MER101: ENGINEERING GRAPHICS/AT

Schedule: MER 101-01:  MWF  9:15 am – 10:20 am    NWSE 205 (Lecture)
                  TU.   9:10 am – 12:00 noon    Engineering Lab

Mer 101-02: MWF  11:45 am – 12:50 pm   NWSE 205 (Lecture)
             TH.   9:10 am – 12:00 noon    Engineering Lab

Instructor: Abraham Tchako, Ph.D.
            Room 235 Steinmetz Hall
            Tel.: 388-6144

Email: tchakoa@union.edu

Office Hour: MW 10:30 am – 11:30 am    NWSE 235
             Or by appointment

                 SDC Publications.

            2) "Engineering & Computer Graphics Workbook with SolidWorks 2008". By:
                 Ronald E. Barr, et al.
                 SDC Publications.

Web Page:   http://antipasto.union.edu/mer101/

COURSE GUIDELINES AND DESCRIPTION

This is a mechanical Engineering graphics course with emphasis on design for manufacturing.
The course has 4 fully integrated components:

1) Hands-on engineering drawings,
2) Computer Aided Design and
3) Hands-on machine shop exercises.
4) Reverse Engineering

A) HANDS-ON ENGINEERING DRAWINGS

In this course you will be introduced the student to the basic fundamentals of engineering
drafting and design. Instruction will include the identification and use of basic drafting
tools and instruments. The development of good lettering techniques, freehand drawing
skills, and the construction of geometrical figures will also be included. Traditional
concepts of multiview drawing, pictorial drawing, sectioning, threads representation and
the techniques of dimensioning and tolerancing will be learned and applied during in-
class and homeworks exercises.
B) COMPUTER AIDED DESIGN USING SOLIDWORKS

The SolidWorks® Lab component of MER101 is an introduction to the Computer Aided Design (CAD) using the SolidWorks® software. CAD will be introduced to you with a variety of assignments. Doing these assignments will familiarize you with the design to manufacture concepts. SolidWorks® user interface and basic menu commands including extruded and revolved features, configurations and design tables for parts, part editing and problem solving, bottom up assembly design and detail drawing creation will be covered. Whenever practical, assignments will be based on real mechanical systems or objects.

C) HANDS-ON MACHINE SHOP EXERCISES

1) During the first week of the term, you will be introduced to machine shop, the use of hands-on measuring tools, fabrication tools and safety policies.

2) In the second week, you will get feeling for handling individual material with manual machining exercises in centering and marking, handling hand tools such as files, saws, taps and dies, countersinks, and layout tools.

3) During the following three weeks students will start the manufacturing project. Students will be introduced to power tools and basic machining (Drill press, grinder, turning, boring lathing, reaming).

4) In the sixth, seventh and eighth week students will complete and assembly the manufacturing project.

5) At the end of the term, each group will submit a fabrication report including a CAD assembly of the manufacturing project give an oral presentation of their project.

The drawing, workshop and CAD portions of the course are conducted in parallel. In each component of the course, students will be given short lectures followed by hands-on exercises to create immediate feedback of basic principles applied to engineering design. Hands-on experience is emphasized as opposed to extensive theory. Standard teaching aids will be used when applicable (blackboard, projector, films, etc.).

D) REVERSE ENGINEERING

You will be given an existing product and will be asked to improve or redesign a part or function of the product. The project will have a functioning movable mechanism that can be simulated using SolidWorks®. You will be working in group of 2.

1) In the first two weeks of the term, you will be introduced to design, drafting, measurement tools and concepts in the classroom and machine shop.
2) In the third week, group will be formed.

3) In the following weeks each group will disassemble its project. During disassembling, you will be required to measure and draw two- and/or three-dimensional views of the parts and show how they fit together. Drawing could be done using free-hand sketching or drawing tools.

4) After the completion of sketches and drawings, you will be required to recreate the parts and assemblies using SolidWorks®.

5) You will show the final product with the improved part or function in simulation.

6) At the end of the term, each group will give an oral presentation and submit a written report on the project.

E) CLASS LECTURES:

1) Students are expected to attend each class lecture.

2) Students are expected to answer questions and solve example problems during class lectures.

3) Students are responsible for all material covered in class lectures.

4) All cell phones are to be turned off during class lectures and laboratories. Cell phones ringing in class will result in the reduction of the student's course grade by one grade increment (i.e., B to a B-). Same rule applies to e-mails or unauthorized computers usage during lectures or laboratories.

5) Food is not permitted in the classroom.

6) No drink permitted during CAD lab.

7) Please leave your workstation cleaner than you found it.

F) READING ASSIGNMENTS:

1) You are responsible for reading the textbook material that is pertinent to the class lectures prior to the lecture.

2) Selected reading recommendations will be posted on the syllabus web page.

G) HOMEWORKS:

1) Homework will be pre-posted on the assignment webpage with due dates.

2) Both SolidWorks and Handdrawing HWS will be posted on the same page.
3) The homeworks are due at the beginning of the class session.

4) Keep a port-folio of your graded HWs. This will help you keep track of how you are doing in the class and also will help clarifying any grade reporting error.

5) **NO LATE HOMEWORK WILL BE ACCEPTED.**

   Each student is expected to solve each of the homework problems assigned. However, discussion of the homework problems with other students is encouraged.

   Homework grades must be contested within two days of their return. Contested homework will be subject to re-grading and a lower score may result.

   A student found directly copying another student's work or engaging in any form of academic dishonesty will be reported to the Chair of the Department of Mechanical Engineering and/or Dean of Undergraduates for appropriate disciplinary procedures. Repeated offense in any other course may result in the offending student being expelled from the College.

**HAND DRAWINGS HOMEWORKS:**

- You will be required to do and submit multi-problem assignments.

- Homework must be done using the specified **FORMAT** with borders and title block.

  **HWS NOT DONE USING THE FORMAT WILL NOT BE GRADED.**

- Only one sketch or drawing per sheet, unless otherwise specified (UOS).

- All multi-page HWs must be **STAPLED** together before submission.

- Pay attention to the instructions such as (**scale, construction lines, dimensioning, etc..**).

- When hw is to be done on Isometric paper, cut and paste a created title block at the bottom right corner of the sheet.

  - *Homework papers are to be neat and clean.*

**SOLIDWORKS HOMEWORKS**

- You will be required to do and submit multi-problem assignments.

- Prepare two templates (in mm and in inch) and save them on you system. You will be using them for HW and class exercises.

  - **DO NOT EMAIL HWS TO ME (UOS).**

- Print out you HW and **STAPLE** the pages together before submission.

**H) MANUFACTURING PROJECT:**

- Lab attendance is mandatory, and an absence will result in no credit for the associated assignments.

- Attend lecture session of lab.
- Attend your assigned lab session.
- Keep a daily journal of your work in the shop.
- Fabricate your assigned pieces.
- Assemble the piece with a partner.
- Submit CAD drawing and assembly of the clamp with fabrication report.
- Each group is expected to write their own laboratory report. Discussion of the laboratory assignments with other students is encouraged.
- Students found directly copying another student's work or engaging in any form of academic dishonesty will be reported to the Dean of Undergraduates and the faculty in the Department of Mechanical Engineering. This action may result in the offending student being expelled from the College.

I) EXAMS: (There is no make-up exam)

1) All exams will be opened notes and book.

2) Dates for exams will be announced during lectures and posted on the course web page. (Students missing lectures are responsible for all material covered and announcements during the missed lecture.)

3) The final exam will be given during finals week on the date assigned by the registrar.

4) Exams must be contested within two days of their return. Note: contested exam papers will be subjected to re-grading, a lower score may result.

5) Students are not permitted to leave the exam room without permission from the instructor.

6) A student found looking at another student's work during an exam, looking at any type of notes, or engaging in any form of academic dishonesty will be reported to the Chair of the Department of Mechanical Engineering and/or Dean of Undergraduates for appropriate disciplinary procedures. Repeated offense in any other course may result in the offending student being expelled from the College.

7) It is the policy of Union College to make reasonable accommodations for QUALIFIED individuals with disabilities. A person with disabilities that wishes to request accommodations to complete this course must contact the Director of Student Support Services, in the Dean of Students Office and notify the instructor in the first two weeks of class.
J) GRADES:

1) Course grades will be determined using these weights:

- 20 % for homeworks,
- 20 % for the Reverse Engineering Project,
- 20 % for the Manufacturing Project,
- 20 % for Midterm exam,
- 20 % for the final exam or presentation.

2) Letter grades are assigned as follows:

   - 93 – 100%    A,
   - 90 – 92 %    A-
   - 87 – 89 %    B+
   - 84 – 86 %    B,
   - 80 – 83 %    B-
   - 77 – 79 %    C+
   - 74 – 76 %    C,
   - 70 – 73 %    C-
   - 65 – 69 %    D,

3) All exams grading must be contested during office hours and prior to the beginning of the lecture period following the period at which the original assignment was returned.