MET 306.1, .2
Mechanical Engineering Technology
Spring 2014

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Office and office hours: 213c REDC. Monday 2:30 pm – 3:30 pm
                                Tuesday 1:30 pm – 2:30 pm
                                Wednesday 4:00 pm – 5:00 pm
                                Other days and hours by appointment

Course Title: Computer Aided Drafting and Design, Required Course

Course Meeting Day, Time, and Location:
MET 306.1, .2 Tuesday & Thursday 6:00 pm – 6:50 am 107 Burke
MET 306.1 Thursday 11:00 am – 1:50 pm 007 Burke
MET 306.2 Thursday 7:00 pm – 9:50 pm 015 Burke

Course Description: Computer-aided drafting and design; computer software solutions to mechanical engineering technology design problems.

This course is designed to be the third CAD course in a Mechanical Engineering Technology program. Students will be exposed to modeling industry specific geometry using solid and surface modeling techniques. Sheet metal modeling, tool path generation and material removal simulation for CNC operations as well as mechanism analysis are taught. Automation and optimization techniques using CAD packages are also covered in lab assignments. Students are expected to document their designs by producing industrial quality working drawings. Lecture material is directly related to the laboratory assignments and topics in understanding hardware and CAD software bench marking as well as associated costs and their relationship to the engineering design process are also covered. Experience in basic CAD modeling is required as well as a working knowledge of Statics, Dynamics and Strength of Materials. Evaluation is based on laboratory assignments, homework assignments, quizzes and a final project.

Prerequisite(s): CMPSC 101, CMPSC 201C, CMPSC 201F or MET 107; EG T 121 or EG T 201 and EG T 205

Textbook(s) and or other required material (supplemental/web pages):
Precision LMS (PTC University eLearning)
Web pages located at: http://engr.bd.psu.edu/forsman/
Course Objectives:
After completing this course, students should be able to:

1. Effectively model industry specific geometry as it relates to the mechanical design industry using Creo.
2. Create solid geometry through the use of surface modeling techniques.
3. Convert solid geometry to sheet metal parts as well as generate pure sheet metal geometry.
4. Create tool paths using Pro/Manufacturing and check them with Vericut.
5. Create and run a motion analysis using Mechanism Design.
6. Produce industrial quality working drawings with tolerances.
7. Automate the design process using Excel, Pro/Layout and Pro/Program with Creo.
8. Optimize designs using the Behavioral Modeling module with Creo.
9. Understand bench marking, cad system selection, associated costs and its relationship to the engineering design process.

Topics Covered:

Creo Modeling
- Inheritance features
- Drafts
- Parallel Blends
- Variable Section Sweeps
- Datum Points, Axis, Planes, Curves
- Composite Curves
- Ordinate Dimensioning
- Surface Modeling
- Merge
- Offset Surfaces
- Boundary conditions
- Tool Path Creating
- Rips
- Walls
- Bends
- Profiles, Joints, Connectors

Creo Modules
- ISDX
- Pro/CASTING
- Pro/MANUFACTURING
- VERICUT
- Pro/SHEETMETAL
- Pro/MECHANISM
- Expert Framework Extension
- Pro/PROGRAM
- Behavioral Modeler
Excel
  • Creo integration

Mathcad
  • Creo integration

XXXX (Un-named) Cad package
  • Use and application

Varied Lecture topics
  • Learning to use Software Packages
  • Design for Changes
  • Technological Literacy
  • Modeling Systems
  • Benchmarking
  • High Tech Tools
  • Single vs Multiple CAD Systems

Class/Laboratory Schedule:
2 fifty minutes Lectures and 1 two hour fifty minute Lab per week

Relationship of course to student outcomes:

Graduates have an ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology (Student Outcome b).

Graduates have an ability to identify, analyze and solve technical problems (Student Outcome f).

Graduates have a recognition for the need for, and an ability to engage in self-directed professional development. (Student Outcome h).

Prepared by and date of preparation:  David R. Forsman, 1/6/2014

Calendar/Dates:
Quizzes are open book/notes and are unannounced.
A final project takes the place of the final exam.
Refer to web pages for specific dates and times of assignments
Grading Criteria:

- Lab Assignments: 60% + 10%
- Pre-Lab Online Quizzes: 5%
- In Class Activities and Quizzes: 20% +/- 5% (Drop lowest quiz grade)
- Homework: 10% +/- 5%
- Final Project: 10% +/- 5%

Grade Scale:

- A  93-100%
- A-  90-92%
- B+  87-89%
- B  83-86%
- B-  80-82%
- C+  77-79%
- C  70-76%
- D  65-69%
- F  Below 65%

Attendance Policy: "A student should attend every class for which the student is scheduled and should be held responsible for all work covered in the courses taken." (See Policies and Rules for Students, Class Attendance (42-27) on the PSU website at http://www.psu.edu/ufs/policies)

Makeup Policy: Students who fail to attend will not generally be allowed to make up laboratories, quizzes, or exams unless a prior arrangement has been made. Note that in case of illness, funerals etc., the student is responsible to notify the instructor before the class begins and then must produce evidence which documents the absence.

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. Any violation of academic integrity will receive academic and possible 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. Students are encouraged to review more information on academic integrity which can be found at: http://www.pserie.psu.edu/faculty/academics/integrity.htm

Support Services:
Learning Resource Center: http://pennstatebehrend.psu.edu/academic/lrc/index.htm
Library: http://www.behrend.psu.edu/academic/library/index.htm
Computer Center: http://www.behrend.psu.edu/compcntr/compindex.htm

Lab Safety: Not Required (Computer Lab)

Course Policies and Procedures:

- You must come to class properly prepared are expected to be a positive contributor to class discussions.
- You are expected to pay attention, take good notes, ask questions, and participate during class.
- Students taking this course are required to have a background in solid modeling using a feature based, parametric system. It is expected that students are well versed in the use of Creo. This includes having the course pre-requisites.
Course Policies and Procedures, continued:

- This course will focus on the higher end functionality of CAD packages. Surface modeling, top-down design, assembly modeling, tolerancing and producing industrial quality documentation will be covered using Croe. In addition, automation and optimization methods will be introduced using Creo.
- Lab attendance is REQUIRED for full credit for a lab assignment. Role will be regularly taken at various times during lab. If you wish to leave lab early, you may upon submission of that weeks work. There is a 15% reduction in that week’s lab grade for non-attendance. Lab hours are scheduled so you have access to the instructor’s expertise during this time. Make good use of it. You are responsible for material covered during an absence from class. Likewise, classroom disruptions will not be tolerated (e.g. talking during lecture, using profanities, etc).
- Labs (activities) with are to be placed on the instructor's desk before class starts on the date they are due or they are late. You are not to be in another lab finishing up assigned work, then walking into class 10 minutes late and turning it in for full credit. That is not fair to students who complete assignments in timely fashion.
- Late labs will be docked a letter grade (10%). Late lab assignments are to be completed on your own time, not during class work periods.
- Homework is due at the beginning of class on the day specified in the assignment.
- Working on any computer during instructor lectures or demonstrations is inappropriate.
- I may be communicating in between classes with you via e-mail and on the web pages. You will be expected to check your e-mail and the course web page on a regular basis.
- Students will not share unauthorized materials during a quiz.
- Accuracy as well as good drafting procedures will be rigidly stressed at all times. Most questions related to detailing can be answered by referring to the Penn State Erie Graphics Standards.
- A failing grade may be assigned for the course if all assigned work is not satisfactorily completed.
- I may be communicating with you between classes via email. You are expected to regularly check for these communications.

- Professionalism: A faculty might be late for class. In industry, if your supervisor is late for a scheduled meeting, it is common courtesy to wait for a few minutes as he (she) might be dealing with CEO or a client, be on the phone or taking care of another issue. If, after a few minutes you supervisor does not show up, one person from the group should seek them out (they might simply be running late), or find out the reason for the absence (possibly no one notified the group). Only upon finding the reason for the absence can the meeting be adjourned. You will follow the same procedure for a late faculty member. Penn State has no “X minute rule”.
Course Policies and Procedures, continued:

- Just as industry, where all job related documentation must be accessible by other people related to a project, all computer related course work must be available for instructor review on the P: drive. Create a new subdirectory (NOT under the Private directory) labeled MET_306 and place all your work for this class in this location. The purpose of this is for the following: If you have any questions regarding your assignment, you can stop by the instructors’ office (or e-mail him) and he can quickly map your drive space to bring up your work to be better able to answer your questions. In addition, while grading your assignment (the documentation which is usually turned in on paper), if there are any questions relating to your documentation, the instructor can access your files to resolve any questions. All computer files for the assignment must remain accessible on disk until the assignment is returned to the student. If the instructor needs to check the data files and these files do not exist in the MET_306 subdirectory, then the worst case scenario will be assumed. If you keep files on a pen drive, you must also upload these files to the MET_306 subdirectory on your P drive! Do not create the MET_306 subdirectory under the Private directory and then move it. If you do this, all the read/write permissions still are associated with the directory and the instructor will not have access!

- You will be required to “drop box” a pre-built Excel file containing all of your grades on a irregular basis. A 5% reduction in that weeks lab grade will result from either drop boxing an incomplete (not up to date) file, incorrect header, having a file with an incorrect file name (Lastname_of_student.xlsx required), drop boxing to the wrong folder (section/date) or not drop boxing the file at all. The purpose of this exercise is to make sure the student knows their standing in the course at all times.

- Use of Electronic Devices:
  Cell phone use is not permitted in classrooms, computer laboratories or mechanical laboratories. All phones should be set to silent and must not be viewed during quizzes or exams. Ipods/Zunes/MP3 type devices are not to be used in classrooms or computer labs when an instructor is conducting a class or lab. These devices are not permitted at any time in any mechanical labs. Violations of the above will be considered a violation of the Academic Integrity policy and will be dealt with accordingly.

General Policies, Rules & Procedures: [http://www.sa.psu.edu/ja/procedures.shtml](http://www.sa.psu.edu/ja/procedures.shtml)

Note to students with disabilities: Penn State welcomes students with disabilities into the University’s educational programs. If you have a disability-related need for modifications or reasonable accommodations in this course, contact the Disability Specialist in the Office of Student Affairs, Room 115 Reed Union Building, 898-6111.

Evening Exams, if any: Does not apply.