NEW YORK CITY COLLEGE OF TECHNOLOGY
The City University of New York

DEPARTMENT: Electrical and Telecommunication Engineering Technology

**SUBJECT CODE
AND TITLE:**   EET1102
Techniques of Electrical Technology

**COURSE
DESCRIPTION:**   An introduction to the use of computers for analysis of electrical and electronic circuits by using state of- the-art software computer simulation of circuits.

Required Course

PRE or COREQUISITE: MAT1175 or higher

TEXTBOOK:
1) Matlab for Engineering Applications. by William Palm III
   McGraw-Hill Education; 4th edition, 2018
   ISBN-13: 978-1259405389
   ISBN-10: 1259405389
2) Multisim (capture& schematics) hand out
   https://www.academia.edu/28766509/Multisim_Bas
   ics_Schematic_Capture_and_Simulation_Day_1_of
   _2_Hands-On_Training
   http://www.ni.com/tutorial/10710/en/

COURSE OBJECTIVES:

(ETAC/ABET Criteria 3,
Program Criteria)

Upon completion of this course, students will be able to:
1) Describe the basic operations of a Personal Computer, the use of some software applications such as MS words, MS equation 3, EXCEL, to solve and plot engineering problems. (ETAC/ABET Criteria 3.1, PCa)
2) Define good problem solving techniques and program design and be able to apply these to solving engineering problems using MATLAB. (ETAC/ABET Criteria 3.1, PC a, PC b)
3) Demonstrate the ability to solve fundamental DC circuits using a Multisim basics and to capture, simulate, and analyze electrical schematics. (ETAC/ABET Criteria 3.1, 3.4, PC a, PC b)

TOPICS:
1. Basic **computer** operations; software licensing requirements and Number systems, bits, bytes. ASCII code ,scientific notation, metric prefixes.
2. **Application software** :MS words; Inserting &drawing tables, graph ,MS Equation3&Excel basic; getting around in worksheet, entering data, formulas, excel graphing, importing/exporting data.
3. **MATLAB:** Problem solving Basic input/output variables: types, scalars, arrays, strings Assignment operator and expressions Script files. MATLAB Arrays, Matrices & polynomial operations with arrays, MATLAB files, functions
4. MATLAB programming using logical operations ,for and while loops,
5. MATLAB plotting, functions &data, Solving linear algebraic equations in MATLAB
6. **Multisim (capture& schematics)** Basics: Drawing a Schematic DC circuit; Creating and Editing a Component, Adding Instruments to the circuit, Simulating circuit & performing analyses

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CLASS HOURS:	1 lecture hour, 2 lab hours
CREDITS	2 credits
Prepared by:	Professor Xinzhou Wei, Spring 2022
Coordinator:	Professor Xinzhou Wei Email: Xwei@citytech.cuny.edu Tel: 718-260-5934

LABORATORY COURSEWORK:

Week	Descriptive details for laboratory coursework:
1	Introducing students to computer lab& rules and homework& projects format
2	Computer on ,off, logging to a network, opening MS words: typing formatted text, inserting tables and Ms Equation3 graphs, saving (on floppy & Flash drive), printing
3	Excel: entering data(V=IRexperimentaltableresults),formulas(V=IR)theoreticalresult),Useexceltoplot data& formula,
4	MATLAB Interactive session: starting MATLAB, entering command, making calculations by translating the Mathematic expression into the MATLAB statements. Practice T1.1-1.
5	Practice on tables 1.1.and practice T1 Complex numbers.
6	Practice on table 2.1 & table 2.3. Do Current Power Dissipation in resistors. Polynomial practice T2.5(1-5)
7	Practice table 3.1 & table 3.1. Do one example on a MATLAB user defined function
8	Drawing &using flow chart & Pseudocode MATLAB programming using logical operations ,for and while loops, Do examples 2 &3 on and also on P(211)&P(221)&p(43-51)
9	MATLAB plotting, functions &data Practice on table 5.1 &table 5.2. Graphical solution of equations Practice P(276-278).
10	Practice on Electrical Resistance Network on P(370&371).
11	MULTISIMS basic circuit components and operation(Grounded supply switch and a lamp in series) ,circuit construction (series, parallel, or series parallel circuits),
12	Adding Instruments to the circuit. Ohms law, series and parallel measure voltage and current in a circuit.
13	simulation for the electrical resistance network on Page 370 add instruments to measure the currents
14	Project: Typing a text and inserting tables , MS equation , graphing data & formulas using excel. And MultiSim simulation for the electrical resistance network on Page 370 add instruments to measure the currents and use MATLAB to solve for the currents & compare the two results .
15	Final Exam

GRADING POLICY:

Class Participation	10%
Quiz	10%
Midterm Exam	30%
Final exam	30%
Homework & Project Reports	20%

Letter Grade	Numerical Grade Ranges	Quality Points
A	93-100	4.0
A-	90-92.9	3.7
B+	87-89.9	3.3
B	83.86.9	3.0
B-	80.82.9	2.7
C+	77-79.9	2.3
C	70-76.9	2.0
D	60-69.9	1.0
F	59.9 and below	0.0

Contribution of course to meeting the requirements of Criterion 5:

EET 1102 meets criterion 5 by providing students an introduction to the use of computers for analysis of electrical and electronic circuits by using state of- the-art software. By also fostering critical thinking with a commitment to quality, timeliness, and continuous improvement, students develop the skills needed to solve problems in a classroom and laboratory environment which later serve them in the work place.

Assessment

The following assessment techniques are correlated to the course objectives as follows: In addition, each assessment technique incorporates one or more of the following ABET Criteria outcomes (ABET Criteria 3.1, 3.4)

COURSE OBJECTIVES	ASSESSMENT
1)Understand the basic operations of a Personal Computer, the use of some applications software such as: MS words, MS equation 3, EXCEL to solve and plot engineering problems	Understand the function of different components of a personal computer, Boot up the lab computers and sign on to the network. Use modern engineering software tools including the latest versions of MS office to write, format and verify their analysis and/or design work , as appropriate. Solve and will validate their hand theoretical calculations using Excel; Write papers, and present reports record data, analyze data, run computer simulations, and write team lab reports
2) Define good problem solving techniques and program design and be able to apply these to solving engineering problems using MATLAB	Use MATLAB program to solve engineering problems. Correctly assign variable names in MATLAB and translating the Mathematic expression into the MATLAB statements Use the latest versions of MATLAB to verify their analysis and/or design work, as appropriate. Validate their theoretical calculations using MATLAB 2.4 .Use MATLAB and Excel for data in various forms for plotting/presenting 2.5.Produce a MATLAB program to a specific electrical circuit. The aim will be to demonstrate an ability to design an operational program based on the design and implementation and simulation with MULTISIMS
3) Demonstrate the ability to solve fundamental DC circuits using Multisim basics and to capture, simulate, and analyze electrical schematics.	Use of Multisims to simulating an electrical circuit testing in a virtual environment prior to building actual-real circuits in a timely manner.. To develop skills to simulate circuits , instruments and do measurements Access Multisims library devices and construct different types of circuits Perform DC analysis appropriate to the constructed circuit. Correlate computer simulated circuit output with results calculated analytically. Complete &simulate a team project involving a verification of a specific dc electrical resistor network .Observe the solutions using MATLAB and submit a project report with complete, computer results conclusions.

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Weekly Schedule

WEEK	TOPICS	HOMEWORK
1	Basic **computer** operations, software licensing requirements and Number systems, bits, bytes. ASCII code Scientific notation, metric prefixes	Read introduction to a personal computer ,buy USB flash drive.
2&3	**Application software** :MS words; Text, Inserting &drawing tables, graph ,MS Equation3. MS Excel basic; getting around in worksheet, entering data, formulas, MS Excel graphing, importing/exporting data.	1) Type Problems 1- 4 (in Section 1.1, P47) of Textbook using MS Equation3. 2) Use excel to graph the data V=I*R in the table created by instructor. ,
4	**An Overview of MATLAB:** Introduction to MATLAb Menus and the Toolbar. Arrays, Files, and Plots. Srcipt Files and the Editor/Debugger. The MATLAb Help System. Problem solving methodologies. **Quiz**	Type the Mathematic Expression of Section 1.1: 5 - 6 (P47-48).Solve the problems of Section1.3: 13- 16 (P49) in MATLAB.
5	**Chapter 2: Numeric, Cell, and Structure Arrays:** Introduction to MATLAB Arrays, Matrices polynomial operations with arrays. General Matrix Multiplication in MATLAB.	Solve Problems on the Section 1.3: #18-#19 (P49) Solve the Problem 10, 11, 12, and 13 Solve Problems on Section 2.1 (P98) 5, 6, 8, 9, 10, 11, 12,13, 19.
6	**Chapter 3: MATLAB files, functions** Introduction to Elementary Mathematical Functions, User-defined functions. Working with data files.	Solve Problem Section 3.1 (P141) : 1 – 6. Solve Problems on Section3.3:18, 19,&20 (P144)
7	**Chapter 4: MATLAB programming using logical operations** Program Design and Development, Relational Operators and Logical Variables, Logical Operators and Functions, Conditional Statements, for and while loops, Switch structure. **Review of Midterm.**	Solve Problem Section 4.1 (P200) : 1 – 3. Solve Problems on Section4.1: 4, 5, 6, 7, 8, 9 (P201)
8	**Midterm**	
9	**Chapter 5: Introduction to MATLAB Plotting** XY Plotting Functions, Additional Commands and Plot types, Interactive Plotting & Three-Dimensional Plotting.	Solve Problem Section 5.1, 5.2 & 5.3: (P252) : 3, 6. Solve Problems on Section5.1-5.3(P254) : 12, 13, 15.
10	Chapter 8: Solving Linear Algebraic Equations in MATLAB Matrix methods for Linear Equations, The Left division method, Undetermined Systems, A General Solution Program.	Solve Problem Section 8.1 (P357-P358) : 1 – 3. Solve Problems on Section8.2 (P358) : 4, 6.
11	**Multisim (capture& schematics)** Basics: Drawing a Schematic dc circuit ; Creating and Editing a Component **Basic Simulation of a design.**	Create a design: Read the MultiSim Online Tutorial: https://www.multisim.com/help/getting-started/creating-design/ HWK: Instructor's handout.
12	Adding Instruments to the circuit Introduction of Instrument Panel, Multimeter & Oscilloscope	Instructor's assignment. Simulate a design:

		Read the MultiSim Online Tutorial: https://www.multisim.com/help/getting-started/simulating-design/
13	Simulating circuits & Performing analyses.	Instructor's assignment. Simulation Tutorial from National Instruments: http://www.ni.com/tutorial/10710/en
14	Projects and Practices • Circuit Schematics • Simulations	Selected projects by the instructor. See lab handout. More Advanced tutorial from National Instruments: http://www.ni.com/pdf/manuals/374482j.pdf
15	Final exam	

New York City College of Technology Policy on Academic Integrity
Students and all others who work with information, ideas, texts, images, music, inventions, and other intellectual property owe their audience and sources accuracy and honesty in using, crediting, and citing sources. As a community of intellectual and professional workers, the college recognizes its responsibility for providing instruction in information literacy and academic integrity, offering models of good practice, and responding vigilantly and appropriately to infractions of academic integrity. Accordingly, academic dishonesty is prohibited in the City University of New York and at New York City College of Technology and is punishable by penalties, including failing grades, suspension, and expulsion. The complete text of the College policy on the Academic Integrity may be found in the catalog.