



South Portland, Maine 04106

Architectural and Engineering Design

Title: Mechanical Design

Credit Hours: Three

Lecture (or Lab): 30 Lecture/30 Lab

Office Location: TECH 209

Drop-in office hours: MTWR 12:00-1:00*

***Occasionally I will have to attend Department Chair or Faculty Senate meetings at this hour. Please make an appointment if needed.**

Catalog Number: AEDD-250

Total Contact Hours: 60

Instructor: Meridith Comeau

Email: MComeau@smccME.edu

Phone:741-5779

Course Syllabus

Course Description

This course provides advanced instruction in producing working drawings in manufacturing. Students apply ASME standards in drawing, geometric tolerances, and annotation of designs.

Course Objectives

After successfully completing the course, the student will be able to:

1. Apply ASME standards correctly and consistently to drawings.
2. Use proper techniques to make design changes.
3. Apply geometric tolerances to drawings.
4. Calculate tolerances for fits on a hole or shaft basis.
5. Determine and represent appropriate surface finishes.
6. Generate accurate welding drawings.
7. Generate appropriate gear and cam drawings.
8. Complete design related-projects.

Topical Outline of Instruction

1. Review of drafting standards and shape description.
2. Ordinate, tabular, and arrowless dimensioning.
3. Linear tolerances and GDT.
4. Calculating fits and finishes.
5. Fastener use and representation.
6. Forming processes and methods of manufacturing.
7. Welding drawings and applications of welding symbols.
8. Gear and cam representation.
9. Design of tools and machine parts.
10. Complete design assignments.

Course Requirements

Students will be required to attend class regularly and complete all projects, homework, reading assignments, quizzes and exams in a manner that meets graphics standards.

Student Evaluation and Grading

Final grade will be calculated from completed drawings (70%), tests (10%) and a comprehensive final exam (20%). Grades will be reduced for more than three absences. All assignments must be submitted.

School Closures for Flu or Other pandemics

If SMCC is forced to close for any reason, this syllabus may be modified.

Text, Tools and / or Supplies

Shop Reference for Students and Apprentices, or Machinery's Handbook
Ultimate GD&T Pocket Guide, 2cd edition, ETI (www.gdtsource.com/home.php)

Attendance Policy

I take attendance at the beginning of each class. If you are late, you will be marked absent unless you ask me at the end of class to change my entry. If you miss three classes concurrently without contacting me with an explanation, I will enter a grade of AF (Administrative Failure) and report you as having stopped attending. If that happens for unforeseen reasons, contact me as soon as possible so I can return you to active status. I will reduce your grade for more than three unexcused absences during the semester.

End-of-Course Evaluation

Students complete evaluations for each course attended at SMCC. Evaluations are submitted online and can be accessed through the student portal. Students can access the course evaluations beginning one week before the end of classes. The deadline for submission of evaluations occurs Monday at 5 p.m. following the last day of the class. You will receive an e-mail to your student e-mail account when course evaluations are available.

ADA Syllabus Statement

Southern Maine Community College is an equal opportunity/affirmative action institution and employer. For more information, please call (207) 741-5798. If you have a disabling condition and wish to request accommodations in order to have reasonable access to the programs and services offered by SMCC, you must register with the Disability Services Coordinator, Sandra Lynham, who can be reached at 741-5923. Further information about services for students with disabilities and the accommodation process is available upon request at this number. Course policies about online testing are modified to suit each individual's accommodations.

SMCC Pay-for-Print Policy

Each semester students receive a \$20 printing credit. The balance resets at the end of the semester and any remaining credits are removed. The College's pay-for-print system monitors printing on all printers (including those in general access labs, library printers,

Tutoring Services, Campus Center Lounge and technology labs). Be sure to log OUT of the system when you've finished your printing, to prevent unauthorized access to your account. Students can check the number of pages they have printed by using the Printing Balance tool available on SMCC computers (located in the lower right corner of the screen, near the clock). Departments with work study students who need to print documents for the department should contact the Help Desk at 741-5696 to have a special account set up. To find ways to reduce your printing charges, please go to the IT Help tab on My SMCC. If you have questions about the pay-for-printing policy or your printing charges, please contact the Help Desk at 741-5696 or send an e-mail to helpdesk@smccme.edu.

Refunds

Print jobs are eligible for a refund in the event of mechanical or electronic error on the part of the printer, print server, or software used to submit the job. Jobs are not eligible for a refund in cases where the job was not set up correctly, was submitted multiple times, or the student is not satisfied with the result. To request a refund, please bring the offending print to the IT Department in the basement of the Ross Technology Center. Refunds will be granted in the form of a credit to the student's account.

Add-Drop Policy

Students who drop a course during the one-week "add/drop" period in the fall and spring semesters and the first three days of summer sessions receive a 100% refund of the tuition and associated fees for that course. Please note any course that meets for less than the traditional semester length, i.e., 15 weeks, has a pro-rated add/drop period. There is no refund for non-attendance.

Withdrawal Policy

A student may withdraw from a course only during the semester in which s/he is registered for that course. The withdrawal period is the second through twelfth week of the Fall and Spring semesters and the second through ninth week of twelve-week Summer courses. This period is pro-rated for shorter-length courses (usually 75 percent of course meeting times; please check with the Registration Office. To withdraw from a course, a student must complete and submit the appropriate course withdrawal form, available at the Registration Office. This process must be completed either in person or by using SMCC e-mail accounts.

Plagiarism Statement

If an instructor suspects that a student has knowingly committed a violation defined in the Maine Community College System Policy on Student Grade Appeals and Academic Misconduct, the instructor has the authority to review the alleged misconduct and determine the grade that the student should receive for the assignment and the course. The instructor

may assign a failing grade for the assignment or course and may require the student to complete additional work for the course. The instructor may consult with the department chair and/or the College's chief academic officer prior to making such decisions. If a student seeks to challenge an instructor's determination, the student should submit a grade appeal. Grade appeal forms are available in the Advising Office on the South Portland Campus or in the administrative offices in the Learning Commons on the Midcoast Campus. An instructor may also refer the matter to the College's disciplinary officer for review under the procedures of the MCCS Student Code of Conduct

Department Policies

1. Grading Equivalents

Letter	GPA	Project	Percentage
A	4.00	9.5-10	95-100
A-	3.67	9-9.4	90-94
B+	3.33	8.7-8.9	87-89
B	3.00	8.3-8.6	83-86
B-	2.67	8-8.2	80-82
C+	2.33	7.7-7.9	77-79
C	2.00	7.3-7.6	73-76
C-	.67	7.0-7.2	70-72
D+	1.33	6.7-6.9	67-69
D	1.00	6.3-6.6	63-66
F	0.00	<6.3	FAILURE
P	NONE		Equivalent to a "C" (2.0) or better
AF	0.00		Administrative Failure
I	None		Incomplete*
W	None		Official Withdrawal from course
NS	None		Failure to appear for any session of class

*Incomplete grades are given at the discretion of the Instructor. Incomplete grades may only be given after an incomplete contract between the instructor and student has been signed and submitted to Enrollment Services. Students may withdraw from a class up to the twelfth week into the semester to avoid a failing grade. Make note of the class withdrawal deadline date and time in the student handbook and academic calendar on the portal.

2. Work submitted that does not meet standards will be given and "N/A Resubmit". Instructions on how to correct your work will be provided through redlines (comments by instructor). All redlines must be corrected before resubmitting the assignment. NO PARTIAL credit will be given unless all redlines have been corrected.

3. **Late work** will drop a letter grade per week late. Assignments turned in more than 4 weeks late will result in a failing grade for that assignment. Completion of all assignments is required.

4. Any activity, conversation or behavior that I do not consider appropriate for the classroom or professional environment will result in the request that the behavior cease. If it does not, the student(s) involved will be dismissed from class and referred to the dean of

Students and may not return to class until they have met with the Dean of Students, Department Chair and Instructor.

6. Use of cell phones, and other electronic devices during class, which are not for class purposes, is prohibited. Cell phones **do not** need to be turned off, but should be set to **vibrate** or **silenced** during class, although I would prefer it if you just turned it off.

7. Personally owned computers are not required to be successful in this program, however they are highly recommended. All students have access to free Autodesk software downloads available at <http://students.autodesk.com/>. SolidWorks students can get a link from instructor to download software. If you do not have access to your own computer to complete your homework, computer labs are available during open building hours 8:00 AM – 9:30 PM M-F. At least 3-9 hours of homework time outside each 3 credit course is normal and to be expected.

8. Hours for faculty members are posted on the faculty member's door. You may also make appointments with faculty via e-mail.

9. Only SMCC E-mail addresses will be used by faculty to communicate to students. E-mails between student and faculty must meet the following criteria:

- a. The subject line has the **class code** along with a reference to the e-mail subject
- b. E-mails must be signed with the student's full name as it appears on the class list.

See the full e-mail etiquette policy in **R:\General\Department Policies**.

10. It is the responsibility of the student to obtain the course materials and assignments that were covered during his/her absence. Assignment due dates WILL NOT BE ADJUSTED DUE TO AN ABSENCE. See late work policy above.

11. All students are expected to take notes and maintain them for reference purposes throughout the class and future classes. Students must also be responsible for their own backup of course work. If work is lost it is NOT the AEDD responsibility to replace or find it.

12. All work must follow the [Technical Graphics Standards Manual](#) for the Architectural and Engineering Design Department. A copy of the manual has been placed in R:\Standards Various Sources

Architectural and Engineering Design

Title: Mechanical Design

Catalog Number: AEDD-250

Credit Hours: Three

Total Contact Hours: 60

Lecture (or Lab): 30 Lecture/30 Lab

Instructor: Dan Abbott

Office Hours: Lunch Time (Mon-Thr)

Email: dabbott@smccME.edu

Office Location: TECH 211

Phone: 741-5564

Tentative Lesson Plan

AED250 Mechanical Design
Southern Maine Community College

Lesson Plan -- Abbott
Spring, 2014

Required Texts: Shop Reference for Students and Apprentices, OR Machinery's Handbook

The Ultimate GD&T Pocket Guide 2nd, Krulikowski

R:\AEDD-250\TechnicalGraphicsReview\TECHNICAL GRAPHICS
STANDARDS_rev8.pdf

(Note: The project assignments in this lesson plan often refer to figures in the book Engineering Drawing and Design, Jensen & Helsel, which is no longer in print. The pages containing those figures are included in the file R:\AEDD-250\ReferencePages\AssignmentPages.pdf.)

Unit 1 Review of technical graphics view placement and dimensioning
"R:\AEDD-250\ASME-Y14.5 \AsmeY14.5M-General.ppt"

Reading: TGS (Technical Graphics Standards) pages 23 – 28
Shop Reference, Pages 161 - 163

Sketching: p. 126, Fig. 6-108, in both 3rd Angle and 1st Angle

Model: Figure 8-94, p. 223

Homework: p. 127, Fig. 6-112. Draw all necessary views

Unit 2 Dimensioning

Reading: Shop Reference, Pages 126-149

"R:\AEDD250\AsmeY14.5M-General.ppt"

Sketch: Dimension sheet handout

Model: Fig. 7-54, page 167, Angle Slide.

Add dimensions and tolerances to fig. 6-112 drawing

Add dimensions to fig. 7-54 drawing.

Add dimensions to fig. 8-94 drawing.

Goals: Apply ASME Y14.5 standard practices to the following:

- Dimensioning of common features
- Coordinate, baseline, and tabular dimensioning
- Limit, bilateral and unilateral tolerancing.

- Review auxiliary views.

Unit 3 Fits and Finishes

Reading: Shop Reference, Pages 205 – 213, 161-177

Ultimate Pocket Guide, Pages 118 - 121

Drawing: prob. 26, figure 8-121, page 233.

Homework: Prob. 21, fig. 8-116, p. 231. Inch fits only.

Goals: Understand fit classes and their applications. Calculate dimensions on a hole and shaft basis fit. Understand and apply the surface finish symbol.

Unit 4 Detail and Assembly Drawings

Review sample assembly drawings.

Drawing: Create an assembly drawing for prob. 26 including details of

non-standard components, bill of materials, and revision block.

Homework:

Revise the column bracket to allow for porous- bronze sleeve bearings and an internal oil reservoir for the horizontal shaft. Reference chap. 21-2, pages 759-760 as needed.

Goals: Understand the difference between detail and assembly drawings.

Properly format a B.O.M. Understand and apply proper drawing revision practice.

Unit 5 Geometric Tolerances 1. Basic concepts and Datums

R:\AEDD-250\ASME-Y14.5 ASMEY14.5-GDT.ppt

Reading: Shop Reference, Pages 149 – 160

Reference: Ultimate Pocket Guide, Pages 1 - 52

Drawing: Problem 17, fig. 16-217, page 606

Homework: Problem 18, fig. 16-218, pg. 606

Goals: Understand the function and importance of GD&T. Understand the meaning and application of GD&T symbols. Understand the concept of a tolerance zone. Understand the concept of a datum.

Unit 8 Mid-term exam.

Unit 6 Geometric Tolerances 2. Controls of form and orientation, MMB, LMB

Reading: Ultimate Pocket Guide, Pages 53 - 66

Handout: prob. 3, p. 601-602, problems 5 and 10, page 603

Drawing: Add geometric controls to probs. 17 and 18

Homework: prob. 20, figure 16-220, page 607 (handout)

Goals: Understand the concepts of degrees of freedom and datum reference frames. Understand material boundary concepts and how they relate to part function and available tolerance. Understand the meaning and application of straightness and flatness, circularity and cylindricity, angularity, parallelism, and perpendicularity.

Unit 7 Geometric Tolerances 3. Position, Profile, Runout

Reading: Ultimate Pocket Guide, Pages 67 -82

Drawing: chose one: prob. 66, figure 16-263, page 624 for a possible 8.0

Prob. 65, figure 16-262, page 624 for a possible 10.0

Goals: Reinforce material condition and datum concepts. Understand the meaning and application of position, profile, and runout controls. Understand the concept of projected tolerance zones and the tangent plane modifier.

Unit 9 Fasteners

Reading: Shop Reference, Pages 266 - 270

Drawing: prob. 12, figure 10-60, p.300. Include dimensions.

Goals: Identify the different types of common fasteners and their uses. Understand how to depict fasteners on a drawing. Specify appropriate tolerances and callouts for holes used with common fasteners.

Unit 10 Welding drawings

Reading: Handout

Drawing: prob. 4, fig. 18-45, pg. 676

Homework: Prob. 11, fig. 18-58 page 685 (handout) (reference 18.5 as needed)

Goals: Understand the weld symbol and how it is applied on a drawing.

Unit 11 Gears

Reading: R:\AEDD-250\ReferencePages\GearTables.pdf

Shop Reference, Review pages 322 - 330

Drawing: five spur-gear train with following characteristics:

5 pitch, 14.5 pressure angle, with 56,28,20,12,and 56 teeth.

Homework: Prepare Cutting Data Table as shown on page 734 using the data from table 20-15, and the appendix. Add the RPM of each gear with the first gear driving at 320 RPM

Goals: Identify the different types of common gears and their uses. Understand how to depict a gear on a drawing. Understand how pitch and tooth count effect how gears mesh and function.

Unit 12 Cams

Reading: Handout
Drawing: Problem 2, page 817.

Goals: Identify the types of cams and their uses. Understand the common types of motion used in cams. Understand how a cam is laid out and drawn.

Unit 13	Final Exam Review
	Reading: Handout Project as assigned
Unit 15	Final Exam