SOUTHERN MAINE COMMUNITY COLLEGE
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Architectural and Engineering Design Department (AEDD) South Portland, Maine 04106

Title: CAD Management	**Catalog Number: AEDD-260**
Credit Hours: 3	**Total Contact Hours: 60 Lecture: 30 Lab: 30**
Instructor: Paul Richardson III	**Phone: 741-5664**
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Course Syllabus

Course Description:

This course will provide an introduction to the management of AutoCAD using the current version of the software. Students will learn advanced techniques in geometry creation, management of CAD systems, development of macros, use of scripts, programming for automation, customizing the software's interface, updating multiple drawings, managing externally referenced files, and other management tools.

Prerequisites:

AEDD-160 or appropriate experience

Course Objectives:

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

1. Increase their drawing speed without reducing their accuracy.
2. Develop CAD management skills that include programming.
3. Customize menus, toolbars, tool palettes and accelerator keys.
4. Create a set of programs for modifying multiple drawings.

Topical Outline of Instruction

1. Developing Drawing Speed
2. Managing files and using DOS batch functions
3. Creating external commands and aliases
4. Developing intermediate programs in AutoLISP
5. Create and manage template files that include blocks with attributes
6. Advanced concepts of external references
7. Advanced Concepts of Paper Space
8. Exchanging data among various software applications.
9. Customizing menu, toolbars, tool button, tool pallets and quick keys.
10. Automating the update of large groups of drawings.

Course Requirements

Students must actively participate in classes and complete all assignments in a timely fashion.
A letter grade will be deducted per week for late assignments.
All assignments should be placed in **S:\AEDD-260\Grade\Lesson1 through Lesson13**

Student Evaluation and Grading
Final grade is determined from the average of all projects. See department policies below.

Text, Tools, and/or Supplies
AutoCAD: Secrets Every User Should Know, Abbott
Reference -- AutoCAD and it Applications Advanced, Madsen and Shumaker
Sufficient means of creating electronic backups of all work

Department Policies
1. Grading – grading policies may vary by instructor

A	4.00	9.3-10
A-	3.67	9-9.2
B+	3.33	8.7-8.9
B	3.00	8.3-86
B-	2.67	8-8.2
C+	2.33	7.7-7.9
C	2.00	7.3-7.6
C-	1.67	7.0-7.2
D+	1.33	6.7-6.9
D	1.00	6.3-6.6
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 addressed 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 student who submits work done by someone else will at the least, receive a failing grade for that assignment and must redo the assignment. Should the instructor see fit, the student involved will be reported to the Dean of Students in violation of the Student Code of Conduct which will result in the student receiving a failing grade for the class.

5. Any activity, conversation or behavior that is not considered 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. Class time is for class activities only.

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/. 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. **Attendance policy** – attendance is taken at the beginning of each class. If the student is late for a class it is the responsibility of the student to review their attendance and make sure that they have been marked Tardy rather than absent. There are no excused absences. Students are either present or absent.
    a. **For classes that meet once a week** – no more than 3 absences are allowed **total**, no more than 2 classes may be missed **in a row**. A student who misses a class will receive a warning e-mail; if two weeks in a row are missed without communication the student will receive an Administrative Fail (AF) for the class. A student who has a total of 3 classes will receive an AF.
    b. **For classes that meet twice a week** – no more than a total of 5 absences are allowed; no more than 3 classes may be missed **in a row**. If a student fails to attend two classes in a row he/she will receive a warning e-mail. If no correspondence has been made and the student fails to show for the third class in a row, the student will receive an AF for the class. Students that have missed a total of 5 classes will receive an AF.
    c. It is the responsibility of the student to make sure to get 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 AEDD. A copy of the manual has been placed in R:\Standards Various Sources

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**Assignment due date schedule**
See the following section, "Description of Assignments" for details on each assignment.

DATE   GRADE   ASSIGNMENT summary

1. _____ _____   AutoCAD Review and completion of timed drawing post-test.
                                Due class 2

2. _____ _____   Create a batch file as assigned, and annotate the

sample batch file provided by the instructor (XX2.doc) Due
class 3

3. _____ _____   Create external commands and aliases, by editing the
ACAD.pgp file. (ACAD.pgp) Due class 4

4. _____ _____   Create a set of functions written in AutoLISP to improve your
productivity. (ACADDOC.lsp) Due class 6

5. _____ _____   Create template drawings, symbol librarys – with dynamic
blocks, and profile (XX5.dwt; XX5.dwg) Due class 7

6. _____ _____   Create a custom toolbar, tool buttons, accelerator keys,
linetypes, dashboard, and tool palettes that contain your block
symbols (XX6.mns or XX6.cui, *.xtp) Due class 8

7. _____ _____   Create a drawing that uses **multiple** xrefs, and **multiple**
dynamic blocks   containing attributes. (XX7.dwg)

8. _____ _____   Extract attribute values from XX7.dwg (XX8.txt) and use them
to create an AutoCAD table and an ACCESS database.
(XX8.mdb)

9. _____ _____   Create a drawing with annotative objects and multiple layouts,
and plot the layouts using the PUBLISH command. (XX9.dwg)

10. _____ _____   Generate sheet sets that span multiple drawings, export the
sheet sets to .DWG files and prepare all necessary files for
electronic transmittal. (XX10.dwf, XX10.dst, XX10.zip)

11. _____ _____   Create a drawing that includes multiple images, imported RTF
text, fields that reference drawing properties, and a the use of
gradient hatch patterns. (XX11.dwg, XX11.rtf, *.jpg)

12. _____ _____   Create an MSWord document containing multiple vector-based
graphics created in AutoCAD, and raster images captured from
the screen. (XX12.doc)

13. _____ _____   Create a program to automatically modify multiple drawings in
a specified directory. (XX13.scr, XX13.bat, XX13.lsp)

Description of Assignments

This course requires that you complete 13 assignments by the end of the semester. It is my intent that you produce products that have direct value to you -- products that you can use at work, in a portfolio to help you obtain work, or for other courses. This handout is meant to give you general guidelines for each of the assignments. You must develop the content of all assignments yourself based upon a specific field of design and drafting.

Assignment 1 will allow you to review important drawing techniques. Assignment 2 will give

> The first six assignments in this series are designed to help you develop some tools and skills that you can use throughout the course to make your work easier:

you a means of organizing your work, and understanding the process used to set up the environment in which AutoCAD runs in this lab. Assignment 3 will allow you to create short command names for the commands that you use the most. Assignment 4 will allow you to write some LISP programs that can significantly boost your efficiency with AutoCAD. The assignments that follow require you to create a body of work while applying a number of advanced techniques. You must complete the first five assignments by the due dates given to receive a full grade.

Assignment 1 -- AutoCAD Review, pre-test and post-test

The purpose of this assignment is to develop your speed and efficiency at using AutoCAD for 2D drafting, and to review key procedures and commands. If you have difficulty with this assignment, it may be an indication that you are not yet ready for an advanced level course. You have three choices if that is the case: you can review and practice 2D procedures while continuing to take the course for credit; you can choose to audit the course, which you must decide to do within the first week of class; you can withdraw within the first week and wait until you have more experience with AutoCAD and take the course at a future date.

Your first assignment is to complete several drawings within a fixed period of time and answer a group of questions about the geometry you have created. The drawings must be done with perfect accuracy for you to answer the questions correctly. During the first class you will take a non-graded pre-test, after which I will present some strategies for drawing faster while maintaining accuracy. During the second class, you will take a post-test. Your grade will be based on how well you do on the POST-TEST ONLY. I will give you a maximum time limit for each of the drawings and questions.

Due date: Pre-test -- class 1 (not to be graded); Post-test -- class 2

Reading: Chapter 1

Assignment 2 – Batch file and batch file annotation.

You are going to do **two** things for this assignment.

First, you will annotate each line of a sample batch file that I will pass out. It contains a variety of sample code that I use or have used for a variety of maintenance tasks.

Second, create a batch file that will copy new files from your S:\ drive to a removable drive: floppy disk, CD, or flash drive. The batch file must create the following directories on the removable drive: GRADE, LISP, SLIDES, TEMPLATE, MENU, DWG, SCRIPTS and TEXT, which should all exist on your S:\ drive so you can use them to store all of the files you generate in this class.

Submit assignments in the \GRADE subdirectory.

Due date: class 3

Reading Assignment: Chapter 2 pages 41 – 68 and Web-based resources as needed

Assignment 3 -- ACAD.pgp file

The ACAD.pgp file (an ASCII text file) defines operating system level functions that can be used from AutoCAD's drawing editor, and defines aliases for existing commands (this is where "L" is defined as an alias for LINE). Aliases are much faster to enter than command names. This assignment has two parts: define at least 12 new external AutoCAD commands; create at least 24 new aliases. Among those 24 aliases, define the following letters as logical commands: J, K, N, Q, and Y. You may also use two- and three-letter aliases. Before you begin, review the entire file to see what aliases are already used for commands, then change or add any for other commands that you use.

Your work **must be in lower-case letters and be placed at the end of the ACAD.pgp file**.

Due date: class 4

Reading Assignment: 68 -- 72

Assignment 4 -- ACADDOC.lsp file

The ACAD.pgp file only allows single command aliases. More involved commands can be created in LISP programming language. Assignment 4 requires that you develop a personal ACADDOC.lsp file. A passing grade requires that your file contain at least a dozen different functions, which **you have written,** to make your drafting more efficient. The more varied and involved the programming is, the better your grade will be.

You must write these programs yourself. I will ask you to explain the programming to me, so make sure that you understand why your programs work. Feel free to look at other programs for some help, but do not simply copy code without understanding it.

Due date: class 6

Reading Assignment: Chapter 8; Reference: Chapter 9

Assignment 5 -- Template drawing and library of symbols

The most straightforward customizing that you can do with AutoCAD is to develop template drawings to use instead of the default ACAD.dwt file. This assignment requires you to develop a template drawing that you can use as a starting point for all of the other drawings for this course. The more thought you put into this, the more useful it will be and the higher your grade. You will undoubtedly continue to revise your template as you complete the other assignments, but it must include at least the following elements:

- block definitions of three title blocks with attributes and appropriate borders

- block definitions of at least 16 standard symbols within your discipline – you must include at least six dynamic blocks as part of the 16.

- annotative dimension styles saved with a names other than "STANDARD" including child variations, as appropriate for your discipline

- appropriate UNITS, LIMITS, and annotative text STYLES

- logical LAYER names with colors and linetypes set to BYLAYER, with at least four layer filters, and four layer states

- variables set to appropriate values and a listing of the variables that you changed – see Dan's book for his suggestions.

- layout configurations with appropriate plot style tables.

- an appropriate table style that uses an appropriate font!

This assignment also requires that you develop a symbol library in your field. The more complete you library, the better your grade. Symbols that get used in every drawing can be part of your template file, but most of your symbols should be saved in one or more separate drawing files for insertion as needed using AutoCAD Design Center or a Tool Palette. The blocks must be created and used at a proper scale for their application.

Using a table, annotate your symbol library by placing a copy of each block definition in the table.

Due date: class 7

Reading Assignment: Chapter 4 & 5

Assignment 6 – menu, toolbar, linetype, tool palette, ribbon

Using the CUI command, make the following customization changes:

- Change the SAVE command on the pull-down to execute the SAVE

- Add a new QSAVE command that issues QSAVE

- Modify the OSNAP cursor menu that pops up when you right click while holding down the SHIFT key. Maybe put the most use snaps at the top.

- Add a new command to the grips menu. This is the one that comes up when you make a grip hot and right click the mouse.

- Create at least two new tool bars, containing at least six custom tool buttons with new icons on each. These buttons can call a mix of custom macros, built-in commands and your lisp programs.

- Create new tool palettes, one containing hatch patterns, commands, and individual blocks of your choosing; and one tool palette for all of the blocks in each of your symbol libraries.

- Open the ACAD.lin file and add a group of new linetypes using text that refers to a style other than STANDARD, using the existing linetypes as a model.

- Change the F1 key from bringing up HELP to being the ESC key.

- Create a new ribbon panel and add appropriate buttons of you choosing. These buttons can call a mix of custom macros, built-in commands and your lisp programs.

- You must use a combination of LISP calls, menu macros and standard commands on your new buttons.

- I will grade this by coming around to each student and having you show me what you have done. Be prepared to show/explain each bullet. Where are the buttons with lisp calls, standard commands and menu macros?

Due class 8

Reading Assignment: Chapter 3

> The remaining assignments are interrelated. Several of them can be passed in at once using the same drawing file. The specifics of your project depend upon your chosen field of graphics. The complexity and accuracy of the work will be taken into account when I grade these assignments. I am looking for work that would make me comfortable in giving you a job recommendation as self-motivated, hard-working, and reliable.

Assignment 7 -- Drawing with external references and blocks using attributes

This assignment requires that you complete a drawing in your field in which you use **both** external references, **and** blocks that contain attribute information.

You must modify your title block so that completing it is automated by using attribute values and field. You must also add attributes to the blocks in your symbol library for this purpose, and then use them in a drawing.

Symbols might have attributes for cost, size, manufacturer's number, special features, etc. Make sure that the scale is given correctly in the title block. Consider using this drawing to satisfy assignment eight by including views in Paper Space done at different scales. This is

not just an exercise: it must be an actual drawing -- a mechanical part, a floor plan, a plot plan, a piping diagram, or something else in your field of drafting.

Use multiple external references that contain annotative dimension and attributes.

Target date: class 9

Reading Assignment: Chapter 5, pages 155 -167

Assignment 8 -- Attribute information extracted from drawing 7

Once you have completed the drawing in assignment 7 extract the information contained in the attributes into a table in the drawing, and into an Excel file. This can be done using the DATAEXTRACTION command. Pass in the dxe (DataExtraction template) file, accdb (your extracted data) file and the dwg file.

Target date: class 9

Lecture date: 4/1

Reading Assignment: Chapter 5, pages 167 – 194

Assignment 9 -- Paper Space layout with plotted drawing – exercise drawing

Set up a drawing containing external references for plotting. This drawing must prove to me that you understand paper space thoroughly. It must include multiple layouts, some of which contain views at different scales. The scale of each view must be properly identified on the view. All views must contain annotative dimensions.

The plotted sheet must accurately reflect the scale you indicate. All line weights must be correct. All text heights and dimensions must be uniform. The drawing layouts must meet all standards in your field and include irregularly shaped viewports.

You **must** use the "Freeze by Viewport" function of the Layer Manager, or the VPLAYER command to manage the visibility of layers in each viewport. The frames of the viewports must not be plotted.

Target date: class 10

Lecture date: 4/9

Reading Assignment: Chapter 6

Assignment 10 – Sheet Sets and transmittal zip file

This course is designed to prepare you for the possibility that you may someday become a CAD manager. That may not happen for all of you, but at the least, you will be most useful if you are capable of solving problems, and getting information on your own.

This assignment requires you to teach yourself something new about AutoCAD. There is no section on Sheet Sets or eTransmit in this set of papers. There will be no presentation in

class about those features. Your job here is to determine, from experimentation, the help system, the internet, or other references, how to create both a sheet set and a transmittal file.

The sheet set file you create must include multiple sheets from different drawing layouts, with saved views.

The transmittal file must be a compressed file that contains a drawing, all images and xrefs that are included in the file.

For this assignment, you are on your own. It will be fun. Really.

Target date: class 11

No lecture.

**Google "Heidi Hewitt" as she is the AutoCAD expert on Sheet Set and has a blog dedicated to teaching Sheet Sets.
http://heidihewett.blogs.com/my_weblog/sheet_sets/**

Assignment 11 -- Drawing file containing non-vector elements

- You must use the IMAGE command to insert several related raster-based images into a drawing file that also contains vector-based geometry. You can use existing image files, or create them with a digital camera.

- You must also import a large amount of related text from an RTF file into the drawing, using the MTEXT import function. Note: the images and text must be related to the vector drawing in a logical way. It will not be enough to combine text and images together simply as an exercise.

- OLE objects, such as spreadsheets, may be included in the drawing.

- Fields that reference drawing file properties must be used in the drawing by placing them in the title block or into an AutoCAD Table.

- A gradient hatch pattern must be used.

Target date: class 12

Lecture date: 4/15

Assignment 12 -- Word Processor file containing AutoCAD graphics

BE CREATIVE! Create a text document in which several vector-based illustrations are used. The document must contain text that refers to the illustrations -- a brochure about a product, a standards sheet illustrating a required title block, a letter of transmittal about a product design, etc. The AutoCAD graphics must be vector-based and created using the WMFOUT command, but you can use additional graphics of the screen, captured using the Print Screen key. Warning: this assignment will be graded in part on structure, grammar and spelling.

Target date: class 12

Lecture date: 4/15

Reading Assignment: Chapter 6, pages 243 - 247

Assignment 13 – Process multiple drawings

For this assignment you must use a batch file, a script file and a lisp file to make changes to all of the drawings contained in a specific directory. The process for doing this is laid out in a technical paper contained in the chapter titled "Changing Hundreds of Drawings in a Hurry." That paper was used for a workshop given at Autodesk University.

You decide what changes you want to make to all of the drawings. The chapter on this process includes several examples. You may get some idea from them, but you cannot use those examples to satisfy this assignment.

> Note: At the beginning of this semester, I got a phone call from an AutoCAD user at a company in New Jersey who was trying to use Chapter Nine in my book to open 5000 drawings, make some changes, and then save them with the same names. He was having trouble with the batch file syntax (a typing error, as it turned out), but once he got straightened out, he was successful. At 5 minutes per drawing (it probably would have taken more) he saved 416 hours. That's over ten weeks of full-time work. Needless to say, his employer was very pleased.

Although you will be submitting these three files in your GRADE folder, you will demonstrate that they work as intended by actually running them for the instructor. You must complete a narrative of the process you went through for this assignment. See same folder this file is in…