EE-120 **Computer Tools** **Fall 2018**

Catalog Description Computer Tools is a first semester introduction to designing, building, and analyzing electrical circuits with the aid of Matlab and Spice circuit simulation. Matlab is used for basic scalar and matrix computations involving circuit behavior, graphical display of circuit variables, and as a programming language. Spice is used to analyze both static DC operating points and time-varying circuit behavior. Required course.

Prerequisites None. Corequisite: None.

Textbook

Required: *Computer Tools for EE Majors*, James Squire and Julie Brown, ISBN pending

Optional: *LTSpice*, free. Clickable link under EE120 course website.
Matlab, Student edition, available for your laptop for free at the barracks help desk

Instructor COL James Squire, NEB 620
Email: squirejc@vmi.edu
Office tel: x7548 Home tel: 264-0122 (call before 2100 – children sleeping)
Office hours: Tues 1300-1350 andFri 1315-1405. Not available then? No worries; stop-ins welcome anytime, or make an appointment to meet via email (very commonly-done) or phone (from your dyke's room), or simply email me your question.

Course schedule (2) 75 minute lectures each week
Section 01: NEB 404 TR 0800 – 0915
Section 02: NEB 404 TR 0925 - 1040

Student Outcomes

a. Students will be able to use Matlab to solve algebraic problems involving given equations such as Ohm's law, voltage divider law, equivalent parallel resistance, and RC filter design equations.
b. Students will be able to use Matlab to solve phasor problems using complex numbers.
c. Students will be able to build and manipulate matrices and vectors, and use these to solve simultaneous equations such are encountered when solving mesh circuits.
d. Students will be able to plot the simulated oscilloscope response of circuit variables.
e. Students will be able to write Matlab programs that solve well-defined electrical engineering problems including
    1) simulated digital logic structures
    2) voltage divider equations.
    3) filter design
    4) mesh analysis problems.
f. Students will be able to debug programs using a modular approach.
g. Students can use SPICE to model the DC behavior of a circuit composed of voltage sources and wires.
h. Students can use SPICE to model the time-varying behavior of a circuit with integrated circuit (IC).

Topics

Chapter	Concept
1	Introduction
2	Matlab as a Circuit Calculator
3	Matlab as a Circuit Response Plotter
4	Matlab as a Programming Language I
5	Matlab as a Programming Language II
6	Circuit Analysis with SPICE

Calendar

Chapter	Class #	Dates	Reading to	Problems due taps	Notes
1	1-2	28,30 Aug	Chapter 1 to Pro Tip		
	3-4	4, 6 Sep	Chapter 1 end	Fri 7 Sep; printed	
2	5-6	11, 13	Chapter 2 to Pro Tip		
	7-8	18, 20	Chapter 2 end	Fri 21 Sep; printed	
3	9-10	26, 27	Chapter 3 to Pro Tip		
	11-12	2, 4 Oct	Chapter 3 end	Fri 5 Oct; printed	Turn in before FTX
4	13-14	9, 11	Chapter 4 to Pro Tip		
	15-16	16, 18	Chapter 4 end	Fri 19 Oct; email zip file	Parent's weekend
5	17-18	23, 25	Chapter 5 to Pro Tip		
	19-20	30, 1 Nov	Chapter 5 end	Fri 2 Nov; email zip file	
review	21-22	6, 8	Chap 4/5 review		
6	23-24	13, 15	Chapter 6 to Pro Tip		Thanksgiving break
	25	29	Chapter 6 Q&A		
	26-27	4, 6 Dec	Chapter 6 to end	Fri 7 Dec; printed	
review	28	11 Dec	Admin		
		14 Dec	Final Exam, Section 02	1400-1700	Cumulative
		19 Dec	Final Exam, Section 01	0830-1130	Cumulative

Grading

Problem Sets from Chapter	Due at taps on the Friday on	%
1	Fri 7 Sep	10
2	Fri 21 Sep	10
3	Fri 5 Oct	10
4	Fri 19 Oct	10
5	Fri 2 Nov	10
6	Fri 7 Dec	10
Final Exam (cumulative)	See above for times	30
Class particip.	Averaged over every lecture	10
Total		100

There are six topic chapters, each spanning approximately one-half month. Chapters have both embedded *Practice Problems*, to be done prior to or during class and due at the end of class, and *Lab Problems* at the end of the chapter due to the instructor on the Friday concluding the 2 week chapter on Friday by Taps as shown in the above table. Class participation, besides simple participation, also includes student performance on the *Practice Problems*. The *Lab Problems* are to be completed in pairs of two partners with no help received outside of that pair. Partners will change each assignment. Collaboration on both *Practice*

and *Lab Problems* is expected within each group, but is not authorized between groups. Help given from one set of partners to a different set of partners must be described in Help Received, and both the giving and receiving parties will not receive credit for that work. The lowest chapter grade will be dropped from the average for the final class grade, but not for the mid-semester (temporary) grade. Partners do not need to describe Help Received from each other, from the instructor, from their calculators, calculator manuals, their class textbooks, from the built-in Help functions in Matlab, or from any handout or notes given in class. All other help is not authorized and will not be given credit, but must be documented in the Help Received.

Late policy Your solutions to the lab problems are due on Friday Taps, 2330, before the start of the following module. You may give them to me in class or leave them under my office door, NEB620. Late solutions turned in after Friday taps but before the start of the Tuesday lecture will be accepted at -15%. Solutions will be distributed and discussed the following Tuesday lecture, so **no solutions will be accepted once the Tuesday class begins**. Hospitalization and absences for reasons satisfactory to the superintendent will be handled on a case-by-case basis. Scheduled guard duty does not exempt a cadet from turning in the assignment on time. I drop the lowest module grade, so do not worry if you waited until the last minute and then found yourself caught; instead, learn from the mistake, don't let it happen again, and know you won't be penalized since your zero will be dropped. Practice problems are collected after each class; they do not need to be made up if you miss a class.

Professional Component 3 credits of Engineering Topics (specifically, Engineering Science and Design)

Relationship Of Course To Program Outcomes primarily department program outcomes 1, 5, 11, 13, 14 and 15.

Prepared by COL James C. Squire, 08/15/18

Appendix A: Institute Work For Grade Policy

"**Work for grade**" is defined as any work presented to an instructor for a formal grade or undertaken in satisfaction of a requirement for successful completion of a course or degree requirement. All work submitted for grade is considered the cadet's own work. "**Cadet's own work**" means that he or she has composed the work from his or her general accumulation of knowledge and skill except as clearly and fully documented and that it has been composed especially for the current assignment. No work previously submitted in any course at VMI or elsewhere will be resubmitted or reformatted for submission in a current course without the specific approval of the instructor.

In all work for grade, failure to distinguish between the cadet's own work and ideas and the work and ideas of others is known as **plagiarism**. Proper documentation clearly and fully identifies the sources of all borrowed ideas, quotations, or other assistance. The cadet is referred to the VMI-authorized handbook for rules concerning quotations, paraphrases, and documentation.

In all written work for grade, the cadet must include the words "**HELP RECEIVED**" conspicuously on the document, and he or she must then do one of two things: (1) state "none," meaning that no help was received except as documented in the work; or (2) explain in detail the nature of the help received. In oral work for grade, the cadet must make the same declaration before beginning the presentation. Admission of help received may result in a lower grade but will not result in prosecution for an honor violation.

Cadets are prohibited from discussing the contents of a quiz/exam until it is returned to them or final course grades are posted. This enjoinder does not imply that any inadvertent expression or behavior that might indicate one's feeling about the test should be considered a breach of honor. The real issue is whether cadets received information, not available to everyone else in the class, which would give them an unfair advantage. If a cadet inadvertently gives or receives information, the incident must be reported to the professor and the Honor Court.

Each cadet bears the responsibility for familiarizing himself or herself thoroughly with the policies stated in this section, with any supplementary statement regarding work for grade expressed by the academic department in which he or she is taking a course, and with any special conditions provided in writing by the professor for a given assignment. If there is any doubt or uncertainty about the correct interpretation of a policy, the cadet should consult the instructor of the course. There should be no confusion, however, on the basic principle that it is never acceptable to submit someone else's work, written or otherwise, formally graded or not, as one's own.

The violation by a cadet of any of these policies will, if he or she is found guilty by the Honor Court, result in his or her being dismissed from VMI. Neither ignorance nor professed confusion about the correct interpretation of these policies is an excuse.

Appendix B: Department Work For Grade Policy
Revised 14 August 2003

Tutoring [e.g. Writing Center, Academic Center, athletic tutors, private tutors]: The ECE Department supports and encourages cadet use of such learning aids, as offered by the VMI Writing Center, VMI Academic Center, and tutors. All assistance from these, and any other similar aids, must be explicitly described in the cadet statement regarding help received.

Peer Collaboration: Peer collaboration policies, including policies on critical comments, will be established by the individual faculty of the ECE Department, and may vary from assignment to assignment. Each ECE faculty member will clearly indicate the appropriate collaboration policy for each assignment. Policy regarding laboratory groups, team cooperation, interaction between teams, etc. will be established by the individual faculty. All assistance from such peer collaboration must be explicitly described in the cadet statement regarding help received.

Computer Aids [including calculators, translators, spelling, style, and grammar checkers]: The ECE Department supports and encourages cadet use of computer aids, including calculators, translators, spelling, style, and grammar checkers to improve the quality of the cadets' work. The use of such computer aids does not constitute help received.

Appendix C: Disability Policy
VMI abides by Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 which mandate reasonable accommodations are provided for all cadets with documented disabilities. If you have a registered disability and may require some type of instructional and/or examination accommodations, please contact me at least 72 hours before any graded requirement for which you request special accommodations. If you have not already done so, you will need to register with the Office of Disabilities Services, the designated office on Post to provide services for cadets with disabilities. The office is located on the 2nd floor of the VMI Health Center. Please stop by the office of LTC Jones, Director of Disabilities Services, for more information.