discussions;
• demonstrate computer techniques as necessary;
• answer questions when appropriate;
• provide techniques to help the student become a self-grower;
• act as a mentor and resource in a professional manner;
• provide meaningful feedback and assessment;
• provide quality evaluation of student performance.

REQUIRED WORK PRODUCTS AND THEIR PERFORMANCE CRITERIA:

• Solid Models
  → Use proper solid modeling techniques and include all required features in the model.
  → All modeled features are the correct size and in the proper location.
  → Any specified design intent must be captured by the solid models created.

• Assemblies
  → Appropriate use of top-down or bottom-up modeling techniques.
  → All parts are present and are properly oriented and fully constrained. Assemblies with unconstrained components will be docked 10%.

• Detail Drawings
  → All detail drawings are to be complete, accurate and aesthetically appealing.
  → Use the standard titleblock format and an appropriate sheet size. The views should be as large as possible without giving the appearance of being crowded.
  → All necessary shape information is provided to completely describe the part. You must show hidden lines on a drawing view. If your hidden lines appear as object lines, your drawing grade will be reduced by 10%. Do not show hidden lines on a section view.
  → Do not show datums, axes, or their labels on a drawing. Your drawing grade will be reduced by 10% for doing so.
  → Do not show tangent edges on a detail drawing. Your drawing grade will be reduced by 10% for doing so.
  → Significant dimensioning errors will result in drawing grade reduction of at least 10%. Individual activity sheets will have more specific information as necessary.
  → Necessary size information is provided and placed on the drawing in accordance with ANSI Y14.5 and the Penn State Erie Graphics Standard.
  → Features of size are to be tolerated correctly.
  → When required, geometric characteristics are controlled properly using proper symbols. (GD&T)
  → See the Penn State Erie Graphics Standard for specific requirements for creating a detail drawing.

• Assembly Drawings
  → Use pictorial, exploded pictorial or orthographic views as appropriate when creating an assembly drawing.
REQUIRED WORK PRODUCTS AND THEIR PERFORMANCE CRITERIA (Continued):

- **Assembly Drawings (Continued)**
  - All parts of the assembly shown are to be labeled using balloons. Item balloons should line up vertically or along one of the isometric axes. Whenever possible, make the arrows parallel to one another.
  - Include a parts list of all of the parts in the assembly. This includes all standard and non-standard parts. Use proper designations for all standard parts in the parts list.
  - Do not show hidden lines on an assembly drawing unless necessary to promote clarity of the part.
  - Tangent edges are often shown in pictorial drawings to show fillets and rounds. Only use tangent edges to promote clarity of the drawing.

- **Printed Model Information**
  - Text output from the solid modeler must be edited to include your name, the course and section number and the date in the upper right corner of the sheet.
  - Staple the sheets in proper order before submitting for grading.

- **Calculations and Worksheets**
  - All calculations should be neatly done on engineering calculation paper. Only use one side of the page. Be sure to date and initial the pages of your calculations. Your name, course and section number and the date should appear on each sheet. Use labels and titles to make your calculations readable.
  - Print neatly. If your work or answers cannot be read, they will be wrong.
  - Pay attention to the number of decimal places you record for your answers. 0.001 is not the same as 0.0001.

- **Notebook**
  - Use a 3-ring binder with clear sleeve cover.
  - Create a cover sheet including your name, course number and the semester. This cover should have a professional appearance.
  - Use divider pages with labeled tabs to delineate the different topics covered.
  - No loose papers in the notebook or inside cover pockets.
  - Include all notes, handouts, and activity submissions.
  - Each page must be dated. All notes must also be signed.